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High Solids Anaerobic Digestion *A Complete Solution for Organics Recycling*

Presentation for

California Bioresources Economy Summit

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CR&R MATERIALS MANAGEMENT INFRASTRUCTURE

- 52 Municipal Contracts
- 15 Anaerobic Digestion Contracts
- 12 Processing Contracts
- 1000 Trucks (400 Natural Gas)
- Transitioning Entire Fleet to Renewable Natural Gas
- 1,500 Employees
- 2.5 Million Customers Served
- 10 Solid Waste Service Centers
- 6 Transfer Stations / MRFs
- 2 Landfills
- 12 Haulaway Service Centers



EVOLUTION OF SOLID WASTE MANAGEMENT 2010's



Material Recovery Facility - MRF



Organics Receiving Facility - ORF



Anaerobic Digestion Facility - ADF



Recyclables



Organics



Trash



Residual



Recyclables



Renewable Natural Gas



Soil Amendment

EVOLUTION OF SOLID WASTE MANAGEMENT 2020's



Material Recovery Facility - MRF



Engineered Municipal Solid Waste - EMSW



Organics Receiving Facility - ORF



Anaerobic Digestion Facility - ADF



Recyclables



Organics



Biofuel



Recyclables

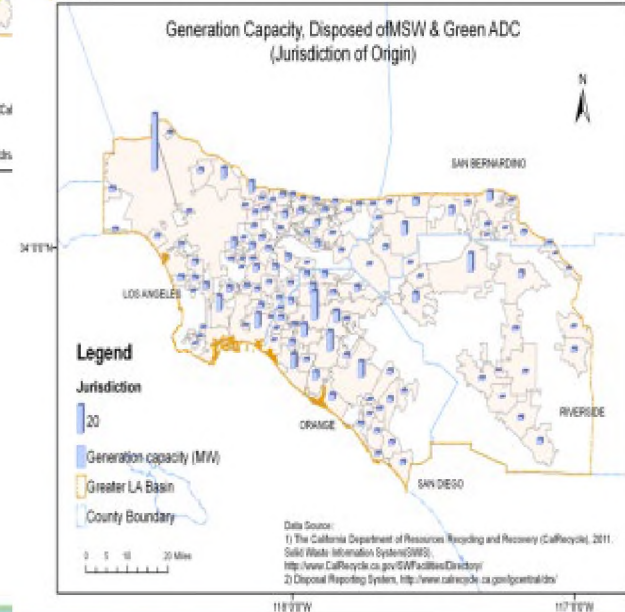
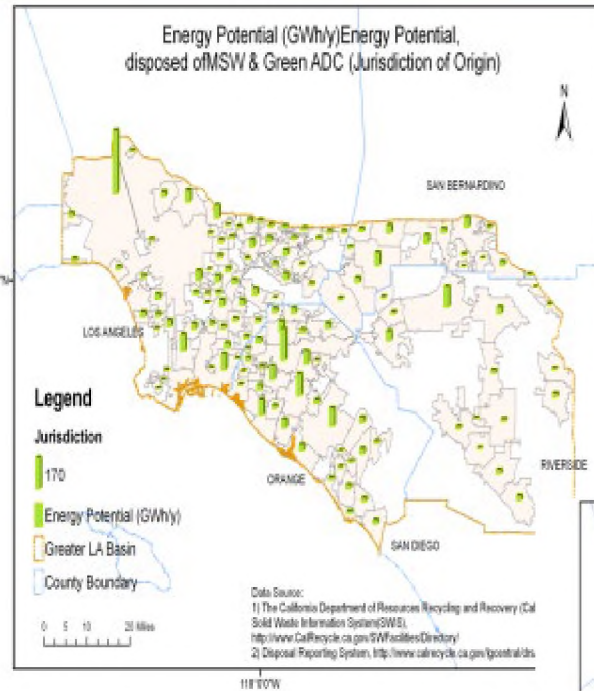
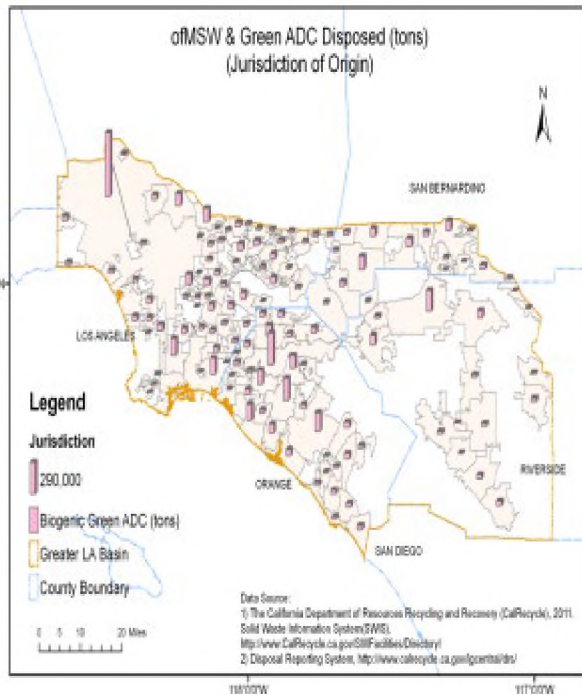


Renewable Natural Gas



Soil Amendment

Urban Organic Biomass Resources in Southern California



- (a) Sum of Biogenic disposal and Green ADC tons (jurisdictions of origin)
- (b) Energy potential of MSW of each jurisdiction in the Greater LA Basin (Gigawatt Hour/year)
- (c) Generation Capacity of MSW of each jurisdiction in the Greater LA Basin (MegaWatt)

SOURCE: STEPHEN KAFFKA, 2015

ANAEROBIC DIGESTION FACILITY



ANAEROBIC DIGESTION TECHNOLOGY

BIOGAS UPGRADING TECHNOLOGY

BIOGAS POLISHING TECHNOLOGY

RENEWABLE NATURAL GAS DISTRIBUTION

PROJECT ENGINEER

EISENMANN



GREENLANE
BIOGAS™



sysadvance®



Southern
California
Gas Company®



ANAEROBIC DIGESTION PROJECT OVERVIEW



Our process runs 24/7 – 365 days/year and is fully automated.



Our process provides maximum flexibility – waste mix, percentage (%) of solids in the waste, mesophilic, thermophilic, up to eight different mixes and temperatures can be run simultaneously.



No other facility in California, operating or planned, can match our capabilities due to our exclusive technology contracts with Eisenmann and Greenlane.

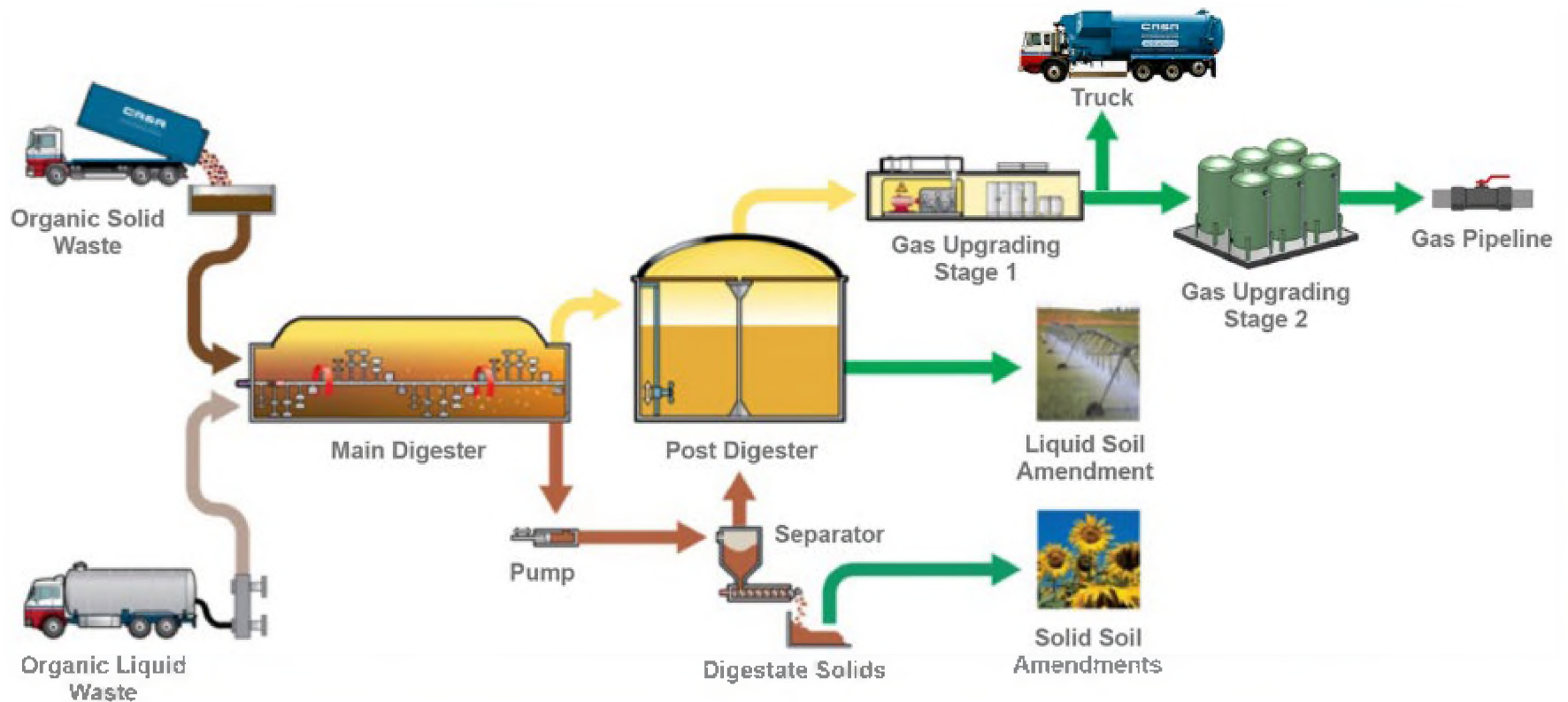


Our process is fully enclosed with zero untreated emissions and has the highest energy conversion rate in the industry due to its design and controls.



The plant will handle 335,000 tons per year, generate 4 million gallons of RNG, and create about 260,000 tons of fertilizer both liquid and solid.

ANAEROBIC DIGESTION - FLOW CHART



ENVIRONMENTAL PROJECT DRIVERS



The AD system will produce RNG, which is cleaner and more beneficial than traditional CNG on a lifecycle analysis as it is produced locally by your organic waste.



The project produces fertilizer that can be utilized by residents, commercial customers, farmers, city parks and golf courses.



AD is the only local option for co-collected green and food waste recycling.



While composting is superior to landfilling, it is inferior to anaerobic digestion, as it does not create energy or capture the emissions being released during the process.



Improves air quality and energy independence.

REGULATORY PROJECT DRIVERS



AB 32 / SB 32: California Global Warming Solutions Act. The project will benefit the city in its efforts to meet the green house gas reduction requirements. One of the most cost-effective ways to ensure compliance.



AB 341: Mandatory commercial recycling and a 75% statewide diversion goal by 2020.



AB 2313: Natural Gas Pipeline Interconnect Incentive.



AB 1826: The city will be able to comply with the organic materials phase out from landfills.



AB 1594: Green Waste (ADC - Alternative Daily Cover) is also currently being phased out by the year 2020.

ORGANICS MANAGEMENT OPTIONS

LANDFILLING

75%
Energy Recovery

75%
Emissions Capture

0%
Nutrient Recovery

COMPOSTING

0%
Energy Recovery

0%
Emissions Capture

100%
Nutrient Recovery

ANAEROBIC DIGESTION

100%
Energy Recovery

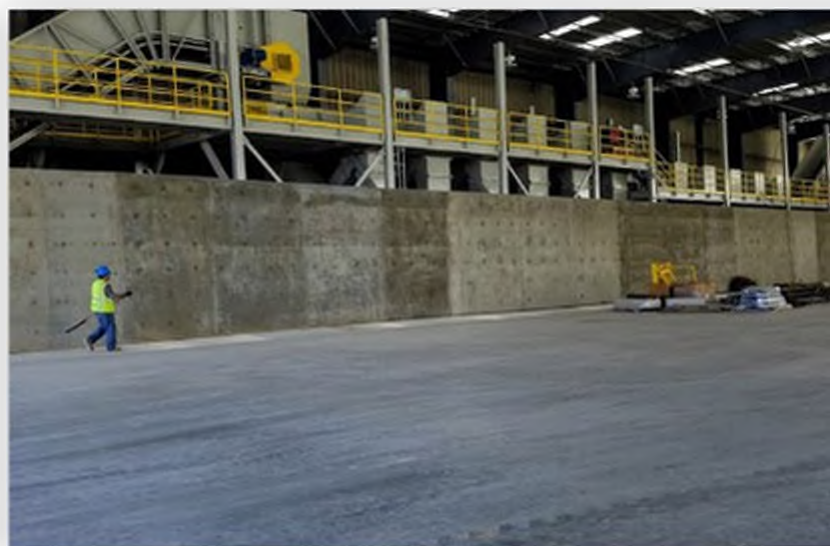
100%
Emissions Capture

100%
Nutrient Recovery

PROJECT SUMMARY



- 100% Emissions, Energy and Nutrient Capture
- All Systems Are Fully-Automated and Continuous 24/7
- “Real Time” Optimization - Temperature, Moisture, Methane, etc.
- Feedstock Can Be Liquids or Solids
- Highest Conversion to RNG Available
- No Loading, Unloading or Human Entry
- Over 90+ Plants in Operation Worldwide
- Can Operate Both Mesophilic and Thermophilic Simultaneously
- Very Small Footprint
- Octaform and Self Consolidating Concrete (SCC)



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