

Business Plan

APIX_MDG_FREE-ENERGY 20000

ZERO-WASTE ZERO-CARBON BUSINESS-MODEL (ZW-ZC-BM)

THROUGH THE CONCEPT OF
**AGRO-POLYMER INDUSTRY COMPLEX-SUSTAINABILITY
ENGINEERED PROJECTS (APIX-SEP)**



APIX_MDG_FREE-ENERGY 20000

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This project is being presented on the basis of the different Bench-level technologies that have been developed by the author, and are generally presented at the **AGRO-BIOGENICS** website: <http://www.agro-biogenics.com> All the data and results are based on experiences in India. However, it is possible to extrapolate these to the specific conditions and situations in any country.

PROJECT HIGHLIGHTS

- 16,500 Tons of non-toxic Organic wastes (Vegetation wastes, Food wastes, Animal wastes and all non-toxic carbonaceous wastes) are converted into 1414.5 KW power (12,221,510 KWH)
- 1125 KW of Power are offered FREE to the group/ entrepreneur/ state who supply these wastes Free to us (our Free offer = 9,720,000 KWH; both heat + electricity)
- 3,500 T of wood wastes and vegetation fibrous wastes would be converted into 1500 T of WOOD Substitute Molded Doors (66,667 "Standard" doors), off-setting 3000 cu m of wood, which would come from 6000 cu m of Tree volume otherwise (3000 T of actual wood)
- Power generation is by using 1155 T of methane gas (generated in anaerobic biogas formation), replacing 2,224 T of Fuel required for equivalent generation (offsetting 6,450 T CO₂)
- The entire CO₂ of 2145 T (in the Biogas) would be sequestered to produce Carbon Sink Engineered Products (CSEP) = 9840 T
- The resultant CSEP would offset 6,888 T Petrochemical based Polymers in specialty Adhesives/ sealants. Further, these would also replace an equivalent tonnage of "mineral based" materials that are used otherwise
- The estimated Carbon Credit (CC) potential is not less than 8,500 CC, although it could be far higher
- The project uses virtually 100% of Renewable Resources and recycles all available water

EXTRACTS FROM PROJECT ECONOMICS COMPUTATIONS (Values in US \$)

Description	Trial period	Year-1	Year-2	Year-3	Year-4	Year-5
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
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 33.18% on TOTAL Investment]

Av. cash-flow before repayment = \$2,128,262 (41.27% on Investment) ... payout during sixth year

Av. cash-flow after annual repayments = \$1,328,262 (25.76% on Total capital investment)

BREAK-EVEN EXPECTED AT THE END OF ONE YEAR AFTER TRIAL MARKETING period

Estimated Carbon Credits Potential = 8500 (valued €212500)

APIX_MDG_FREE-ENERGY₂₀₀₀₀

Purpose of Plan and Summary

We plan to be in the Business of GREEN-Wealth creation through conversion and recycling of Organic/ Vegetation RENEWABLE RESOURCES (RR) and Wastes into Energy and Engineering Materials. **This Business Plan broadly presents our First Pilot Project that would convert a total of 20, 000 T of organic wastes into the following end-products:**

1. Electric Power 1400 KW
2. Natural Fiber Polymer Composites (Wood Substitutes) ... 1500 T
3. Carbon Sequestered Engineering Products (CSEP) 9840 T
4. Biofertilizer ... (Solids) 1089 T
5. GREEN Sulfur 23.1 T

[Out of the total power of 1400 KW we shall offer 1125 KW Free to the Group/ Entrepreneur/ State supplying the 20, 000 T Wastes Free to us; all other products are valued \$30 million from the Third year of Operation, running three shifts]

Total Capital Investments are estimated @ \$5, 244, 000. The estimated average ROI (after depreciation deducted, but taxes not considered) 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. We expect to obtain 100% Tax exemption in view of the GREEN nature of the project.

We call this project **APIX_MDG_FREE-ENERGY₂₀₀₀₀** Module, which could be extrapolated world wide so that hundreds of thousands of such relatively small size Energy + Materials Engineering projects could be set up, answering the twin-problems of Global Warming and Poverty (GWP). **AGRO-BIOGENICS** wish to lead in this.

Details of the Business

Business Name: AGRO-BIOGENICS

Contact Name: Hariharan PV

Address (Home & Business)

No.2, S-2, ROHINI, Syndicate Bank Colony
Off_Magadi Road, Prashanth Nagar – Bangalore – India – 560079

Website: <http://www.agro-biogenics.com> and <http://freeenergytoworld.wordpress.com/>

Telephone No. (Home & Business) 91 80 32929584

E-mail address (Home & Business) pvhramani@yahoo.com

Legal Status: To be incorporated as a Company

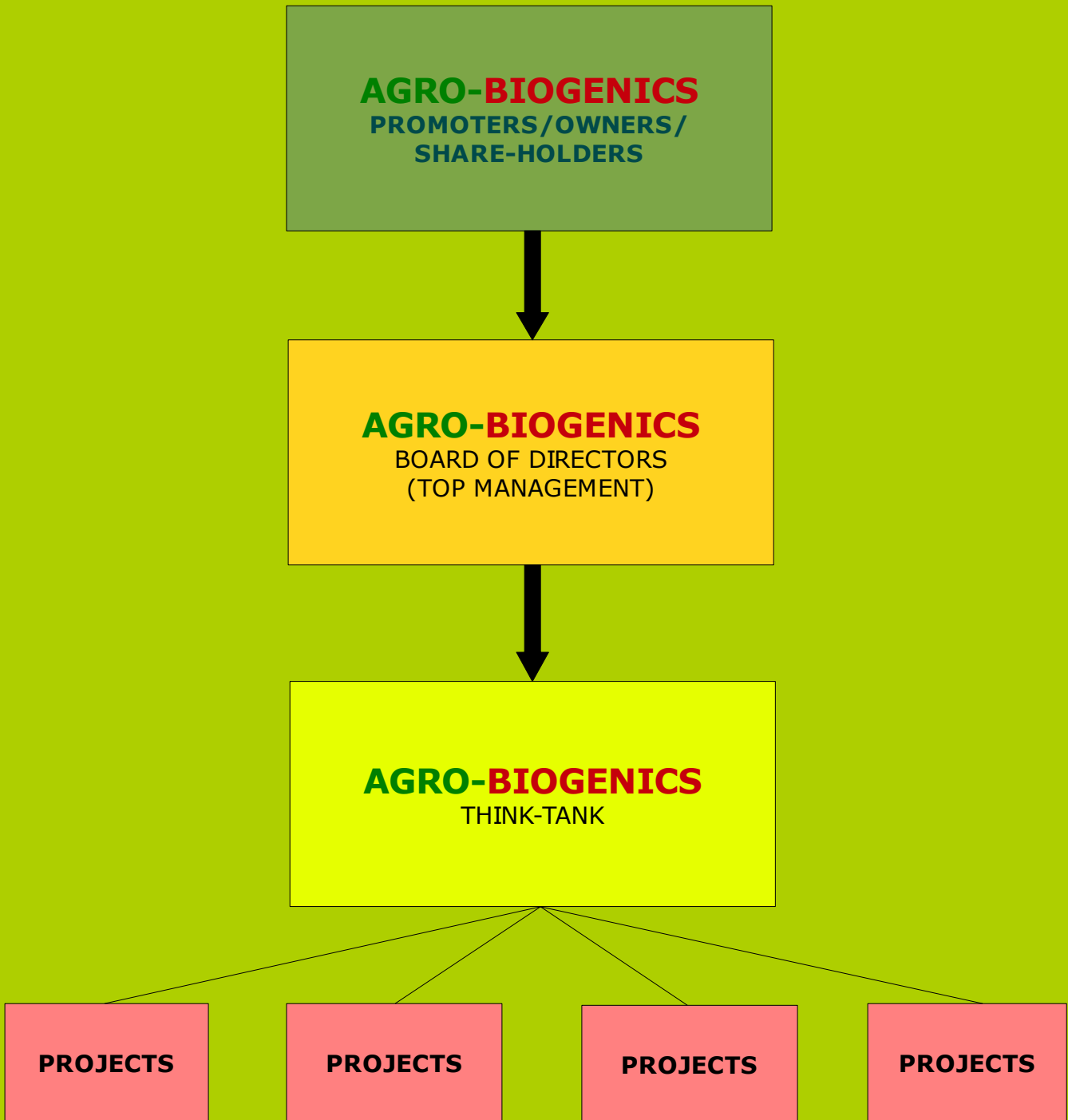
Date of start or proposed start: During 2010

Name(s) of partners or other director(s)

1. Mwaniki Gachuba III (gachubah@yahoo.com)
2. Michael Sahilu (mykeybizu2000@yahoo.com)
3. Other Directors would be from amongst the THINK-TANK Members: please visit:
<http://www.agro-biogenics.com/>

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Management of the Business



Name Address Telephone No. Date of Birth E-mail Qualifications Work Experience Training Advisers Consulted	Chief Mentor: Hariharan PV No.2, S-2, ROHINI, Syndicate Bank Colony, Prashanth Nagar, Bangalore, India – 560079; Ph:91 80 32929584 pvhramani@yahoo.com B.Tech (mech); 38 years experience in Industry, Business, Polymer Technology, New products development, Agro- Resources, Renewable Resources, Specialty Industrial products; Project Setting up, and Development of the	Concept of Agro-Polymer Industry Complex, and total Company management More details at: http://www.linkedin.com/in/hariharanpv http://apixssaproject.wordpress.com/ http://www.sustainabilityengineering.wordpress.com/
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Products & Services

PRODUCT SYSTEM	INDUSTRIAL/ COMMERCIAL	HOUSE HOLD	REMARKS	GENERAL MARKET INFO/ OTHER REMARKS
ENERGY	✓	✓	1400 KW (24 x 360) Power . Both Heat and Electricity	1125 KW FREE Power to FREE-Wastes supplier. Rest used for processes
MOLDED DOORS	---	✓	Wood substitute Molded Doors are durable, aesthetic and "ready-made"; economical too	Competes with both Wood and other related Doors
HYBRID CSEP Materials	✓	✓	Used as Adhesives, Caulking Compounds and Water Proofing (both industrial and household)	Excellent market: Industrial/ Automobile/Boat building, adhesives
BIOFERTILIZER	✓	---	To be supplied to local farmers. Also available a huge quanta of recovered water, to be recycled	Demand for Biofertilizer is constantly increasing
GREEN Sulfur	✓	---	Specialty Chemical, Industrial product	Non fossil sulfur is preferred by market; but rarely available. We have good market

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
 2. **Hybrid CSEP** (converting 6887 T basic CSEP) 9840 T
 3. Biofertilizer (Solids in 41,184 T Sludge) 1089 T
 4. "GREEN" Sulfur 23.1 T
 5. "Spent" Chemicals (in Solution) 2,109.90 T
- TOTAL VALUES OF MARKETABLE PRODUCTS during 3rd Yr \$30, 777, 380**

MORE DETAILS

I. PRIMARY PRODUCT: ENERGY:

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

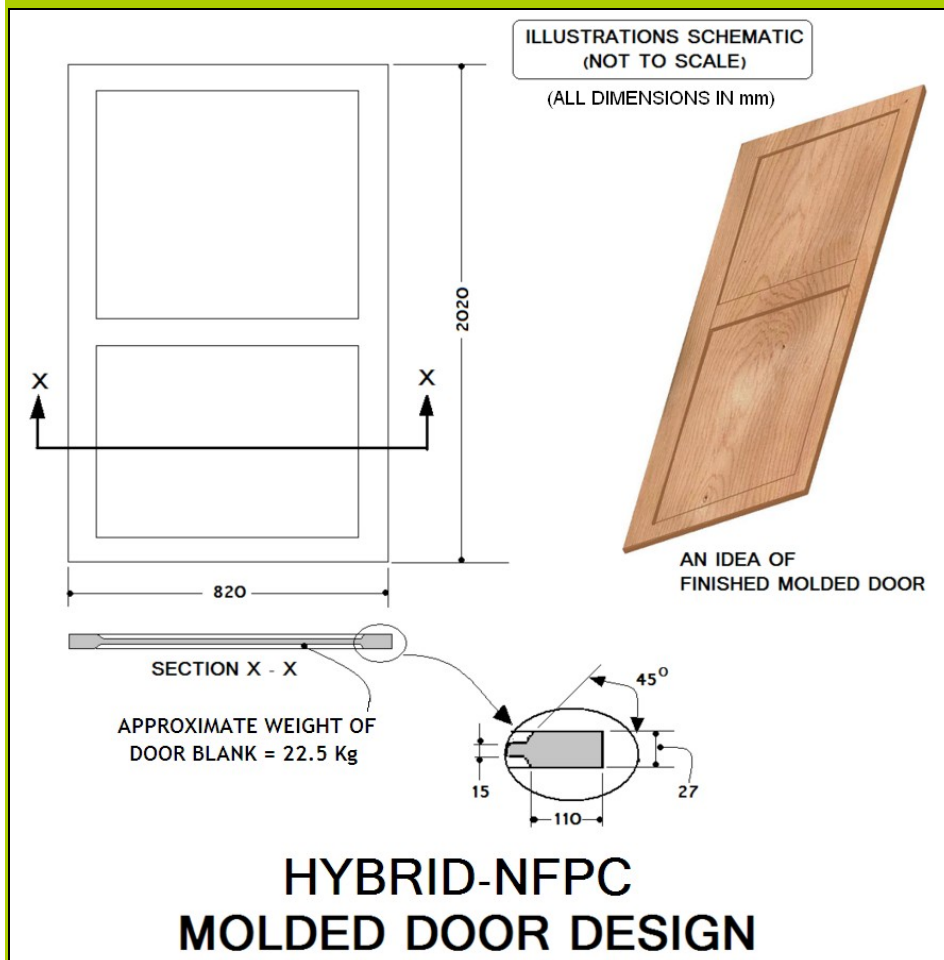
- Total Energy produced by converting 16,500 T Organic wastes 12,221,510 KWH
 - Power available 24 hrs x 360 days 1,414.5 KW
 - Electricity component (@ 38%) 537 KW
 - Heat component (@ 62%) 877 KW
 - Power component used, insitu 289.5 KW
- FREE ENERGY PORTION (@ 1125 KW) Electricity ... 427.5 KW; Heat 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.

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

Molded Wood Substitute Doors are relatively new (**Natural Fiber Polymer Composites - NFPC**); 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:

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- 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 a New Carbon Sequestration Technology. It is produced by reacting the CO₂ 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

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

Note: These CSEP inorganic filler materials would be further processed and converted into high-value HYBRID CSEP. These formulations could use as much as 80% or more of fillers on weight basis, and it is in this category that we may have the "best" markets. In this scheme we shall be manufacturing such **HIGH-VALUE CSEP Adhesive** formulations, so that we have a higher turnover, which would help in subsidizing the energy portion that is offered Free. **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)**

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.

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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)

V. 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)

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. The total Know-How would be IPR protected and AGRO-BIOGENICS have developed the basic "bench-level" technologies. This Pilot plant would be the First Commercial venture: <http://www.agro-biogenics.com>



**HIGH-VALUE MOLDED NFPC PRODUCTS,
WHICH COULD BE MANUFACTURED**

The Market

Market Research (Main products)

1. **ENERGY:** This "General Market Research" has been done in India. India is fast developing and Energy is, at the moment, short by about 30% (about 35, 000 MW). The demand is increasing at nearly 5% to 15% per annum, depending on the types of cities, towns, villages and other regional aspects.
2. **MOLDED WOOD SUBSTITUTE DOORS:** The average Household increment per annum in India is about 6, 250, 000. If an average of 4 Doors were to be used by these new home makers, the annual "incremental" needs for Doors would be 25, 000, 000. This Pilot project would manufacture about 70, 000 Doors per annum (a paltry 0.28% of the annual incremental need)
3. **CARBON SINK (SEQUESTERED) ENGINEERING PRODUCTS (CSEP):** There is a great demand for: General Purpose Household Adhesives, Industrial Adhesives, Water-proofing compounds, Caulking compound, Tile setting adhesive, Boat Building Adhesives, Automotive Structural Adhesives and various related products. This project would utilize all of the CO₂ in the biogas to convert certain Industrial wastes into Hybrid CSEP. These products would compete with the various Multinational products (e.g. "Araldite" is a multinational branded adhesive. We would compete with such products). The production of 9840 T is only a small percentage of actual need/ demand. Carbon sequestered products have certain special properties, which would not be there in any competitor products
4. **BIOFERTILIZER:** The days of Chemicals fertilizers would soon be reduced to some specialized needs. The importance of biofertilizer is not only improving the quality of agricultural output but also in enriching the soil. This is becoming more and more clear to the farmers. More over, appropriately treated and pathologically clean Biofertilizer sludge, with about 97% water (in our case) would be welcome to the farmers. The water needs get reduced as all available water in biofertilizer would be recycled back to the soil. There are not many competitors in this subject market.

Customers

The aforementioned market Research shows the different customer groups also

Geographical area covered

The market survey done has been on an All India basis; we expect to market that way too

Size of market

A brief information about the Market size has also been presented under Market Research

Competitors

Brief information about competitors have also been presented earlier

NOTE: As the project may be Piloted in various nations, other than India, all of the above aspects would have to studied again, in those regions, as appropriate to the situation

SWOT Analysis

- **Business SWOT Analysis** - An analysis of the business, relating to its strengths, weaknesses, opportunities and threats.

<p>Strengths</p> <ol style="list-style-type: none"> 1. Main products based on simple tried/tested technologies 2. Using Renewable Resources (RR) and Industrial Wastes 3. All non-toxic organic wastes used for processing 4. Power generation without fossil fuel 5. Local farmers get value for all biomass and wastes (these do not fetch any value now) 6. Cellulosic portions converted to value added wood substitutes, engineered materials and non-fossil dependent chemicals – all these having good markets locally and internationally 7. All Organic matter + entire water content recycled back to same soil, resulting in Self Regenerative Recycling (SRR) ... Total recycling with no effluent or pollution 8. Able bodied local persons get full-time jobs 9. Promoter has been working on these and developing bench-level products, interacting directly at Indian Village levels for Twenty years 10. All processes/products would be GREEN 	<p>Weaknesses</p> <ol style="list-style-type: none"> 1. The veracity of the concept of APIX-SEP could be established only if the minimum size APIX_Pilot (as designed here in) is practically run 2. Funds are NOT available with the promoter 3. Project would depend on external funding and various other supports initially 4. Need for advertizing and educating on the concept, so that entrepreneurs and financiers understand the strengths 5. Some of the processes and techniques have to be scaled up, and this could be done only as the project progresses
<p>Opportunities</p> <ol style="list-style-type: none"> 1. The Pilot project itself would earn not less than 8500 Carbon Credits (CC) 2. There is a great worldwide thrust on GREEN Technologies and Green Projects. APIX-SEP could be in the forefront 3. APIX-SEP business volumes estimated in India alone = \$3000 billion; the worldwide potential (in other developing nations) = \$4000 billion 4. NEED for mitigation of GWP is paramount, and APIX-SEP systems would answer the same in the most optimum manner. Every developing nation would welcome such projects 5. APIX-SEP has greatest scope for introducing Alternate Engineering materials, Alternate Petrochemicals and Alternate Energy, using available RR in local village regions 6. Continual R & D possible 7. As such, immediate competition in these project systems is not expected 8. If need arises, APIX project could be set up for mainly energy alone (in this case energy would be charged, instead of being Free) 9. Unlike all other "energy answers", APIX-SEP looks at the problem of Global Warming holistically and both Energy and Engineering materials are simultaneously produced, without fossil materials usage 10. APIX-SEP attacks Global Warming and Poverty, simultaneously, and helps in developments as per the UN MDG's 	<p>Threats</p> <ol style="list-style-type: none"> 1. Multinational companies are out there with their "hybridized" Green technologies; all of them having huge resources, and better platforms 2. Political interference would jeopardize APIX-SEP programs 3. Corruption in almost all smaller developing nations could work against APIX-SEP programs 4. Product competitions for different products manufactured in APIX projects could be expected, over time 5. International war and Terrorism

• **Competitors SWOT Analysis** - An analysis of the competitors, relating to their strengths, weaknesses, opportunities and threats.

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<p>Strengths</p> <ol style="list-style-type: none"> 1. Known companies; mostly Multinational corporations 2. All infrastructure ready with them 3. They have the capital and wherewithal to advertize and "tom-tom" their technologies 4. They have a "big lead" ahead of us 5. Smaller nations are enamored by these multinationals, and they have this great advantage 6. Well paid engineers and scientists are available 7. They have enough experiences all over the world 	<p>Weaknesses</p> <ol style="list-style-type: none"> 1. Overheads are very high 2. Most technologies depend on many basic materials that do depend on fossil materials 3. No Technology developed by any one yet, to supply Free Power 4. No technology developed by others, such that a "basket" of utility products are also available 5. Quick changes in technology would not be possible 6. Cost of new technology would be very high
<p>Opportunities</p> <ol style="list-style-type: none"> 1. World needs new technologies to combat Global warming 2. Need for energy continually on the increase 3. Competition may not easily come up, as technology developments take time 	<p>Threats</p> <ol style="list-style-type: none"> 1. Competition 2. Obsolescence 3. New problems can crop up 4. Real solution to Global warming is not mere energy problem alone, and most competitor technologies may soon become irrelevant

[NOTE: In general, there appears to be no immediate "real competition threat" to APIX-SEP, as there are no such projects having comprehensive manufacturing of both Energy and Engineering materials]

Pricing (Main Products)

Serial No.	PRODUCTS	APIX_COSTING	COMPETITORS	REMARKS
1	ENERGY	FREE – No charge	\$0.7 upwards	No one else offers Free Energy
2	WOOD SUBSTITUTE MOLDED DOORS	Unit cost < \$26	Upward from \$30	APIX product is cheaper
3	SPECIALTY ADHESIVE	UNIT COST = \$2/75 a Kg	Unit costs upward of \$3/75 per Kg	APIX product is cheaper
4	BIOFERTILIZER	UNIT COST = \$260/50 per Ton	No such Competitors; but Chemical Fertilizers cost above \$375/ T	APIX product is cheaper

Distribution

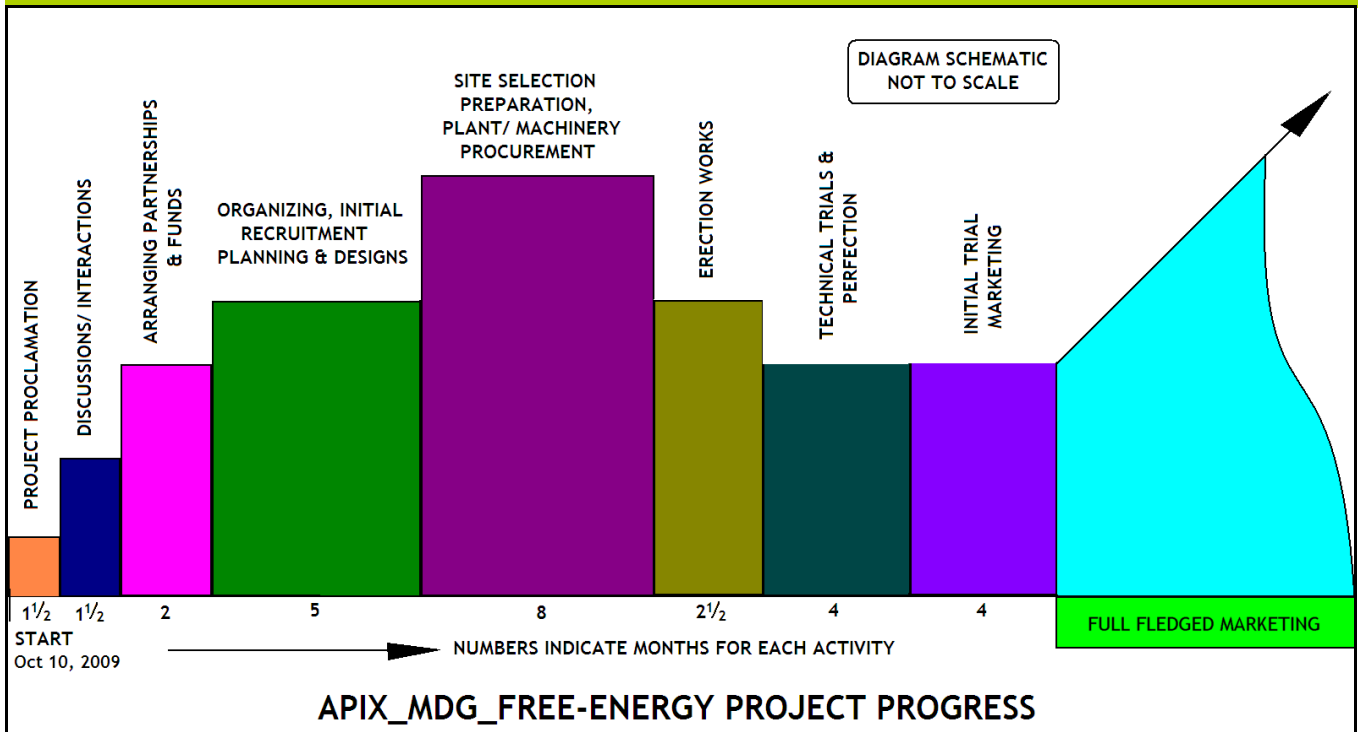
Serial No.	PRODUCTS	DISTRIBUTION METHOD	REMARKS
1	ENERGY	Heat (Thermal Fluid @ 300 C) and Electricity @ 440 3 ph 50 cps – both ready for "take off" from our outer points	No marketing needed
2	WOOD SUBSTITUTE MOLDED DOORS	Offered to Wood products/ Plywood Distributors and also to Builders direct	Marketing works needed
3	SPECIALTY ADHESIVE	Offered through specialty Hardware Distributors and Industry sales direct	Very serious marketing works involved
4	BIOFERTILIZER	Offered through farmer's cooperatives	Not much marketing involved

Design and packaging

It may be noted that only the CSEP products would need certain specialty packaging, as they would have to be made available in various packed quantities. The photo illustration below shows some packaging systems for CSEP products:



Promoting the business



The illustration above shows the Project progress. This project was "Proclaimed" on October 10, 2009. The different steps/ stages involved and the time-functions in each case have been shown, schematically

APIX_MDG_FREE-ENERGY²⁰⁰⁰⁰

Employees (Human Resource)

[NOTE: The data presented are based on Indian experience, using non-corporate wage/salary structure].

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	@ \$416.66/ pm	2	annual	\$10,000
• Stores/Sales-in-Charge	@ \$416.66/ pm	1	annual	\$5,000
• Accountant-cum-Cashier	@ \$520.83/pm	1	annual	\$6,250
• Errand/ Helpers	@ \$156.25/ pm	2	annual	\$3,750
• Security	@ \$208.33/ pm	2	annual	\$5,000
• Technician/ Electrician	@ \$416.66/ pm	2	annual	\$10,000
• Marketing Supervisor	@ \$729.17/ pm	1	annual	\$8,750
• Marketing Support	@ \$520.83/ pm	2	annual	\$12,500
• Driver/ Skilled	@ \$312.15/ pm	1	annual	\$3,750
• Manager	@ \$937.5/ pm	1	annual	\$11,250
[Total annual outgo salaries ... \$76,250 ... 15% benefits = \$11,437.50; All TOTAL = \$87,687.50]				
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	@ \$937.50/pm	1	annual	\$11,250
• Office staff	@ \$416.66/pm	1	annual	\$5,000
• Unskilled	@ \$156.25/pm	4	annual	\$7,500
[Total 6 personnel ... Annual salaries outgo ... \$23,750 ... 15% additional benefits ... \$3,562.50; TOTAL OUTGO, inclusive of all benefits ... \$27,312.5]				

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

• Supervisors	@ \$729.17/pm	3	annual	\$26,250
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APIX_MDG_FREE-ENERGY²⁰⁰⁰⁰

- Skilled @ \$312.50/pm 1 annual \$3,750
 - Stores personnel @ \$416.66/pm 1 annual \$5,000
 - Semi-Skilled @ \$208.33/pm 8 annual \$20,000
 - Security staff @ \$208.33/pm 1 annual \$2,500
 - Unskilled @ \$156.25/pm 17 annual \$31,875
 - Errand/helpers @ \$156.25/pm 3 annual \$5,625
- [Total annual outgo salaries = \$95,000 15% benefits = \$14,250; Total annual outgo = \$109,250]

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	\$39, 583	\$118, 750	\$241, 063	\$367, 044	\$378, 0560	\$389, 397
Factory benefits	\$5, 938	\$17, 813	\$36, 159	\$55, 057	\$56, 708	\$58, 410
Admin. basic	\$25, 417	\$76, 250	\$78, 538	\$80, 893/65	\$83, 320/45	\$85, 820
Admin. benefits	\$3, 813	\$11, 438	11, 781	\$12, 134/10	\$12, 498	\$12, 873
Total HR cost	\$74, 750	\$224, 250	\$367, 540	\$515, 129	\$530, 583	\$546, 500

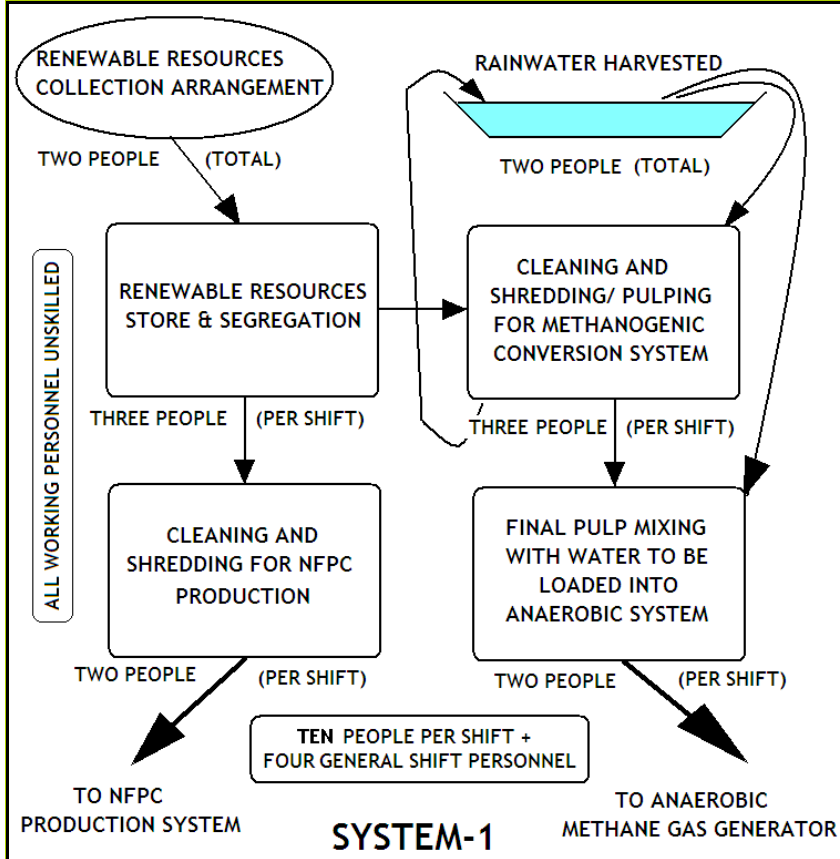
Premises

A total of 2 ac of land would be needed, which could accommodate the various process systems, equipments, plant/ machinery, generation systems, buildings and the various auxiliaries. As we shall obtain water, through rainwater harvest, all the structures would also have "dished" tops, with collection systems for the rainwater collection and storage. A large area would be used to accommodate 32 numbers of methane gas generators/ reactors, and also the Gas Collection chamber and the various other Process chambers/ reactors. Total built up area for Sheds, Office, Rest rooms/ facilities and Restaurant would be 2000 sq m (about 21, 500 sq ft). The land is sufficient for current/ immediate operations as well as any possible expanded operation in future.

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Vehicles, Equipment & Other Assets (Plant & machinery/ Production Set-up)

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

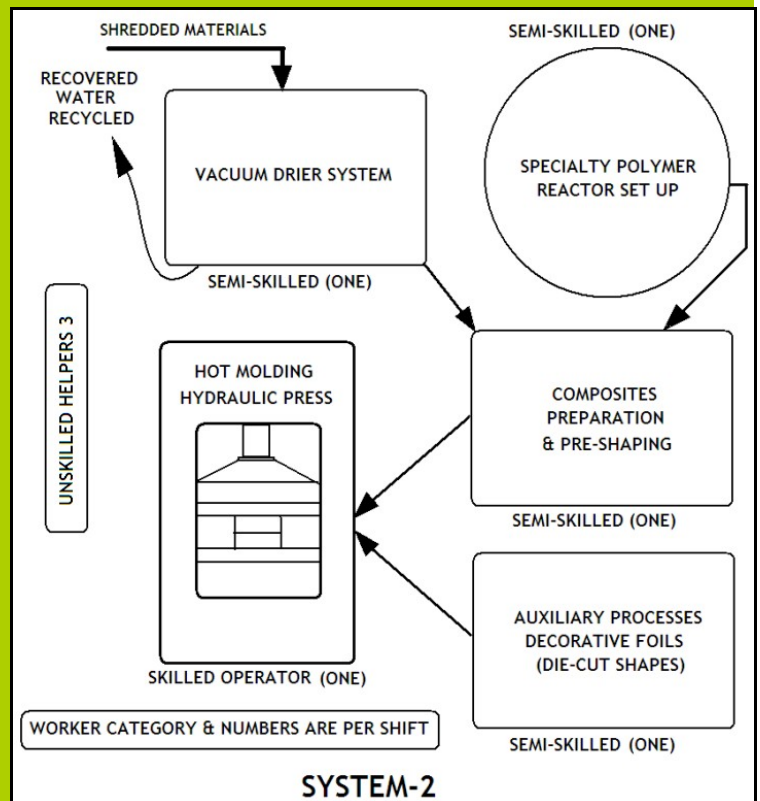
- Single Shift 14
- Two Shifts 24
- Three Shifts 34

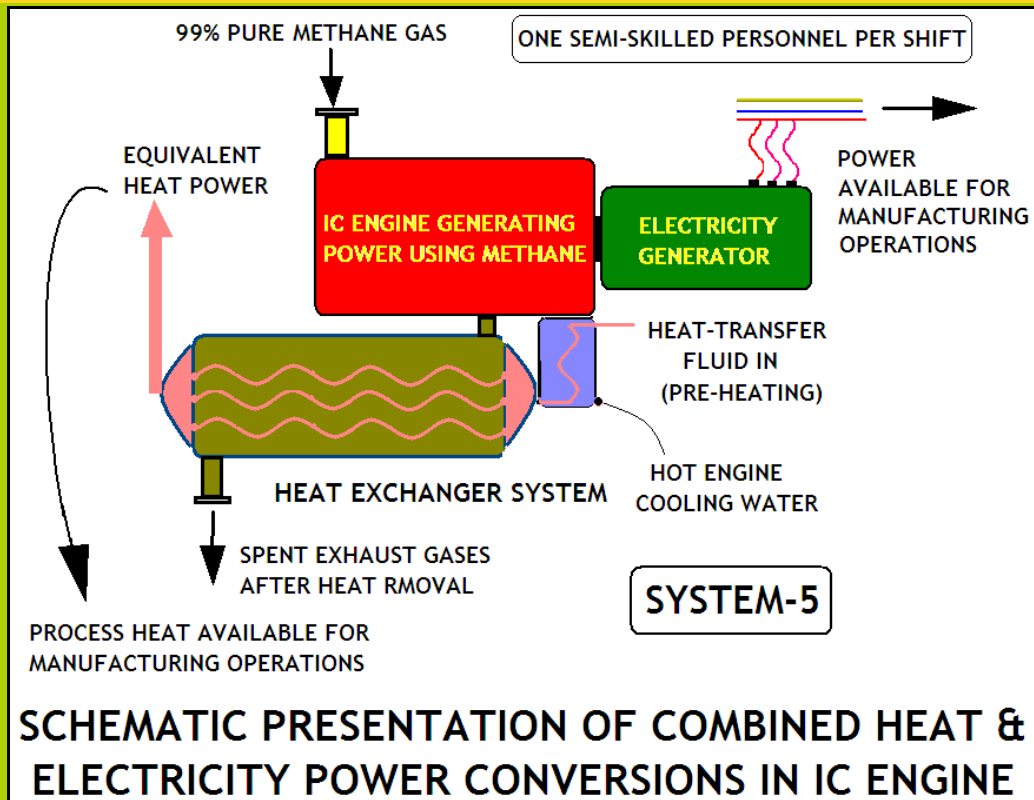
2. SYSTEM-2: NFPC MOLDING

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





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

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)

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

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)

Legal / Health & Safety

All Licenses (such as those needed under Factories Act, Pollution Control, Employees benefits/ PF/ Insurance, Local Town/ Municipal, etc) would be strictly adhered to. The premises would have, as per statutory needs, a Full Time Medical Inspection facility for emergency needs, which would be handled by Trained "Security staff". All safety measures shall be adhered to; not only on the basis of statutory provisions, but also from scientific and technical angle.

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Quality

We shall follow the codes of ISO14000, and all Supervisors would be trained and Certified to be within this Quality level

Environmental Policy

This project would have ZERO-WASTES and Zero effluents, although the inputs are mainly Organic wastes. Even the sludge bio-liquid would be processed to deliver a pathologically neutral/ non-toxic Biofertilizer, which would be sold to the farm community

Business Objectives – Vision for the future

The primary objective is to develop and propagate a Sustainable Business paradigm that answers the twin-problems of Global Warming and Poverty (GWP), without Government subsidies and other doles that are now being rolled out to the "other" Green/ Clean technologies. This is being advocated through **APIX_MDG_FREE-ENERGY**₂₀₀₀₀, wherein the businesses generated by marketing the various engineered products would "subsidize" the costs for the Free Energy supplied. If we do get any subsidies, that would be our "bonus"

There are many long-term advantages to be gained through this APIX project, which form **our Vision:**

1. This APIX project creates GREEN and affordable Energy, without dictation from cartels and other vested interest groups
2. Such a condition is possible through the "smaller" modules of about 1 MW projects (as is being advocated) that would be dispersed over large areas, instead of being concentrated in "single locations". The net end-result is: Mitigation of GWP, through wastes utilization and reduction in energy wastage
3. As energy and materials are being developed/ produced using available vegetation Renewable Resources (RR), even small nations with relatively less fossil resources would have near self sufficiency in energy and livelihood securities, without any environmental damages
4. Hitherto almost all businesses look at ONLY the so-called "bottom-line"; but here we look at the "Bottom of the Pyramid", and make sure that the spin-offs generated create conditions for the poorest to get better livelihood benefits through more "full-time" work and wages
5. This pilot project is planned to be a "show-case" for many others to take advantage of the Technologies and Sustainability Engineering methods that we advocate through APIX-SEP
6. The estimated annual Organic wastes generation all over the world is about 10, 840, 500, 000 T. These 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. We wish to LEAD in this WASTES CONVERSION ventures all over the world – tapping at least 10% of the estimated \$650, 000, 000, 000 Energy businesses in the next 10 years

Finance

Start up costs

1. Initial Research/ Developments (already incurred) \$72,000
2. Further developments to commercialize \$150,000
3. Site preparation, Buildings etc \$450,000
4. Plant and Machinery, Auxiliaries etc \$2, 792, 000
5. Other incidentals (one year @ \$15,000/ month) \$180, 000
6. Imponderables @ 9% of the above costs \$327,960
- TOTAL FIXED CAPITAL COSTS = \$3,971,960 (**rounded off to \$4,000,000**)
7. Estimated 1st yr Working Capital and Gear-up costs \$1,244,400
- TOTAL PROJECT COSTS \$5,244,400**

Personal contribution (cash and assets) – A

1. Contribution by Chief promoter (already incurred) \$72,000
2. Further contribution (by cash, to be done) \$52,000
3. Other Shares of Promoters and Associates \$100,000
4. VC Funds expected \$150,000

Financing the remainder – B

1. Expected Carbon Credits (out of an estimated 8500 credits) \$155,000
2. Other Grants/ Prizes expected \$100,000
3. Debt financing \$4,615,400
- TOTAL OF 'A' + 'B' = \$5,244,400**

Security against borrowing

1. Fixed Assets (Plant/ Machinery and Buildings etc) \$3,242,000
2. Stocks, In-process, and Receivables \$1,913,845
- TOTAL BORROWINGS = \$4,615,400 ... SECURITY VALUES OFFERED = \$5,155,845**

Financial projections

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

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- 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 yr (= 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 @ 1/7th 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 2nd 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

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ESTIMATE OF COSTS AND OVERALL ECONOMICS – CSEP_HIGH-VALUE PROJECT

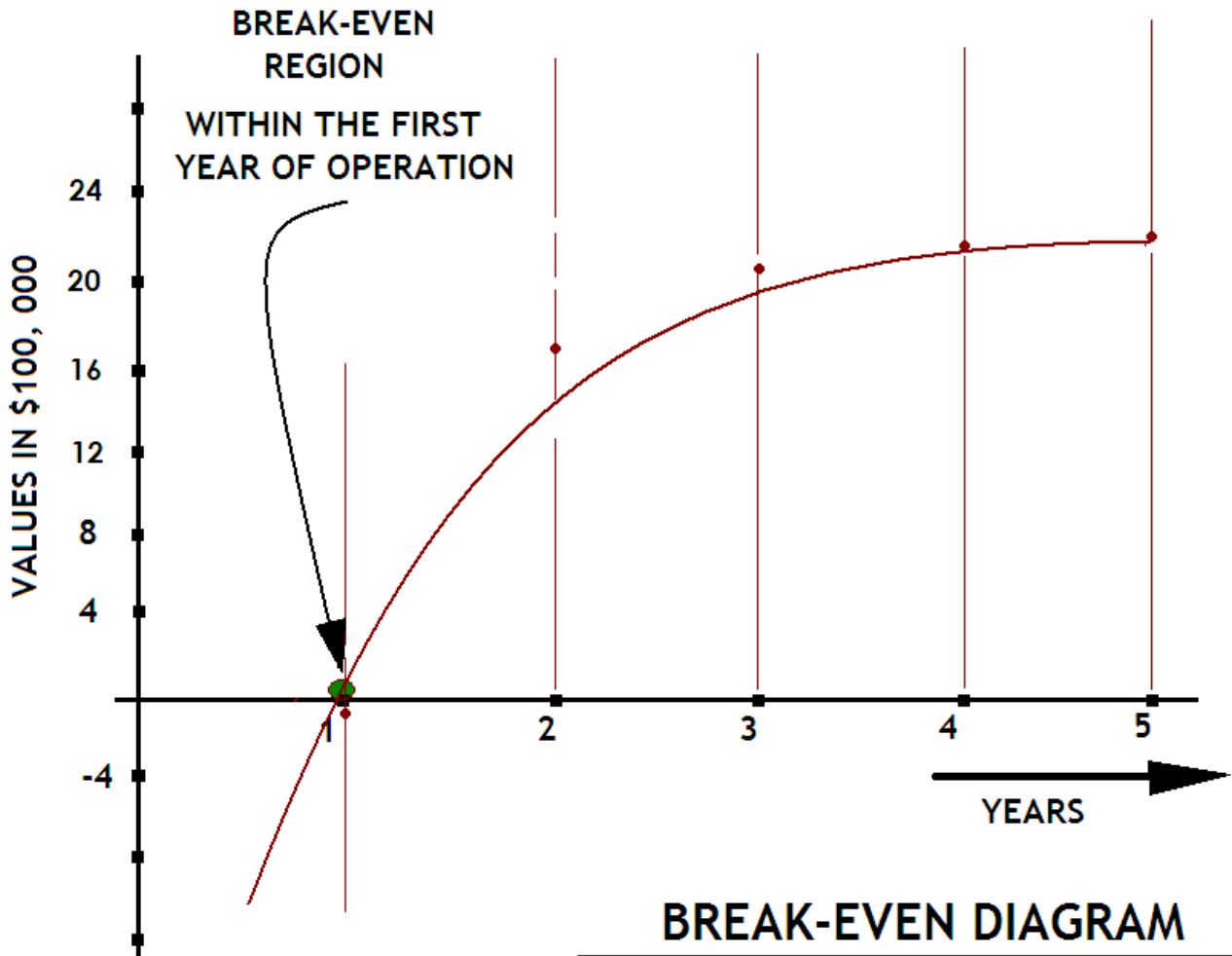
[Note: All figures are in US \$; rounded off to the nearest tens. Power generation costs also shown]

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 33.18% on TOTAL Investment]						
Av. cash-flow before repayment = \$2, 128, 262 (41.27% on Investment) ... payout during sixth year						
Av. cash-flow after annual repayments = \$1, 328, 262 (25.76% on Total capital investment)						
BREAK-EVEN EXPECTED AT THE END OF ONE YEAR AFTER TRIAL MARKETING period						

BREAK-EVEN DIAGRAM – CSEP_HIGH-VALUE PROJECT

SCHEMATIC ... NOT TO SCALE

CSEP - HIGH-VALUE PRODUCT SYSTEM



BREAK-EVEN DIAGRAM

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

PROFILES OF THE PROMOTERS/ DIRECTORS

1. HARIHARAN PV (Concept & Technology Development Engineer, Innovator and Developer of APIX-SEP)
2. MWANIKI GACHUBA III (Prime Promoter in Scotland, dynamic Farmer and supporter of APIX-SEP)
3. MICHAEL SAHILU (Design Engineer in Ethiopia, and dynamic supporter of APIX-SEP)

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HARIHARAN PV

Concept & Technology Development Engineer

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Chief Mentor & Promoter

AGRO-BIOGENICS

<http://freeenergytoworld.wordpress.com/>

<http://apixssaproject.wordpress.com/>

<http://www.linkedin.com/in/hariharanpv>

Developing a new Business paradigm to mitigate Global Warming and Poverty,
closing the gap between "rich" and "poor"

Starting as a Mechanical Engineer, is professionally experienced in MATERIALS ENGINEERING, POLYMER ENGINEERING, MOLD/ MOLDING TECHNOLOGY, ADHESIVES, COATINGS, CORROSION ENGINEERING, COMPOSITES, NEW PRODUCTS DEVELOPMENT, ENERGY, ENGINEERING ECONOMICS, and AGRO-RENEWABLE RESOURCES/ SUSTAINABILITY ENGINEERING, and complete Project sett-up/ management.

OBJECTIVE & MISSION

The prime Objective is to apply the fundamentals of science, engineering, economics and social themes toward enhancing the standard of living of the Rural/ village communities in India. The methodology followed will be based on the development and commercialization of a newly devised all-encompassing concept: AGRO-POLYMER INDUSTRY COMPLEX-SUSTAINABILITY ENGINEERED PROJECTS. The concept (acronym = APIX-SEP) takes advantage of the available resources (biomass resources and animal resources) and converts them into value added products/ energy systems needed by the local society as well as competing at national/ international levels. These development themes could be applied to generate wealth in more than 635, 000 villages in India, presently in the throes of stark poverty and subsistence level living conditions with very poor infrastructure. The MISSION is to initiate techno-commercial activities that would help achieve a GROSS VILLAGE PURCHASING POWER (GVPP) value of about \$2, 500 Billions (Rs.125 Trillion) by the year 2050. GVPP is a new paradigm *that constitutes the sum total value of economic/ commercial activities, generated through APIX-SEP systems in the Rural areas*, independent of the other nationally programmed economic development themes. The VISION is an India that would generate a parallel GVPP index based on:

- # 500 million tons of food produce and processed food systems
- # One billion tons of Alternate Engineering materials
- # 500 million tons of Alternate Petrochemicals – Bio-based
- # Availability of work and wages to about 700 million people in the villages, with average per capita income of over Rs.100, 000 ... raising over fifteen fold from the present paltry Rs.6, 000

EMPOWERMENT OF PEOPLE IS ECONOMIC DEVELOPMENT

After fifteen years of down-to-earth interactions at the village/ field levels, the writer had been working on a new concept of Sustainable Rural Development theme, which would start at the village level, through the utilization and recycling of all available Renewable Resources and through the involvement of the local population. This innovative theme envisages Economic

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Development on the basis of parallel Techno-Commercial programs within the Democratic Constitution of India, wherein both traditional and greenfield enterprises could be set up that would generate new businesses both nationally and internationally.

Plants, trees, shrubs and other vegetation materials are the systems, which support human existence. But we are not utilizing these appropriately. We never use more than 10% of the Biomass generated in any farm/ plantation activity, wasting almost 90% or more of the total biomass. For example, let us consider Banana cultivation. The per annum per hectare biomass (total materials including the banana trees and banana crops) in a plantation in a state like Kerala, for example, would be about 135 to 150 tons (green weight). However, the real fruit portion would be less than 15 tons – all the balance material being considered as Agrowastes. The effective Agrowastes, in this case, would be in the range of 125 tons to 140 tons (green weight). If we study the economics of banana cultivation we would observe that the annual gross income per ha would be an optimum value of Rs.150, 000. This is based on an average value of Rs.10 per Kg of banana fruit. However, if the entire biomass is converted into Value Added Products, we should be able to get about Rs.150, 000 per ha (at a mere Re.1 per Kg) for the biomass alone! The other value added products could fetch more than Rs.500, 000, additionally. The same would be the case with any other farm produce system – whether it is coconut, areca nut, mango, jack-fruit, etc – though the volumes and values may differ. If we study these across the length and breadth of India, we have various biomass systems that have annual renewable resources generation from about 5 tons per ha in the Desert regions of Rajasthan and Gujarat to about 200 tons per ha in the rainy high ranges of Kerala State. Neither have we correctly and fully identified all of these nor have we visualized the huge potentials to utilize all of these to develop the overall national economy in a sustainable manner. This writer has taken up the works of converting all these resources into Economic Development resources, through a MISSIONARY zeal.

The final Vision is an India where villagers become self sufficient through APIX-SEP systems; we would see transformed villages that are revenue centers for the Government... not the dilapidated and under-developed places of filth and squalor. The high Purchasing Power of the people would empower them to self sustain and create cascading developments by way of better schools, better sanitation, better health care centers/ hospitals... which no amount of Government subsidized doles and give-aways would ever bring forth... resulting finally in true Sustainable Development.

PROGRAMS & ACTIONS INITIATED TOWARD SUSTAINABILITY ENGINEERING/ DEVELOPMENT

As a first step, the writer has initiated a small activity ... through an NGO: Sumangali Seva Ashram: <http://sumangalisevaashram.com/>

The dynamic president Smt Susheelamma has consented to use the available farmland in one of the NGO branches, about 35 km from Bangalore, where this writer is helping in setting up a PILOT APIX system that would utilize available resources (both renewable and human) within the region... a place called Madappana halli ... a village with about 200 to 300 families. As a first step, the inmates of the Ashram there (Nisargashrama) are being trained to convert agrowastes such as grass clippings, tree clippings, fallen twigs, sawdust from local saw mill... etc into utilitarian products.. the first such product developed is Hand Molded Teepoy (side-table), which has exquisite and exclusive design themes. Other products soon to be launched are: Molded Doors, Tables, Boards, Tiles, Flooring etc. All these products do not use any electricity, but have excellent qualities to compete with any machine made systems. The next step (during next year) would be to convert the wastes into Biogas, Bio-Fertilizer, chemicals and energy/ electricity... The long term idea is as follows:

One Module would consist of there/ four persons per shift, and each such module would produce

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products worth about Rs.5000 to Rs.10, 000 per shift per day
 # Each working person would get, at optimum level, not less than Rs.200 to Rs.300 per day...as personal earning
 # One village would have about 250 to 300 modules, generating not less than Rs.4.5 million worth products per day... resulting in over Rs.1.50 billion worth productions per annum... in just one village
 # As the turnover increases, the village level APIX would be able to pay still higher wages to the working groups...even as much as Rs.500 per day per person.
 # Once the Sumangali Pilot system is brought to success, the original trained personnel could train more Villagers...not only locally but on an all India basis

So far the entire expenses for development, and setting up..etc have all been pooled in from own resources of this writer... working undaunted independently and with missionary zeal...



AGROWASTES CONVERTED UTILITARIAN MOLDED PRODUCTS

It is gratifying to observe that AN INTERNATIONAL AWARD has been bestowed on the writer (to be shared along with Sumangali Seva Ashrama) for the Products/ Scheme under review above. The award is: JEC INNOVATIONS AWARD 2008 FOR ENVIRONMENTAL CATEGORY:
<http://www.jecomposites.com/composites-news/4436/2008-JEC-Innovation.html>

EDUCATION

1955 - 1958	Primary School	Government School	Alappuzha, Kerala
1958 - 1959	Primary School	Government Model School	Thiruvananthapuram, Kerala
1959 - 1960	Secondary School	"Vivekodayam" School	Thrissur, Kerala
1960 - 1962	High School	Madras Higher Secondary	New Delhi
1962 - 1965	High School	Sainik School (Military)	Thiruvananthapuram, Kerala
1966 - 1971	Engineering	Regional Engg. College (NIT)	Raurkela, Orissa

BUSINESS & PROFESSIONAL EXPERIENCES

1. 1971 - 1972: Worked as a SALES & MARKETING ENGINEER in a Private Company, which had various Mechanical and Electrical Engineering Works Contracts with the Raurkela Steel

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Plant in Orissa State. Though the involvement was only for a brief period, it provided an opportunity to study and understand the magnificence of an INTEGRATED STEEL PLANT.

2. 1973: Started prospecting to set up a Plastics Molding plant as a Small Scale Industry, through visits and interactions at the Industrial centers such as Bombay, Surat, Ahmedabad, Faridabad, Delhi, Calcutta, Madras, Jullunder, Ludhiana, Poona, etc. After about one year of observational interactions with the various industries in the different cities, a proposal to set up MELAMINE CROCKERY MOLDING PLANT was finalized.
3. 1974: Three brothers, at Kottayam, Kerala State, formed a Partnership Firm –THE POLYMER PRODUCTS COMPANY – and a project to manufacture Melamine Molded Crockery was organized. The project was commissioned/ commercialized by early January 1976, and marketing of Melamine Crockery started from then on. This unit was the FIRST of its kind in South India – the major units of this type existing in northern Cities of Delhi/ Faridabad/ Bombay/ Calcutta.
4. 1978: The Firm was converted into a Private Limited Company and additional Plant/ machinery was set up to Produce Injection Molded Industrial and Consumer Products. This unit also developed and manufactured MOLDED DISPOSABLE CUPS – at that time the first of its kind, developed and commercialized indigenously (Production Machinery, Molds and Material formulations).
5. 1979: A small Plant was set up to produce IN-plant needs of Melamine Resins, to manufacture Melamine Design Foils, indigenously.
6. 1981: A self content TOOL ROOM was added on to facilitate Mold construction and other Electro-Mechanical maintenance works.
7. 1983: A unit to Develop Technology and new Products was established, and interactions with various manufacturers in Southern India started.

NOTE:

(i) The different units, together, had about 125 personnel working at optimum levels and EVERY PRODUCT was a LEADER in the market.

(ii) In view of constant labor troubles – a thing for which Kerala State is universally famous for – the working of the units got paralyzed intermittently from 1986 (some times the resultant strikes stretching up to three or four months), and the different units could not operate at profitable levels. And it was decided to close down the units in 1987 – 88.

(iii) Even though the manufacturing operations had stopped, TECHNOLOGY & PRODUCT DEVELOPMENT works continued as a Consultancy set up, and continues to this day – though carried on independently/ individually.

TECHNOLOGY & PRODUCTS DEVELOPED/ BEING DEVELOPED

Over the years, various New Technologies and Products were developed. Some of the most significant ones are presented here:

1. MELAMINE INLAY FOILS: These are based on Special cellulose/ cotton cloth based foils with specially developed inks used to impart prints on the melamine products. Indigenous development needed specialized inks and “cellulosic” foils. And the printing system also had to be developed.
2. MELAMINE MOLDING COMPOUNDS: Indigenous processes for converting News Print Paper Pulp and Banana Fiber materials into CELLULOSE FILLERS were developed, which were to be used in Melamine Molding compounds.
3. NATURAL FIBER POLYMER COMPOSITES (NFPC): Electro-mechanical accessory parts were developed using Thermosetting compounds made of Natural Fibers such as Banana Fiber, Coconut Husk fiber, Wood wastes, Sisal, etc.
4. THIN WALLED DISPOSABLE CUPS: High speed Injection mold, having production speeds of

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- 1, 000 “shots” per hour was designed and constructed, toward developing THIN WALLED DISPOSABLE CUPS (wall thickness @ 0.3 mm to 0.35 mm. This was made possible by designing and developing a revolutionary molding system – SELF INSULATED STRAIGHT SHOT SPRUE ELIMINATOR.
5. **CHEMICAL COATING FOR CORROSION PROOFING STEEL:** A specialty chemical coating was developed to obviate the need for hard chrome plating of molds. The process could also be used to impart corrosion resistance in any steel component.
 6. **ADHESIVE FORMULATIONS:** various Thermoset Adhesives were indigenously developed using EPOXIES, POLYESTERS, POLYURETHANE, NYLON, PHENOLICS and FURANS.
 7. **WOOD SUBSTITUTES:** Natural Fibers and wood wastes were used in developing wood/ plywood substitutes. These could totally replace wood for applications (both structural and aesthetic) in Building Construction, Boat/ Ship Building, Furniture, Flooring, etc.
 8. **MOLDED DINGHY/ BOAT:** Coir Fibers and Glass fibers were combined to develop a “hybrid” Composite, and the same was used in constructing a small Boat/ Dinghy.
 9. **FIRE RETARDANT WOOD COMPOSITE:** A new indigenous composition was developed to design and construct FIRE-RETARDANT Composite. The system was used to further develop Fire Retardant Plywood.
 10. **BIOGAS & CHEMICALS:** A system has been developed to convert any Biomass into Methane gas and the Carbon-di-Oxide/ Hydrogen Sulfide etc are recovered and converted into various chemicals such as PRECIPITATED CALCIUM CARBONATE, CADMIUM SULFIDE, SULFUR, etc.
 11. The current activities include: METAL REPLACEMENT COMPOSITES DEVELOPMENT, TOTAL WOOD SUBSTITUTE DEVELOPMENT, GREEN TECHNOLOGIES, RECYCLING and NEW SYSTEMS FOR NON CONVENTIONAL ENERGY (An example is the conversion of the Exhaust Heat of IC Engines into Process heat and electricity)
 12. Patent applications are pending for the following Products/ processes:
 1. Coconut Splinter based Wood substitute Composites
 2. Hybrid Sandwich Molded Natural Fiber Polymer (NFPC) Composites for metal replacement
 3. Self laminated wood substitute Boards
 4. Specially cast (steel casting) modified Hydraulic press design for NFPC moldings
 5. Special Formulations/ processes for Fire retardant wood systems/ NFPC
 6. IC Engine Exhaust Gases recycling for process heating
 7. Carbon Sink Engineered Products (CSEP)

While the spirit of wanting to do something for the nation was triggered in 1971, immediately after the completion of engineering studies at the Raurkela (Rourkela) Regional Engineering College (NIT), when the signatory chanced to hear a speech by the then Prime Minister – Mrs. Indira Gandhi – it transformed into a MISSION in 1988, when there was a chance meeting with a few “down-to-earth” farmers in Mettur, Tamil Nadu. There has been ‘no looking back’, since then. The concept of **AGRO-POLYMER INDUSTRY COMPLEX** was born during this period from 1988, when concerted attempts to study the problems (and their causes) of the farmers were made, through visits/ interactions/ observations at various farmlands in places as wide ranging as Jalgaon in Maharashtra State to Kanyakumari in the southern most tip of the land. A few other places where very serious study/ interaction was made are: Talegaon in Maharashtra; Mysore, Hunsur, Coorg, Nanjangud and Srirangapatna in Karnataka State; Chittoor in Andhra Pradesh; Erode, Salem, Mettur, Coimbatore, Mettupalayam, Pollachi, Madurai, Thanjavoor, and Tirunelveli in Tamil Nadu; Trivandrum, Alleppey, Kottayam, Idukki, Ernakulam, Palakkad, Malappuram, Wayanad and Kozhikode in Kerala State.

While there is a high level of technical and economic perfection in the NFPC product systems, the other systems which finally take us to the BIO-REFINERY set up has not been developed to that extent. This is mainly due to the fact that these works would need more sophisticated scale up

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arrangements that are available only in the University research labs and the Government research labs, which are out of bounds to private personnel. However, that would not be a stumbling block to enter into a project to set up an **AGRO-POLYMER INDUSTRY COMPLEX** in any farm area. The project could easily begin with the NFPC unit, along with the Methane Gas set up and Energy conversion set up. The returns would be excellent that we could pool back enough to develop the **BIO-REFINERY**, using the spin offs. The spin-offs are such that the initial project would trigger a **SELF-PERPETUATION**.

As the writer is presently engaged, on a missionary zeal, in the development of the **CONCEPT OF AGRO-POLYMER INDUSTRY COMPLEX (APIX)** towards achieving **ECONOMIC DEVELOPMENT** of **RURAL/ VILLAGE** areas, apart from interacting with select industries in advising and assisting in new product developments, all other activities have been relegated to secondary level. Technical subjects being handled: Polymer Engineering; Plastics Process Engineering; Engineering Composites; Advanced Materials engineering; Adhesives and Coatings; Corrosion Engineering; Wood and Plywood Technology; Alternate Engineering Materials; Energy and Engineering Economics; New Technologies/ Concept & Technology Development. A New Company: **AGRO-BIOGENICS** is being formed, with world wide operational objectives, toward practically implementing the commercial themes in APIX systems. The business and social themes involved are: *Developing a new Business paradigm, wherein the values of business and economic development are proportional to the closing of the gap between the "rich" and the "poor"*.

Website: <http://www.agro-biogenics.com>

PERSONAL

Age: Born on March 8, 1949

Language Known: The following languages are known (reading, writing, speaking): **ENGLISH, HINDI, MALAYALAM, and TAMIL**. Additionally, some working knowledge of: **KANNADA and ORIYA**

Community/ Leisure Activities: Interaction with Farm communities and Village people. Technical writing (articles in "MODERN WOODWORK", "ENVIRONMENT PRODUCT FINDER) ... and Technical interaction through the net. Another serious avocation is the study of the **NATURAL WORLD**. Painting, Carnatic Music, Light Music, Mimicry, Screen Printing and amateur photography are recreations/ hobbies ...

The family consists of wife – Annapoorni (Uma) – who devotes full time as an excellent house-wife; first daughter – LAKSHMI, a post graduate in Biochemistry – who works for a major Pharmaceutical Company, in Singapore; second daughter – CHITRA, a graduate in fine arts – who works as a SW Engr/ BOSCH in Coimbatore; son – VAIDYANATHAN (Srikanth) – having graduated in Chemistry, is now working in a Private Firm at the management level, apart from assisting the writer in setting up APIX systems.



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Mwaniki Gachuba III believes that the broader a man's education is, the wider the horizon of his thoughts and observations, the more affluent his resources and the more humane his policies are.

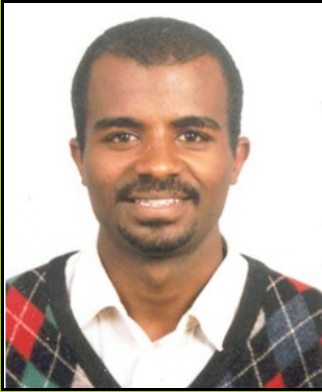
This conviction is reflected in his educational background which is as follows:

- (a) MSc in Intellectual Capital Management for Lawyers, i.e. IP law, IP Management, Innovation Management and Wealth Creation in Knowledge based Economy.
- (b) MSc in Maritime Affairs, i.e. International Shipping/Trade, Maritime Law and Law of the Sea.
- (c) LL.M in Energy Law i.e. Hydrocarbons (onshore & offshore) and Renewable Energy Law and Policy.
- (d) LL.M in International Economic Law i.e. all applicable principles in international transactions between individuals in different States as well as transactions between individuals and States (international trade and investment law and policy).
- (e) LLB.
- (f) BA
- (g) Diploma in Procurement, i.e. a Chartered Buyer (MCIPS – UK)
- (h) Diploma in Clearing and Forwarding.

Before proceeding for further education in 2002, he had worked for Schenker Stinnes Logistics and Haco Industries (E. Africa). He is a village based entrepreneur dealing with honey and the biggest khat farmer in Mbeere district. He also consults in legal matters.

He lives with his wife and son in Aberdeen, Scotland. Gachuba enjoys long walks, running marathon and martial arts (Karate and Jiu jitsu). His languages are English, Kiswahili, Kimbeere, Kikuyu and a bit of Swedish.

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Michael Sahilu is passionate about purpose driven life and he is much shaken and moved by the thought ... **everybody should experience abundance and way of better living in this fantastic world.** The tool that can bring his vision to reality is "Re-Design"; the results are smart design solutions ultimately to be shared to the entire world in the conspicuous "Open-Source" plat form.

Education and Training:

<u>Education:</u>			
Arba Minch University	Arba Minch, Ethiopia	BSc. In Mechanical Engineering	Graduate of 2004
<u>Trainings:</u>			
ESME*	Addis Ababa, Ethiopia	Total Quality Management	May, 2009
Inchcape plc	Oxford and Luxembourg	Up-Selling (The Inchcape way of selling)	November, 2008
ESME	Addis Ababa, Ethiopia	Project Management	May, 2008
Sherwin-Williams	Addis Ababa, Ethiopia	Product and Technical Refinishing	February, 2008
The V	Nairobi, Kenya	Personal Development	October, 2007
Zede Engineering	Addis Ababa, Ethiopia	Welding Technology, Standards & Quality	February, 2007
ESME	Addis Ababa, Ethiopia	Entrepreneurship for Engineers	September, 2005

*Ethiopian Society of Mechanical Engineers

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Experience:

Experience (Employment, Part time and others)			
July, 2007 to date	Moenco, Addis Ababa	Instructor (Full time)	Working as an instructor on Toyota vehicle technologies. Moenco is an Inchape company from UK with high reputation.
November , 2004 to July, 2007	Akaki Spare parts and Hand tools Factory, Addis Ababa	Design Engineer (Full time)	Immediately after graduation joined one of the biggest design and manufacturing governmental corporation in Addis Ababa. During the stay designed machines, dies, spare parts and others industrial subassemblies.
2006 and 2007	Arba Minch University	Project Advisor (Part time Basis)	Proposed and Consulted six Final year papers for Mechanical Engineering graduates of the year 2006 and 2007. The target was to share and experience design for manufacturing as per the manufacturing capacity of Ethiopia.
Since 2006 up to date	Demotech, Netherlands	Volunteer (Messenger)	Involved on the mission of Demotech, a NGO from the Netherlands. In June, 2009 invited the founder to Ethiopia and together involved on the campaign of a hand washing device called "Hy2u" at Addis Ababa. Visit: http://www.hy2u.org/
February, 2008	Nigat Engineering, Addis Ababa	Consultancy (Part time)	Market study for the expansion project in connection with casting and roll forging of various fast wear items, including components for earth moving equipment, construction equipment, industrial and mining equipment
April to October, 2008	Ethiopian Science and Technology Authority	Researcher (Part time)	Won a research grant for the project "Bicycle Ambulance Design" in 2008. Design of the Bicycle Ambulance is completed and ready for prototype manufacturing and implementation.

Michael has involved and presented/ shared his approach for development on symposiums organized by Arba Minch University in April, 2008 and by Jima University in January, 2009. In September, 2009, he nominated and assigned as the publication council chair man for the Ethiopian Society of Mechanical Engineers.

He is 29 and married living with his wife in Addis Ababa. His wife, Tirsit, is graduate Information Technology for Middle Level Diploma and running her own small business. She is one of the supporters of the mission of **APIX-SEP**. His languages are English and Amharic (the national language of Ethiopia). Michael plays ground Tennis and enjoys car race.