

**Palmdale Organics Management
& Renewable Energy Center**

**Utilizing Green & Food Waste
to Create Renewable Energy**

**Inland Empire Resource Recovery &
Go-Green Consultants**



**Submittal to the City of
Palmdale
November 13, 2019**

Project Background

- California's Cities must comply with organic waste laws:
 - AB 1826 requires commercial generators of food waste to have it composted or transformed to energy via anaerobic digestion.
 - AB1594 overturns a 1996 law that allowed landfilled yard trimmings to count as being “diverted” from landfills when used as alternative daily cover (ADC)
- Opportunities exist to convert these materials into renewable energy and useful materials
- Inland Empire Resource Recovery (IERR) and Go-Green (GG) have teamed to provide facilities and services that ensure our client's compliance with these laws



Inland Empire Resource Recovery (IERR) Background and Qualifications

- Sergio Perez, President has over 30 years of food industry processing experience
 - Developed and operates the CoWest Food Waste Slurry system in San Bernardino
- Michael Brown, Executive VP has over 40 years of experience with the implementation of waste processing and renewable energy projects
 - Involved in the financing and implementation of over \$3 billion projects primarily in California
- Together they have developed and are constructing the \$40 million food waste Biodigester in San Bernardino
 - Enables San Bernardino and surrounding jurisdictions to meet food waste diversion requirements



San Bernardino BioDigester Project Status

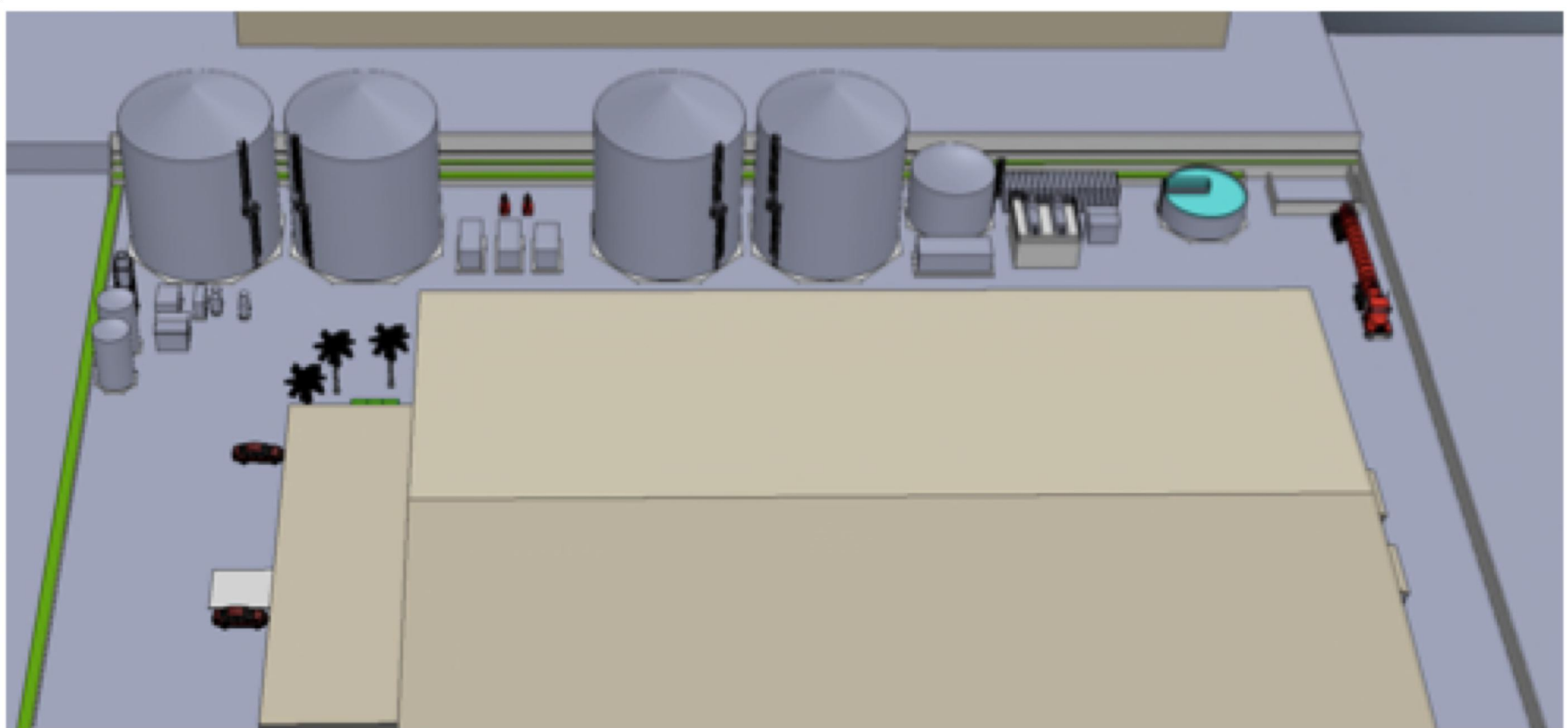
- CEQA completed and Use Permit Issued
- Obtained sales tax exemption
- Obtained Feedstock Agreements
- Investment Tax Credits monetized
- Consolidated construction/long term loan obtained
- Utility Interconnection and Power Purchase Agreement (PPA) approved by SCE
- Construction in progress



Initial operation by the end of this year!



OES BioDigester Project



CONSTRUCTION 70+% COMPLETE



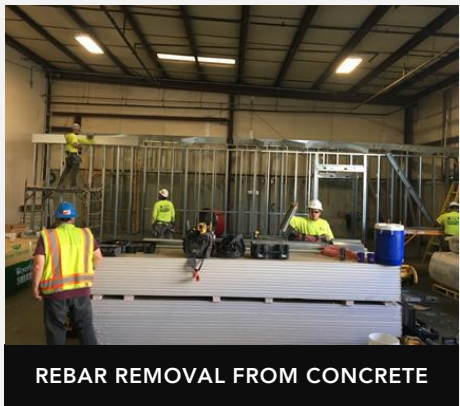
PILOT DIGESTER IN OPERATION



HEATING SYSTEM SKID



GAS LINE RELOCATION



REBAR REMOVAL FROM CONCRETE



DIGESTERS AND HYDROLYSIS TANKS



DIGESTER ROOF STRUCTURE



Go-Green (GG)

Background and Qualifications

- Energy asset development, financing and management Firm
- Over 10 years relevant experience
- Highly qualified key personnel:
 - Paul Galindo, President
 - Cruz Bustmante, Chairman of the Board
 - Eli Cortez, VP of Project Development
 - Responsible for government relations and feedstock procurement



Palmdale Organics Management/Energy Center (POM/EC)

- Converts food, green and woody wastes to renewable energy and valuable products, including:
 - Electricity
 - Compressed natural gas
 - Diesel
 - Compostable soil amendment
 - Biochar
 - Organic, nitrogen-rich fertilizer

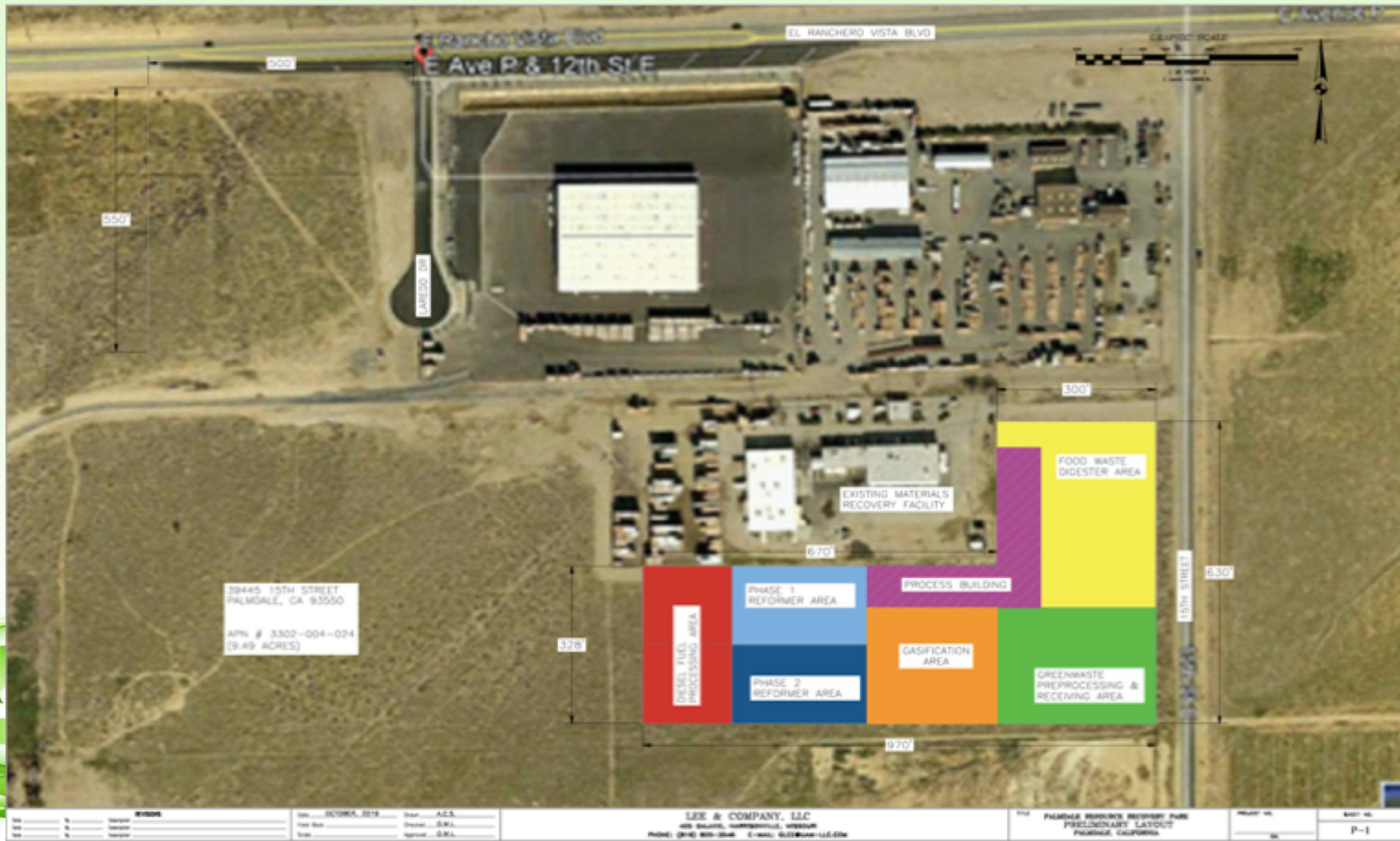
This project ensures compliance with California's tough new organics laws!!!

POM/EC Project Elements

- Element 1- Food waste wet anaerobic digestion
- Element 2- Greenwaste dry anaerobic digester
- Element 3- Biomass gasification
- Element 4- Diesel fuel production
- Element 5- R&D testing and demonstration



POM/EC Site Layout



Element #1- Food Waste Anaerobic Digestion

- Food waste will be digested in a Monsal wet AD system
 - Provided by Suez, a very large, international technology provider
 - Used in IERR's BioDigester
 - Twenty+ operating systems
 - Operating project in Salt Lake City



- Most efficient and reliable food waste digestion system in the world!!!



SUEZ's Biowaste Facilities

Charlton Lane
2019



Deerdykes
2010



Westry
2011



Wasatch
2019



Hemswell
2015



✓ Treating 385,000 tons/year
✓ Producing 17.5MW of Renewable

Avonmouth
2012



Montreal
2023



Halstead
2014



Codford
2014



Walpole
2012



**2 Biowaste Facilities Under Contract in North America
Commissioning 2019 & 2020**

Food Waste Preparation



BREAD / DOUGH



PREPACKAGED MEALS



RETAIL WASTE



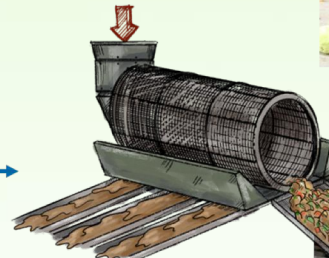
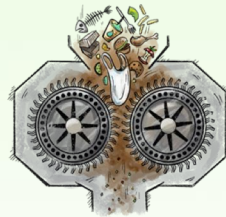
FISH PRODUCTS



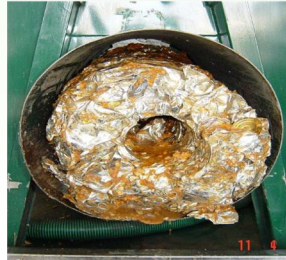
CHICKEN VICERA



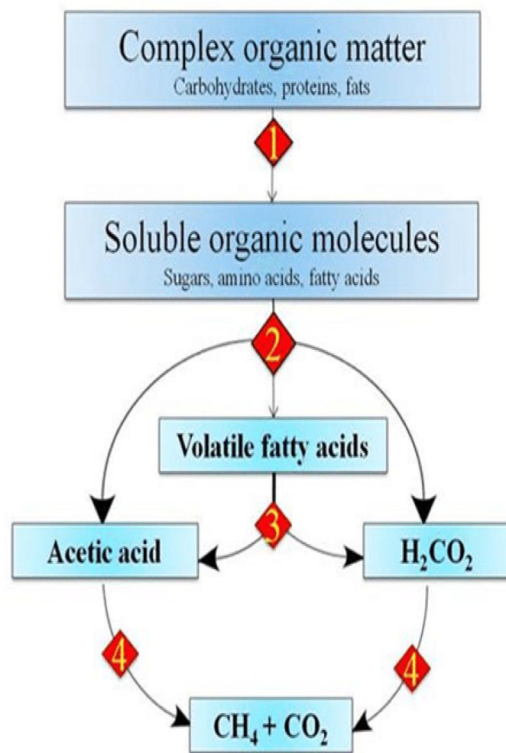
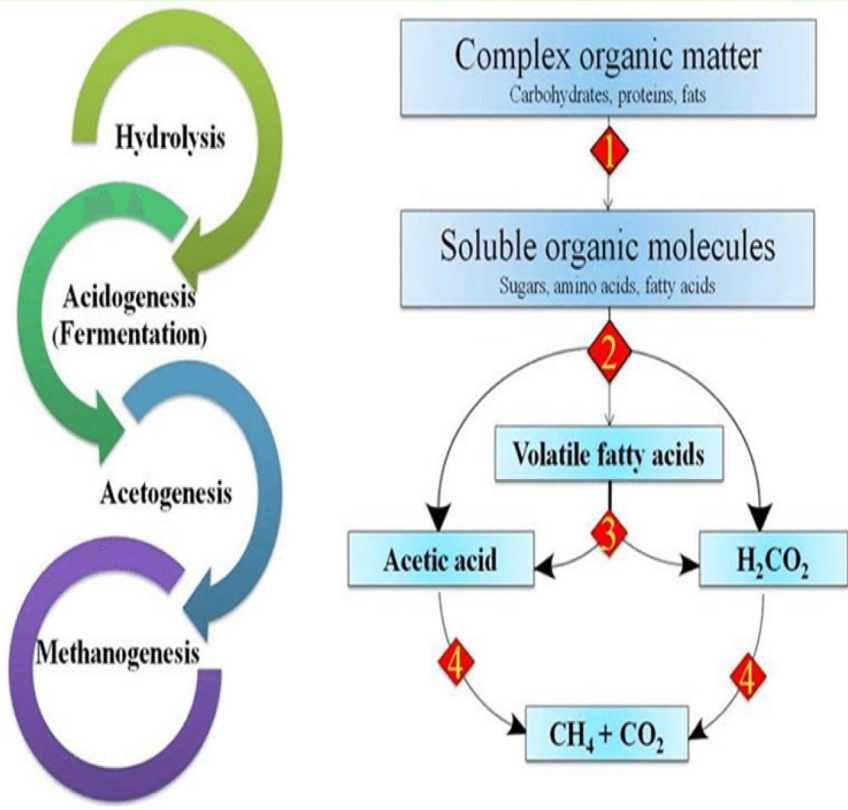
EXPIRED GROCERY



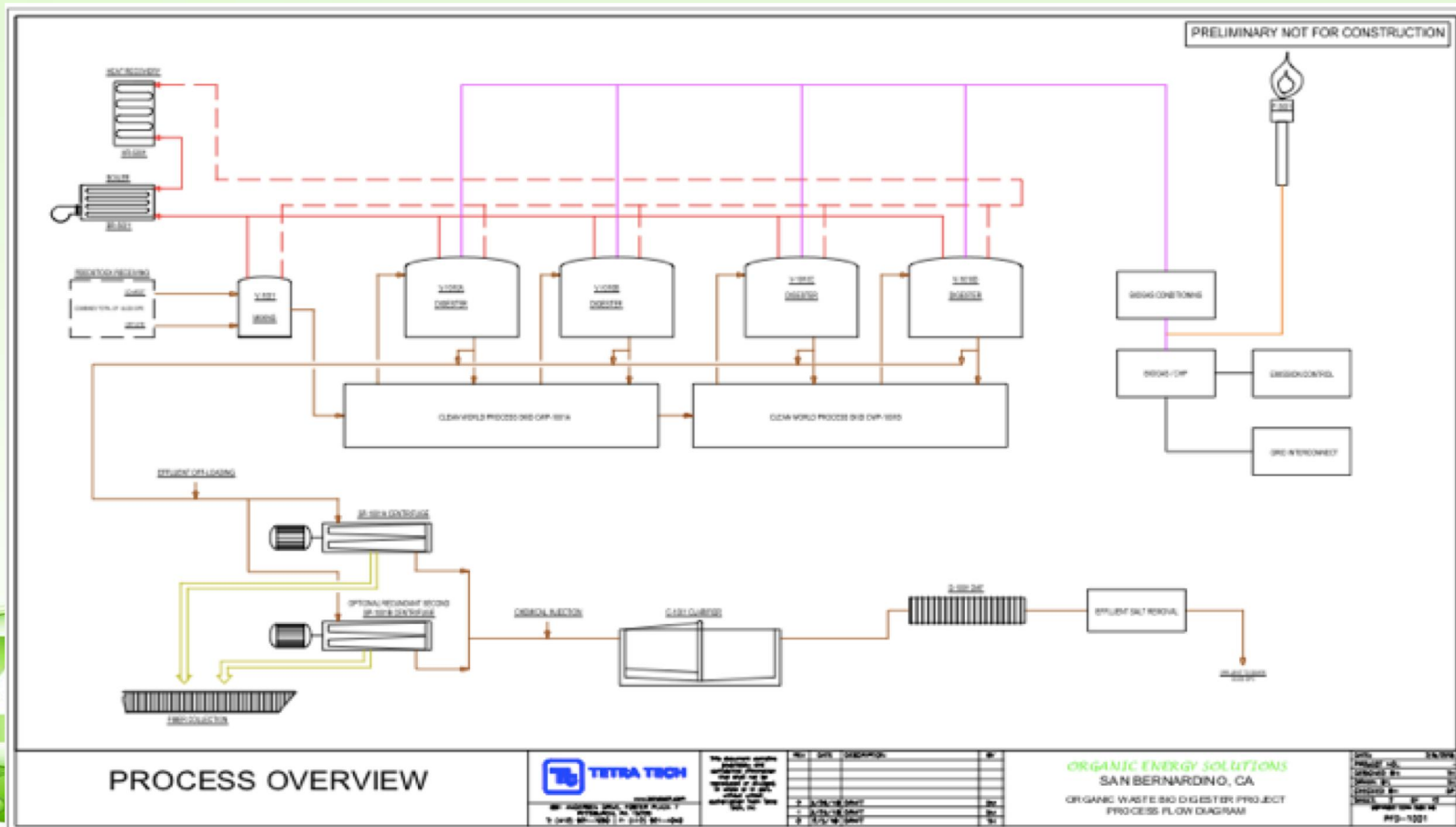
CRUSH CANS/BEVERAGES TO RECYCLE METAL, PLASTIC, CARDBOARD, AND GLASS.



Anaerobic Digestion Schematic



Anaerobic Digestion System Process Flow



Element 2- Greenwaste AD System

Preferred Vendor- Zero Waste

- Project development and management
- Technical, financial, capital and engineering analysis
- System integration
- Operations and asset management
- Advanced proprietary waste processing and sorting technologies including Max-AITM, NIHOT and NRT
- Energy and compost market analysis and sales strategies
- Equipment engineering, fabrication, installation and commissioning



SMARTFERM
DRY ANAEROBIC DIGESTION SYSTEMS



SMARTTURN
ADVANCED COMPOSTING SYSTEMS



BHS

Material Screening



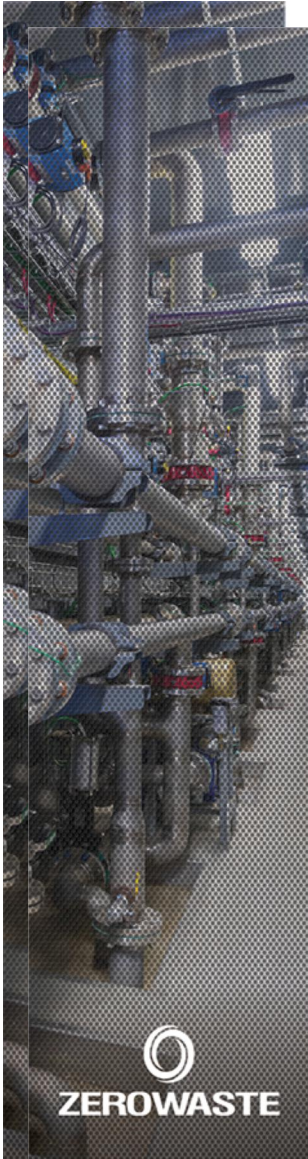
NIHOT

Air Separation



nrt

Optical Sorting



ZEROWASTE

ZWE Completed and Operating in California

Monterey Regional Waste Management District,
Marina, CA
SSO Dry Anaerobic Digestion to CHP



Zero Waste Energy Development Co.
San Jose, CA
OFMSW + SSO Dry Anaerobic Digestion to CHP

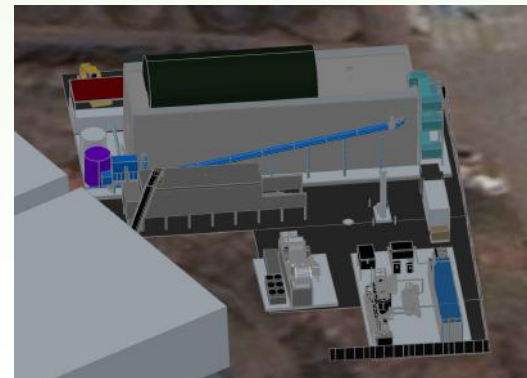


Blue Line Transfer/SSF Scavengers
South San Francisco, CA
SSO Dry Anaerobic Digestion to CNG



Currently in Engineering

Napa, CA
Oakland, CA
Monterey, CA
Victorville, CA



Plug-Flow Dry Digester Design

Benefits

Maximized biogas yield

Sanitization - PFRP

Organic Material Degradation to Rottegrad/Dewar 4+

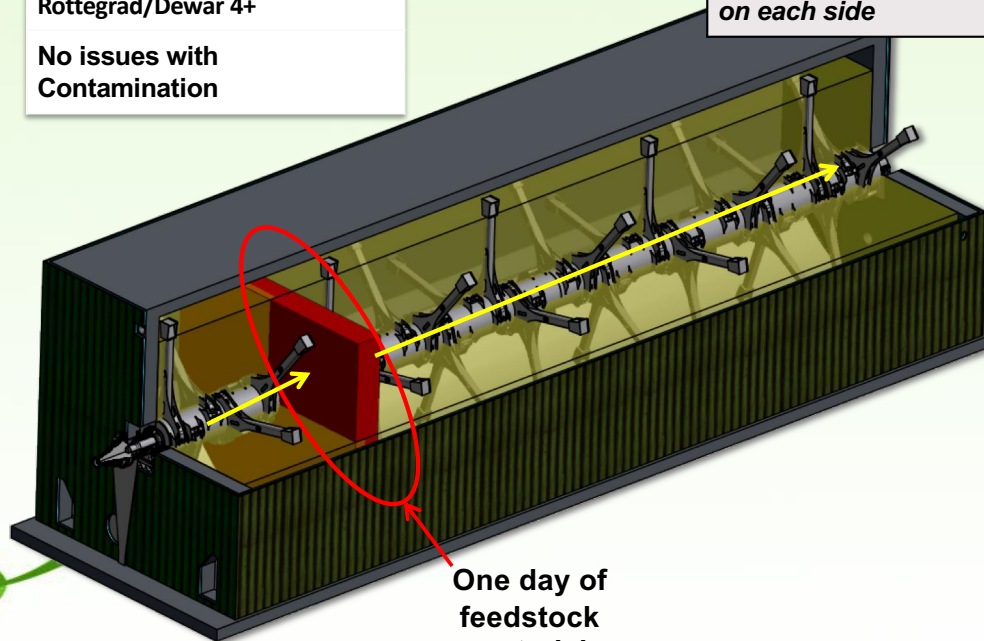
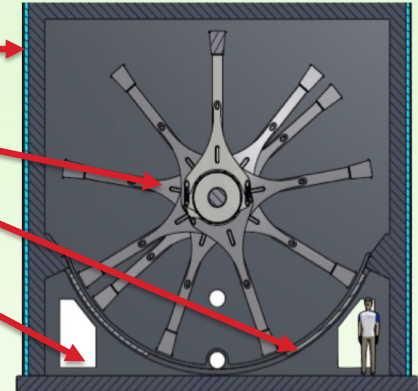
No issues with Contamination

concrete or steel digester construction options

paddle agitator

steel bottom shape

inspection tunnels on each side

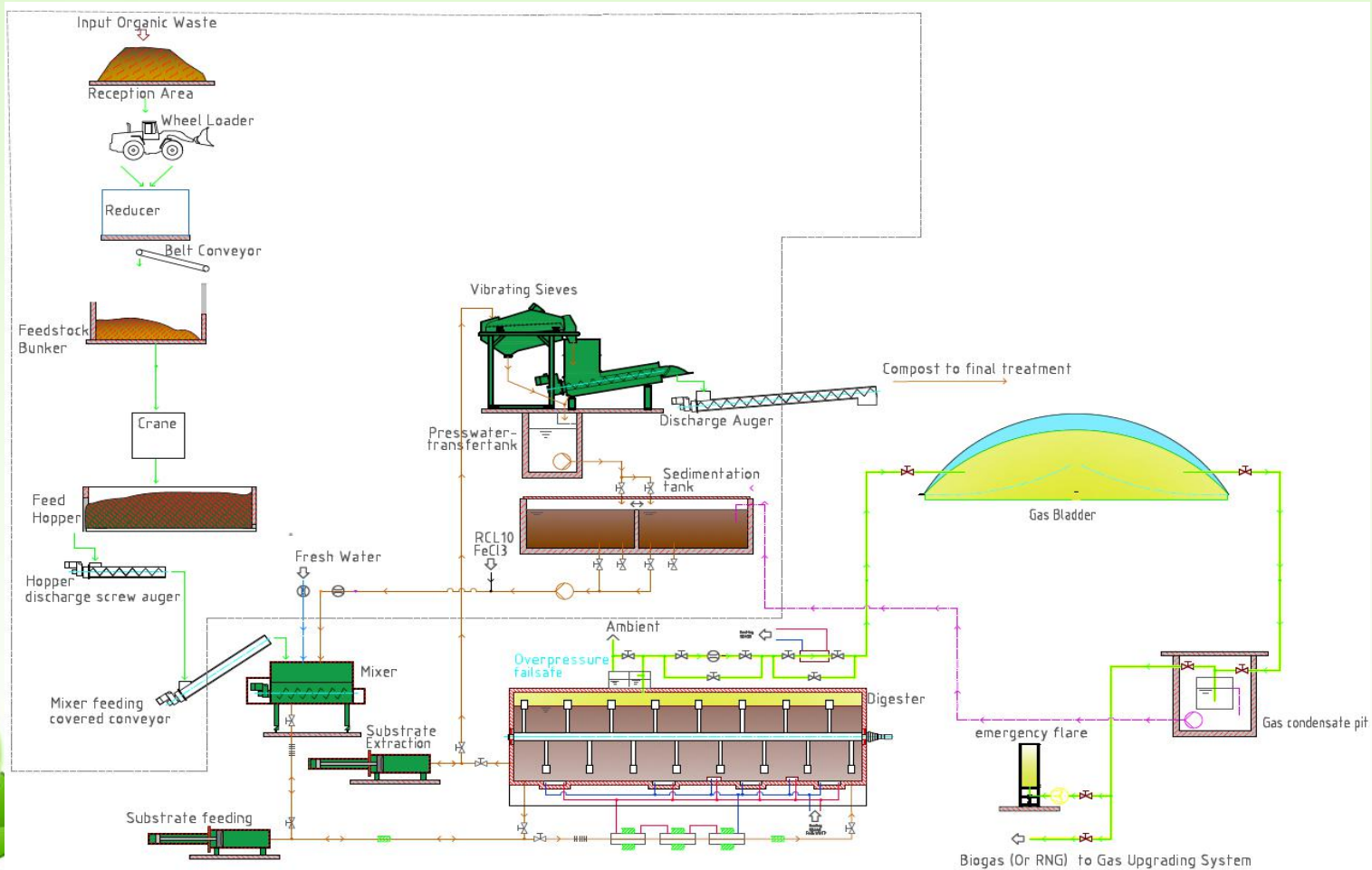


One day of feedstock material

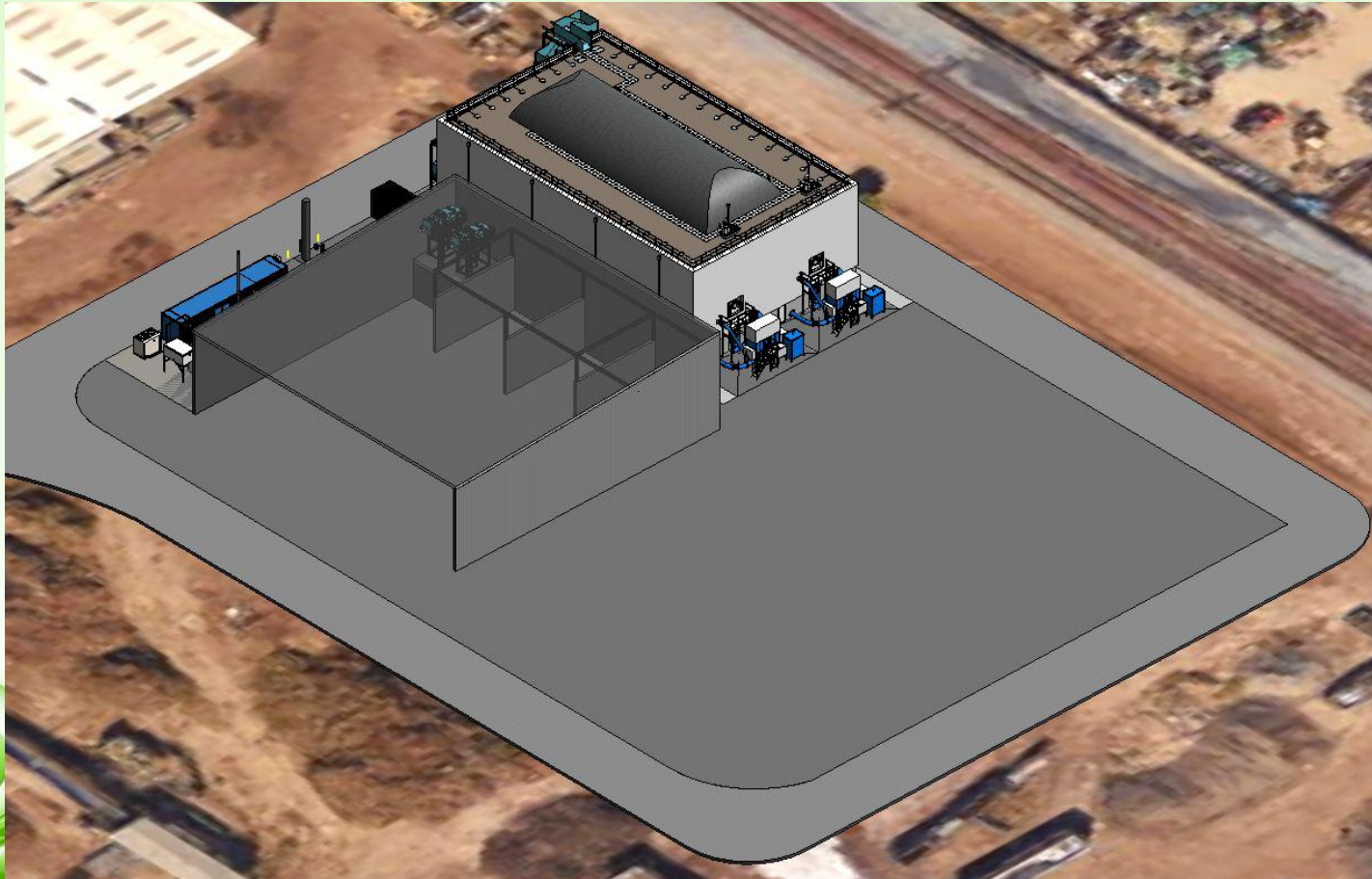
Useful volume = 85% fill level	Annual Throughput (Tonnes Per Year)	Double Digester Design (2x)
1,300 m ³	24,000 TPY	48,000 TPY
1,650 m ³	31,000 TPY	62,000 TPY
1,850 m ³	34,000 TPY	68,000 TPY
1,950 m ³	36,000 TPY	72,000 TPY
2,100 m ³	40,000 TPY	80,000 TPY
2,250 m ³	42,000 TPY	84,000 TPY



Greenwaste AD- Process Flow Diagram



Greenwaste AD System- Artist's Rendering

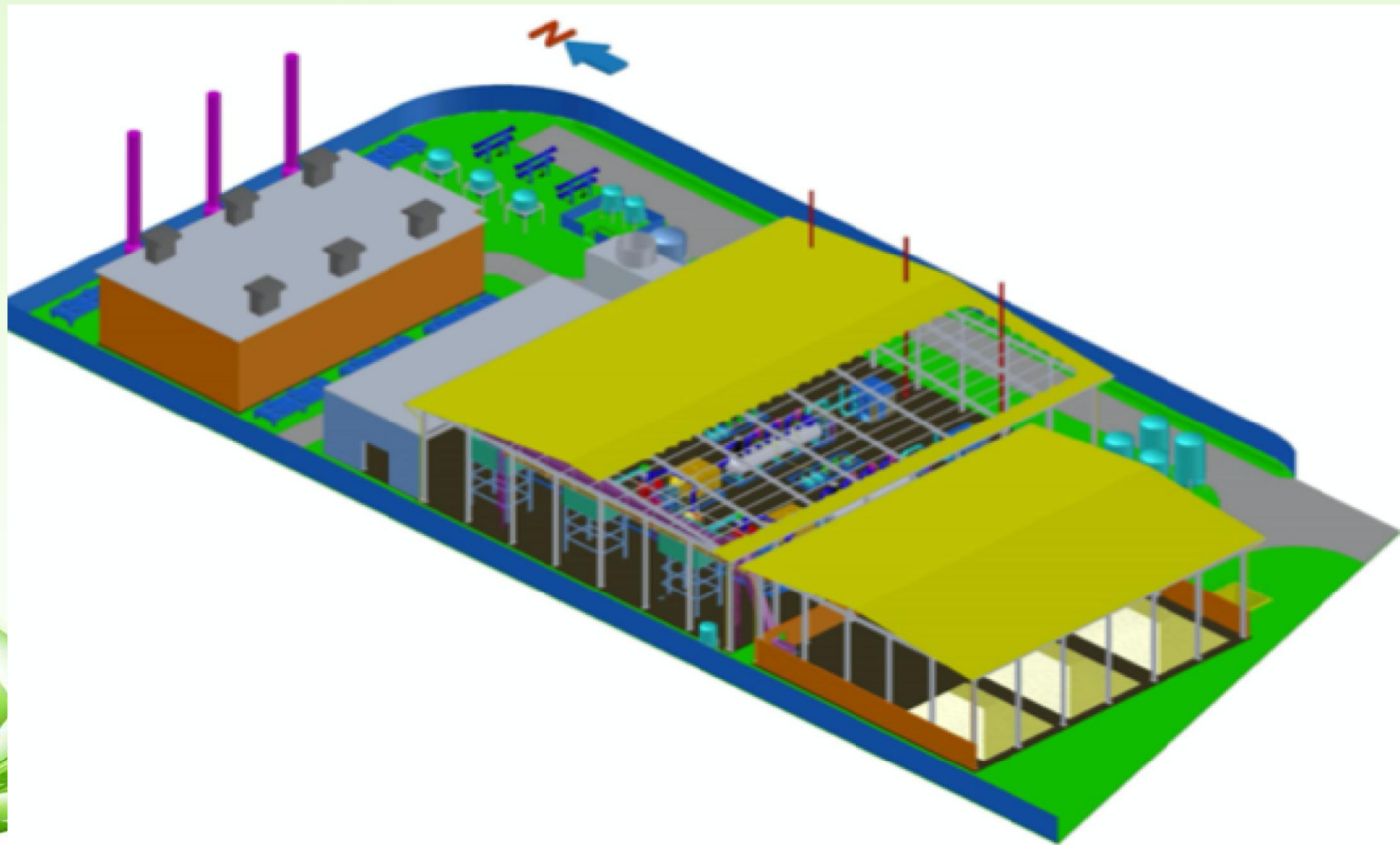


Element #3- Biomass Gasification

- Produces syngas for conversion to electric power
- Modular systems efficiently producing 3 to 10 MW
- Vendors under consideration include Zero Point, Phoenix Energy and Synova
- Reference plant in operation in Amsterdam
- Several projects under development in CA



Palmdale Biomass Gasification to Power Plant Artist Rendering



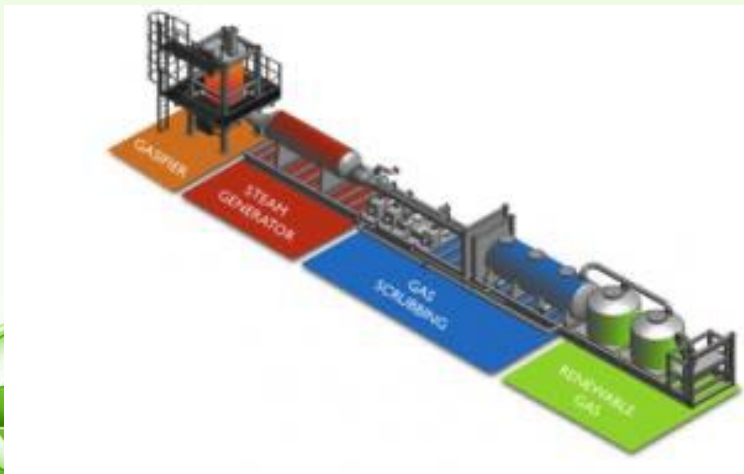
Biomass Gasification



Typical Gasification Plant



Gasification System



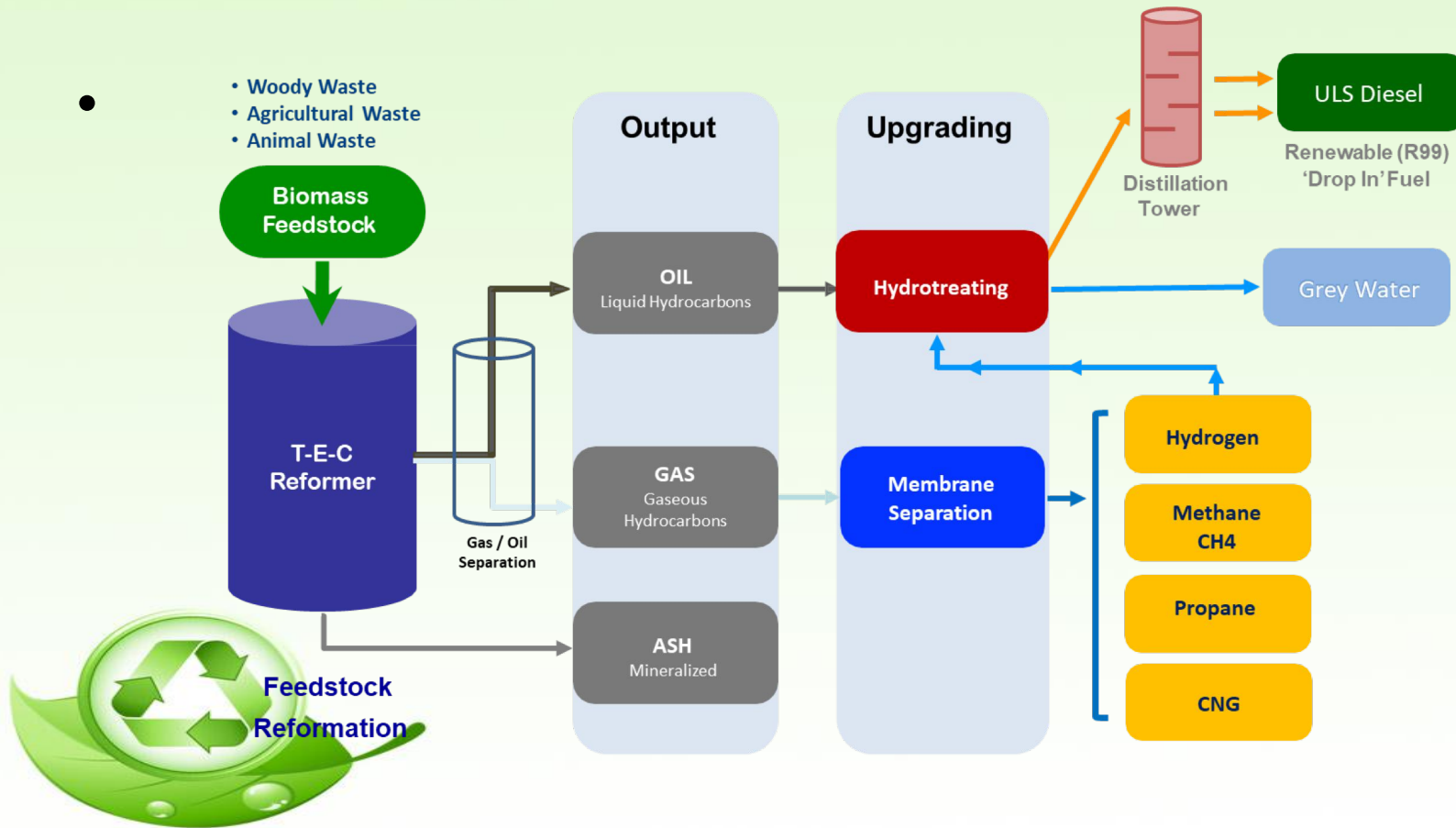
Gasification System Schematic

Element #4- Diesel Production

- Converts cellulosic waste streams into Liquid & Gas Commodities & Soil
- Rearranges molecular structure of carbon-based “green” materials:
 - **OIL:** upgraded into ultra-low Sulphur Renewable Diesel and other fuels
 - **GAS:** rich in methane & hydrogen: processed into LPG, CNG, CO and CO₂
 - **ASH:** fertilizer or soil amendment
- Energy products used as transportation fuel and/or to generate electricity
- Over 60% reduction in Greenhouse Gas emissions
- Produces no hazardous or fugitive emissions
- Renewable diesel is direct substitute for fossil derived diesel



Diesel Production Schematic



Element #5- R&D Demonstration Area

- Facilitates demonstration of emerging technologies, including:
 - Cellulosic waste pre-digestion
 - Jet fuel
 - Organic fertilizer
 - Enhanced soil amendments
- Patterned after Stanford University's Wastewater Research Center
- Provides developers space, infrastructure, access to a wide variety of organic wastes and converted products (biogas, biodiesel, digestate etc.) and technical expertise



CONTACT INFORMATION

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