CR&R INCORPORATED

environmental services

the face of a greener generation

Aliso Viejo
Avalon
Bellflower
Blythe
Calimesa
Calipatria
Canyon Lake
Costa Mesa
County of Imperial
County of Los Angeles
County of Orange
County of Riverside
County of San Bernardino
Dana Point
El Centro
Heber
Hemet
Irvine
Laguna Niguel
Lake Elsinore
Long Beach
Los Angeles
Newport Beach
Newport Coast
Norwalk
Orange
Perris
Rancho Santa Margarita
Riverside
San Clemente
San Jacinto
San Juan Capistrano
Santa Fe Springs
Stanton
Temecula
Tustin
Westmoreland
Wildomar

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"Supplying energy to a growing world population while reducing greenhouse gas emissions is one of the grand challenges that we humans must face this century."

Dr. Lynn Orr
Project Director

Global Climate and Energy Project
Stanford University

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The Evolution of Solid Waste Management

1970s

Trash Bags and Cans → Landfill

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The Evolution of Solid Waste Management

1980s

Trash Bags and Cans

Landfills

Recycling Crates

Recycling Centers

1990s

The Evolution of Solid Waste Management

One Automated Can

Materials Recovery Facility – MRF

OR

Three Automated Cans

Landfill / Residual

Recycling

Alternative Daily Cover – ADC

The Evolution of Solid Waste Management

2010s

Two Automated Cans

Materials Recovery Facility

Residual

Recycling

Anaerobic Digestion

Renewable Natural Gas

Fertilizer

The Evolution of Solid Waste Management

As technology, disposal rates and various regulations have changed. We are at the next stage of solid waste management evolution. To continue to comply with AB939, which requires 50% diversion, AB341 which requires 75% diversion, and the soon to be implemented ban/phase-out of organics (food and yard waste) from the landfill and its usage as alternative daily cover, there are 3 options.

1. Continue with full solid waste processing if such a facility is available. This will limit the usage of some organics and slightly reduce the overall recycling rate.

2. Continue with the 3-can system. This will be highly dependent on the participation of each household, as the trash can is not processed.

3. Adapt to the new waste stream characterization and utilize CR&R's 2-can system. This will basically eliminate the so called trash can, as all waste will either be processed for recycling or anaerobic digestion. We believe this is the best of both worlds, 100% participation, 100% processing, maximum organics value, maximum recyclables value, while minimizing the economic and environmental costs.

Anaerobic Digestion Facility

Anaerobic Digestion Project Overview

- We will convert all of the organic (yard and food waste) into fertilizer and renewable natural gas to run our collection fleet.
- This program will keep all of your city's organic waste out of the landfill, where they will naturally degrade and release methane into the atmosphere.
- Over the next 5 to 10 years, nearly every product and package currently consumed will be either recyclable or digestible or both.
- They currently make recyclable and digestible plastic cups, knives, forks, spoons, napkins, to-go boxes, etc. All of which may be digested in our facility at a future time.
- Methane is 20 times more damaging to the atmosphere than carbon dioxide.
- No other company has our technology available.

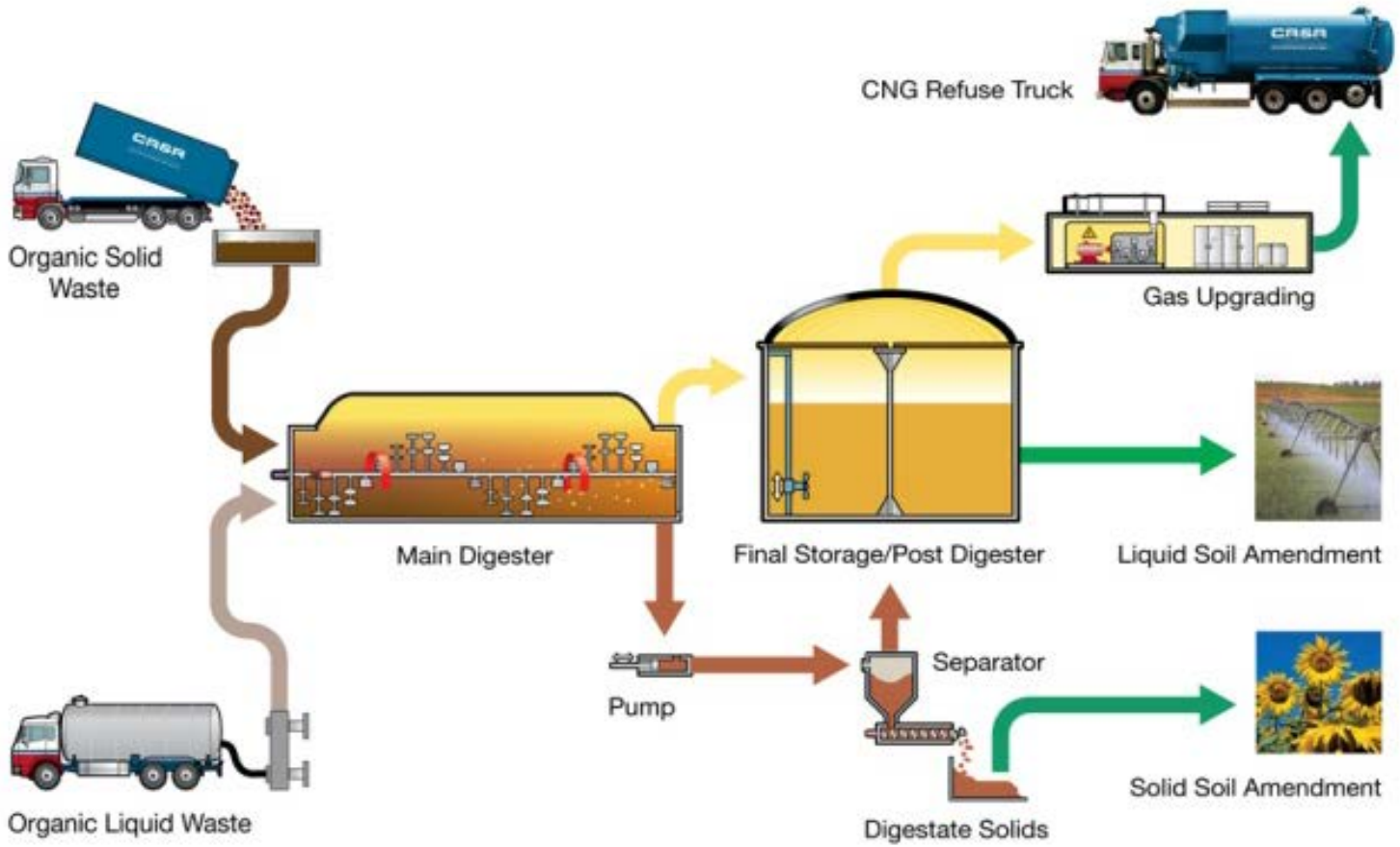
Anaerobic Digestion Project Overview

- CNG is the cleanest burning fossil fuel.
- There are nearly 10 million vehicles running on CNG worldwide.
- Anaerobic digestion is simply replicating Mother Nature in a more controlled and cost effective environment.
- Our process runs 24/7 – 365 days/year.
- Our process is fully automated.
- Our process provides maximum flexibility – waste mix, percentage (%) of solids in the waste, mesophyllic, thermophyllic, up to four different mixes and temperature can be run simultaneously.
- No other facility in the U.S., operating or planned, can match our capabilities.

Anaerobic Digestion Project Overview

- Our process is fully enclosed with zero untreated emissions.
- Our process has the highest energy conversion rate in the industry due to its design and digital controls – time, temperature, solids, moisture, nutrients, gas quality, etc.
- The initial plant will handle 83,600 tons per year.
- The plant will generate 1,000,000 gallons per year (DGE) of renewable natural gas (RNG).
- This will result in creating about 65,000 tons of fertilizer, both liquid and solid, per year.
- The plant will use “recycled” water from the local waste water treatment plant.

Biogas Flow Chart



Anaerobic Digestion Facility – Phase 1

Anaerobic Digestion Facility – Phase 4

Environmental Drivers

- The AD system will produce a **renewable zero carbon bio-fuel** for use in CR&R's fleet.
- The fuel produced by the system is Renewable Natural Gas (RNG), is cleaner and more beneficial than traditional CNG on a lifecycle analysis.
- The proposed project produces fertilizer that can be utilized by residents, commercial customers, farmers, city parks and golf courses.
- The current system of landfilling organic materials is becoming antiquated.
- AD is the only local option for co-collected green and food waste recycling.

Environmental Drivers

- While composting is superior to landfilling, it is inferior to anaerobic digestion, as it does not capture the energy or emissions being released during the process.
- Biogas produced by our project will result in the cleanest truck fleet possible.
- RNG is six times cleaner than CNG based on a complete lifecycle analysis as it is produced locally by organic waste.
- Fuel is produced from your city's discarded organic materials – a sustainable fuel resource.
- Benefits of the project are easy to communicate to your city's residents and businesses – reflecting a common desire to improve air quality and energy independence.

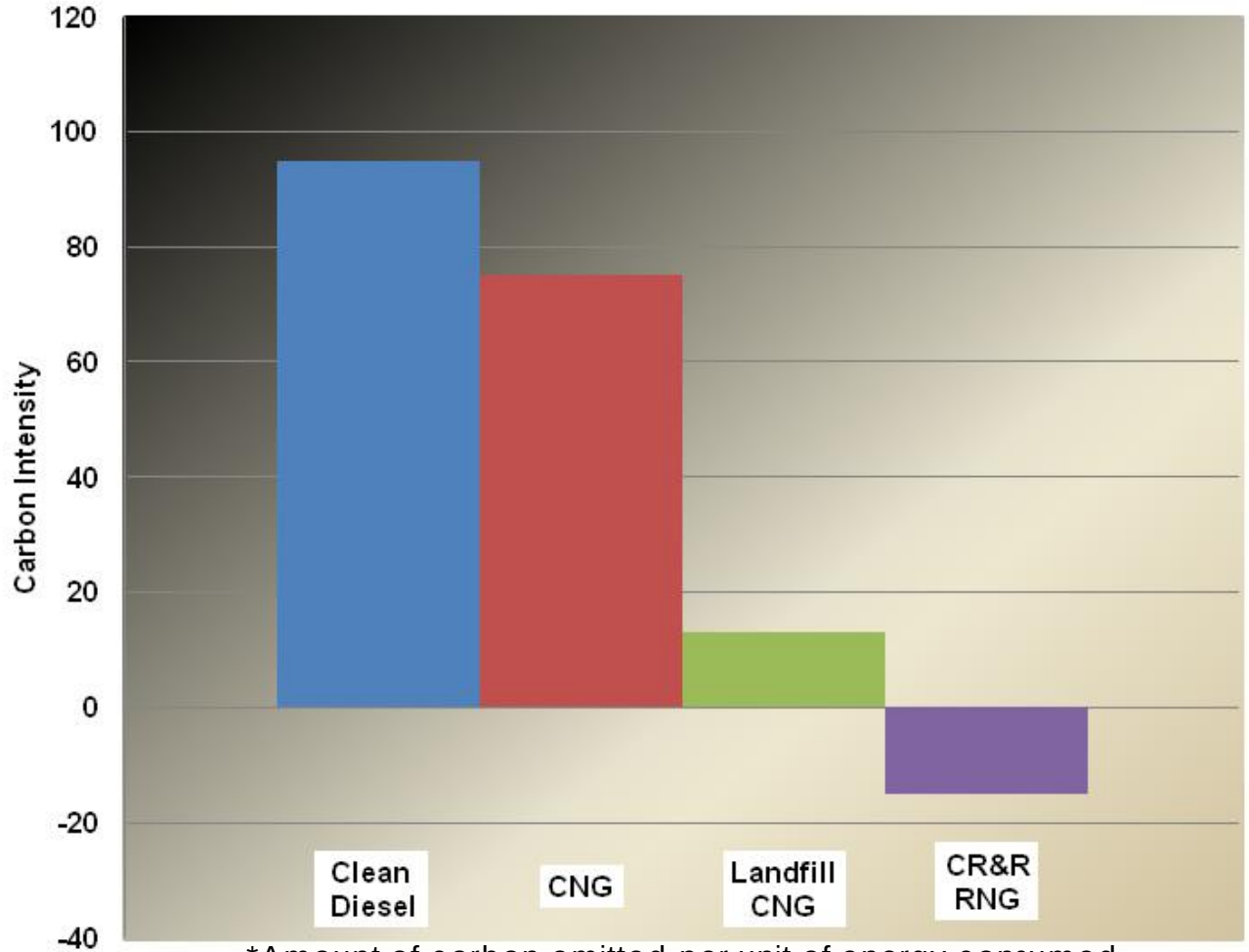
Economic Drivers

- The cities that sign up first will secure their position in the system as well as take advantage of the many grants received by CR&R, which lowers the initial rate per ton.
- The utilization of this project will provide the city with sustainable disposal options other than the landfill system, which will provide many environmental benefits as well as long term pricing stability.
- Once in place our fuel costs will be relatively constant, reducing fuel cost exposure in the future.
- This advanced system is the only way to provide your city with a combined green and food waste program for residents using the same collection routes and containers that are already in place.

Regulatory Drivers

- AB 32: California Global Warming Solutions Act. The project will benefit the city in its efforts to meet the green house gas emission requirements.
- One of the most cost-effective ways to ensure compliance with AB 32.
- AB 341: Mandatory commercial recycling and a 75% statewide diversion goal by 2020.
- AQMD and CARB air quality regulations will be satisfied.
- The city will be able to comply with the proposed and future organic material ban from landfills as is currently being contemplated by policy makers.
- Green waste (ADC – Alternative Daily Cover) is currently planned for a phase out by the year 2020.
- Low Carbon Fuel Standard
- Zero Waste Initiatives

Carbon Intensity *



*Amount of carbon emitted per unit of energy consumed

Organics Management

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

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We thank you for your time and interest.