



PYROLYSIS AS APPLIED TO THE PROCESSING OF WASTE

To: NY Climate Action Council

From: Kevin M. Dailey, CEO

Dated: March 13, 2022

Green Waste Energy, Inc. and C6 Technology

-Summary-

I am forwarding this statement with some information on our company. Green Waste Energy, Inc. ("GWE"). Green Waste Energy, Inc. owns a patented Advanced Thermal Conversion Technology known as "C6". Our process is capable of converting virtually any form of carbon based waste into a clean syngas – and from there into "green" electricity, renewable natural gas or with additional processing into hydrogen. Our technology operates through a pyrolysis process, featuring prominently an oxygen starved technological process – with the significant result that we do not create emissions or greenhouse gases. The C6 conversion process is an endothermic reaction as opposed to many other technologies now being employed worldwide – which are exothermic (burning).

With environmental standards continuing to tighten worldwide, it would appear that incineration and landfilling will soon no longer be acceptable solutions to the problem of "what to do with the waste". Plans to address the problem with new landfills and new burn plants are not politically acceptable as such facilities are directly harmful to the environment, are costly in the extreme and create unacceptable greenhouse gas emissions, toxic residues and ground water pollution. Moreover, any such plans are met almost immediately with a storm of environmentalist opposition.

Our equipment is both modular and scalable, so we can adjust the size of the facility to the local need. Our C6 technology can dispose of any form of carbon based waste, which includes, besides municipal solid waste ("MSW"), C&D debris, agricultural waste, manure, abattoir waste, tires, medical waste, municipal sewer cake, FOGS (fats, oils and grease), electronic waste and

maritime oil sludge. In terms of re-cycling, we capture 95%+ of the recyclables in the waste stream, where elsewhere best efforts get in the neighborhood of 30%. This aspect of our technology goes hand in hand with the already commendable environmental efforts in many communities.

The first stage of our process for processing Municipal solid waste involves autoclaving, which is a sterilization system that removes pathogens and converts MSW into a homogeneous feedstock while reducing volume by two-thirds. There is no need to either pre-shred or open trash bags prior to loading into the autoclave, as an internal auger in the unit performs this function. Batches of MSW are loaded and heat applied at 160 degrees centigrade for 55 minutes. The autoclaves in a "train of equipment", operate in pairs, as one is being loaded, the other is emptying out and heat is transferred between the autoclaves as a cost savings measure. This preconditioning system creates no emissions. The material that emerges is transferred to a classification system, where the recyclables (clean metals and glass) are separated out mechanically, leaving a pathogen free cellulose product (composed of bits of organic material, paper, wood and textile), which is mixed with ground up plastic obtained from the waste stream, providing the feedstock (of carbonaceous material) for the C6 pyrolysis unit.

The heart of the C6 system is the pyrolyser, for which we have patented the technology (US Patent No. 9,410,094 B2). This advanced conversion technology converts the feedstock at a high temperature (900 degrees centigrade) from a solid to a liquid to a gas, in the absence of oxygen, thus enabling the production of an energy laden synthetic gas (syngas). The principal factors that distinguish the C6 technology as superior are: the efficiency of the system, the quality and consistency of the gas, exceedingly low emissions, the "swallow all" capacity for virtually any form of carbon based waste and the swallowing capacity – for high volumes of material. The system operates by taking back a very low parasitic load of electricity to operate the plant and can be established on a small footprint, less than 4 acres for a 440 ton per day facility. In the process of achieving the above we initiated several novel design concepts for the support equipment, which were incorporated into the US Patent application. The result of our development was a "Flash Pyrolyser" that is vertically oriented, has several heat paths to retain a high heat flux and is multi zoned. The transformation time to gas is 8 seconds.

ENERGY VALUE – The syngas as mentioned above, can be used to produce electricity but can also be compressed into a renewable natural gas or can be further processed into hydrogen. By using pyrolysis instead of gasification (the two are distinct), we will achieve a higher volume of syngas with a greater energy value, resulting in a syngas that has a higher energy value of 20% more than any other form of waste processing. This is very significant.

GWE's plants take approximately 14 months to build and as mentioned above, are fully scalable to accommodate increased demand. The facilities operate 24 hours a day, seven days a week in all weather. The green electricity can be sold as base load electricity – or directly to a retail customer, such as an industrial plant or office campus. GWE's facilities derive revenue from: 1. tipping fees from incoming waste streams; 2. the sale of electricity, RNG, hydrogen pursuant

to power purchase agreements; 3. the sale of renewable energy credit (RECs”) and carbon credits, where available; and 4. the sale of recovered metals, recycled plastics and recycled glass. This approach is faithful to the concept of a “circular economy”.

The implementation of a C6 Technology facility will drive numerous financial, economic and environmental benefits for the host community. A \$90 Million plant designed to handle 450 tons per day of MSW, will include \$20 Million in local construction and economic activity and add roughly \$6 Million in annual payroll to the local economy, with the project creating 70 new jobs. Additionally, with the diversion of waste from the local landfill, the carbon footprint is diminished dramatically. A “C6 Technology” facility will be more efficient and have a smaller capital cost per MW of electricity produced than any other power generating system. Generally a trash incineration plant equipped with the latest scrubbing technology (which is a must by standards today) will cost half again as much to build as a GWE C6 facility- for the same tonnage of waste to be disposed of. However, a GWE facility utilizing C6 Technology will produce 50% more electricity. In addition, unlike incineration plants, C6 does not produce a toxic ash waste residue as an end product, that needs to be disposed of at a landfill and carrying a substantial cost. The C6 end product after pyrolysis, is an inert material that can be vitrified and added as a component to blacktop or concrete. This end product has potential commercial value.

We believe that GWE offers to New York a “best in class” technology that is far superior to any other waste disposal solution available in the marketplace – at an affordable price and at a premium in terms of energy produced – that is, from an often overlooked source, MSW (or other streams of carbon based waste). GWE’s pyrolysis technology stands apart from all other pyrolysis technologies in the ability to process large volumes of material, offer a “swallow all waste streams” capability and features a pyrolysis process that takes eight seconds to operate. General Electric in evaluating the technology referred to C6 as an “elegant solution” to the global waste problem. To sum up, when we state that GWE’s C6 process offers a “best in class” technology, we intend that a discerning client understand the following:

- the C6 facility requires a small parasitic load to operate, taken from the electricity produced by the facility, so no power is required to be purchased from the grid;
- requires a relatively small footprint, approximately 4.0 acres for a 440 tpd (tons per day) facility;
- the technology is scalable, so additional trains of equipment can be added as demand for electricity, or the supply of waste increases or becomes available;
- has a high “swallowing” capacity, in terms of volume of waste processed – and types of waste (“swallow all”);
- produces a high calorific value gas – which can be used to produce electricity – or can be converted to renewable natural gas or hydrogen – and where desired to a liquid fuel.;

- has a high power yield per unit, with 11.5 MW produced in a 440 ton per day facility; and 25 MW produced in a 1,000 ton per day facility;
- plant emissions are for the most part non-existent, or at best negligible – and are far below European Union and US environmental standards.

Lastly, we at GWE believe that present methods of waste disposal, for the most part incineration or landfilling, are in the long term unsustainable. I believe that most informed people in New York would likely agree.

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C6 Technology – Sustainability

- Captures 95% of the recyclable in the waste stream;
- Recyclables (metals, plastics, glass) are sterilized/pathogen free; ready to go directly to the market;
- Reduces the volume of the waste stream by two-thirds;
- The remainder material – is a dried cellulose material, rich in energy value – this material is an asset!
(n. waste haulers are burying this material in landfills, where it emits Methane – some is captured, most isn't);
- So, there are no methane emissions; in fact the measured emissions from a C6 train of equipment – are negligible;
- 100% of the waste stream is utilized in some capacity, including the residue after pyrolysis, which can be vitrified and utilized an additive to blacktop or concrete – or as landfill cover.

Benefits –

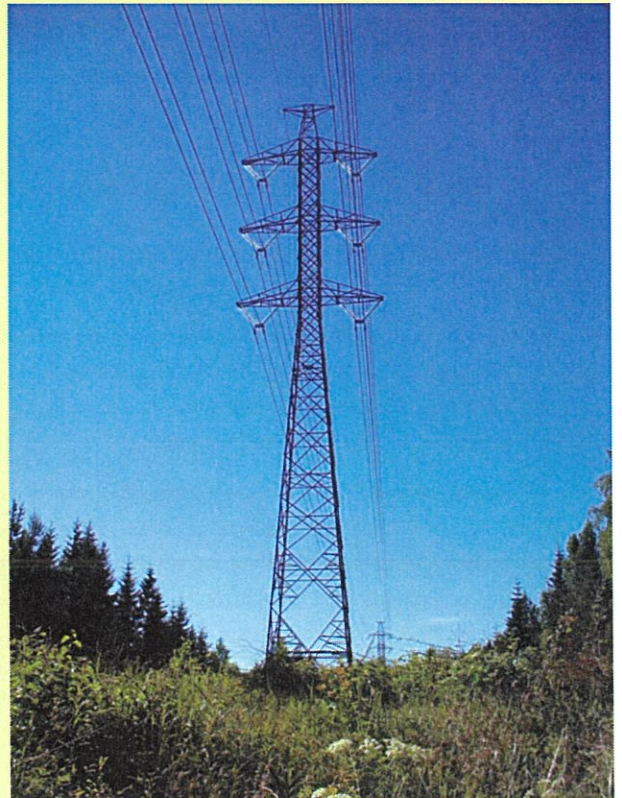
- The refuse derived fuel in the form of a syngas, can make “green” electricity, renewable natural gas, or can be converted to hydrogen;
- Environmentally friendly, C6 Technology operates in the absence of oxygen, produces little of no emissions, captures CO₂, no toxic waste from burning, no greenhouse gases;
- Helps navigate a somewhat uncertain regulatory environment – and firmly places pyrolysis on the right side of the environmental debate.



C6 ADVANCED RECYCLING AND ENERGY CONVERSION (AREC) SYSTEM

Technology Overview

State-of-the-art in efficiency, flexibility and pollution control



WASTE, ENERGY AND THE FUTURE

THE PROBLEM

Among the problems facing world economies in the coming years are two very significant challenges:

Waste Disposal

Huge quantities of waste are produced around the world, with amounts increasing due to population growth and change in consumption patterns. The US alone produces over 250 million tons of municipal solid waste per year, plus many hundreds of millions of tons of commercial waste, hospital waste, used tires and other types of non-recyclable waste. Most waste is burned in incinerators or dumped in landfills, both of which are inefficient, costly and lead to a host of environmental problems.

- Contaminated moisture from landfills can leach into the water table for decades;
- The solid remains of landfills are a long-term contaminant;
- Methane and carbon dioxide (in addition to unpleasant odors) are released into the atmosphere;
- Landfills can catch fire, and are very difficult to extinguish,

resulting in increased pollution;

- Incineration can release NO_x, SO_x, dioxins, furans and other dangerous pollutants;
- Fly-ash from incineration is hazardous and typically must be buried in specially designated landfills.

In many countries, landfill space is now in short supply. For example, in 1978 there were around 20,000 landfills in the US. The US Environmental Protection Agency estimated that by the end of 2010, only 1,200 landfills remain.

Recycling, while positive, can only address a fraction of the problem, as there remain many types of waste that cannot be recycled.

Over-Reliance on Fossil Fuels

The supply of fossil fuels is finite and subject to political uncertainty, which is reflected in the long term upward price trend. Burning oil and gas to produce electricity is very costly. Fossil fuel-fired power stations produce large amounts of pollutants and greenhouse gases.



THE SOLUTION

C6's Advanced Recycling and Energy Conversion technology provides a solution to both of these problems by turning harmful waste into energy using a state-of-the-art, pollution-free process that does not burn waste.



BENEFITS OF ADVANCED RECYCLING AND ENERGY CONVERSION

Advanced Recycling and Energy Conversion provides a number of benefits compared to other types of renewable energy:

Continuous and Predictable "Base Load" Renewable Energy:

A robust and reliable process which produces sustainable energy continuously and at high availability, not dependent on wind, sun or other climactic conditions;

Energy Located Close to Consumers: AREC plants can, regulations permitting, be sited in or near population centers, unlike other types of renewable energy such as solar, wind, geothermal and marine which are often located at a considerable distances from where the energy is required, resulting in increased interconnection costs and transmission losses.

Reduction in Incineration and Landfill and Associated Pollution: C6 AREC plants provide a more efficient, environmentally-sound method of disposal of non-recyclable waste, eliminating the need for incineration and dramatically reducing new landfill requirements; even existing landfills can be remediated and the land re-used for other purposes. This in turn reduces harmful emissions and other pollutants caused by landfill and incineration.

Robust Financials with multiple revenue sources: The financial return is less dependent on the price of competing energy sources, since only a part of the revenue is derived from the sale of electricity, with tipping fees making up a significant percentage of revenues.

C6's AREC TECHNOLOGY

C6's Advanced Recycling and Energy Conversion (AREC) plants deploy an advanced process that integrates two proven thermal conversion technologies, autoclaving and pyrolysis, plus proprietary waste drying, syngas and exhaust clean-up technologies, shown in the process flow diagram on the next page.

The operating principle of the C6 plants is to pre-process the waste to remove recyclables and excess water, then generate an intermediate synthetic natural gas, "syngas", from the incoming waste by means of pyrolysis. This intermediate fuel is cleaned, then used in engines to produce electricity.

ADVANTAGES OF C6's AREC TECHNOLOGY

The C6 technology offers several advantages over competing waste to renewable energy technologies:

Multiple waste streams: The C6 technology is able to treat many types of waste, such as municipal solid waste, tires and contaminated oil, concurrently.

More Efficient: The C6 equipment has a higher thermal efficiency (MW per ton of waste) and a lower energy usage (parasitic load) than competitor products, allowing more of the energy produced to be sold rather than used to run the plant. It provides more than twice the energy conversion efficiency of traditional "mass-burn" incineration, without the adverse side effects. The C6 equipment also uses water very efficiently and in most cases returns clean water to the environment.

Further Reduction in Emissions: The syngas is automatically scrubbed to make it "engine-ready", thereby eliminating the need to clean engine flue gases. The C6 Thermal Oxidizer (patent pending) processes the combined dryer, pyrolyzer and engine exhaust to further reduce emissions and meet all global emissions standards with ease.

Automated Handling of Bio-Hazardous Waste: Sterilization in the autoclaves destroys pathogens and microbial life, eliminating the health hazards associated with landfill and standard Mechanical Recycling Facilities. Hazardous waste is processed in a fully automated, enclosed system, and MSW is treated without the need to open trash bags.

Automated Recycling: The C6 system automatically sorts waste constituents and sorts out the recyclables. The recyclables are sterilized and deglazed and reduced in volume for easy handling. C6 enhanced recycling recovers close to 100 % of all metal, plastic, glass, etc. Source separation typically recovers up to 1/3 of recyclables at best.

No Odors: Unlike landfills and incinerators, C6 plants will not produce any noticeable odors due to their integrated design, with the only emission point being the smokeless exhaust stack.

Flexible: The C6 technologies can handle a very diverse range of waste and can produce energy products in both liquid and gas forms in addition to electricity.

ADVANTAGES OF C6's AREC PLANTS

When the superior C6 technology is applied in practice it results in plants with several significant advantages over competing systems.

End-to-End Processing: The C6 technology solution combines sterilization, sorting, drying, pyrolysis and electricity production under one roof, which is revolutionary in the waste processing and waste to energy industries.

Scalable & Flexible Plant Design: The technology can be adapted to create various sized plants; plants can also be built to process mixed waste types in different quantities.

Multiple Revenue Streams: Plants earn revenues from three sources: tipping fees, generally charged in developed countries for disposal of waste; the sale of electricity and the sale of renewable energy credits or similar; the sale of recyclables, residue and other outputs such as liquid fuel.

No Odors: Plants are closed systems with no direct air emission points, therefore they do not emit unpleasant odors, unlike landfills and incinerators.

Improved Aesthetics: Each plant will be enclosed in a low-rise warehouse-type building designed to blend in with the environment. Unlike incinerators, there is no smokestack.

Modular Construction: Plants can be built in phases as additional waste streams are secured, which reduces initial capital outlay and the time to plant commissioning.

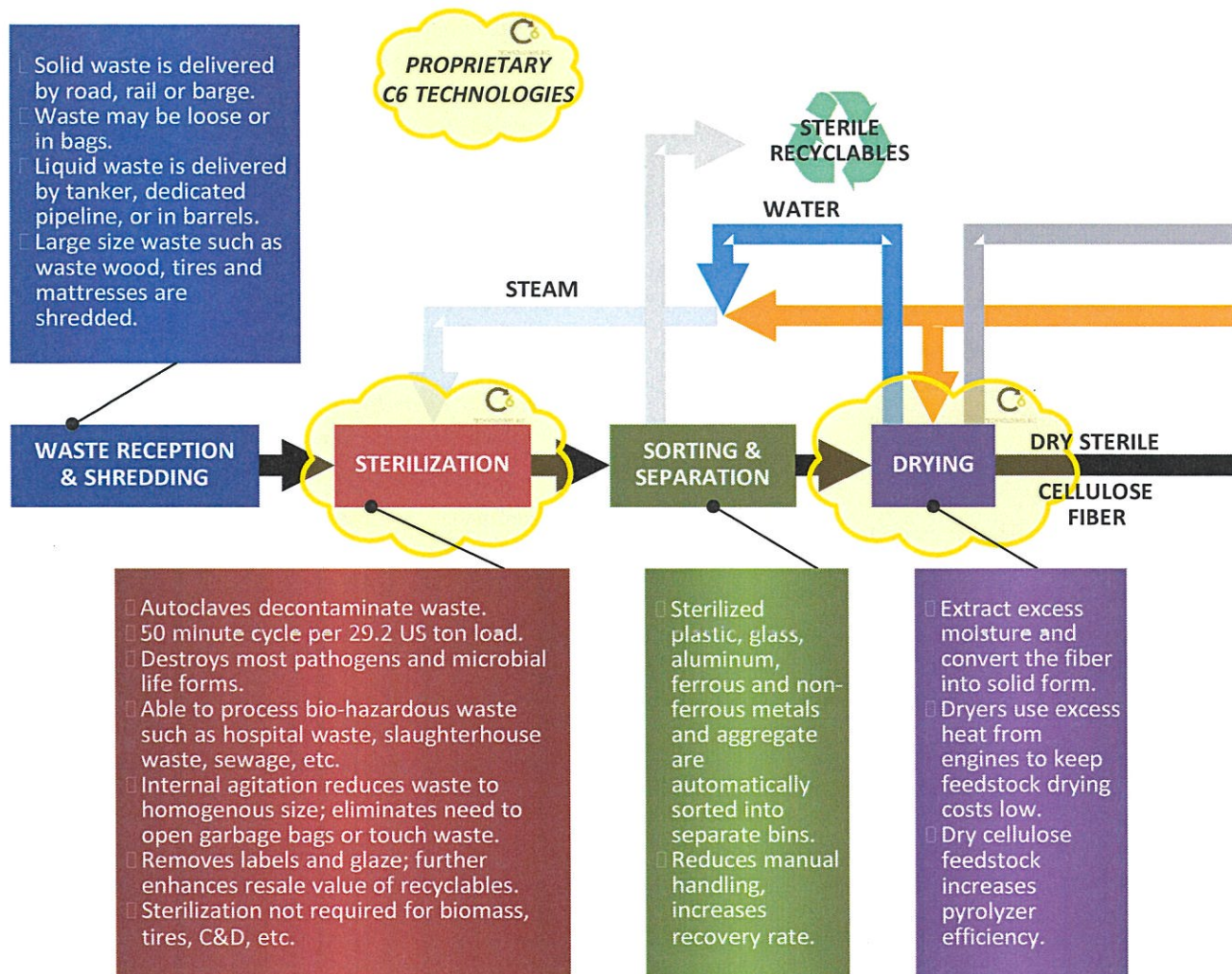
Attractive to equity investors: With excellent returns, long-term recurring free cash flows and early exit potential via sale to other investors upon plant commissioning.

Attractive to banks and debt providers: Strong debt service cover ratios and other metrics; revenues are not subject to capacity factor probability estimates, unlike wind and solar.

Turnkey Solution: All necessary equipment and materials to construct AREC plants are provided by the licensed manufacturer, apart from site facilities such as access roads and fencing, buildings and waste transportation vehicles.

EPC wrap and O&M contract: Provide low risk, integrated solution that is attractive to potential investors.

OVERVIEW OF THE C6 PROCESS



WHAT KINDS OF WASTE CAN BE PROCESSED?

The C6 technology can process any type of waste that has a calorific value:

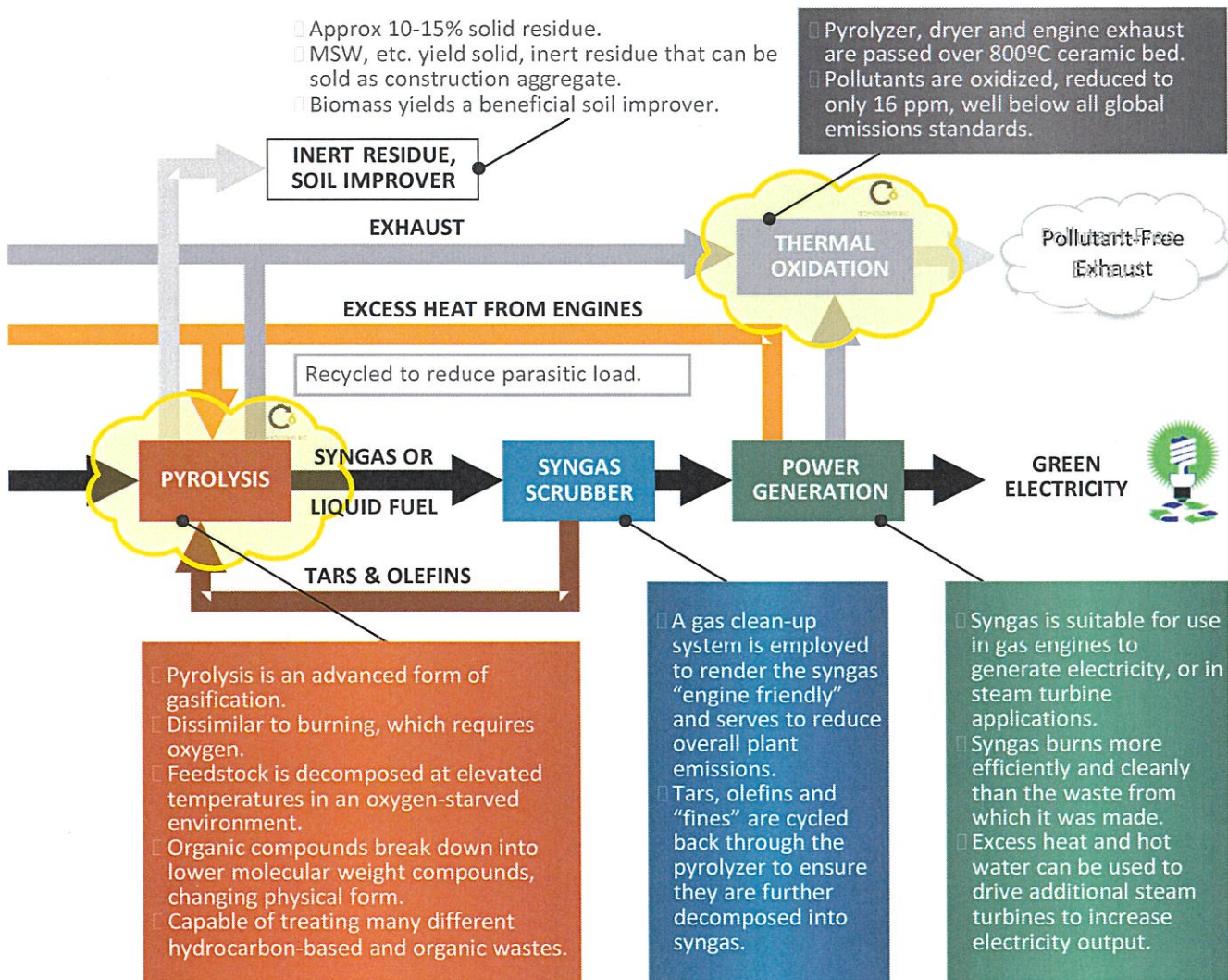
- Hydrocarbons such as oil;
- Complex sugars such as vegetable waste;
- Organic chemicals such as animal fat.

Specific types of waste that can be processed include:

- Municipal solid waste ("MSW"): discarded food, bottles, cans, paper, fabric, hygiene products, plastic packaging and other household trash.
- Commercial & industrial waste.
- Construction & demolition debris such as old wooden doors and window frames, timber framing, wooden forms for concrete, waste wood products such as MDF, particleboard, Formica, etc.

- Hospital waste: blood, human tissue, used wound dressings, contaminated disposable instruments.
- Slaughterhouse waste and veterinary waste: animal tissue, blood, contaminated packaging.
- Sewage and cesspool waste. Animal manure and slurry.
- Contaminated oil: used oil from engines, transformers and other machinery, high in hazardous PCBs.
- Oil sludge: residue in oil storage tanks that cannot be used in refinery.
- Biomass including household garden waste, forestry waste, agricultural waste and energy crops.
- Contaminated timber such as old railway sleepers or fencing contaminated with oil, tar or creosote.





MARKETABLE OUTPUTS

Recyclables

The waste preparation process sterilizes and segregates various types of recyclables including:

- Glass;
- Plastic such as PET bottles;
- Aggregates such as stones;
- "Tin" cans, aluminum and other non-ferrous metals;
- Steel and ferrous metals from tires, building waste, mixed waste.

The process enhances the value of the recyclables:

- All recyclables are sanitized;
- Labels are removed from bottles and cans, and the cans are deglazed, crushed and may optionally be baled;
- Plastics are ground into 1cm chips for recycling or if of low commercial value are included in the pyrolyzer stream.



Pyrolysis Residue

The inorganic feedstock materials form an inert, non-hazardous residue that is approximately 15% of feedstock volume, depending on the feedstock composition. The residue is of grey granular form.

The inert residue has several applications including:

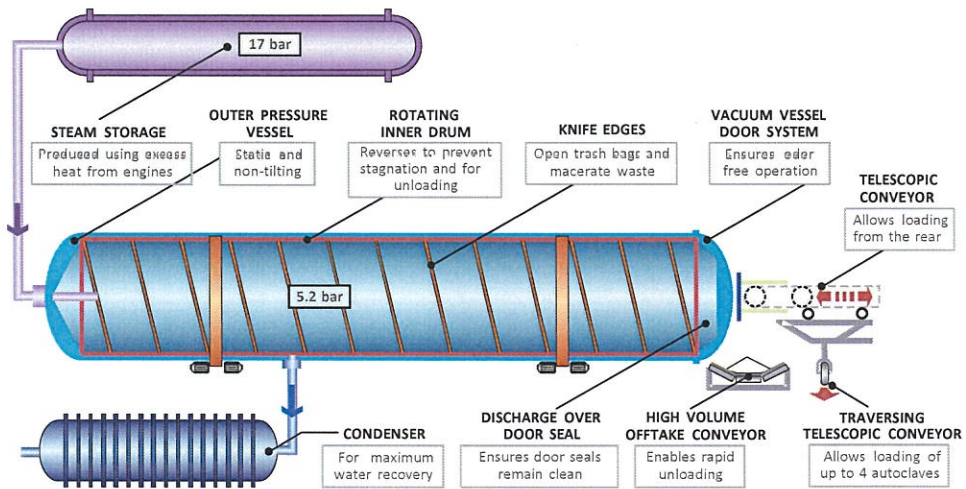
- Road Aggregate: rocks or sand;
- Brick-Making: Low cement type stock bricks;
- Combined with resin to make particle board substitute;
- In the worst case, the residue is a non-hazardous landfill;
- Pyrolysis of biomass produces a potassium-rich organic output that can be used as a beneficial soil additive.

PROPRIETARY C6 TECHNOLOGIES

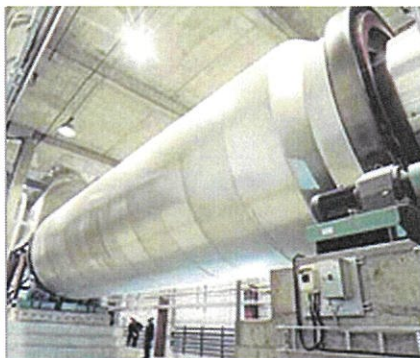
The innovative C6 AREC process is built upon 4 key proprietary pieces of equipment that are patented or patent pending.

AUTOCLAVE

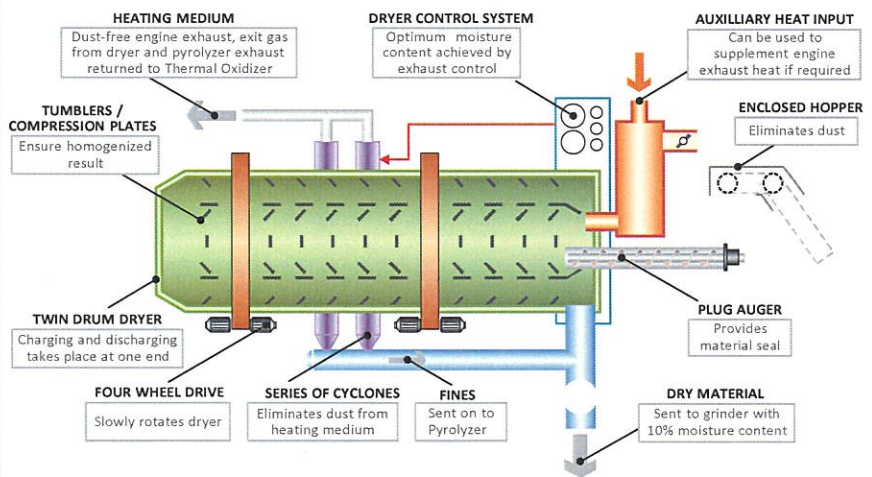
- Waste is processed in batches of 29 tons.
- Pressurized saturated steam (160°C and 5.2 bar) "pressure-cooks" the waste for up to 50 minutes, giving a very high pathogen and virus kill rate.
- [Feedstocks like forestry waste and oily sludges do not require autoclaving.]
- Outer pressure vessel is static; inner drum allows reverse / forward rotation for material homogenization, and continuous reverse for material discharge.
- Loading conveyor allows loading to 70% volumetric capacity in 15 minutes (competitor systems achieve 50%); telescoping feature allows loading from rear (eliminates bridging with alternative systems); traversing feature allows loading of up to 4 autoclaves.
- High volume offtake conveyor empties vessel in 10 minutes.
- Door seals (problematic on competitor designs) are protected by the inner drum extension into the door.
- Internal agitation eliminates need to pre-shred or open trash bags prior to loading.
- Steam stored at 17 bar to ensure availability on demand.
- System designed to duplex, saving 40% operational energy.
- Sealed unit; no emissions or odors.
- Condensers and vacuum pumps enable relatively dry discharge of cellulose fiber and recyclables.



DRYER



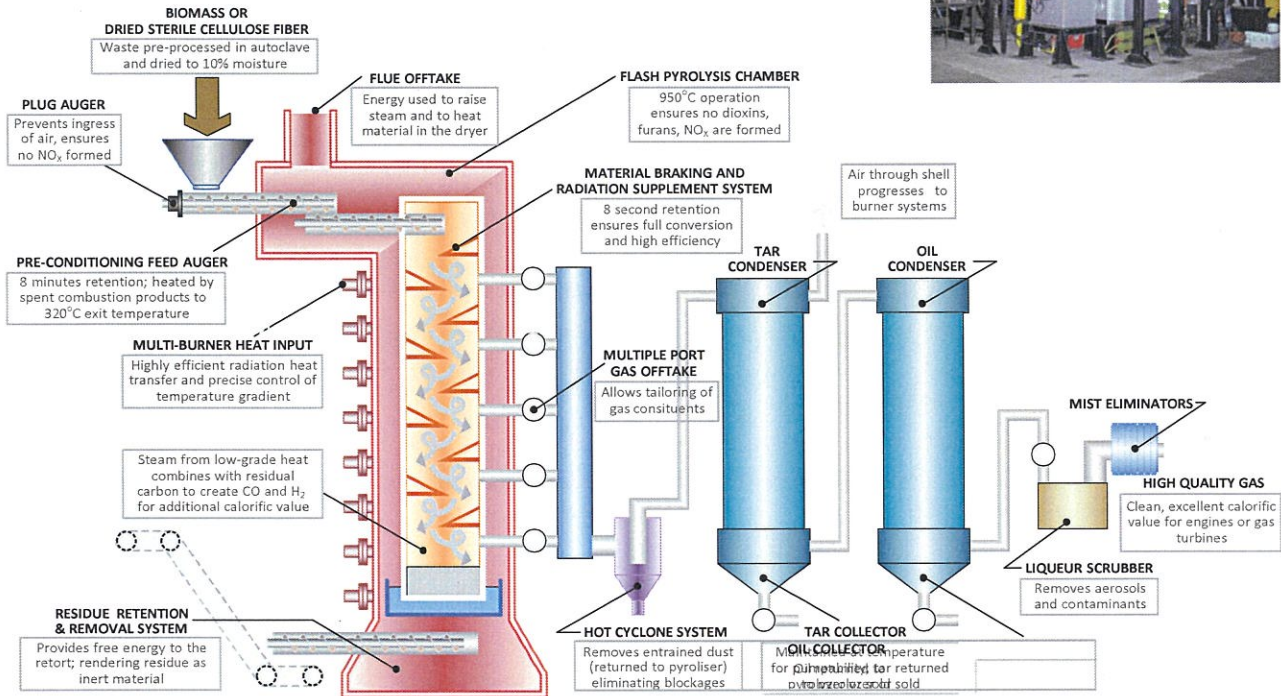
- Can process all materials e.g. Refuse Derived Fuel, cellulose fiber from autoclaves, wood waste, chicken manure etc.
- Efficient twin drum design allows loading and unloading from one end and reduced overall length.
- Sealed hopper and auger for material handling eliminates dust.
- Extremely reliable four wheel drive rotates dryer.



- Internal tumblers and compression plates homogenize any feedstock.
- Accurate moisture content achieved through exhaust control.

PYROLYZER

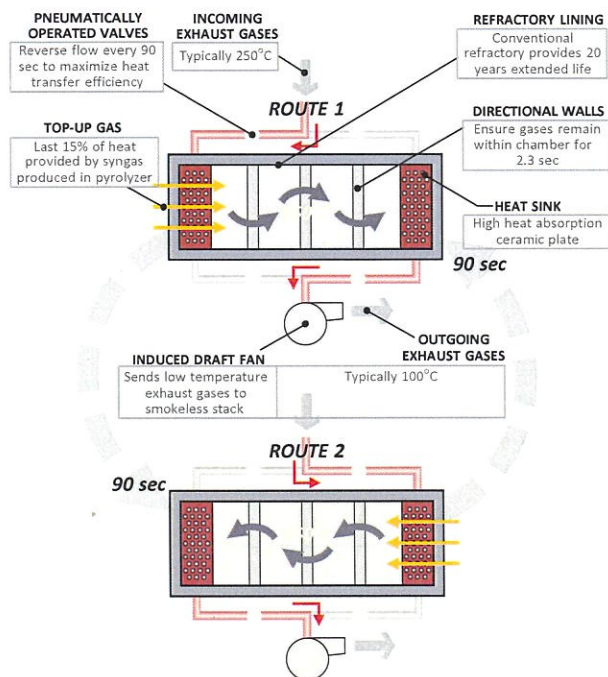
- Very high calorific value gas – typically 22MJ/m³ (competitive systems less than 15MJ/m³).
- High volume of gas and thus electrical energy – typically 1.1 MW per US ton for materials with nominal CV of 16 (competitive systems less than 0.7 MW).
- Maximum use of energy with parasitic load of around 10% (competitive systems typically 25%).
- No fines carry over to gas clean-up system.
- No high temperature moving parts.
- No gas leaks.
- No char (all carbonaceous fraction converted).
- Remainder of low grade heat is employed to preheat the air to the burners.
- Pyrolyzer exhaust provides heat to preconditioning system.
- Ultra low emissions.
- Purifying syngas is simpler and less expensive than cleaning flue gases from incineration.
- Entire system can be pre-assembled to minimize site construction.



THERMAL OXIDISER



- Most Environmental Agencies require all air emissions to be heated to 850°C for more than 2 seconds, typically requiring high energy consumption.
- The C6 design reduces energy consumed to almost 15% of competitive designs.
- Gases acquire heat from a ceramic bed at one end and deposit it at a bed at the other end prior to discharge to the stack.
- Flow is reversed each 90 sec to allow the previous exit heat sink to heat the incoming gases.
- Last 15% of heat is supplied by syngas produced by the pyrolyzer.
- The unit removes all volatile organic compounds.
- In the event of high concentrations, NO_x can be reduced by 90%.
- System can be effective from full output to a fraction of output.
- Easily meets the very strict EU environmental emissions laws, as well as US EPA regulations.
- Neutralizers can be added to treat otherwise difficult compounds.



EMISSIONS DATA

Thanks to their efficient pyrolysis technology and extremely effective thermal oxidizer clean up equipment, C6 plants easily meet all environmental agency pollution standards. The results below are typical of a C6 plant operating with one engine.

Contaminant	European Waste Incineration Directive Limits	Typical Result
CO	50 mg/m ³	17.7 mg/m ³
SOX	50 mg/m ³	negligible
NOX	200 mg/m ³	26.4 mg/m ³
Dioxins & Furans	0.1 ng/m ³	negligible
Particulates	10 mg/m ³	0.1 mg/m ³
TOCs	10 mg/m ³	negligible

PLANT REVENUE MODEL

Advanced Recycling and Energy Conversion plants benefit from multiple sources of revenue, which makes them less sensitive to price variations in any particular area. AREC plants generate revenues from:

- Tipping fees (in the form of landfill taxes and gate fees) from incoming waste.
- The sale of electricity or fuel, often enhanced with renewable energy incentives.
- The sale of recovered metals and other recyclable commodities, and (potentially) inert residue.



ABOUT C6

C6 Technologies, Inc. (C6) is a W2E technology licensor. For 6 years C6 has been at the forefront of Research & Development into energy conversion involving pyrolysis and autoclaving equipment specifically designed for black bag and general waste.

C6 secures their return on the development through a licensing arrangement with the end user. The fees per item of equipment are very modest and the annual license fee can be negotiated as a percentage of total revenue or a percentage of electricity or liquid fuel income or the gate fee as appropriate. In this manner the plant operator is not burdened with cost without return.

Agreements already signed:

Green Waste Energy Development, Inc. (GWED) is currently developing projects in the U.S. and elsewhere and exclusively employs the patent pending C6 Technology for their waste to energy opportunities.

C6 Technologies invites other project developers to utilize the C6 Technology, under the same preferential conditions that GWED currently enjoys. While it is not a prerequisite regarding the use of C6 products, GWED has agreed to co-develop plants with other developers should they consider this option to be preferable.

DESIGN, CONSTRUCTION & OPERATION

Exceptional technology is only part of a plant's success. As important is the ability to design, manufacture, install and operate the plant efficiently.

C6 has provided a sole manufacturing license to Prestige Thermal Energy South Africa, who are able to provide an end to end turnkey solution that includes:

Engineering analysis and design to optimize the plant to handle the specific waste stream and site layout.

Manufacture of all key equipment.

Partner with local suppliers for fabrication of high mass equipment.

Plant construction (construction times vary between 12 months for a 300 tpd plant and 24 months for a 3,000 tpd plant).

PLANT OPERATING MODEL

C6's Advanced Recycling and Energy Conversion plants can utilize centralized or decentralized operating models:

Renewable Energy Centers provide end-to-end processing to convert waste into renewable energy all under one roof.

Alternatively, **Waste Transfer Stations** can aggregate, sterilize and dry the waste using C6's autoclave and dryer, which reduces its weight and volume by around 65%. Dry sterile cellulose fiber is then transported to Renewable Energy Centers, where it is pyrolyzed and used to produce renewable energy. This approach reduces waste transport costs and minimizes the risk of transporting bio-hazardous waste.

