Eco health center

Environment, Pollution

| | 2012 | | | | Eco Health Centre (EHC) A conceptual project for the Solid Waste Management at Vadavathur, Vijayapuram Panchayat, Kottayam Prepared By Amal. K +91-8277022808 amal. iirm@gmail. com PROJECT AT A GLANCE: a) PROJECT : MUNICIPAL SOLID WASTE PROCESSING b) LOCATION : VADAVATHUR, KOTTAYAM c) PROMOTER : KOTTAYAM MUNICIPALITY, KOTTAYAM d) OPERATOR : RAMKY ENVIRO ENGINEERS LTD., HYDERABAD. e) SUB CONTRACTOR : SITCO, KODUNGALLUR f) CAPACITY : INPUT 30 MT GAEBAGE PER DAY PREFACE Dumping of waste is an economic transaction An asset can be defined as something that is of value to the holder of it. It ceases to be an asset at the point when the holder of it feels it no more valuable and when it so ceases to be an asset, he hurries to dispose it considering it a waste. An individual strives to protect his assets while he throws away the waste. This is the natural course of any transaction. Waste for someone is Asset for someone We can now analyze the same in the context of municipal waste. The society comprising numerous entities that dump waste materials, as a whole, dumps a huge bulk of waste which is detrimental to the public health. To protect the public health, the very learned law makers all over the world defined the waste as the asset of Municipalities (refer Sec 330 of Municipal Act, India). This makes the Municipalities feel responsible to protect the waste because waste is their asset. Asset becomes waste if managed by obsolete technology The primary responsibility of the Municipality is to recycle the waste and maintain public health. It is the negligence of the Thiruvananthapuram Corporation in adopting an updated technology to carry out this primary responsibility of ‘ managing waste’ that led to the forced locking down of Vilappilsala waste

recycling plant by the public. This is a visible evidence how the public expresses anger when their resilience is tested and such public outbreaks are bound to repeat in other parts of Kerala also if the other corporations or municipalities shows the same negligence. Our proposal for an updated world class technology We put forth the proposal of a European standard bioreactor and our APS modules as a solution to the waste recycling management at Kottayam Municipality. The approximate cost @ six hundred lakhs rupees for 30 tonnes. of MSW, We are also prepared to implement the model adopted in the Kodungallur Municipality, if the client feels it suits for Vadavathur. Please note the amount quoted are based on the assumption that the existing waste recycling buildings, machineries and vehicles at Kottayam can be used for the mentioned projects. 1. INTRODUCTION COMPANY PROFILE: SITCO is a 20 year old private limited company, functioning in the field of manufacturing of Special Purpose machines. We have designed and installed machines for specialized usages for many well known industrial establishments and SSIs. We mainly deal in size reduction machines. Address: SITCO M/s Suntech Industrial Steel CO, Edavalangu P. O, Thrissur 680671. 2. MUNICIPAL SOLID WASTE SCENARIO-KOTTAYAM: The rapid growth of population and urbanization decreases the non renewable resources and disposal of effluent and toxic waste indiscriminately, are the major environmental issues posing threats to the existence of human being (Allen et alÍ¾ 1997). The most common problems associated with improper management of solid waste include diseases transmission, fire hazards, odor nuisance, atmospheric and water pollution, aesthetic nuisance and economic losses (Jilani et al). There has been a

significant increase in solid waste generation in India over the years from 100 gm per person per day in small towns to 500 grams per persons per day in large towns. Presently most of the municipal solid waste in India is being disposed unscientifically (Akolkar, A. BÍ¾ 2005). Generally municipal solid waste is collected and deposited in sanitary landfill, such unscientific disposal attract birds, rodents and fleas to the waste dumping site and create unhygienic conditions (Suchitra, et al). The degradation of the solid waste results in the emission of carbon dioxide (CO2), methane (CH4) and other trace gases. The unscientific landfill may reduce the quality of the drinking water and causes the disease like jaundice, nausea, asthma (MeBean, E. A et alÍ¾ Amar M. Dhere et alÍ¾ 1995). Solid waste Management is a dilemma faced by the cities and towns in Kerala and finding a suitable landfill area is the serious problem faced by the urban centers in Kerala. 1. Initial Observations A casual study of MSW (Municipal Solid Waste) regions under consideration revealed the following. The MSW contains moisture to about 50-70%, plastic about 10-20% , organics 20-30% , Heavy solids (glass, metal pieces, ceramics etc) 1-2%. The waste from slaughtering region is around 4-5 tons/day. (Calculated based on 50kg waste is generating for each cow / buffalo slaughtering time) In this region receive rain for 8 months on an average and the relative humidity is very high (65 to 80) 3. PROCESSES AVAILABLE TO TREAT MSW: 1. Aerobic Composting Most of the Indian cities are using aerobic composting to treat municipal solid waste. But this process has not proved to be quite ideal for Kerala-thanks to high humidity, higher moisture content in typical garbage received and longer rainy days in the State. All these factors combined generate more leachate, which adds to the

woes of municipal authorities. Besides, in this technology plastic cannot be separated for commercial use. In addition to their the EM bacteria which is generally use in the technology will remain alive in compost and landfill which is learned to be not advisable. Practically, close to 15% of the MSW is converted into useful compost and all remaining has to be discarded as landfill. 2. Bio gas plants- present technologies. The present biogas technology used in Kerala and all over India for MSW processing have become obsolete. This technology is not efficient as in the thermophilic bacteria based processing. The outlet slurry contains bacteria causing contagious diseases, which pollute water and surrounding. Separation of plastic makes bio gas feeding also impractical. 3. Vermin Composting; This technology is not suitable for non vegetarian components. In this case also Plastic mixed with biodegradable waste prove to a bottleneck. 4. Waste pelletization for fuel Two small scale experimental projects were undertaken in the State to dry and pelletize municipal waste. Both failed for the simple reason that the calorific value of mixed Indian waste is barely 800 to 1000 Kcal/kg of waste. Sun-drying becomes impossible in monsoon rains. Covered storage of sufficient area is prohibitively costly and artificial drying is energy-negative. Issues of PVC waste generating dioxins from burning of Refuse Derived Fuel (RDF) have not been addressed yet. 5. Other Thermal Processes: (Incineration , Pyrolysis, Catalytic Thermal conversions to fuels etc.) As India has signed in the CDM (Clean Development Mechanism) under Kyoto protocol, thermal processing of organic waste matters has limitations. As the moisture content of our MSW is 50-70% the plants will not be commercially viable. It also needed heavy investment and maintenance cost,

which is sufficient to consume gigantic pie of the revenue of the municipal bodies. 4. DETAILS OF SUGGESTED TECHNOLOGY The suggested technology is named as Eco health centre (EHC) 1. SALIENT FEATURES OF ENVIRONMENTAL HEALTH CENTRE TECHNOLOGY - No Foul smell, No water pollution, No discharge of leachate. No Fly’s The machine GREEN APSM (Automatic Plastic Separation Module) can automatically separate the mixed city garbage into bio-degradable and non-bio degradable. GREEN APSM is capable of separating the plastic, rubber, etc instantaneously on feeding and can process the organic matter to the aerobic /anaerobic compost. - This is the only system available in India to process the municipal solid waste on day to day basis. Processing capacity of each module is 1- 3 tons/Hr. - The municipal solid waste we receive is not a homogenous mixture. The machines make it homogenous to be fit enough for anaerobic digestion, aerobic composting or vermin-composting. - In anaerobic process, the products are biogas and 99. 5% plastic free bio manure. The fuel extracted from this process can be utilized for running the plant and the remaining fuel can be sold directly or can convert it into electricity. - In aerobic process, products are 99. 5% plastic free bio manure and plastic powder. - Due to higher rate of oxygenation /aeration in enclosed chamber up to the 10 meter height, the pollutants are minimized in this plant hence reducing the chance of spread of contagious viral diseases. - No chemicals or genetically modified bacteria are involved in this process. - This plant can process any solid waste containing heavy fibers, like tender coconut husks, elephant dung, branches of trees, etc. - Solid waste includes born from fish/meat markets can also be processed in this plant. - The average power consumption of the plant is

15kw/Hr/ton (60Rs). - Doesn’t create water, air or sound pollution - Follows MSW rules 2000 of India. - The plant can be of stainless steel Built 2. Limitations of the EHC technology 1. Biomedical waste, industrial waste and e waste cannot be process through this technology. 2. As the system is dynamic machineries based, failure in critical machines may affect the regular functioning of the system. 3. The presence chemicals and certain pathogen may upset the bioreactor system. 3. Suggestions for overcoming the limitations. 1. Bio medical waste and Industrial waste need separate system for collection and processing 2. Sufficient spare machines should be installed and regular maintenance should be carried out. This should be ensured in contract sign between the technology provider and stake holders. 3. Regular scientific monitoring of organic slurry and the installation of a proper discard system should be included in the process layout of bioreactor feed system. 4. Insure the properties and proper maintenance for all systems should be incorporated. 5. Precautionary Dumping yard should be constructed for meeting contingencies 4. LIMITATIONS OF THE EXISTING MECHANISM IN KOTTAYAM The process and technology used in MSW plant Kottayam has the following drawbacks: 1. Leachate generation: Owing to the very nature of the process being followed in Kottayam, leachate is generated as a natural by product. Leachate is generated both from windrow platform as well as from the sanitary landfills. This causes great inconvenience for the nearby residents. 2. Odor: The accelerated bio digestion causes bad odor, which invites high resistance from the nearby residents against the plant operations. 3. Rejects/Landfill: More than 70 % of the garbage (By volume) what is received everyday goes into landfills. 4. Minimal recovery of reusable

plastic: The current process does not allow recovery of plastic for reuse. This is a major cause for the high volume of net reject after processing which ultimately goes in to the landfill. 5. HOW EHC PROPOSE TO ADDRESS THESE ISSUES: 1. EHC separates the fresh garbage into Bio-Degradable and non-bio degradable. 2. The Bio degradable materials are crushed to make slurry of it, which is further allowed to degenerate in natural way. This process ensures that no foul smell is generated in the whole process. 3. Non bio-degradable particles-Mainly plastic- is separated by APS.. This allows recovery of plastic in reusable form. This reduces the need of landfill to less than 8% of the present level. 4. Since the rejects are 100% free of biological particles, the chances of generation of leachate at landfill is practically nil. 5. The leachate generated at the feeding point is reused in the process. By this it is ensured that no leachate is released out of the plant. This approach solves the issue of leachate generation which the gravest issue in the present process. 6. The bio degradable slurry is ideal to be fed into bio gas plants. This allows generation of electricity out of waste. 5. PROPOSED PLANT STRUCTURE EHC is consists of a bunch of different modules: 1. APSM module — Existing plant at Kodungalloor The core APSM ensure that the basic separation of Bio-degradable and Non Bio-degradable are achieved without using any chemicals and emulated bacteria which are harmful to the environments. The bio-degradable wastes are crushed to form slurry inside the machine itself and the slurry is further composted. Leachate generated from the fresh garbage along with water is used in the process of making slurry and dipping garbage in the water. In this way, it is ensured that leachate is reused and as a result, no leachate goes out of the plant. This process is bundled to give a

solution of foul odor in the site and control of flies and other insects. By-products: The end products of eco-health center will be a. Bio manure (From 3rd month onwards)-which will be produced with the core module and b. A range of Products from crushed plastic, which require optional modules as given below: 5. 2 Optional Modules- Details: 5. 2. a Plastic Film Crunching Module This module is mandatory for processing the waste plastic from MSW. It is used for size reduction of plastic bags separated from the MSW for further processing like using them for re-in forcing the Cement & Bitumen tar for laying roads. 5. 2. b Solid Strip - Casting Module This module is for converting the separated plastic in to Hard Bars in appropriate size for industrial & domestic use as per the commercial requirement. 5. 2. c Tar-Mixing Module This is to mix this plastic with Bitumen Tar for laying road and the municipality/corporation can use as much as 30% of plastic (form the waste) into the tar mix and it is experienced that it improves the life of the roads by near to 80%. 5. 2. d For Brick Making - Mixing Module Plastic Waste is used for making Mix for Bricks /Floor tiles/Fencing pole etc. 3. Euro standard Bio Reactor (Bio gas plant) — Dome type. [pic] The organic slurry which comess out of the APSM module is fed in the dome shaped biogasplant which has a heat exchanger unit (gas firing). After composting, the out flowing slurry is sterilized at 90-1000C and heat is exchanged to the system for maintaining system temperature at 60-700C. Sub modules 1. Electricity generator A set of generators for generating electricity using the biogas. 2. Solid manure module- Here vibrator mesh is used for separating solid manure from outflow of slurry, 3. composting yard for rejected mass, 4. Compost sieving machines etc. 5. 4 STORAGE REGION. This is a storage-area

for the collected dry plastics, glass, metals, e waste etc. from the collection source. 5. 5 PRECAUTION DUMPING YARD. A safely covered dumping yard to meet contingencies. 6. PROCESS DESCRIPTION OF THE PROJECT The rough diagram of the system and the process layout gives an idea about the process. Diagram of proces [pic] 6. 1 Process Layout [pic] The carrier vehicles dump the fresh garbage on the hydraulic tipper of the APSM module. On rising, this slowly discharges the items towards the water pit. Meanwhile the waste packets, if any, present in the garbage are cut by automatic cutting machine and the waste fall scattered in to the water. The high density material will sink in water and those with low density like plastic and organic substances will float. The elevator forklifts collect the floating material at a rate 3 ton/ hr. these materials are sent to the APSM machine. The plastic present is the feed will be separated and dropped in the water tank. The organic matter is fed into a vibrator mesh where it is sieved and collected in a tank. It is diluted, and the accepted slurry will be fed to the bioreactor. It takes about 15-30 days for the bio reactor to produce biogas regularly. Once the APSM separate the plastic, the plastic if fed into shredding machine. The Shredder cuts the plastic into near powder form. Plastic at this form is dried, packed and sent out of the plant for making value added products. The organic slurry from bio-reactor is drained to a tank and sterilized. If there is any rejection of the organic slurry is there on the process control tank that can be transferred to aerobic composting yard for producing compost. 6. 2 Aerobic Compost Yard: The aerobic compost yard is the open area where the fresh slurry is kept covered for a period of 90 days so that the slurry turn into compost in aerobic manner. No

concentrated or emulated bacterial solution is added to the slurry so collected. This ensures that the composting happens purely in natural way thus reducing the foul order to the least. 7. INFRASTRUCTURE REQUIREMENT: Built up area for processing 30 TPD of garbage is estimated to be 4000sqmtr. The flooring to be made of poly carbonated sheets/ rolling roofs. Flooring should be made according to the specifications, which will be furnished later. 8. Other factors to be taken in account while planning the project. As the technology provider is not willing to sell off the technology and machinery, the project will be realized only after signing a contract with the technology provides. 8. 1 Suggested Solutions 1. Mutually acceptable contract may be made between the technology provider and Ramky. 2. Proper awareness program should be given to the public 9. Financial and in fractural requirements These financial and infrastructural requirements are calculated considering the capacity to about 30 tons/ day. The separate expenditure incurred for 10ton and expenditure for future 20 tone are mentioned below. 9. 1 Details of implementation cost for Kodungallur model aerobic composting plant Presently, 1620 sqmtr built up area is available to be used as composting yard in the Kottayam MSW plant. This space is presently being used as windrow platform. Rest of the built up area is largely occupied by the existing machineries and hence cannot be used at this point. We propose building of additional 3000 sqmtr of building towards the west of the existing built up area. Both the existing windrow platform as well as the new building would be required to handle upto 35TPD of garbage. Draft map of the proposed location: 9. 2 COST FOR STARTING OPERATION FOR 35 TPD | Sl No. | Particulars | Unit | Rate | Total amount in Rs. | | 1 | New rolling roof

building | 3000 m2 | 4000 | 1, 20, 00, 000 | | 2 | Roof change to rolling roof for existing building | 1620 m2 | 1000 | 13, 00, 000 | | 3 | Changing of floor with proper inclination and strength | 1620m2 | 650 | 11, 00, 000 | | 4 | Waste water collection RCC tank | 6 no. | | 1, 00, 000 | | 5 | 15 meter height RCC concrete structure for APS Modules | 2 no. s | 150000 | 3. 00, 000 | | | Total | | | 1, 48, 00, 000 | 9. 3 COST FOR STARTING OPERATION WITH THE EXISTING BUILT-UP AREA: | Sl No. | Particulars | Unit | Rate | Total amount in Rs.| | 1 | Roof change to rolling roof for existing building | 1620 m2 | 1000 | 13, 00, 000 | | 2 | Changing of floor with proper inclination and strength | 1620m2 | 650 | 11, 00, 000 | | 3 | Waste water collection RCC tank | 6 no. | | 1, 00, 000 | | 4 | 15 meter height RCC concrete structure for APS Modules | 2 no. s | 150000 | 3. 00, 000 | | | Total | | | 28, 00, 000 | Note: The said space ie. 1620sqmt is sufficient to handle only 12 Tonne per day 10. REVENUE SHARING: - SITCO will bear the cost of APSM and other - The cost of operating the module is to be borne by REEL, and the same is to be paid to STISCO. - All the by-products (Compost, Plastic rejects) will be the sole property of SITCO. 11. CONCLUSION: APSM has been functioning successfully treating 3 TPD of mixed garbage in Kodungallur municipality since last 3 years. Till now more than 2000 tons of municipal garbage has been segregated and successfully treated by the machine. This gives SITCO the confidence that it can handle 30-35 TPD of garbage with greater efficiency and we feel honored that Ramky, the industry leader in solid waste Management in India has invited us for a tie up. We are looking forward for a lasting relationship with you. ---------- Plastic collection tank Fresh garbage feeding point Leachate collection tank Bio Degradable slurry

collection point landfill North South Existing built up area- Windrow platform APSM Unit- 2 no. s Proposed space for construction of compost yard