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(54) **LIFE TO WASTE TO ENERGY COMPLEX**

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(57) **ABSTRACT**

The invention relates to a life to waste to energy complex. In particular, the present invention comprises a work/living complex capable of highly efficiency resource allocation, use, and recycling or all community waste streams.

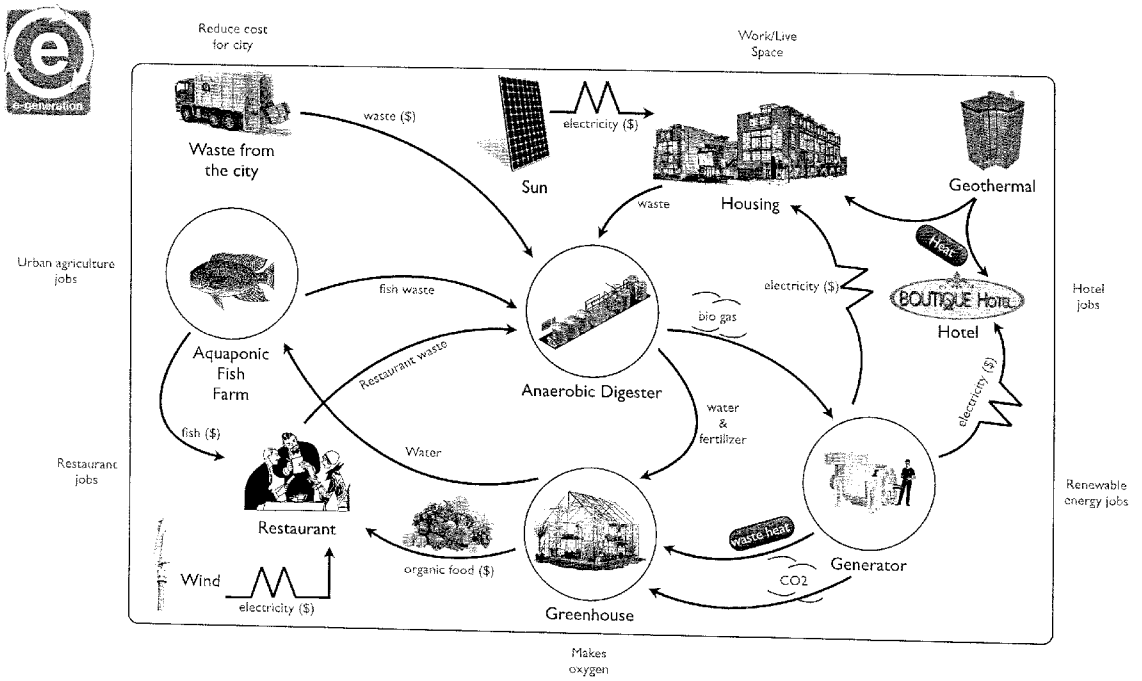


Fig 1

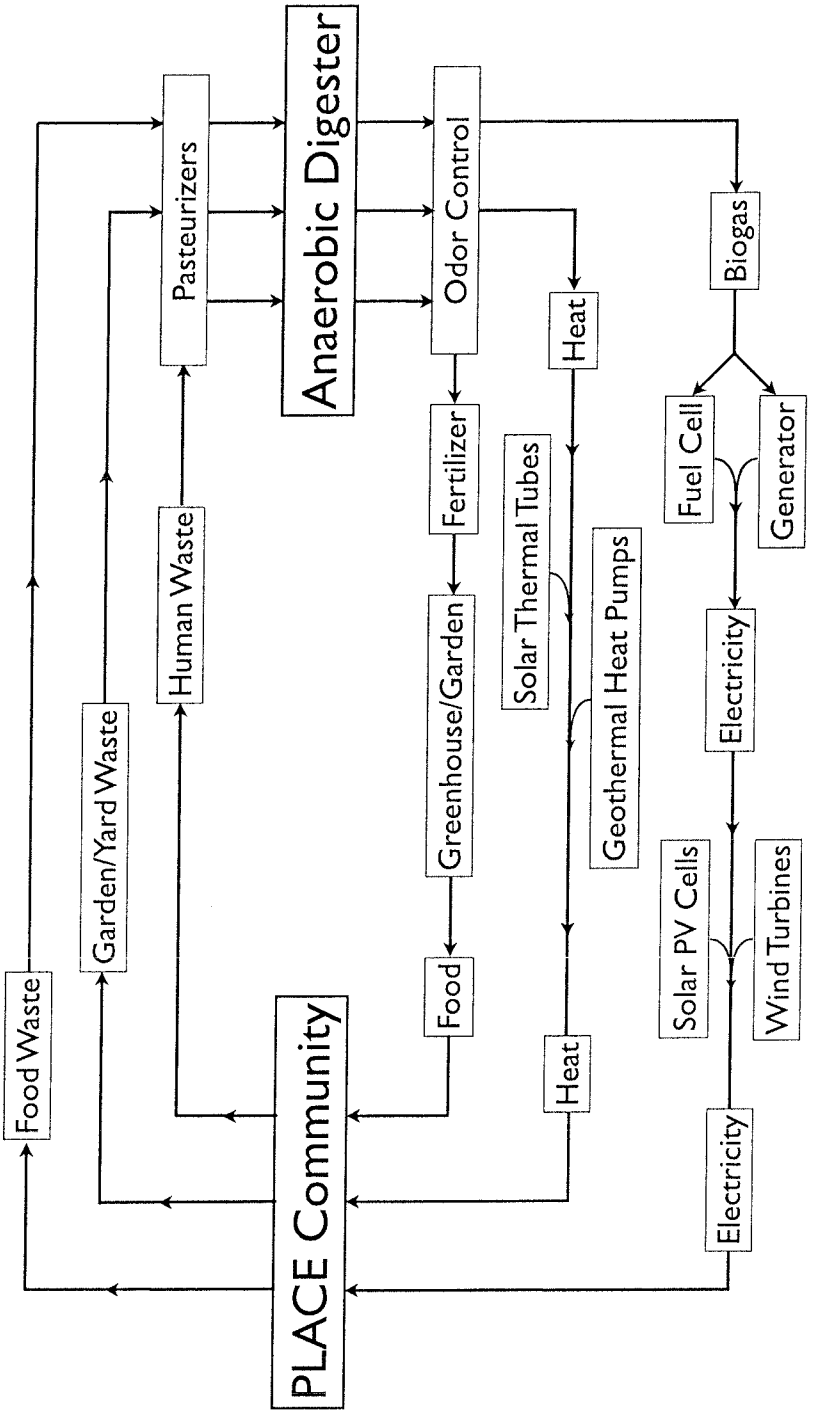

PLACE Community
Food Waste
Garden/Yard Waste
Human Waste
Pasteurizers
Anaerobic Digester
Odor Control
Biogas
Fertilizer
Greenhouse/Garden
Food
Heat
Solar Thermal Tubes
Geothermal Heat Pumps
Heat
Fuel Cell
Generator
Electricity
Solar PV Cells
Wind Turbines
Electricity

Fig 2

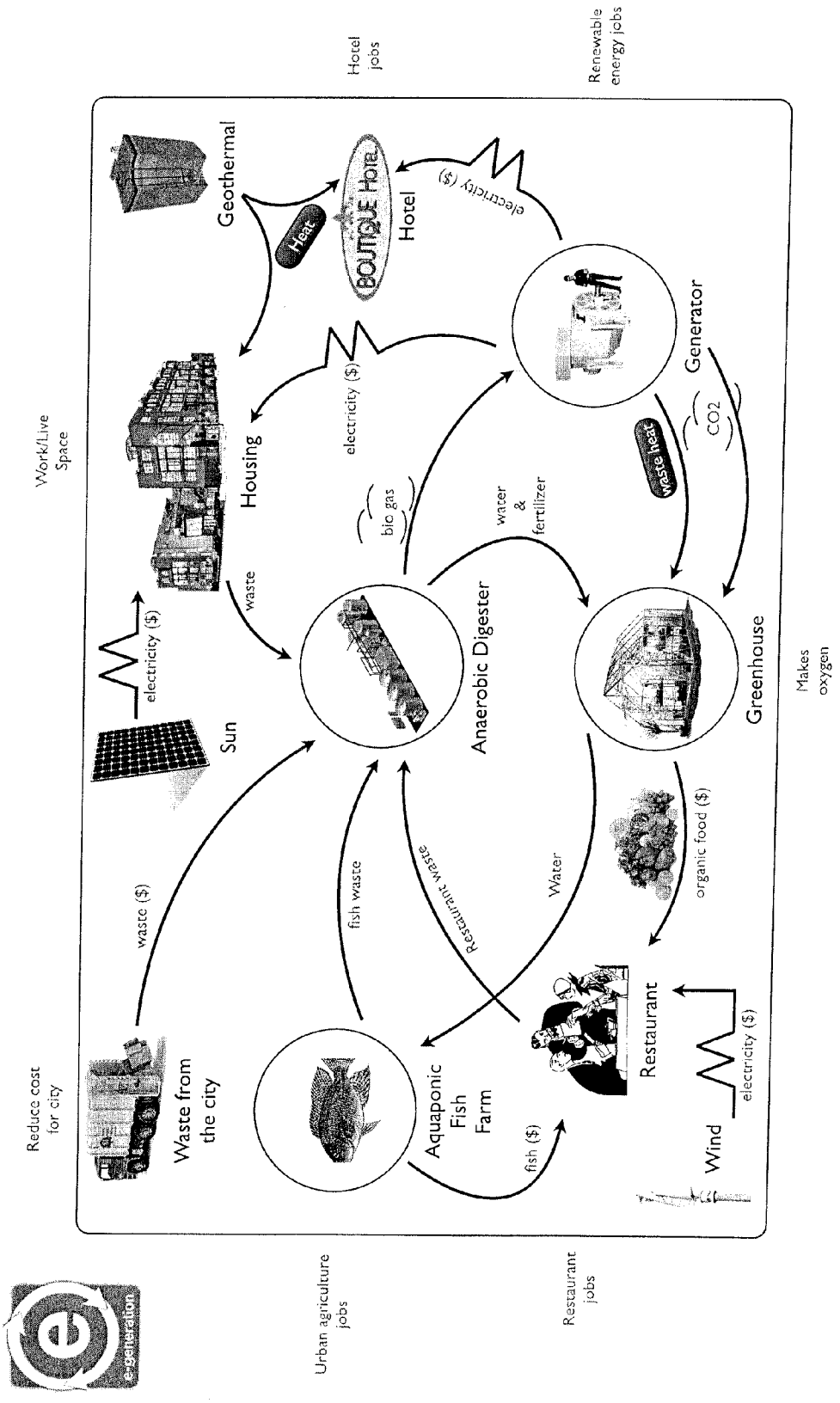
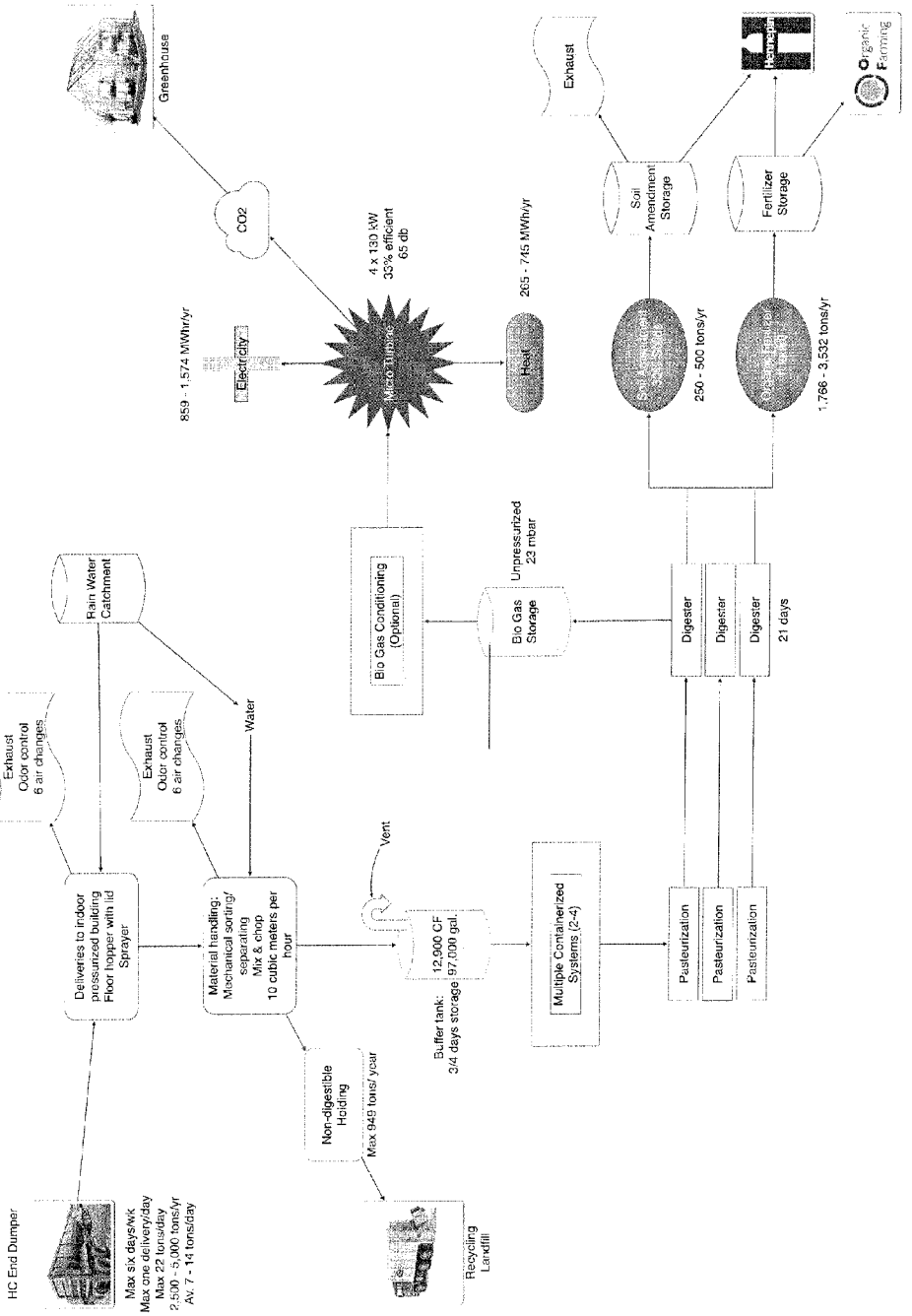

Hotel jobs
Renewable energy jobs
Work/Live Space
Geothermal
Heat
BOUTIQUE Hotel
Hotel
electricity ($)
Housing
electricity ($)
Generator
CO2
waste heat
bio gas
water & fertilizer
waste
Sun
electricity ($)
Anaerobic Digester
Greenhouse
Makes oxygen
Reduce cost for city
waste ($)
Waste from the city
fish waste
Restaurant waste
Water
organic food ($)
Aquaponic Fish Farm
fish ($)
Restaurant
Wind
electricity ($)
Urban agriculture jobs
Restaurant jobs

Fig 3


HC End Dumper
Max six days/wk
Max one delivery/day
Max 22 tons/day
2,500 - 5,000 tons/yr
Av. 7 - 14 tons/day
Recycling Landfill
Non-digestible Holding
Max 949 tons/ year
Deliveries to indoor pressurized building Floor hopper with lid Sprayer
Material handling: Mechanical sorting/ separating Mix & chop 10 cubic meters per hour
Exhaust Odor control 6 air changes
Exhaust Odor control 6 air changes
Rain Water Catchment
Water
Vent
Buffer tank: 12,900 CF 3/4 days storage 97,000 gal
Multiple Containerized Systems (2-4)
Pasteurization
Pasteurization
Pasteurization
Digester
Digester
Digester
21 days
Bio Gas Storage
Unpressurized 23 mbar
Bio Gas Conditioning (Optional)
Micro Turbine
4 x 130 kW
33% efficient
65 db
Electricity
859 - 1,574 MWhr/yr
Heat
265 - 745 MWhr/yr
CO2
Greenhouse
Soil Amendment Storage
250 - 500 tons/yr
Fertilizer Storage
1,766 - 3,532 tons/yr
Exhaust
Organic Farming

LIFE TO WASTE TO ENERGY COMPLEX

RELATED APPLICATIONS

[0001] The present application claims priority to and incorporates by reference thereto, U.S. Provisional Patent Application No. 61/788,035 filed on Mar. 15, 2013.

BACKGROUND

[0002] 1. Field of the Invention

[0003] The present invention relates to a life to waste to energy complex. In particular, the present invention comprises a work/living complex capable of highly efficiency resource allocation, use, and recycling.

[0004] 2. Background of the Invention

[0005] To date, waste-to-energy processing facilities (WTE), which convert waste to electricity or heat through incineration, have either been located far away from where residential or commercial waste is generated, requiring excessive expenditure of fossil fuels in waste collection and transport, or the treatment facilities located in cities have been large-scale plants that degrade the local quality of life rather than enhance it.

[0006] This is true of most waste processing facilities, no one wants them in their backyard or anywhere nearby. For example conventional transfer stations, which are necessitated by the fact that the processing and dumping facilities are so remotely located, are considered a lesser undesirable use of real estate, a nuisance to the senses, and attract vermin. This is generally true of most types of waste processing facilities.

[0007] The typical remote location of waste processing facilities, such as WTE facilities, creates another inefficiency. The energy created by WTE facilities (for example) must then be transmitted to points of consumption, and approximately 7-10% of the power generated is lost in transmission over distances due to electrical resistance. A secondary consequence of these distances is that power must be transmitted over high voltage lines creating large EMF fields, resulting in health concerns, and aesthetic complaints.

[0008] WTE facilities generally use fossil fuels as a source to start the WTE cycle and to "optimize it" to maintain proper operation, which is less than optimum.

[0009] Waste processing is generally required because most byproducts of human living still go to waste. Most of the energy we use converts swiftly into trash in landfills. Few products made are in use for more than 6 months.

[0010] Thus, there is a need to reduce the burden on landfills and incinerators, and better capture energy that is wasted needlessly in the process of waste removal and processing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. **1** is a flow chart of the present invention.

[0012] FIG. **2** is chart of the beneficial aspects of the present invention.

[0013] FIG. **3** is a flow chart of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0014] The present invention comprises a set of processes to enable life-to-waste-to-energy complexes (E-Generation) in a range of 50-300 households living and working on site. E-Generation minimizes inhabitants' waste (through design efficiencies and behavioral incentives), and then utilizes the remaining waste as a valuable resource, through anaerobic digestion, recycling, and finally creating energy. E-Generation provides all the inhabitants' energy needs and returns resources (electricity, heat, fertilizer/soil amendments, and clean water) to the complex and larger neighborhood.

[0015] E-Generation requires waste-to-energy components to be integrated into a residential and work (live/work) combined complex in order to achieve the intended recovery and regeneration loop 24-hours a day, every day. Unlike other waste-treatment or waste-to-energy systems, E-Generation depends upon people living and working within the complex on a constant basis, not only a few resident employees that run the system, but residents working on-site in commercial spaces, offices, and cottage industries.

[0016] E-Generation loses virtually no energy in transmission due to integration of the waste collection systems, electrical and heat infrastructure, and water systems into its buildings in order to maximize efficiency.

[0017] E-Generation has the following features, which are also summarized in the accompanying process diagram:

[0018] 1) Through efficient design the complex uses less of each resource input than would standard residential operations systems.

[0019] 2) Resource inputs for the life cycle of the E-Generation, are largely generated on-site rather than brought in from the outside: primarily labor, electricity, steam, biogas, clean water, oxygen, fertilizer, and food. E-Generation will need less water, oxygen, energy resources, and food from the surrounding neighborhood than will other communities. Energy is generated through balanced use of solar, wind, geothermal, and waste-to-energy technologies, weighing the carbon-cost of the infrastructure choices with the benefit of reducing or eliminating daily use of more carbon-impactful sources.

[0020] 3) Jobs associated with waste recovery and recycling, as well as food production are created and maintained on site.

[0021] 4) A majority of recyclable materials are preserved.

[0022] 5) The complex creates more energy than it needs, feeding itself and the grid or a fleet of renewable energy vehicles.

[0023] 6) The complex can accept waste from off-site for conversion, in addition to the waste created on-site, relieving the surrounding area of waste burden.

[0024] 7) Greenhouse/aquaponics may be integrated to utilize the soil amendments, absorbed CO2, use irrigation-quality water resulting from waste-to-energy processes and to produce high-quality food for residents.

[0025] 8) Duckweed wastewater treatment may be included.

[0026] In their flats/houses, residents remove compostable items that are then collected by resident employees for the anaerobic digestion and/or composting center; the resulting fertilizer or mulch is utilized in the complex's microagriculture or can be made available for off-site use if there are excess solids.

[0027] Residents do not separate recyclables. Ordinary mixed household waste entering trash chutes arrives at the waste-utilization center and is taken through a sorting process to remove the recyclables. The non-recyclable waste is sent to an optimized waste-to-energy unit selected and licensed for that site, program, and waste stream, for example, a pyrolytic or gasification energy generation process or an anaerobic digester.

[0028] Recyclables are sorted, compressed, baled, and sold as commodities.

[0029] The complex's sewage flows to the waste-utilization center where it is mechanically separated into fluid and semi-solid components. The fluid stream is split into: 1) a duckweed treatment system that ultimately reclaims clean water for the complex's microagriculture and improves air quality within the waste-to-energy facility; and 2) the waste-to-energy process. The split is rebalanced throughout the day to handle peak and low-flow periods. Redundancy will include either holding tanks or connection to the municipal sewer system, depending upon local code and other requirements.

[0030] E-Generation complexes may not require trash pick-up services. There is no need for resident trash pick-up if all the trash is processed on site, which eliminates the energy/carbon associated with pick-up and hauling to remote facilities. In larger E-Generation complexes, trucks will bring municipal solid waste from the surrounding neighborhood (preferably no more than one per hour). Trucks will enter a one-way bay after which the door closes behind, disgorge loads directly into the processing systems, and proceed out the opposite bay door. Noise and smell impact are isolated and minimized. Vibration and noise minimizing chambers between the bay and the surrounding superstructure protect inhabitants from noise, and industrial air filtration/ozonation removes odors and renders gaseous compounds inert.

[0031] The by-products of the waste-to-energy process are fertilizer, water, and soil amendments suitable for use in construction and agriculture. To the extent that all compost, sand, and biogas or syngas are not utilized within the complex, these commodities can be sold.

[0032] Three to four resident employees have full-time, prevailing wage jobs managing the waste stream and tracking the energy and financial impact to the complex.

[0033] Depending upon the local energy market, the system can be balanced to produce electricity that is used on-site and fed back to the grid, or to produce biogas or syngas and heat that will be utilized on-site.

[0034] Five technologies would be combined in a typical E-Generation complex to optimize the use of input resources and "nutrients", these comprise: anaerobic digestion; solar; specialized wind turbines; pellet gasification; and duckweed water treatment. Other existing technologies may also be used or combined within the E-Generation complex to optimize waste utilization and energy generation.

[0035] The present invention embeds a multifamily waste utilization/power generation/food production system within an optimal mix of solar, geothermal, and wind infrastructure to trigger the waste-to-energy processes, co-supply the complex's power needs, provide redundancy, and charge storage batteries and electric cars to capture the most energy possible, minimizing residents' dependency upon fossil fuels and overall carbon footprint.

[0036] An E-Generation complex utilizes all its own waste and accepts nearby waste quietly and land-efficiently while being aesthetically pleasing. The energy efficiency of the complex allows it to give power back to the surrounding community. The local generation of power reduces energy waste and safety hazards of high-voltage transmission. The unique interconnection of solid-waste-to-energy, gray/black-water treatment technologies, battery technologies, and solar/wind/geothermal energy sources, permit the E-Generation complex to treat all its own waste and generate more energy than it consumes, while minimizing fossil fuel expended to collect waste from surrounding neighborhoods.

[0037] Furthermore, small E-Generation facilities that constantly and unobtrusively convert waste to energy within neighborhoods minimize the amount of time that garbage and food waste sit in containers in and outside homes and multi-family complexes, reducing the potential for vermin, noxious odors, and contagion.

[0038] Energy created in small E-Generation facilities will not have to travel far to the end-users, thus reducing the need to expand vulnerable, high-voltage transmission lines which have accompanying health hazards and infringe upon neighborhood green space otherwise available to promote health. Also, transmitting electricity long distances is inefficient. The resulting local energy system becomes a resilient microgrid that can operate when the larger grid fails due to aging infrastructure, extreme weather events or disaster. E-Generation captures the vital nutrients contained in these organic waste streams and returns them to the life cycle to cultivate local food production.

[0039] Removing any need to truck the waste from neighborhoods to large transfer stations and then a final destination such as a landfill, will reduce carbon emissions and therefore reduce immediate respiratory and water quality health impacts, as well as longer-term carbon emission health impacts.

[0040] Reduction of the overall urban waste stream reduces the negative effects of incineration.

[0041] Preventing waste from entering landfills increases the amount of land available for beneficial uses, reduces the escape of greenhouse gases into the atmosphere, and reduces toxic leachate that contaminates land and groundwater.

[0042] E-Generation facilities will support outdoor green space and greenhouses on-site that will grow food year-round and improve neighborhood air quality.

[0043] Currently, local governments subsidize source-separation of organics and often subsidize the true cost of garbage hauling and disposal: for-profit enterprises have little incentive to deeply lower the cost of waste collection and disposition for the responsible government entity, and incentives favor large, centralized waste treatment and disposal facilities that cannot be located close to the source of the waste or the need for the energy.

[0044] Reducing truck-miles per ton of waste, and the size of the trucks needed, will immediately reduce damage to road surfaces and traffic congestion/accident potential, particularly in urban areas.

[0045] Generating energy near end-users will reduce stress on the grid, particularly at peak times in urban areas, will eliminate waste of that electricity in transmission over long distances, and will reduce the cost of upgrading electrical infrastructure which is often a shared cost of utility companies, municipalities, rate payers and developers

[0046] The positive health effects outlined above will also reduce burdens of government. Government typically bears the lion's share of urban vermin control, contagious outbreaks, and health care for those unable to afford their own health care, particularly in low-income neighborhoods most affected by poor quality waste collection and disposal service.

[0047] In addition to the positive health effects and reduction of burdens on government already outlined, E-Generation facilities will have the following social welfare effects:

[0048] create several permanent green-collar tech jobs at each facility within walking distance of employee's residences;

[0049] stimulate economic development by creating: 1) construction in neighborhoods that have languished; 2) long-term activity that will support other businesses in those neighborhoods; 3) opportunities to finance urban-villages surrounding the E-Generation facility that will provide very low, low, and mixed-income housing, supportive services, alternative transportation, and other public benefits; 4) upgrades to public infrastructure that will leverage other developments;

[0050] research, develop, and demonstrate a key element of smart growth and sustainable design for sustainable communities: conversion of waste to energy and food in a low-impact, healthful, and efficient manner;

[0051] lower the cost of utilities for low-income residents and public benefit tenants of the urban village;

[0052] through design intended for public benefit, improve deteriorated neighborhoods, thus encouraging market-rate housing and businesses to remain in the area;

[0053] provide direct educational experiences for neighborhood residents to understand a sustainable urban food-waste-energy-and-food loop;

[0054] create opportunities at each site for urban agriculture in greenhouses sustained by the heat, electricity, and inert fertilizer created and thus fresh, nutritious food for neighborhoods that typically lack access to same;

[0055] provide 24/7 power to the immediate neighborhood, including a source to efficiently charge electric vehicles (cars and trucks, bicycles, scooters, segways) during off-peak hours and thus capture "idle" energy being generated on standby;

[0056] reduce the net negative human impact upon crucial resources like land, air, water, climate, and wildlife, thus extending the availability of those resources and actively renewing them on a daily basis in the urban environment;

[0057] The E-Generation facility will employ anaerobic digestion (AD) to process the source separated organics. Beneficial end-products of AD include biogas, renewable energy in the form of heat and electricity, mulch, and certified class A organic fertilizer.

[0058] The present invention can be described in one or more steps as follows.

[0059] Step One—Delivery: In the case where the facility will accept outside waste. A delivery truck arrives at the E-Generation facility. The facility will receive end-dump trucks and other common types. A large door admits the truck and closes behind it. The facility is pressure controlled to contain odors. Once the truck is inside, a hopper is opened, and the truck dumps organics into the hopper. The hopper is closed again, and the truck departs through the exit door. Engines will be turned off to avoid idling when not needed to operate the dumping process.

[0060] Step Two—Sorting: This step would apply to waste from the community or from outside sources. The load is moved via augers into a mechanical sorting system. The sorting will separate digestibles from non-digestibles, including removing organics from sealed packages. The sorting system can process 10 cubic meters per hour.

[0061] Step Three—Recycling Bin or Buffer Tank: Non-digestible material will move to the recycling bin. Digestible material will move to a buffer tank.

[0062] Step Four—Containerized System: Organics will move from the buffer tank into the containerized system, an automated system that macerates, pasteurizes, and digests the material, producing biogas suitable for producing heat and/or electricity, mulch and organic fertilizer. Emissions are processed through a carbon filtration system designed to remove odors. The containerized process takes approximately 21 days to complete. The facility is scalable in size, with modular expansion available to provide redundancy and reliability.

[0063] The automated process takes approximately 22 days from delivery to the final biogas, fertilizer, and mulch.

[0064] The system is designed for between 80% and 90% capacity in order to account for variability in delivery. The capacity can be easily expanded when the number of deliveries increases over time.

[0065] A mechanical sorting/separating process will be used to separate digestibles from nondigestibles. The nondigestibles will be separated into those that can be recycled and those that cannot. Non-recyclables, will be sent to a landfill only if no other process exists locally to utilize the material.

[0066] The bio gas will be used for one or more of the following:

[0067] 1) Provide heat for the E-Generation facility itself

[0068] 2) Provide heat for an on-site green house

[0069] 3) Provide bio gas to the pipeline

[0070] 4) Create compressed natural gas for municipal fleets

[0071] The electricity will be used for one or more of the following:

[0072] 1) Provide electricity for the E-Generation facility

[0073] 2) Provide electricity for the grid

[0074] 3) Provide electricity for such activities as light rail line

[0075] The soil amendment will be used for one or more of the following:

[0076] 1) Provide for use as a soil amendment for on-site greenhouse/gardens

[0077] 2) Provide for use as a soil amendment for municipal parks

[0078] 3) Provide for use as a soil amendment for nearby organic farms

[0079] Concentrated liquid fertilizer will be used for one or more of the following:

[0080] 1) Provide fertilizer for on-site greenhouse/gardens

[0081] 2) Provide fertilizer for nearby organic farms

[0082] The present invention reuses the nutrients in the production of food.

[0083] Aggressive odor control measures are used. As described, there will be multiple layers of odor control employed. The containerized system employs three, redundant odor-control measures including carbon filtration to eliminate odors even if standing next to the digester. The system will be deployed inside a building fitted with negative pressure systems to prevent odors from escaping the building. Exhaust air will be fitted with scrubbers to remove odors. And exhaust will be discharged into a greenhouse for another layer of odor control. With six independent odor control measures, people can live and working in close proximity to the E-Generation facility without detecting any odors.

[0084] The following is a grid that shows how various systems handing problems associated with waste processing, collection, and disposal. The systems include, landfills, incineration, composting, anaerobic digestion, and the present invention (E-Generation).

	Land-fill	Incinera-tion	Com-posting	Anaer-obic Digestion	E-Genera-tion
Returns nutrients to the life cycle	X	X	✓	✓	✓
Prevents the release of harmful CH4	X	✓	De-pends	✓	✓
Creates useable biogas	X	X	X	✓	✓
Avoids consumption of primary energy	X	✓	X	✓	✓
Avoids nuisance to community	X	X	X	X	✓
Avoids manufacture of chemical fertilizers	X	X	✓	✓	✓
Avoids eutrophication from water discharge	De-pends	✓	De-pends	X	✓
Avoids air acidification	X	X	✓	✓	✓
Avoids pathogen & vermin spread	X	✓	X	X	✓
Avoids release of airborne toxins	✓	X	✓	✓	✓
Requires no added energy to operate	✓	✓	X	X	✓
Requires no added water to operate	✓	✓	✓	X	✓

[0085] A check mark indicates that the system can handle the requirement. An x indicates that the system cannot. In some instances the answer may depend on the circumstances. For example, if the landfill or composter has a liner, or the system is capped, release of harmful gasses or toxins is less likely to occur.

[0086] The present invention will harness an advanced, containerized, micro anaerobic digestion (AD) process, along with mechanical separation and recovery of "contaminant" materials, to capture key nutrients that should be returned to the life cycle while also generating energy in an efficient, clean, and safe manner.

[0087] The E-Generation process does not consist of AD alone. It employs a mix of renewable energy technologies to power a community (solar, wind, waste-to-energy, geothermal), and lower the parasitic power load on the facility, depending upon the characteristics of each site. It will likely combine a solar garden and helical wind turbine with micro AD. The facility will first mechanically scrub the air for odors and particulate matter. The resulting cleaner air, which will include incidental human and vehicle CO2, will vent and filter through our commercial greenhouse, so that even the CO2 is captured and converted on-site to plant nutrition and oxygen.

[0088] The natural gas powered generators will also vent their minimal CO2 and heat into the greenhouse (which will have CO2 sensors to guarantee levels safe for humans). The E-Generation system is designed to capture even the CO2 of workers. Landfills and compost facilities, whether capped or not, allow greenhouse gases (and odors) to escape, and typically, little effort has been made to capture and use the CO2 of vehicles or workers.

[0089] In the present invention, the resulting liquid fertilizer and mulch are rich in nutrients that will be returned to the soil, having been enhanced by the bacterial digestion process. Some of it will be used on site in the commercial greenhouse, some will be made available to the county at a deep discount, and the remainder will be made available to local farms at reasonable rates.

[0090] The micro AD technology selected for this particular E-Generation facility pasteurizes at the front end, and only beneficial, non-GMO organisms are involved in the digestion process. Unlike landfills or composting, pathogens and vermin cannot be transmitted through to groundwater, soil, and air; disease vectors will be eliminated but the nutrient values will be preserved and returned to the life cycle as they are in composting.

[0091] Because sources cannot guarantee less than 10% contamination of material by volume, and that contamination will apparently consist largely of plastics and some paper that cannot be recycled due to extensive mixing with food matter, a different means to use the "contaminants" is being sought (other than sending them to a landfill).

[0092] The solution most likely to be selected is to supply the separated nonrecyclable plastic, paper/cardboard, and larger pieces of wood at no cost to another local provider that adds value and creates a commodity. A friction or infra-red drying system could be installed so that the cleaned plastics could reenter useful life with a recycler which produces plastic lumber.

[0093] It is also possible that contaminants will include broken glass, which cannot presently be recycled and would have no destination other than landfill. As this waste stream is likely a small amount, E-Generation will attempt to store it for a period of time until alternative uses like art glass or concrete production are explored.

[0094] If any materials are shipped away from the site, for example, those contaminating items that cannot be used on site, E-Generation will select services and haulers that use alternative fuels. Bio gas can be cleaned on site and used to create compressed natural gas that could fuel vehicles that would haul away any recaptured glass, metal, and nonrecyclable items.

[0095] This process will dramatically reduce the number of truck miles traveled to handle the material, which in turn will dramatically reduce diesel emissions. A side benefit will be the faster turnaround time from transfer station to our facility, not only from a labor perspective, but from a truck availability perspective. During times when the transfer station is receiving a lot of material, having the available vehicle return faster to remove additional material will smooth operations and delay the need to expand the fleet. Delaying or even preventing the purchase of additional vehicles for the purpose of hauling waste prevents costs and carbon footprint (emissions in manufacturing and delivery of trucks) from expanding prematurely.

[0096] The facilities are constructed to a far higher degree of resource efficiency (energy, water, materials) than conventional buildings, typically using 35%-50% less energy.

[0097] By using complimentary renewable energy to operate the E-Generation facility, the intent is to power the entire operation on 100% renewable energy, aiming for net zero energy use. In addition, the process does not discharge water after the digestion process, which prevents the eutrophication of the water shed. The intent is to use energy on-site, and some of the fertilizer and mulch on site as well.

[0098] FIG. **1** shows the general flow of the E-Generation process. The community would generate certain waste streams. Including, food waste, garden and yard waste, and human waste. These streams as much a possible would be fed to an anaerobic digester, but first pasteurization or other technology would be used to eliminate pathogens, pests, vermin

and the like. For example, in states like Minnesota yard waste must be treated to eliminate the Emerald Ash bore, which is very harmful to ash trees.

[0099] The output of the anaerobic digester comprises a plurality of streams. Including, biogas—which can be used as a fuel in combination with other sources; heat—which can be recaptured for a variety of uses; and fertilizer—which can be used at the facilities greenhouse or garden or exported.

[0100] FIG. **2** shows a flow chart capturing various beneficial aspects of the present invention, which are described in detail above.

[0101] FIG. **3** is an additional flow chart showing the configuration of the system of the present invention.

[0102] While the preferred embodiment of the invention has been described in reference to the Figures, the invention is not so limited. Also, the method and apparatus of the present invention is not necessarily limited to digital signage, but can be applied to any field where real-time content verification is desired.

[0103] Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. Although methods and materials similar to or equivalent to those described herein can be used in the practice or testing of the present invention, suitable methods, and materials are described below. All publications, patent applications, patents, and other references mentioned herein are incorporated by reference in their entirety to the extent allowed by applicable law and regulations. In case of conflict, the present specification, including definitions, will control.

[0104] The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and it is therefore desired that the present embodiment be considered in all respects as illustrative and not restrictive, reference being made to the appended claims rather than to the foregoing description to indicate the scope of the invention. Those of ordinary skill in the art that have the disclosure before them will be able to make modifications and variations therein without departing from the scope of the invention.

1. A sustainable complex, comprising;

a plurality of residential or commercial units within the complex;

a waste treatment facility integrated into the complex, which provides resources for the complex.

2. The complex of claim **1** where the waste treatment facility handles organics, including food waste, garden and yard waste, and human waste.

3. The complex of claim **2** where the waste treatment facility comprises an anaerobic digester.

4. The complex of claim **1** where the waste treatment facility further comprises pasteurizer for treating waste.

5. The complex of claim **3** where the anaerobic digester produces heat, fertilizer, and gas.

6. The complex of claim **5** where the products of the digester are returned to the complex as resources for use therein.

7. The complex of claim **1** further comprising a greenhouse, on-site, or local agriculture

8. The complex of claim **7** where the greenhouse receives resources from the waste treatment facility.

9. The complex of claim **1** further comprising a renewable resource for providing resource input.

10. The complex of claim **9** where the renewable resource is solar, geothermal, or wind.

* * * * *