

What You Need to Know for a Successful Bio-Gas Project

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Session Topics

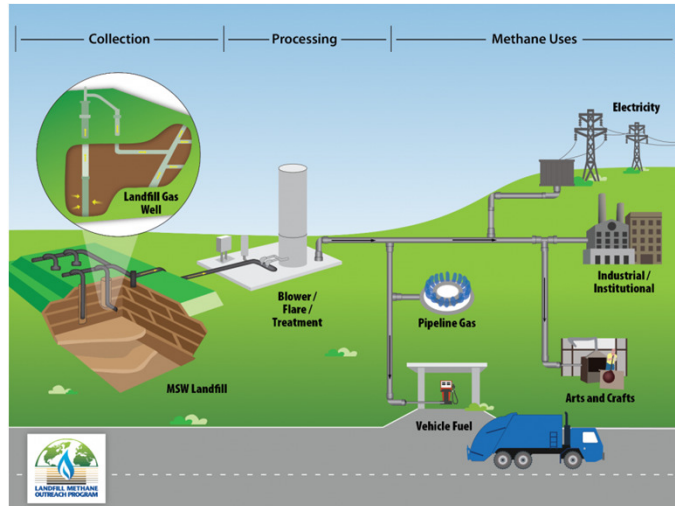
- ▶ Overview of Types of gas projects
- ▶ Trends and Considerations for Gas Projects
- ▶ Stages of a RNG Project Development
- ▶ Investor and Developer Business Models
 - ▶ Pine Creek RNG
 - ▶ Vespene Energy
- ▶ Questions



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JF1

Beneficial Usage Options



- ▶ Direct Use
- ▶ Electrical Generation
- ▶ Electrical Generation with Cogeneration
- ▶ High BTU Natural Gas (RNG/Bio-CNG)
- ▶ 693 Operational Projects nationwide
- ▶ 6 Projects in IA

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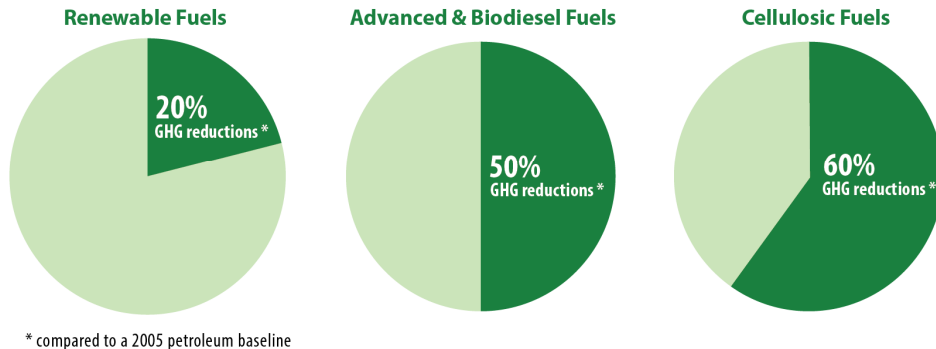
Renewable Fuel Standard (RFS)

- ▶ Federal program for the development of renewable transportation fuels
- ▶ Goal is to reduce petroleum usage and GHG emissions
- ▶ Renewable Volume Obligation (RVO) requirements set by EPA yearly
- ▶ Four categories
 - ▶ Cellulosic biofuel (D3)
 - ▶ Biomass-based diesel (D4)
 - ▶ Advanced biofuel (D5)
 - ▶ Renewable fuel (non-advanced/conventional biofuel) (D6)
- ▶ Renewable identification Number (RIN)

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Why Different Fuel Types?

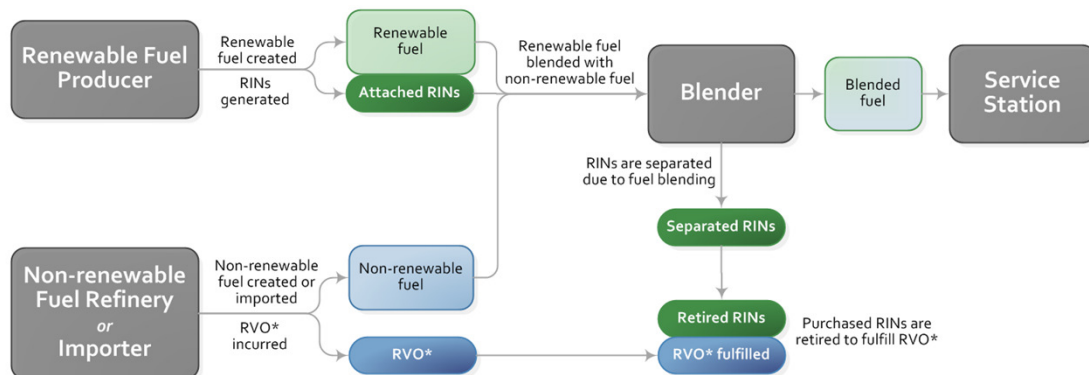
GHG emissions must take into account direct and significant indirect emissions, including land use change.



Graphic from US EPA

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Example Life Cycle of A Renewable Identification Number (RIN)



* RVO = Renewable Volume Obligation

Image from US EPA Website

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Project Timeline

- ▶ Request for Proposals vs. Direct Solicitation
- ▶ Letter of Intent
- ▶ Gas Rights and Land Lease Agreement
- ▶ Design and Engineering
- ▶ GCCS & RNG Gas Plant Permitting
- ▶ Construction Phase
- ▶ Pipeline Interconnection



PINE CREEK

Creating Value in Clean Energy

2023 Company Overview

pinecreek.com

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Pine Creek Renewables Business Overview



Pine Creek RNG

Formed in 2019 — Develops, builds, owns and operates landfill and digester methane capture plants as well as other commercially viable waste-to-energy infrastructure facilities.

pinecreekrng.com

Lancer Energy

Over 30 years in the automotive and advanced fuel industry, has become a leader in engineering and constructing advanced fuel stations (Electric, CNG/RNG, Hydrogen).

lancerenergy.com

Anode Power

Battery technology development and manufacturing for the telecommunications industry.

anodepower.com

Pine Creek Power Systems

Micro Grid design, construction, operations, optimization, and monitoring.

pinecreekpowersystems.com

Continuous Power (Inala)

Serving the global telecommunications industry since 1996 in Energy Service Company (ESCO) hardware, monitoring as a service, and edge compute virtual technician software.

continuouspower.com

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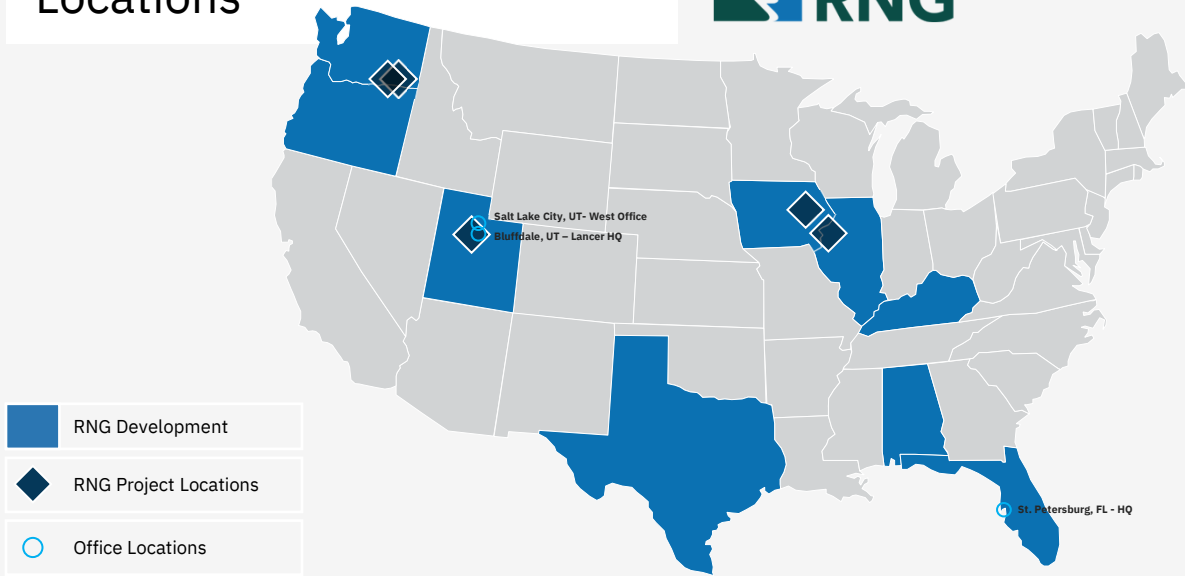


- Develops, constructs, owns and operates RNG projects
- Developing projects throughout the US
- Landfill and Industrial AD focus

Based out of St. Petersburg, FL, **Pine Creek RNG** is a vertically integrated Renewable Natural Gas ("RNG") producer that develops, owns, and operates RNG facilities across the U.S. Industry leading owners of landfills and industrial digester partner with **Pine Creek RNG** to convert sources of raw biogas into low carbon fuels. **Pine Creek RNG's** executive team is comprised of industry veterans with decades of experience in energy and technology, deep market knowledge, and know-how. Driven by a culture of collaboration and partnership, **Pine Creek RNG** and its people are committed to creating value through positive environmental impact.

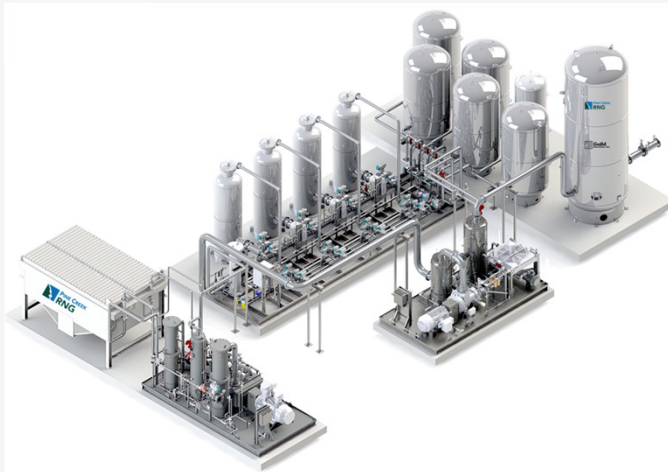
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Pine Creek RNG Locations



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Pine Creek RNG RNG Plant Overview



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For biogas separation and upgrading, Pine Creek will utilize pressure swing adsorption ("PSA") technology manufactured by Guild Associates. Guild's technology is a media-based PSA. The PSA technology has decades long track record of successful operations and proven capability to process and convert the raw gas into high Btu RNG that meets or exceeds pipeline specifications and delivery pressure.

Processing Stages:

1. Raw feed gas from the landfill collection system is sent to the PSA system at 0 PSIG and ~100°F.
2. Gas is compressed to 110 PSIG, chilled to < 50°F, and reheated to 150°F using compressor waste heat.
3. Dry, reheated gas is sent to the PSA system for CO₂, VOC, Siloxane, and H₂O removal; CH₄, N₂, and O₂ pass through the bed.
4. Vacuum compression regenerates the PSA beds by removing the contaminants; low-pressure tail gas is sent to the flare/TOX.
5. Product gas is cooled and sent to the Equilibrium PSA system.
6. The Equilibrium PSA system adsorbs the CH₄, while N₂ and O₂ pass through the bed to the enclosed flare (by others).
7. Recycle compression is used to enhance methane recovery.
8. Vacuum compression regenerates the Equilibrium PSA media by removing the product gas.

Novel **Microgrid** Approach to Landfill-Gas-to-Energy Projects with Vespene Energy

vespene^{energy}

HISTORICALLY, ONLY TWO WAYS TO UTILIZE LANDFILL GAS

01 Refine to RNG

- **High margin and lucrative, but...**
 - Infrastructure and capital intensive
 - Heavy power requirements
 - Requires new pipeline construction or virtual pipelining
 - Typically requires higher flows (>800 scfm)



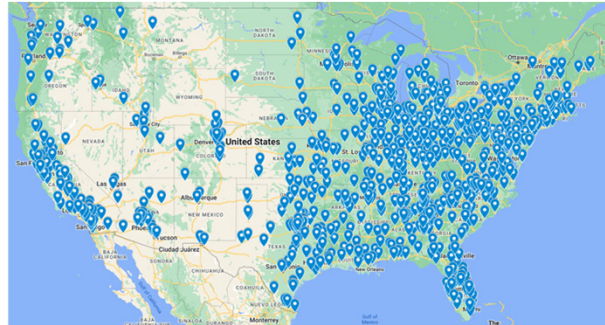
02 Sell Electricity to Grid

- **Lower capital requirements, but...**
 - Historically low margin
 - Long interconnect timelines
 - Some sites lack 3-phase power



OPPORTUNITIES AT SMALL LANDFILLS

- **NSPS-Regulated Sites:** Small landfills collecting and flaring gas represent a significant untapped opportunity to tie together baseload distributed generation resources, while currently a major **economic liability** for communities and landfill operators.
- **Non NSPS-Regulated Sites:** Without a financially viable method of mitigation / use, these sites will remain an **environmental liability** until the landfill grows or more stringent regulations come into place.
- Based on EPA data, we estimate there is approximately 2 GW of potential electricity generation that is either being flared or emitted



MAP OF US LANDFILLS WITH UN-UTILIZED OR UNDER-UTILIZED GAS RESOURCES AND FLOW RATES >100 SCFM
(SOURCE: EPA LANDFILL METHANE OUTREACH PROGRAM DATABASE)

MOST OF THESE SITES ARE TOO SMALL AND DECENTRALIZED TO BE VALID TARGETS FOR RNG DEVELOPMENTS, AND VOLUNTARY CARBON CREDITS ALONE ARE NOT ENOUGH TO FUND MOST PURE DESTRUCTION PROJECTS.

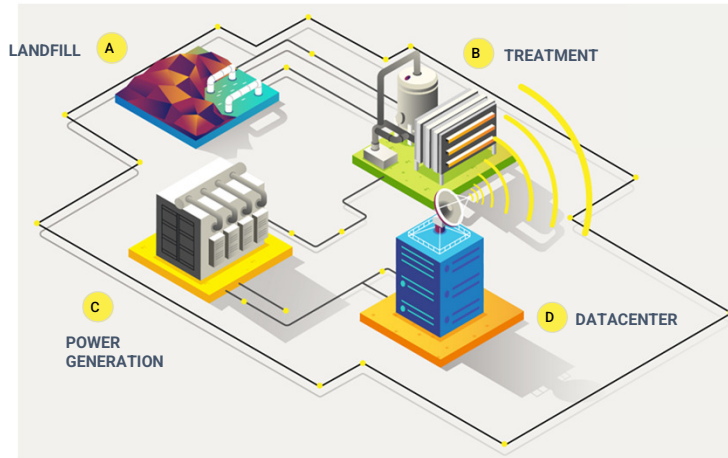
VESPENE PROVIDES A SOLUTION

Vespe Energy's Self-Sustaining Microgrids combine the high economic returns of RNG with the lower cost and scalability of electricity projects, allowing small landfills to profitably contribute to the renewable energy transition.

WITHOUT REQUIRING A GRID INTERCONNECT

PHASE 1: THE CORE OF A SELF-SUSTAINING MICROGRID

Vespene's Self-Sustaining Microgrid is a LFG electricity project co-located with a modular datacenter. In this way, we bring the user of the energy to the site, rather than exporting the energy to the user. **The only export from the site is data, not electrons or molecules, and data can be transferred via satellite or other wireless internet option.**



B.
GAS CONDITIONING

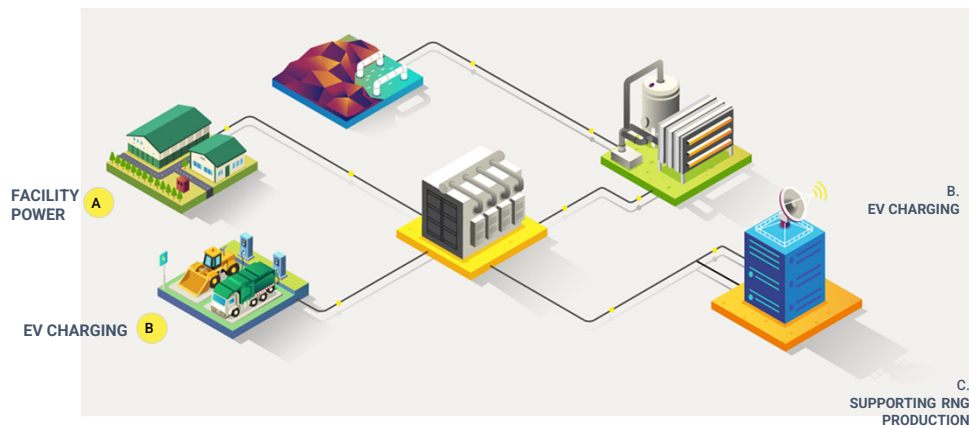
C.
CLEAN
GENERATION

D.
CONTAINERIZED
DATACENTER



PHASE 2: ENABLING ON-SITE USES

Vespene Self-Sustaining Microgrids balance site loads with **fully interruptible datacenters which enable reliable off-grid energy for EV charging, facility power, and other variable site loads.** This ensures that 100% of the electricity is always put to beneficial use and monetized, allowing the generation assets to run continuously.



A.
FACILITY POWER

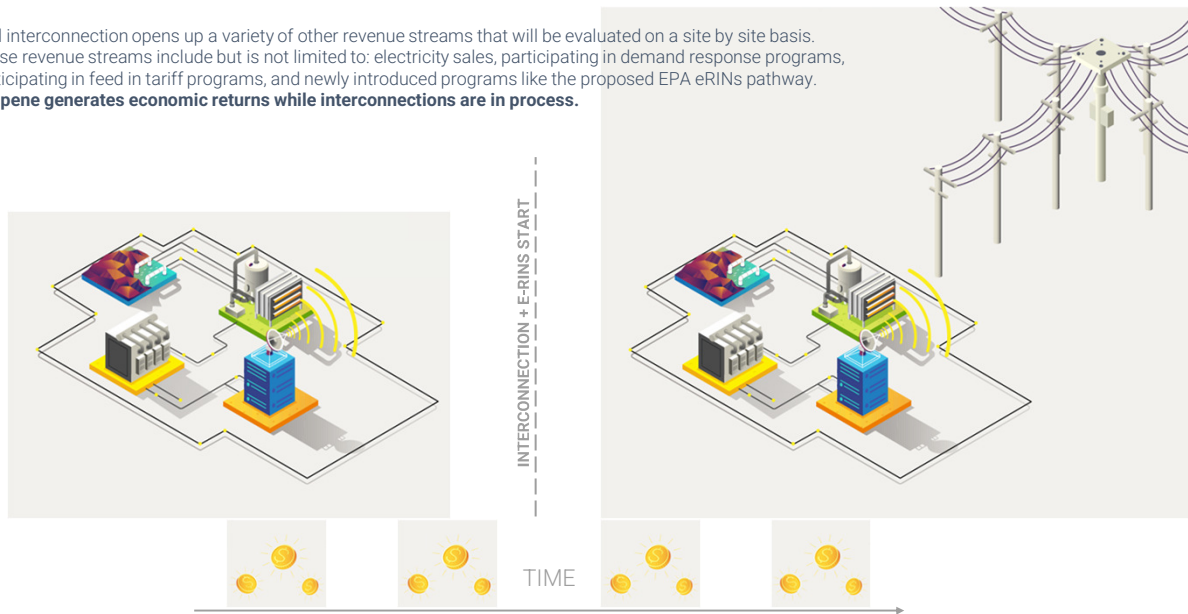
B.
EV CHARGING

C.
SUPPORTING RNG
PRODUCTION



PHASE 3: GRID CONNECTED

Grid interconnection opens up a variety of other revenue streams that will be evaluated on a site by site basis. These revenue streams include but is not limited to: electricity sales, participating in demand response programs, participating in feed in tariff programs, and newly introduced programs like the proposed EPA eRINS pathway. **Vespene generates economic returns while interconnections are in process.**



KEY BENEFITS

01 GHG Emission Reduction

Economically mitigates methane emissions without regulatory intervention.

02 Modular and Scalable

Minimal site infrastructure requirements. Scales to amount of gas available. Applicable for closed landfills as well as C&D landfills.

03 Health and Safety

Hazardous air pollutants such as VOCs, NOx, and H2S are filtered or destroyed during the combustion process.

04 Regional Economic Benefits

Job creation in rural areas. Royalties provide additional revenue for communities. Stimulates adoption of electric vehicles, allows landfills to benefit from government EV incentive programs. Renewable energy for rural electric cooperatives.

05 Reduces Environmental Compliance Costs

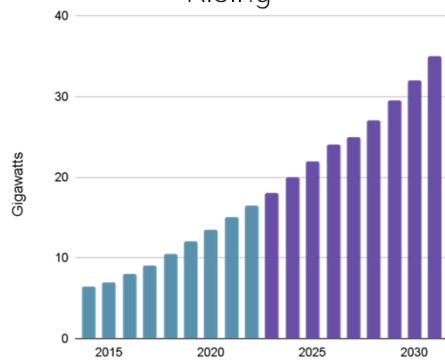
Avoids potential future costs related to EPA compliance due to landfill growth or changes to the regulatory landscape.

06 Complimentary to Other Projects

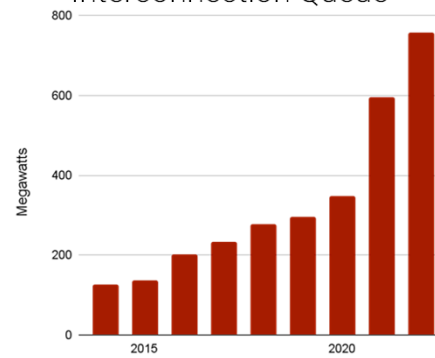
Monetize gas during the build-up of a larger project, or the excess gas from an existing project.

ENERGY BENEFITS

Data Center Energy Demand Rapidly Rising



New Energy Generation Stuck In Interconnection Queue



We bring the energy user onsite and avoid delays in revenue from long interconnection queues

MARATHON COUNTY LANDFILL PILOT

AT A GLANCE:

- 2 MW landfill gas to electricity self-sustaining microgrid
- Partnership with Viridi RNG, Data centers as bridge to RNG
- Vespene and our partners will be fully capitalizing the project

DEVELOPMENT TEAM REPRESENTATIVE SHOWCASE: VESPENE

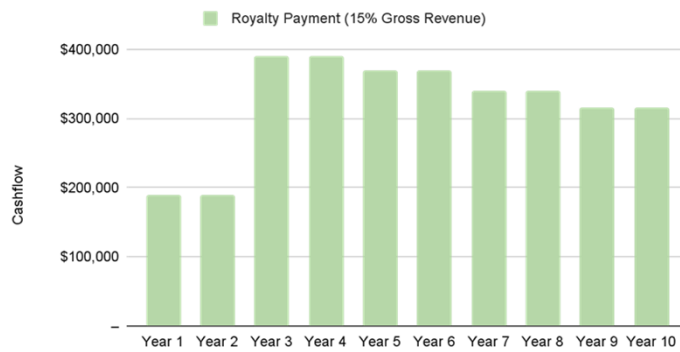
- Marathon County Landfill in Wisconsin
- 2 MW LFGTE Project Co-Located with Datacenter



BENEFITS TO CLOSED LANDFILL

ECONOMIC

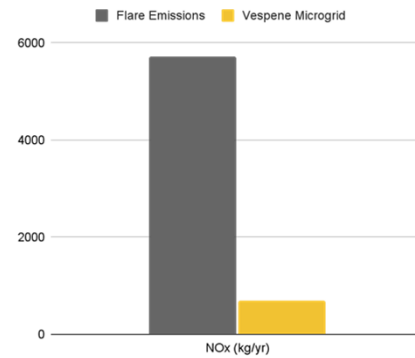
Projected Royalties of \$3.2m over 10 Years for Landfill



**ProForma Financials (Examples Purposes Only)*

ENVIRONMENTAL

88% + Reduction in NOx Emissions



Thanks for Attending

Lets Connect

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vespene^{energy}



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