

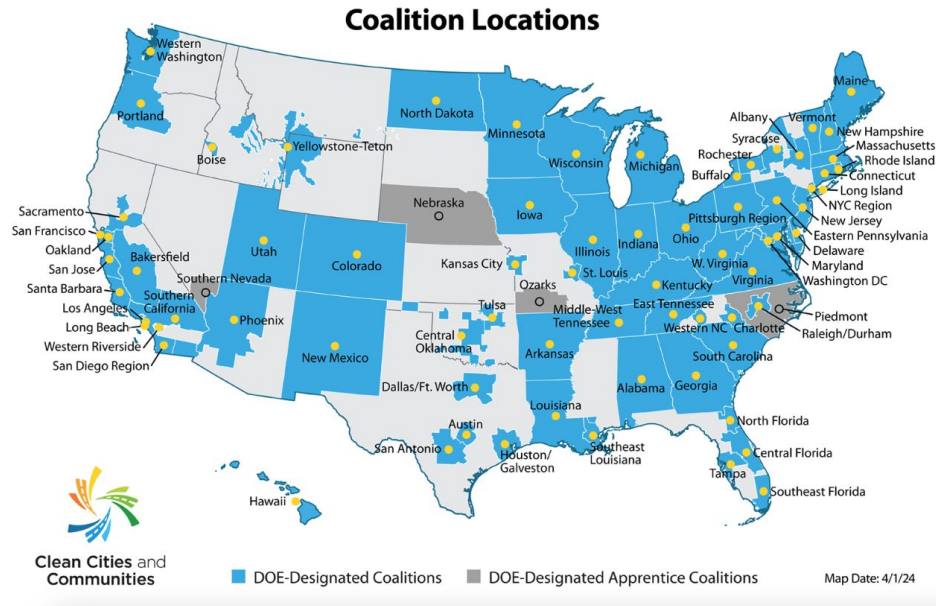
Texas Roundup

Renewable Natural Gas 101

WELCOME

Thank you for joining!

Clean Cities & Communities Coalition Network



Advancing affordable, domestic transportation fuels and technologies

- Forums for local stakeholders to connect and collaborate
- Provide grassroots support and resources
- Identify cost-effective solutions that work locally

Vehicle Technologies Office

Advanced domestic transportation fuels and technologies:

- ✓ Improve energy **efficiency**
- ✓ Increase domestic energy **security**
- ✓ Reduce operating **cost** for consumers and business
- ✓ Improve global **competitiveness** of U.S. economy



Technology Integration



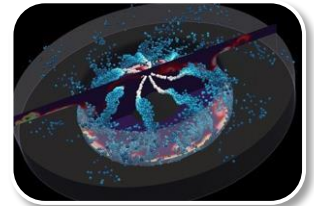
Materials Technologies



Energy Efficient Mobility Systems



Batteries and Electrification



Advanced Engine and Fuel

Technology Integration

Provide objective data and real-world lessons learned that inform future research needs and support local decision-making



Information and Tools



Technical Assistance



Financial Assistance



Training, Outreach, and Partnerships



Clean Cities and Communities

Network of Coalitions





Texas Roundup



Renewable Natural Gas 101



Lone Star Clean Fuels Alliance RNG Overview

Jesse Blair

June 18,
2024

RNG in the

FINANCE

Wall Street's Next Big Play Is Garbage

Landfill firms are investing in trash-gas production and recycling technology

By Ryan Deitzman, [Follow] and [Follow] [Follow](#)
May 28, 2023 8:00 am ET



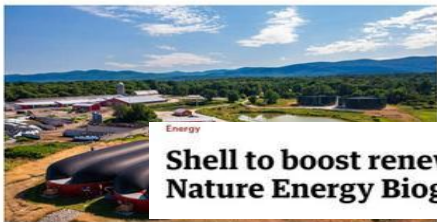
Waste Management is investing in expanding and automating its recycling business. PHOTO: WASTE MANAGEMENT

The green push by the U.S. and state governments is turning trash into treasure and boosting the firms that handle America's garbage.

◆ WSJ NEWS EXCLUSIVE FINANCE

BlackRock Is Buying Renewable Natural Gas Producer for \$700 Million

Massachusetts-based Vanguard Renewables works with companies to convert food waste and cow manure into a



Energy

Shell to boost renewable natural gas business with \$2B acquisition of Nature Energy Biogas

11/6/23, 1:36 PM

Enbridge to purchase seven renewable gas facilities in Texas, Arkansas for US\$1.2-billion - The Globe and Mail

Enbridge to purchase seven renewable gas facilities in Texas, Arkansas for US\$1.2-billion

CALGARY
THE CANADIAN PRESS
PUBLISHED NOVEMBER 3, 2023

Canadian pipeline giant Enbridge Inc. [ENB-T \(/investing/markets/stocks/ENB-T/\)](#) +0.19% ▲ has signed a deal to purchase seven existing renewable natural gas facilities in Texas and Arkansas for US\$1.2-billion.

DIVE BRIEF

Synthica, with Goldman Sachs investment, plans to break ground

AD sites in 2024

re not disclosed for the transaction.

NextEra expands renewable natural gas ops via USD 1bn acquisition

US clean energy group NextEra Energy Inc [NYSE:NEE](#) is expanding its renewable natural gas

Colorado Springs Utilities among group seeking future renewable natural gas developers

Natural Gas as a Key Alternative Energy Source in Sustainable Renewable Energy Transition: A Mini Review

Energy

Kinder Morgan grows RNG footprint with \$355M acquisition, adds Arlington gas facility

ENERGY TRANSITION | NATURAL GAS — 29 Aug 2023 | 14:30 UTC

Listen: Renewable natural gas is headed for the moon

BP Boosts Biogas Dreams With US Acquisition

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What is RNG (Renewable Natural Gas)?



Produced by capturing methane released by decomposing organic waste



Substitute for traditional fossil gas, sometimes called biomethane



Reduction in CO2 emissions and enhances sustainable circular economy



Used for CNG Vehicles, Electrical Generation and Industrial Heating



RNG

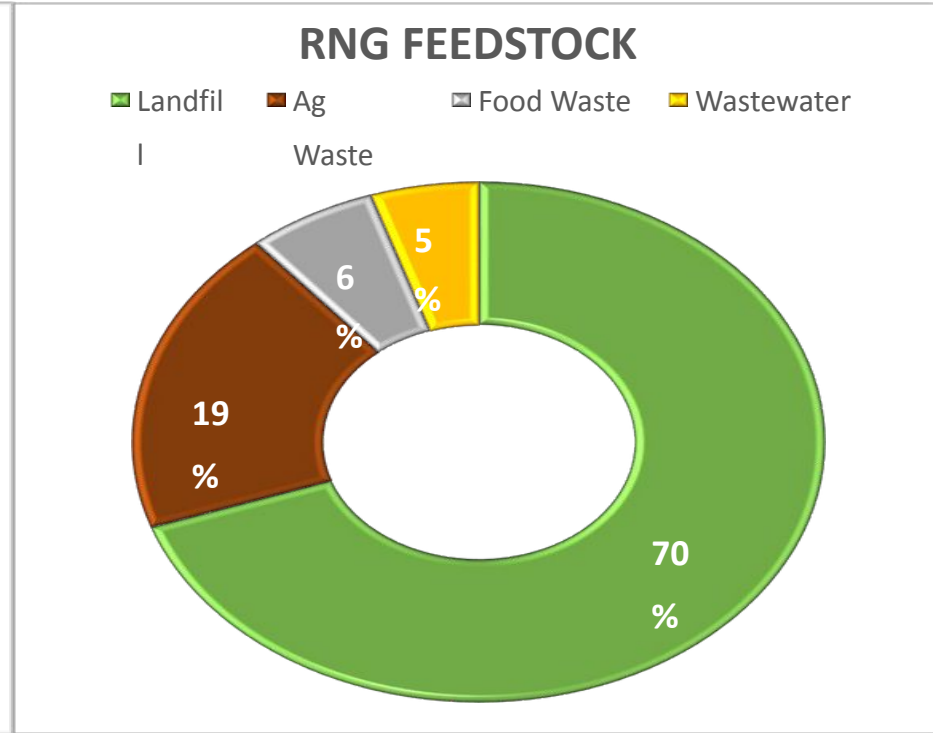
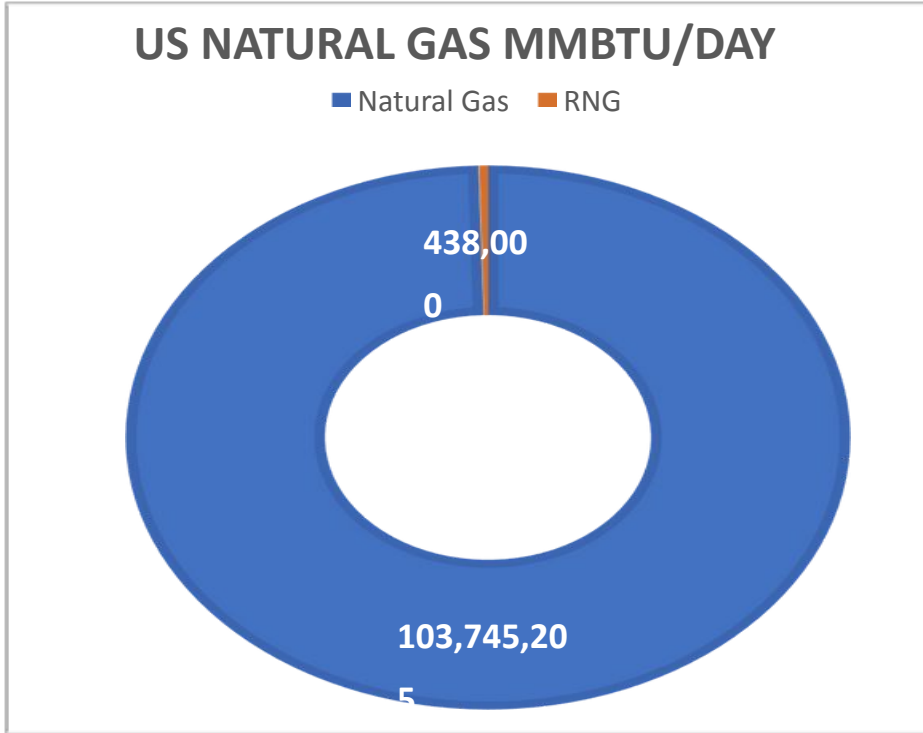


RNG Project

Landscape



Natural Gas Market Size



Synthica Opportunity



Synthica Background

- Founded in 2017 in Cincinnati, OH by Sam Schutte and Grant Gibson
- Broke ground on first facility in St. Bernard Ohio in Summer 2023
- Closed on an equity investment from Goldman Sachs Asset Management in August 2023



Mission

Reduce landfill volumes, increase recycling and create an accessible solution using food and organic waste to create renewable energy.



Problem

Food waste accounts for nearly 50% of landfill capacity. These organic waste streams are increasingly difficult for landfills to take, while they could be directly routed to anaerobic digesters.



Solution

Develop a network of digestion facilities which will accept organic byproducts instead of going to landfills. Use proven technologies to inject pipeline quality gas into the existing pipeline grid.



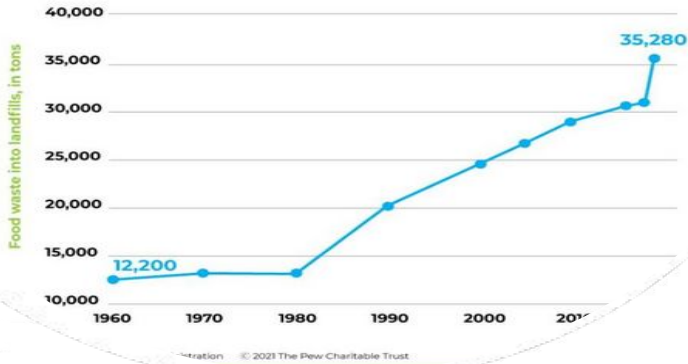
Landfill Food

Waste

Growing Challenge: Food Waste in Landfills

The amount of spoiled food going to landfills has increased dramatically in recent years. As food waste breaks down, it emits methane, which is naturally occurring, but potent and harmful greenhouse gas.

RNG projects capture this methane from existing food waste, animal manure, wastewater sludge and garbage, and redirect it away from the environment, **repurposing it as clean energy** to fuel, heat and power our vehicles, homes and businesses.



30%+ of food produced in the US is lost or wasted



Food is the most common material found in landfills which enables methane release



Waste management in landfills accounts for 1/4 of U.S methane emissions



Methane emissions are 28X's more potent than emissions from CO2



World Bank projects solid waste increase by nearly 50% by 2050



Development Footprint





Texas Roundup: RNG 101

Morrow Energy

June 18, 2024



About Morrow Energy



Fabrication Facility – Midland TX



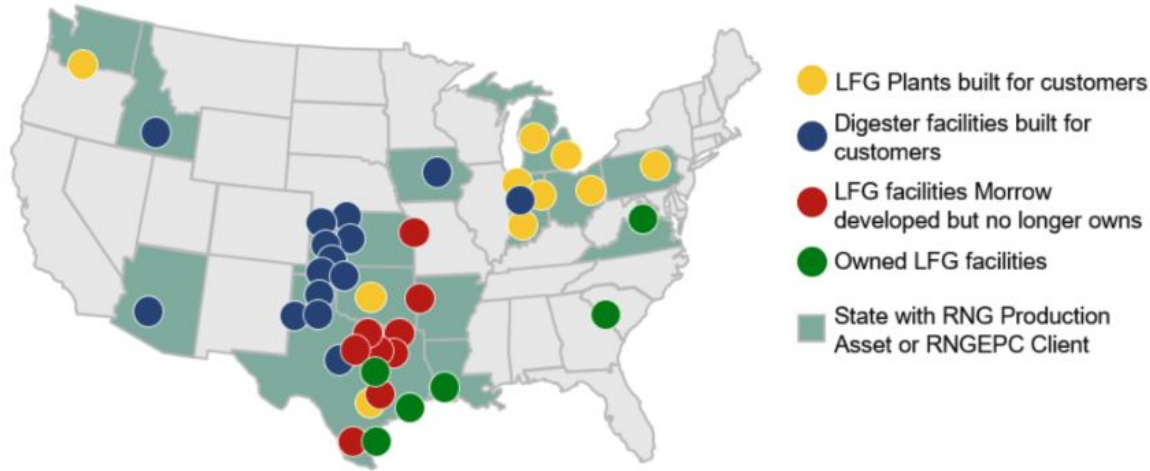
Blue Ridge RNG Facility – Houston, TX

Morrow Energy is a Renewable Natural Gas (RNG) developer and equipment fabricator, headquartered in Midland, Texas.

Since 2000, Morrow has built 44 high-BTU RNG projects, operating up to 8 at one time.

About 30% of all RNG capacity in the country was built by Morrow Energy

LFG Development Experience



- Morrow Developed our First LFG to RNG Project in 2000 at a landfill in Kansas City
- Morrow has Developed, Owned and Operated 13 projects in our 25-year history
- 5 of these projects have been with Municipal Landfills

Benefits to Municipalities

Morrow currently operates 3 plants that are partnerships with Municipalities:

- Twin Oaks Renewables with Brazos Valley Solid Waste Management Authority
- Corpus Christi Renewables with the City of Corpus Christi
- JDP Renewables with Jefferson Davis Parish, LA.

These partnerships bring many benefits to the municipalities:

- The host landfills receive royalty payments that are normally a percentage of the revenue from gas sales. This income can go to additional services provided by the landfill or reducing costs to the community.
- The RNG developer normally takes over control of the wellfield, which can remove the cost of Operations and Maintenance of the gas collection system and in many cases remove the cost of future wellfield expansions
- Because the developer is incentivized to collect as much gas as possible, our experience is that gas odors from offsite gas emissions can be greatly reduced or eliminated.

We call these benefits a **WIN⁴**

The community wins, the environment wins, the host landfill wins and the developer wins.

There are not many projects that can deliver this type of benefit, which is why we think RNG projects are uniquely beneficial opportunities for municipalities

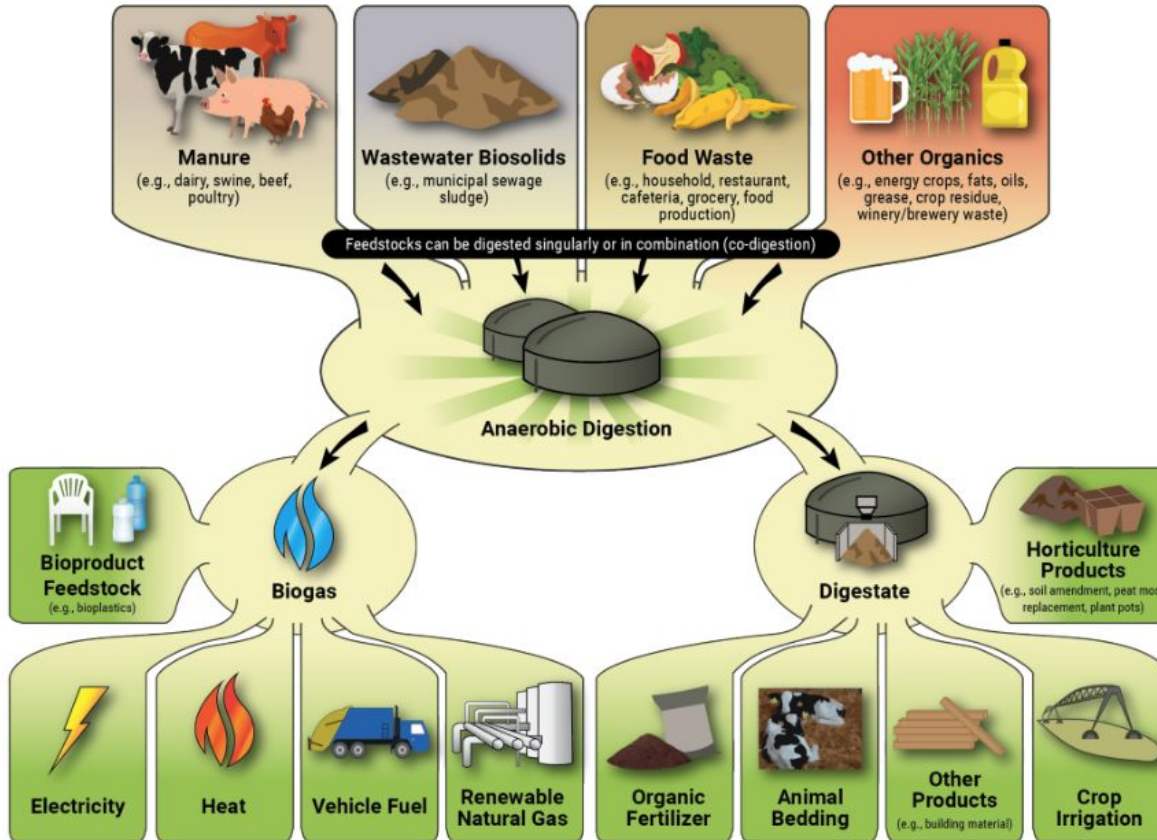


Corpus Christi Renewables in Corpus Christi, TX



Twin Oaks Renewables in Anderson, TX

Anaerobic Digestion (AD)



- Organic matter goes in, gas and digestate come out
- Low Carbon Fuel Standard (LCFS) credits are the main financial driver for AD projects
- AD plants have among the lowest Carbon Intensity scores
- Co-Digestion involves bringing multiple feedstocks to one digestion site

*Source: <https://www.epa.gov/agstar/how-does-anaerobic-digestion-work>



Contact Info



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**A world of
new energy**

**Texas Roundup
Renewable Natural Gas 101
June 18, 2024**

North America



EDL is ranked in the top 10 landfill gas producers in the US.

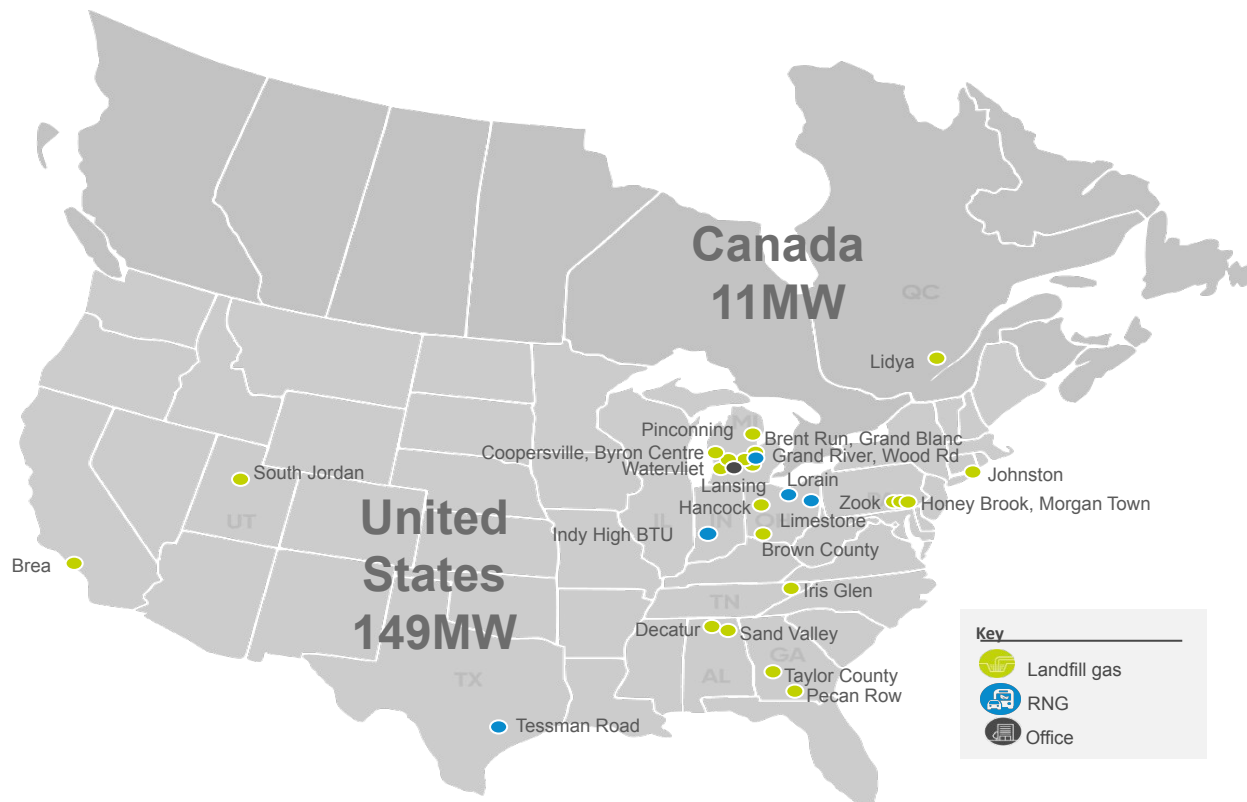
We are also harnessing the full potential of renewable natural gas (RNG) from landfill to generate electricity—commercial and domestic gas and heating—and help decarbonise the transportation industry.

Diversified asset portfolio

160MW
landfill gas

22
assets

5
RNG sites



Community Involvement



EDL has been involved with the San Antonio area communities for over 20 years

Prior to RNG -

- Electric generating facility at Republic's Tessman Road Landfill since 2002
- Sold 14 MWs of renewable electricity to the City of Austin
- As the Power Purchase Agreement (PPA) with the City of Austin neared expiration - EDL began exploring the opportunity to convert the existing electric generating facility to a new Renewable Natural Gas facility

RNG Conversion –

- EDL began discussions with CPS Energy regarding the feasibility of interconnecting to the local natural gas pipelines
- EDL begins looking for a transportation fuel customer to begin discussing sales of renewable natural gas

- Individuals within VIA (the San Antonio metro bus system) read about the City of Dallas finding a new revenue stream called RINs (Renewable Identification Numbers – the name for environmental attributes tied to the use of RNG as a transportation fuel)
- VIA reached out to CPS to inquire about how they could take advantage of RINs.

RNG Operations -

- Revenues from the sale of the environmental attributes, RINs, are shared with the CPS and VIA
- EDL currently provides approximately 50% of VIA's fuel needs

Together EDL, CPS and VIA have created a true local solution for a local issue.

Locally generated waste is being captured and repurposed to transport San Antonians across the metro area.

Tessman Road RNG facility

San Antonio, Texas



~500,000MMBtu or ~0.52PJ
RNG produced per year from LFG



14.1 million gal
diesel displaced per year



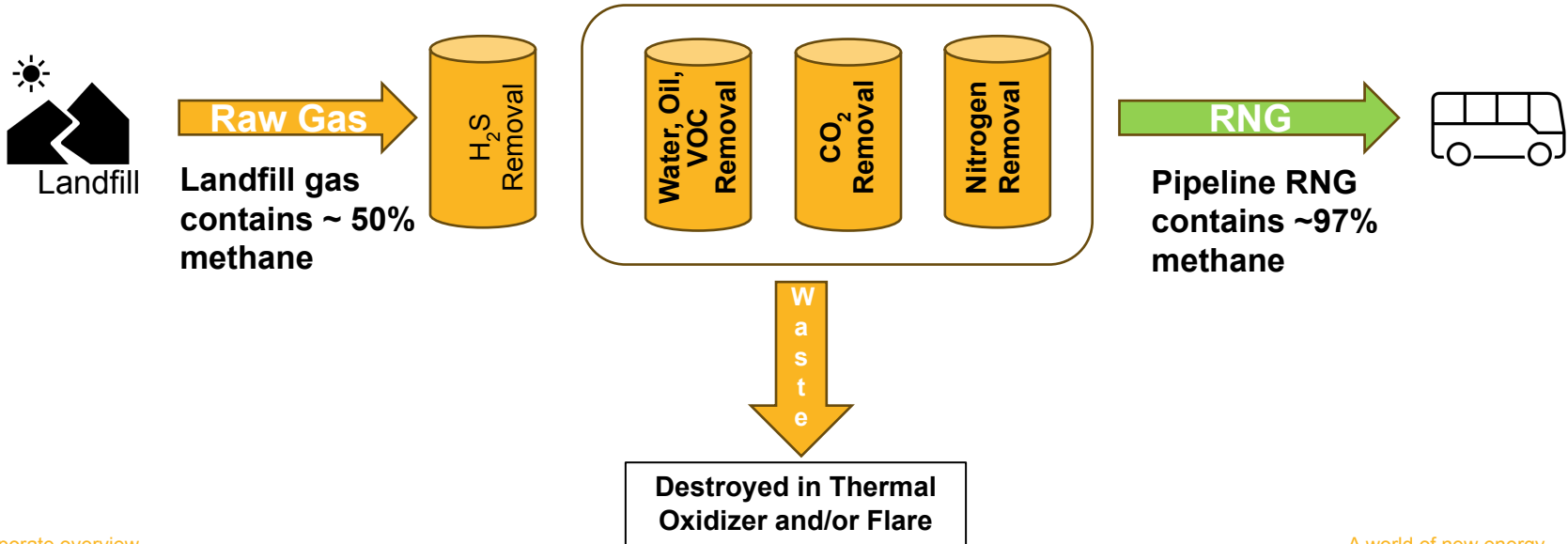
~15,000t
carbon dioxide equivalents avoided per year (2022)

Landfill Gas Processing



Landfill gas based RNG facilities resemble small refineries in their complexity

Through the refining process the raw landfill gas must be “cleaned” to nearly pure methane
This is achieved through a number of systems that remove and destroy contaminants





A world of
new energy

Thank you
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Question?

- **Are offsets or RECs available for third-party buyers?**
- **Is the private sector interested in profitability or is there a policy?**
- **Are any municipalities practicing commercial and residential food waste digestion?**

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