



REACTIVE ENERGY, INC.

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Clean Petroleum
Base Products
From Plastic Waste

TRASH COMPONENTS

- ▶ Bio Mass (Garbage)
- ▶ Wood
- ▶ Paper
- ▶ Glass
- ▶ Metals
- ▶ Plastic

Landfill

Incinerate

Recycling

Gasification

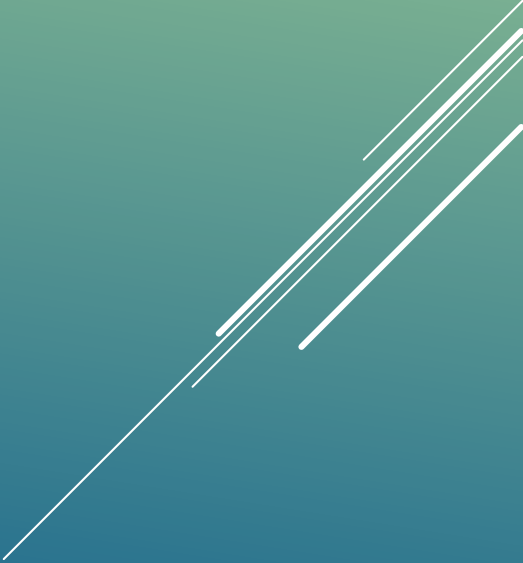
HIGHEST & BEST USE MARKET END-PRODUCTS

- ▶ Incineration
 - ▶ Steam Power
- ▶ Recycling
 - ▶ Paper Mills
 - ▶ Smelter
 - ▶ Reprocessed Glass
- ▶ Gasification
 - ▶ Petrochemicals

ENVIRONMENTAL/TECHNOLOGY/
MARKET BUSINESS MODEL SPECTRUM

- ▶ 28 Million Tons of Plastic landfilled annually in the US.
- ▶ Few recycling alternatives – None for some types.
- ▶ Among Plastics, Biomass, Wood, Metals, Glass, the longest deterioration cycle is Plastics.
- ▶ Strategic approach – convert waste to asset!

ENVIRONMENTAL OBJECTIVES

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- ▶ **Potential Petrochemical Products**
 - ▶ **Economical Value & Market Demand**
- ▶ **Gasification Plant = Petrochemical Plant**
 - ▶ **Traditional Distillation/Refining Techniques**
 - ▶ **Synthetics**
 - ▶ **Fuels**
 - ▶ **Crude – Kerosene – Diesel – Aviation Fuel – Gasoline**
 - ▶ **Heating Oil - Propane**
 - ▶ **Specialty Products**
 - ▶ **Lubricants – Hydraulic Fluids – Grease - Wax**

MARKET OBJECTIVES

- ▶ **Plastics are a hydrocarbon material**
- ▶ **Petroleum products are a hydrocarbon material**
- ▶ **The objective is to transform the hydrocarbons of plastic to the hydrocarbons of petroleum.**
- ▶ **Options for gasification:**
 - ▶ **Pyrolysis**
 - ▶ **Microwave**

TECHNOLOGICAL OBJECTIVES

- ▶ **Extremely High Temperatures**
- ▶ **Extremely High Pressure**
- ▶ **Expensive Capital Cost Commitment**
- ▶ **Poor Energy Balance Ratios**
- ▶ **Anaerobic Atmosphere required**
- ▶ **Toxic Byproducts:**
 - ▶ **Toluene, Xylene, Benzene and other cyclic hydrocarbons (heat/pressure)**

GASIFICATION BY PYROLYSIS

- ▶ Temperatures between 350° and 750° F
- ▶ Atmospheric Pressure
- ▶ No toxic gas emissions
- ▶ No Nitric Oxide emissions
- ▶ Anaerobic – within more benign environment
- ▶ Low Capital Equipment Commitment –Modular
- ▶ All Plastics – Printed, labeled, Soiled

MICROWAVE ACTIVATED GASIFICATION



BASIC PREMISE - NORMAL
NON METAL REACTION



BASIC PREMISE – METAL
ADDED REACTION



MICROWAVE PROCESSING PLANT



BLACKVILLE, SC PROCESSING FACILITY



MICROWAVE PROCESS

TRASH COMPONENTS

- ▶ Bio Mass (Garbage)
- ▶ Wood
- ▶ Paper
- ▶ Glass
- ▶ Metals
- ▶ Plastic



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MUNICIPAL RECYCLING FACILITIES
BUSINESS MODEL SPECTRUM

PLASTIC RECYCLING CHART

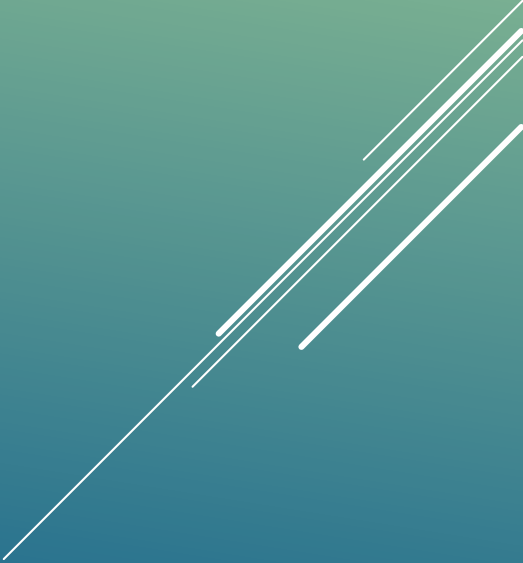
						
PET	HDPE	PVC	LDPE	PP	PS	OTHER
POLYETHYLENE TEREPHTHALATE	HIGH DENSITY POLYETHYLENE	POLYVINYL CHLORIDE	LOW DENSITY POLYETHYLENE	POLYPROPYLENE	POLYSTYRENE	OTHER PC POLYCARBONATE
COSMETIC CONTAINERS FOOD JARS JELLY AND JAM CONTAINERS MOUTHWASH BOTTLES PEANUT BUTTER CONTAINERS PLASTIC BOTTLES PREPARED FOOD TRAYS SALAD DRESSING BOTTLES SINGLE USE WATER BOTTLES SOFT DRINK BOTTLES SPORT DRINK BOTTLES	AGRICULTURAL PIPE DETERGENT BOTTLES EXTRUDED PIPE GROCERY BAGS ICE CREAM TUBS MILK JUGS JUICE JUGS OIL VINEGAR BOTTLES PAIS PLAYGROUND EQUIPMENT SHAMPOO BOTTLES SHIPPING CONTAINERS	BLISTER PACKS BLOOD BAGS CABLE SHEATHING CARPET BACKING FLOOR TILES GARDEN HOSE MEAT WRAP MEDICAL TUBING OUTDOOR FURNITURE PLUMBING PIPE WINDOW FRAMES WIRE INSULATION	6-PACK RINGS BREAD BAGS DRY CLEANING BAGS GARBAGE BAGS HEAVY DUTY BAGS MOLDED LABORATORY EQUIPMENT PLASTIC FOOD WRAP RECYCLING BINS SQUEEZABLE BOTTLES TOYS	BOTTLE CAPS CEREAL LINERS COTTAGE CHEESE CONTAINERS HINGED LUNCH BOXES KETCHUP BOTTLES MARGARINE CONTAINERS MEDICINE BOTTLES MICROWAVE OVENWARE PACKING TAPE POTATO CHIP BAGS RUBBERMAID CONTAINERS STRAWS	CAFETERIA TRAYS CD AND VIDEO CASES DISPOSABLE HOT OR COLD DRINK CUPS & PAPER PLATES DRINKING GLASSES EGG CARTONS FAST FOOD CLAMSHELLS FOAM PACKING HINGED BAKERY CONTAINERS PACKING PEANUTS PLASTIC CUTLERY STYROFOAM TOYS YOGURT CONTAINERS	BABY BOTTLES CAR PARTS FIBERGLASS LARGE WATER BOTTLES NALGENE BOTTLES SIPPY CUPS TUPPERWARE WATER COOLER BOTTLES

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PROCESSING THE SPECTRUM OF PLASTICS

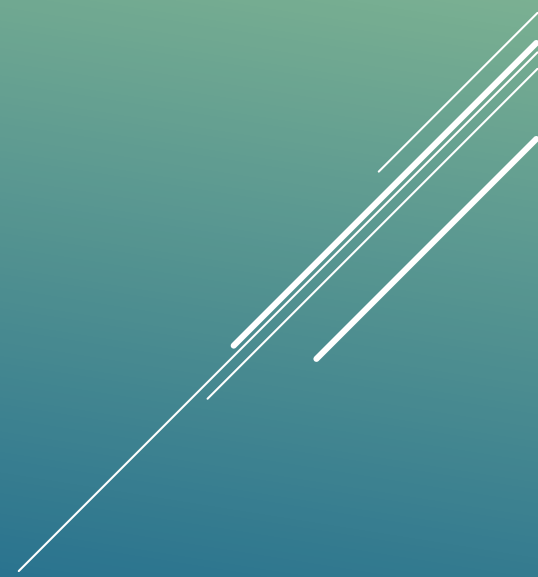
- ▶ **Energy Balance – outside power usage**
- ▶ **Variable Commercial End Product**
 - ▶ Diesel -- Aviation Fuel -- Lubricants
- ▶ **Environmental Compliance – Permits**
 - ▶ Emissions
 - ▶ Noise
 - ▶ Congestion
- ▶ **Labor Requirements - Skills and Wages**

OTHER COMPARATIVE METRICS

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- ▶ **Less volatile technology**
- ▶ **Environmentally preferable**
- ▶ **Favorable Energy Balance**
- ▶ **Modular Implementation**
- ▶ **Flexible Plastic Waste Feedstock**
- ▶ **Easily Permitted**
- ▶ **Wide range of petroleum-based product**

SUMMARY OF MICROWAVE ADVANTAGES



NEXT STEPS

- ▶ **Provide a Letter of Interest and Begin the Process**
- ▶ **Cost Evaluations – Fabrication and Operating**
 - ▶ **Local considerations for budgets, unit analysis and ROI**
 - ▶ Labor wage rates and skills
 - ▶ Fabrication capabilities
 - ▶ Markets
 - ▶ **One 80-ton unit built in USA estimate \$15.0 Million**
 - ▶ **Staging and Number of modular Units**
 - ▶ Let us know your needs
 - ▶ **Fixed Cost or Cost plus agreements**
 - ▶ **Components**
 - ▶ Fabrication Cost – Engineering firm -USA
 - ▶ Microwave Unit – Specialized manufacturer
 - ▶ Reactor Unit – Custom built
 - ▶ Piping, Silos, Tanks, Equipment – local build
 - ▶ Shipping
- ▶ **Competitive Comparisons**