The Recycling of Plastic

A Recuperation Technology

presented by

Fulmina Human Resources

And

PROOF LLC

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Preamble

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Plastic was a nice invention. But it turned out to be an ecological catastrophe. Contrary to glass, humans don't seem to have any respect for a plastic object. They are being thrown away everywhere. The oceans seem to have become the cemetery of everything plastic. Difficult to recycle, waste disposal organizations do not seem to know what to do with plastic. They end up filling the oceans and only the oceans seem to be able to recycle them – but in fact the oceans only succeed in breaking them in small particles that fish swallow. Plastic is difficult to recycle.

Worst of all, these little plastic bits are now taking the ocean space that should be inhabited by the phytoplankton. These little living plants are responsible for the creation of the oxygen we breathe. Less phytoplankton, less oxygen to breathe. We are heading into a wall.

This report has been produced by the scientists associated with PROOF LLC.; it was submitted for analysis to the Academy of the Fulmina Human Resources Foundation.

Narrative Discussion of Plastic to Oil Technology

The OWR[1]-Kaua`i Unrecycled Plastics to Oil Module will consist of 20 tons of plastic per day pyrolysis reactors that will process the anticipated plastic content for 70,000 tons of MSW[2] plus 20-years growth in tonnage. The Pyrolytic reactor technology is operational in more than 170 commercial facilities that convert plastic into oil. The Plastics to Oil Module will generate SynCrude for processing by the Crude Oil Separation unit as well as SynChar and gas that are used as fuel for the Power Module.

The plastics will be processed by the shredders in the Recycling Module to 2" minus, then fine shredded to flake size and stored until needed in a 1st in/ 1st out silo to be subsequently fed to the Unrecycled Plastic to Oil Module. The Recycling Module will have previously extracted the PET, metals and glass prior to shredding. The Plastic to Oil Module will operate the number of hours per day needed to consume the plastics.

OWR Processes Plastics into Oil as Part of a MSW Reuse Process

OWR LLC was established to **Reuse** as much Municipal Solid Waste (MSW) as possible as beneficially as possible, thereby eliminating the need for Class I landfills. OWR can reuse more than 90% of MSW, almost all organics, by extensive recycling (~40%), converting unrecycled plastics into SynCrude (~10%) using a Nacks Process and reusing virtually all of the unrecycled organics (~40%+). The unrecycled organics can be:

- Shred and cleanly consumed by a Fluid Bed Gasification Boiler to generate electricity replacing hydro-carbons as fuel. Fluid Bed Boilers have vastly improved environmental and operational attributes compared with the conventional Waste-to-Energy technology.

[1] OWR – Organic Waste Remediation. OWR LLC is a US corporation.

[2] MSW – Municipal Solid Waste

- Shred, de-watered and pelletized and sold as fuel to concrete plants and other industrial processes replacing hydro-carbons as fuel.
- Shred, de-watered and pelletized and converted into Pyrolytic Fluid (~Crude Oil with 20% to 40% Oxygen content) in a fast pyrolysis process and then converted into BioCrude by using a HydroTreater that injects Hydrogen to combine with the Oxygen.

This is potentially the best option but is presently not cost competitive with Crude Oil out of the ground. E2MC intends to fund research with the goal of eliminating costs.

Plastic to Oil Technology Can Process Ocean Plastic as Well

The PET in the ocean will be easy to recognize. PVC is expected to be a trivial part of the ocean plastic. An ocean-going ship is required that can gather the floating plastic and then be treated by 20 tons per day Nacks Plastic to Oil units. They will generate SynCrude, SynChar and SynGas.

Ocean Plastics to Oil Module

An Ocean Plastics to Oil Module will consist of the number of shredders and 20 tons of plastic per day pyrolysis reactors needed to meet anticipated demand.

Unrecycled Plastics to Oil Module Material Receiving & Pre-Processing- The unrecycled plastics will be shredded to 2 inches' minus and shredded to flake size in the Recycling Module prior to being blown from the Recycling Module into the top of the unrecycled plastics feed bunker in the Plastics to Oil Module building. The primary function of the plastics feed bunker is to level the non-linear delivery pattern of unrecycled plastics until the Plastics to Oil Module is operated. At the start-up of the Plastics to Oil Module, the plastic will be extracted from the bottom of the bunker providing a first in, first out feature. The shredded plastic will be blown to

each of the Plastics to Oil machines.

Ocean Plastics to Oil Module Equipment- Nacks/ Blest/ E-Nergy has sold more than 170 Plastic to Oil machines around the world in the last 10 years. These machines have been continually increased in capacity. Each new machine has been about twice as big as the last in order to ensure that the relationship between inputs and outputs are at least maintained and that heat efficiency is continually improved. 2.5 tons of plastic per day machines have been in operation in Japan for more than 5 years. All of the commercial throughput machines have been designed by Dr. Kiyoshi Nakajima. Dr. Nakajima will be working with E2MC. Dr. Nakajima has designed a new 5 ton per day machine and a 20 ton/ day machine, both of which will be built in the US by E2MC.

The Ocean Plastics to Oil Module has no emissions and therefore needs no Environmental Controls. The Ocean Plastic to Oil Process will not have a mini-refinery as the crude oil will be used in an even mix (50/50) with diesel oil. This situation may need to be re-evaluated in the context of a global program to clean up all the oceans.

The Nacks Reactors use Pyrolysis to convert the plastics into Syn-Crude that is then fed to a batch crude oil separator. Nacks equipment was initially built in Japan by Blest, Inc., who built more than 170 continuous flow machines in the last 7 years. All of these reactors were designed by Kiyoshi Nakajima. Each new design has been about four times as big as the last and each has been at least as efficient as the previous model.

Pyrolysis Definition

Pyrolysis is the breaking down of organics in the presence of heat in the absence of Oxygen. Py-

rolysis breaks the organics down into SynGas, SynChar and SynCrude in the case of plastics, rubbers or organics with oil content like pine wood. The processing of food waste or yard waste with “Fast Pyrolysis” generates Pyrolytic Fluid instead of SynCrude as well as BioChar and Bio-Gas.

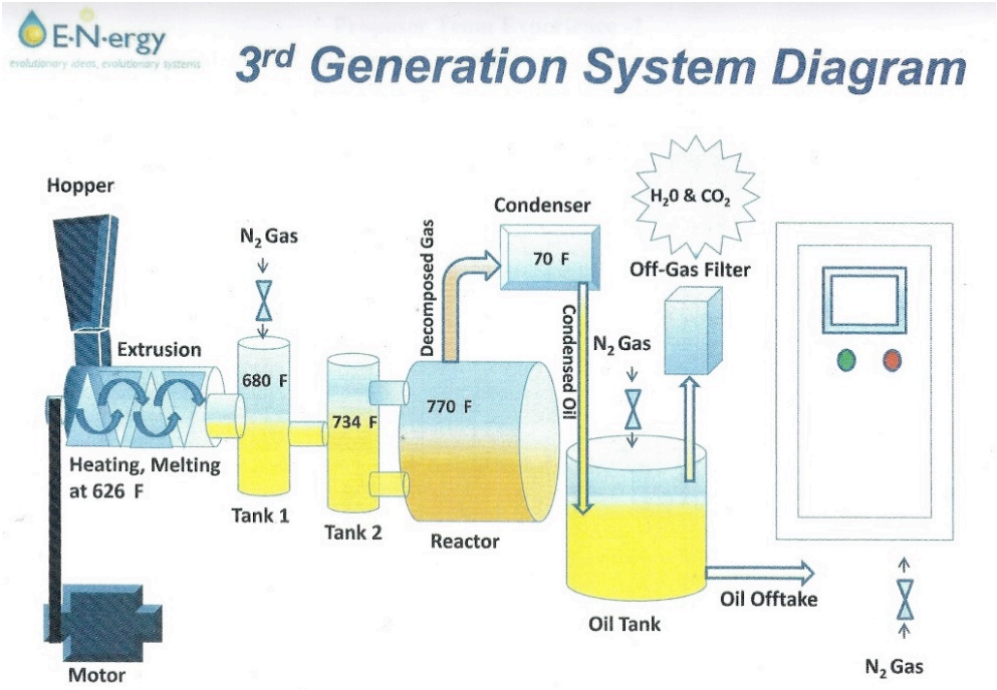
After Processes

The SynGas and BioGas are chemically similar and can be converted to electricity with the use of a gas turbine or a diesel modified to consume gas. SynChar as generated by the Nacks process is Carbon soaked in oil and can be burned in a boiler as fuel. BioChar is Carbon which, if processed from uncontaminated organics, can be used as a valuable soil amendment. BioChar can also be used as a fuel in a boiler. SynCrude, from plastic or rubber, has been directly used in diesel engines after being evenly mixed with diesel oil which is the proposed option on a Plastic from the Ocean Ship-board Process. SynCrude can also be processed by a refinery to generate Naphtha, Kerosene, Diesel Oil, Fuel Oil and Bitumen that meets industry specifications. Pyrolytic Fluid is, simplistically, Crude Oil with 20% to 40% Oxygen which makes it very caustic, hard to handle and dangerous. An explosion requires fuel, Oxygen and a spark. Pyrolytic Fluid has two of the three. Pyrolytic Fluid can be converted into Crude oil with the use of a HydroTreater. A HydroTreater simplistically injects Hydrogen into the Pyrolytic Fluid which combines with the Oxygen to create water which can be easily separated. The HydroTreater option is proven but is too expensive to compete with oil out of the ground. E2MC will fund an R&D Program with Battelle to find a cost competitive option.

Why the Nacks Process is Superior to Alternatives

Almost all Pyrolysis units use vacuum pumps to eliminate Oxygen (as done by OWR) or use a Quasi-Inert gas such as Nitrogen to blanket the organics to minimize Oxygen. These are both

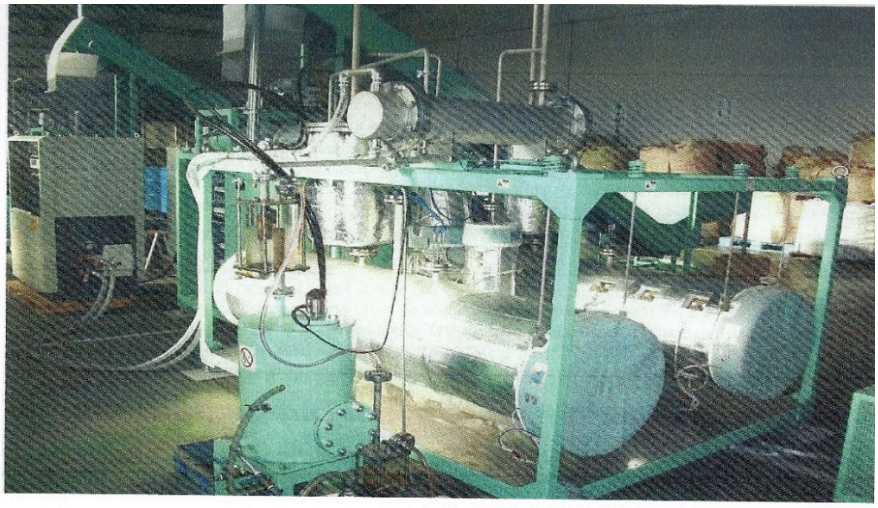
costly due to high maintenance needs. The Nacks Process elegantly processes the plastic in processed oil to eliminate Oxygen. Maintenance costs are minimal.



Unrecycled Plastics to Oil Module Input Material- unrecycled plastics.

Unrecycled Plastics to Oil Module Key Process Conditions- Minimal inorganics, PET and PVC in the feedstock.

Unrecycled Plastics to Oil Module Scale of the Facility- Operational at full scale.

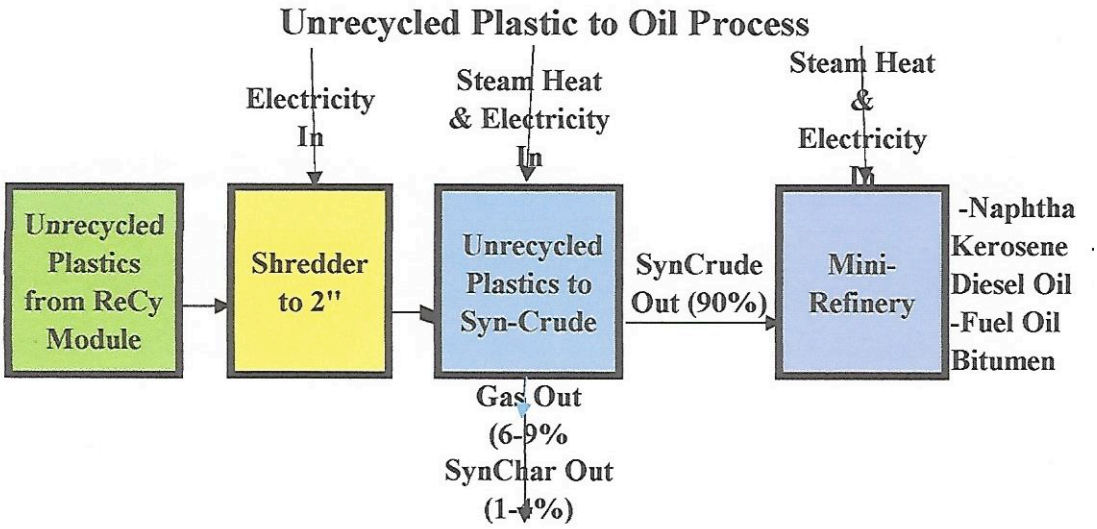


A photograph of the Nagata Shigyou Fukaya Clean Center NGV 2000 2.5 tons of plastic per day machine
The green frame around the reactor is 71" wide, 158" long and 55" high

Unrecycled Plastics to Oil Module Footprint- Approximately 39.3 feet by 33.3 feet plus 59 feet by 70 feet for SynCrude storage tanks.

Unrecycled Plastics to Oil Module Shutdown Frequency and Anticipated Maintenance Duration- The Organics to Oil Module is designed to be maintained by a rigorous Toyota Production System Total Preventive Maintenance System on weekends or during off-shift periods.

Unrecycled Plastics to Oil Module Processing and Process Management- The plastic will be stored until needed in a 1st in/ 1st out bunker and then fed to the Unrecycled Plastic to Oil Module. The reactors use Pyrolysis to convert the plastics into SynCrude, SynChar and a gas similar to Butane or Propane. The Module will consume 3.18 kW of electricity per gallon of SynCrude produced. SynChar and SynGas is also generated which is conveyed to the Power Module to be used as fuel to generate electricity.



Unrecycled Plastics to Oil Module Product and Residue Handling and Management- The BTUs[3] in the feedstock will, by weight of the by-products, be split with 90% in SynCrude, 9% in gas similar to Butane or Propane with 1% as SynChar. The SynCrude is piped to tanks at the batch crude oil separator. The SynCrude is then pumped to a batch crude oil separator that produces by-products that meet industrial specifications including Naphtha, Kerosene, Diesel Oil, Fuel Oil and Bitumen. All of these products are Carbon Neutral and will be sold into the local market. County of Kaua`i will have the ability to buy oil products at a discount. The Bitumen can be combined with the unrecycled inorganics to manufacture asphalt. The SynChar is moved to the Power Module by conveyer to be used as fuel. The gas will be pumped to a tank at the Power Module where it will be used as fuel.

The Unrecycled Plastics to Oil Module has no emissions and therefore needs no Environmental Controls.

[3] British Thermal Unit : a traditional unit of heat; it is defined as the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit.

Addendum "A" – List of Suppliers

ALADDIN (PLASTICS SORTING) - ALADDIN Facility 1

Owner: Cougle's Recycling; Location: Hamburg, PA Matt Cougle 610-562-8336

Startup date: 2008 A-2000-3-TX-M

Rated Capacity: 5 TPH; Tested at more than 5 TPH

Waste processes: Mixed plastic and metal containers

Operational availability: >98%[1]

Amount types of materials recovered: PET, HDPEN, HDPEC, #3-#7, pass aluminum

ALADDIN Facility 2

Owner: EPIC Plastics; Location: Lodi, CA 209-333-6161

Startup date: 2005 A-1600-3-TX

Rated Capacity: 5 TPH; Quantity handled: Tested at 4.5-5 TPH @98% purity

Waste processes: Mixed plastic containers

Operational availability: >98%[1]

Amount types of materials recovered: PET, HDPEN, mixed plastic

GLASSCOLORSORT (GLASS COLOR SORTING) - GLASSCOLORSORT Facility 1

Owner: Rescresco; Location: Nottinghamshire, England

Startup date: 10 units 2006&2007 GCS-384-3

Rated Capacity: 5 TPH; Tested at more than 5 TPH

Waste processes: mixed glass

Operational availability: >98%[1]

Amount types of materials recovered: 3 color of glass, remove ceramics

GLASSCOLORSORT Facility 1

Owner: Allan Company; Location: Baldwin, CA 626-962-4047

Startup date: 2 units 2004 GCS 384-3

Rated Capacity: 5 TPH Tested at more than 15 TPH

Waste processes: mixed glass

Operational availability: >98%[1]

Amount types of materials recovered: 3 color of glass, remove ceramics

METALSORT (METAL SORTING) - METALSORT Facility 1

Owner: Epic Plastics 209-333-6161

Location: Lodi, CA

Startup date: 2005 (Stand-alone unit 64")

Rated Capacity: 5 TPH Tested at more than 15 TPH

Waste processes: Plastic bottles w/metal residue

Quantity handled: 5 TPH

Operational availability: >98%

Amount types of materials recovered: Eliminate any metal in plastic bottle stream

Nacks Incorporated - The Plastic to Oil Technology Provider

Name: Nacks Incorporated

Type of Entity: The owner of Nacks, Inc., Kiyoshi Nakajima has designed the 170 reactors that were built by Blest, Inc. Mr. Nakajima now owns the rights to all of the world except Japan. 5 tons per day (tpd) and 25 tpd reactors have been designed and will be built by E^2MC and Refinery Equipment of Texas under license from Nacks. E^2MC will provide the support equipment in a Turn-Key manner.

Japan Address: Kiyoshi Nakajima, President
253-0086, 410-4 Hamanogou
Chigasaki, Japan
no-nacks@gb3.so-net.ne.jp
Phone: 81-90-6009-9751

US Representative Address: Rodney T. Sato, SatoInc,
312 Briarwick Court
Millersville, MD 21108
sat01nc@verizon.net
(410) 987-9546

Names of Partners, officers and Stockholders who own 10% or more of the shares: Kiyoshi Nakajima

State Formed In/ Form of Business: Japanese C Corporation (Limited)

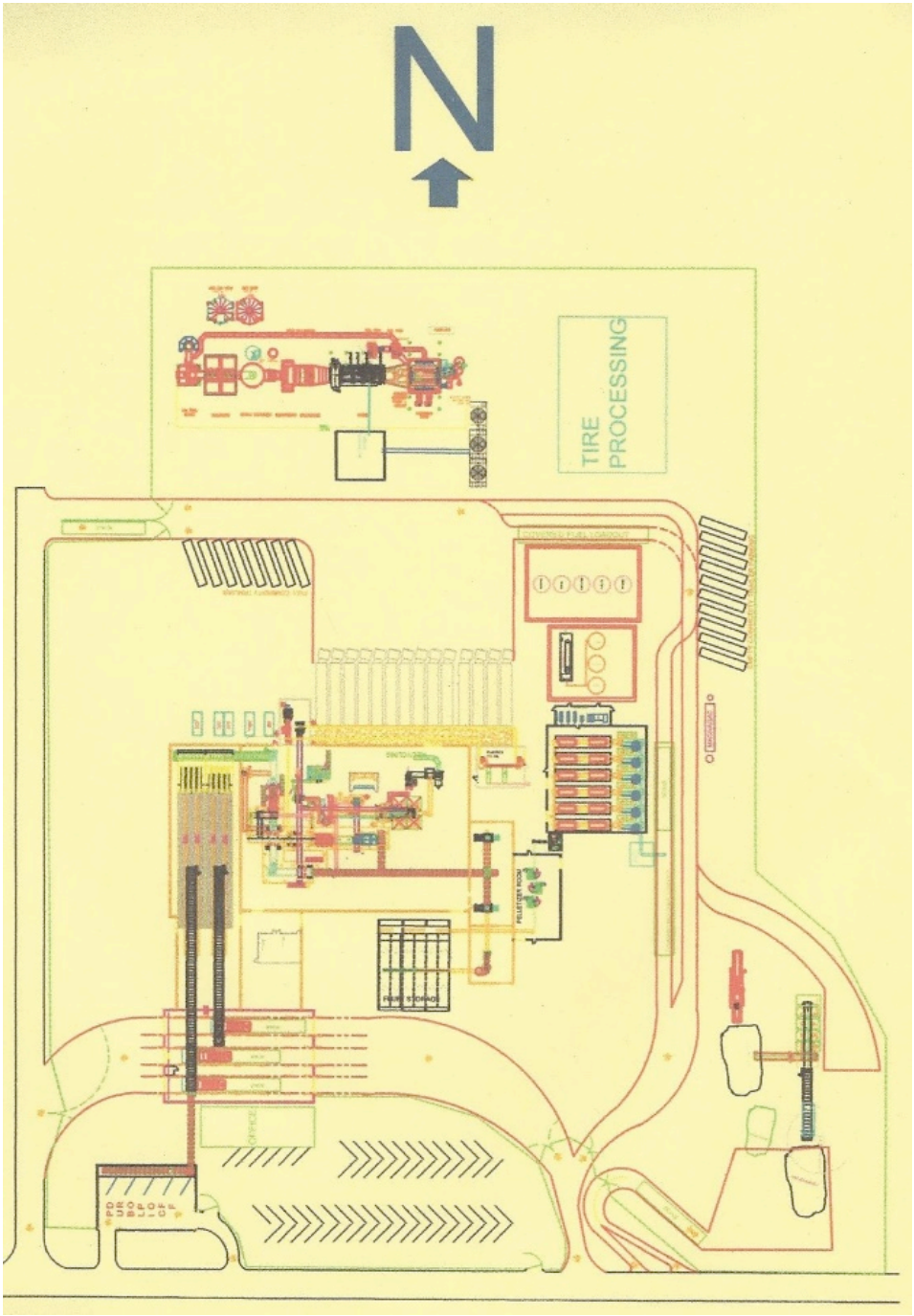
US Contact Person: Rod Sato

US Voice Telephone Number: (410) 562 2797, Cell

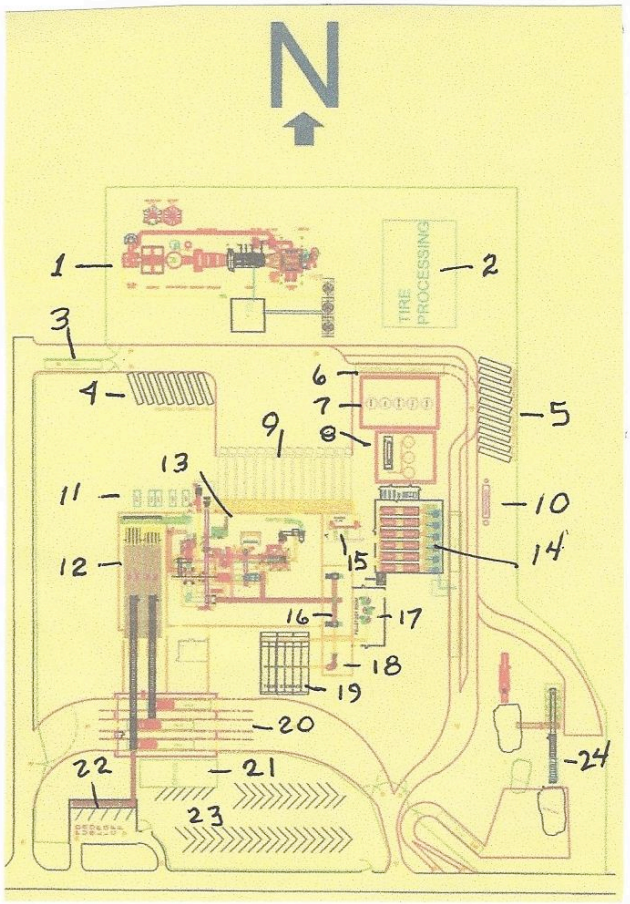
Attach a brief summary of the services and responsibilities of each Participating Entity, limited to one page or less in length for each entity.

Nacks will provide the equipment design for the equipment that will convert the unrecycled plastics into SynCrude for OWR-Kaua`i. The inventor of the Nacks equipment, Kiyoshi Nakajima, and his team will work closely with the manufacturer of the equipment, Refinery Equipment of Texas, during the construction of the equipment. Kiyoshi Nakajima and the Nacks team will be actively involved with OWR and the EPC at OWR-Kaua`i during the equipment installation and equipment startup processes.

Addendum "B" – Diagram of the operation



1 Power Module
2 Tire to Oil Module
3 Commodity Scale
4 Full ISO Containers
5 Empty ISO Containers
6 Oil Tanker Loading
7 Oil Products Tanks
8 Refinery/ Crude Tanks
9 ISO Container Loading
10 MagneGas Module
11 Roll-Off Loading
12 Walking Floor Bunkers
13 Recycling Module
14 Organics to Oil
15 Plastic to Oil
16 Shredders
17 Pelletizers
18 Driers
19 Organics Bunker
20 MSW Scales
21 Office
22 Public Drop-Off
23 Employee Parking
24 C&D/ Green Bulk



Addendum "C" – Additional information on Plastic to Oil Module

Plastics to Oil Module

Design- More than 170 Blest plastics to oil machines are in use in 30 countries that were designed by Mr. Kiyoshi Nakajima. Dr. Nakajima has now formed a new company, Nacks, Inc., that has obtained the world-wide rights to his technology except for Japan. The equipment has been upsized 6 times, each new machine about 4 times larger than the last. Every new machine was more efficient than the previous machine. The Nakajima Pyrolysis process has attributes that makes it easy to upsize.

Equipment- There have been five 2.5 tons per day reactors put into service. Mr. Nakajima has designed a new 5 tons per day and a 20 tons of plastics per day reactor for OWR. OWR will manufacture the machines under license in Houston, TX. Actual manufacturing will be accomplished by the manufacturer of the Crude Oil Separation equipment, Refinery Equipment of Texas. A meeting has taken place in Houston between Mr. Nakajima and his team, the Refinery Equipment of Texas team and OWR team. The drawings were reviewed and production plans made. Five ton machines could be used, even a 2.5-ton machine, if County of Kaua`i is concerned about the size of the capacity jump. OWR has proposed an MSW Reuse facility in Hartford CT that will process 3000 tons of MSW per day, 16 times larger than OWR-Kaua`i. The management of large numbers of the 2.5 ton reactors is very difficult and very expensive.

Successful operating time- The earliest 2.5 tons per day machine started service in early 2012 at Fukaya Clean Center in a suburb of Tokyo, Japan with two additional machines added in 2013. Fukaya Clean Center is the Plastics to Oil Reference Facility.

Biomass Participating Entities- Group List

All entities that will be significant participants in providing the contract services (the "Participating Entities") are identified below. Such entities shall include, as applicable, (1) the Company (which may be a new company formed for the sole purpose of executing and performing the Service Contract); (2) the entity that will lead the design and manufacturing of the technology proposed to be used at the Facility; (3) the entity that will design the Facility; (4) the entity that will construct the Facility; (5) the entity that will operate and maintain the Facility; (6) the Guarantor; (7) the entity that will assume the lead responsibility for the management and co-ordination of all corporate guarantees and the arrangement of construction financing; and (8) any other significant participant or subcontractor.

The Company (1): OWR-Kaua`i will be formed for the operating entity

Technology Provider (2a): Environmental Equipment Manufacturing Consolidated LLC (E^2MC) for the Recycling Technology

Technology Provider (2b): Nacks Incorporated (Nacks) for the Plastic to Oil Technology

Technology Provider (2c): Biomass Conversion Systems, Inc. (BCS), for the Organics to Oil Technology

Technology Provider (2d): Refinery Equipment of Texas LLC for the Crude Oil Separation Technology

Technology Provider (2e): Outotec, Inc. for the Fluid Bed Gasification Boiler Technology

Technology Provider (2f): Himin, Inc. for the Solar Array

Design Entity (3a): E^2MC for the design of the Recycling Module, the Plastic to Oil Module and the Organics to Oil Module

Design Entity (3b): The Power Module will be designed by Harris Group

Design Entity (3c): The EPC (Engineering, Purchasing & Construction) will design the site including roads, utilities, buildings and the integration of the Modules into the site. Will not be known until preparation for the Phase 2 RFP Response.

Design Entity (3d): Organic Waste Remediation for the design if the synergistic facility concept.

Construction Entity (4): The EPC will construct the Facility. The EPC will be determined during Phase 2 RFP Response.

Operation/ Maintenance Entity (5): OWR-Kaua`i

Guarantor (6): Organic Waste Remediation LLC

Project Financier (7): Mesirow Financial, Inc.

Other (8): Kaua`i Island Utility Coop

Addendum "D" – Team Experience

Proposer Team Experience

Organization Structure of Organic Waste Remediation LLC (OWR)