



# Clearing the air: How to reduce methane emissions and generate revenue

Matt Shumway, Mainspring Energy  
Adam Wright, Vespene



# Quick Notes



You should be able to hear me talking now. If you can't, use the questions module to describe your issue.

Two Audio Options: Phone or Computer  
Choose one and connect

Pro tip: Don't call in on our phone if your audio is set to "Mic and Speakers"

Ask questions using the Questions Panel on the right side of your screen at any time.

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The screenshot shows the GoToWebinar interface. At the top, there's a menu with 'File', 'Options', 'View', and 'Help'. Below that, a yellow banner reads 'Attendees still on hold' with the instruction 'Press \*1 to Start the Broadcast for all attendees.' and a checked box for 'Record on start'. A sidebar on the left contains icons for various functions. The main area is divided into two sections. The top section, labeled 'Audio', shows options for 'Computer audio' (unselected) and 'Phone call' (selected). It also displays dialing information: 'Dial: +1 (415) 655-0052', 'Access Code: 147-638-497 #', and 'Audio PIN: 79 #'. Below this is a 'Problem dialing in?' link. The bottom section, labeled 'Questions', shows a table with columns for 'Question' and 'Asker'. The table is currently empty. At the bottom of the interface, there are options for 'Send Privately' and 'Send to All', and a status bar at the very bottom indicating 'Webinar Now' with 'Webinar ID: 815-417-091' and the 'GoToWebinar' logo.

← Audio

← Questions

# Speaker bios

## Matt Shumway - Dir. of Business Development Mainspring

- Leads sales and partnership opportunities with companies and projects for renewable fuels and EV mobility applications. Joined Mainspring 2022.
- Prior to Mainspring, served in Senior Business Development roles for Renewable Fuels at Chevron, where he spent nine years in development, analysis, and strategy positions in renewable and low-carbon fuels.
- Holds BA and MBA degrees from BYU in Provo, UT.



## Adam Wright - CEO

vespene<sup>energy</sup>

- Co-founded Vespene Energy in 2022 to help address the growing problem of methane emissions by increasing utilization of biogas through aggregated development of distributed electricity generation.
- Seasoned management executive with over 18 years experience building and growing companies across a variety of fields including metal 3D printing, submarine engineering, real estate, and renewable energy.
- In 2013, Adam founded DeepFlight, a marine technology manufacturer that became a global provider of personal and tourism submarines.
- Mechanical engineer by training.



# What is your biggest challenge with biogas or landfill to gas electricity project?

- difficulty obtaining air permitting
- need access to more land
- economics don't pencil
- don't have capital budget
- don't have a gas collection system



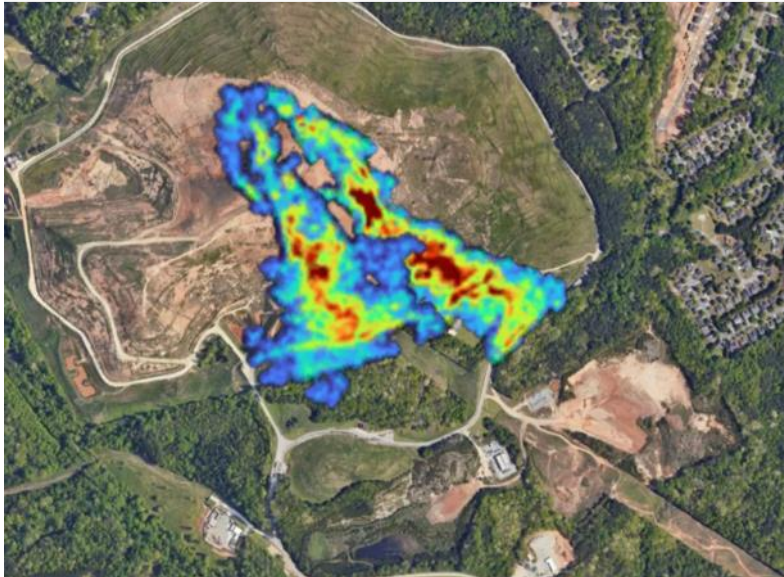
# Tailwinds for biogas to electricity projects

## Methane emissions from landfills

- Estimated at around 20% of global human-caused methane emissions.

CNN World Africa Americas Asia Australia China Europe India Middle East United Kingdom

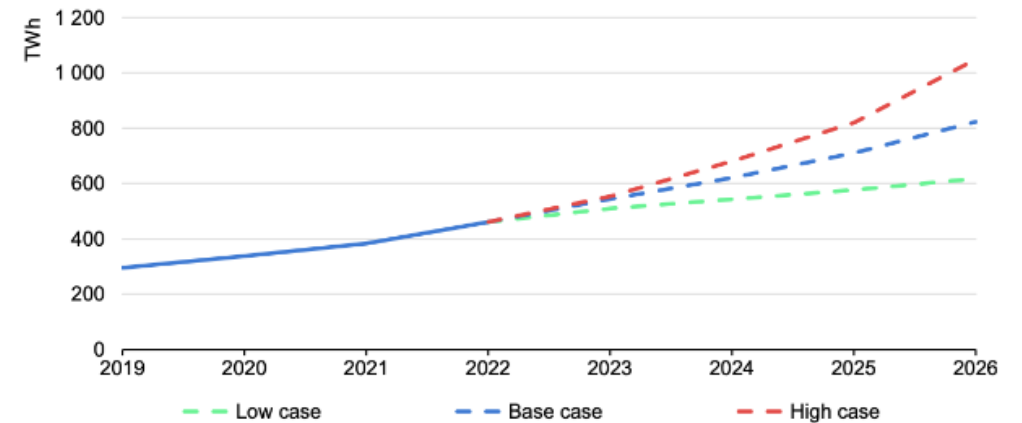
**A potent planet-warming gas is seeping out of US landfills at rates higher than previously thought, scientists say**



## Growing demand for electricity

- The 5-year load growth forecast by grid planners nearly doubled.
- Nationwide electricity demand is projected to increase from 2.6% to 4.7% over the next five years, per 2023 FERC filings.
- Driven by demand from data centers, industrial / manufacturing, transportation, etc.

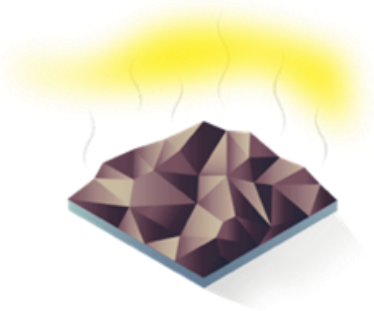
Global electricity demand from data centres, AI, and cryptocurrencies, 2019-2026



IEA. CC BY 4.0.

# About Vespe Energy

Vespe Energy develops regional distributed electricity projects fueled by biogas, tapping into a vast underdeveloped market opportunity.



STEP 1

## BIOGAS COLLECTION

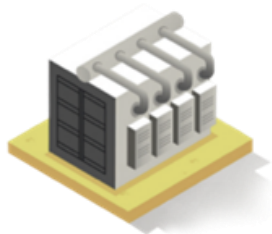
Vespe Energy installs the infrastructure to extract biogas from a site.



STEP 2

## BIOGAS CONDITIONING

Raw biogas is filtered to remove contaminants and moisture. A single unit design can deal with a range of gas flow rates.



STEP 3

## POWER GENERATION

Processed biogas is reacted in an array of Mainspring LGens, producing clean electricity.



## AGGREGATED OFFTAKE

Multiple sites in the same grid region are developed simultaneously, creating a large distributed project producing electricity that can be sold to a corporate or utility off-taker.

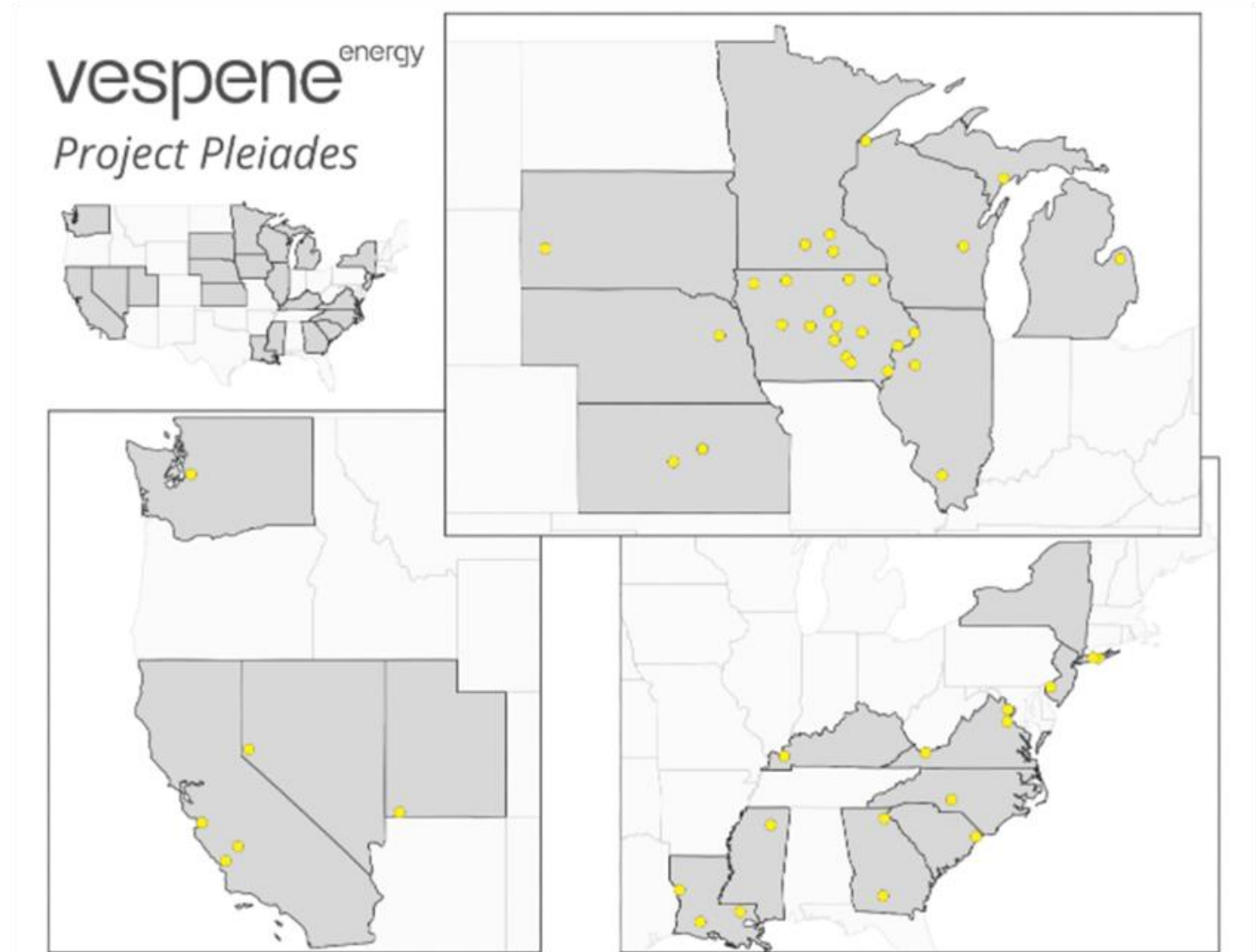


## MODULAR DATA CENTER DEPLOYMENT

Electricity is used locally at the site with excess electricity utilized by a colocated data center.

# Aggregated offtake

- Vespene Energy aggregates small biogas electricity projects into large regional clusters and sells the resulting electricity and environmental attributes.
- Biogas electricity is uniquely able to deliver 24 / 7 hourly-matched clean baseload electricity.





# Modular data center deployment

- Vespene Energy deploys modular data centers as a behind-the-meter revenue source to support biogas electricity development.
- Can act as a bridge toward other use cases, or a standalone project



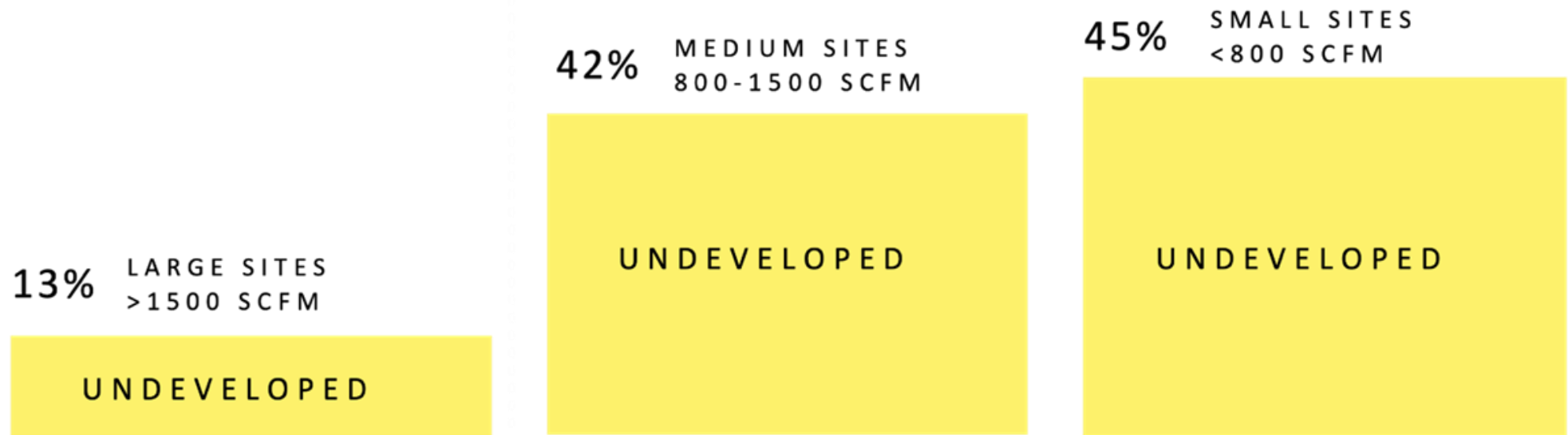
2 MW Data Center Load



# The opportunity

In aggregate, small and medium landfills contain more undeveloped biogas than large ones.

On a volumetric basis, the un-developed biogas generated at small and medium landfills is significantly more than at large sites. Aggregated together, utilizing biogas from Small and Medium sites represents huge opportunity.



# Clean, onsite power generation for biogas projects

## The Mainspring Linear Generator

- **Scalable** - 250 kW per box, scalable to meet any power need with up to 25 MW/acre
- **Seamless fuel switching** - runs on variable methane biogas, natural gas, propane, hydrogen and ammonia
- **Minimal cleanup** - biogas composition requirements much lighter than RNG in all steps of the cleanup process
- **Resilient** - grid parallel and islanded operation
- **Easy to permit** - Near-zero NOx emissions
- **Easy installation** - UL listed, add capacity where and when you need it
- **CHP potential** - exhaust heat supplied to process biogas

## Services

- **O&M services** - 24/7 monitoring, all inclusive service
- **Financing** - zero-money down, offered through NextEra
- **EPC services** - design, construction, and commissioning
- **Biogas cleanup** - leveraging our network of partners



# Problems we solve for biogas projects



## Monetization

Drive economic value

Maximize electricity income and capitalize on available incentives



## Reliability

Maintain site operations

Modular architecture provides inherent redundancy and concurrent maintenance



## Emissions

Remove emissions compliance risk

Low temperature reaction produces electricity with near-zero NOx

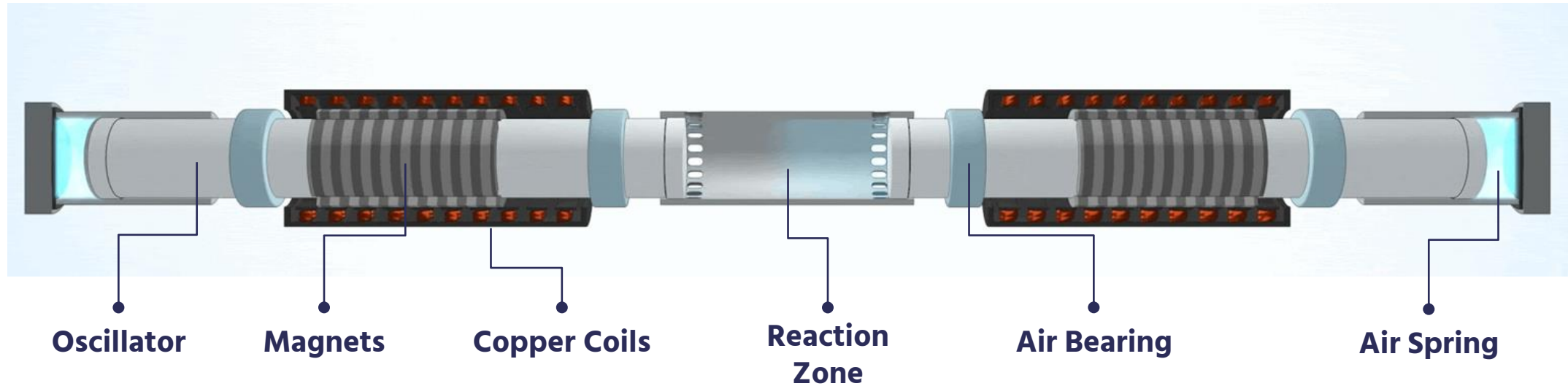


## Speed

Powering sites faster than the grid

Power faster than the utility while maintaining flexibility post-interconnection

# Mainspring delivers enhanced economic value



- ✓ **High Efficiency** enabled by direct conversion of linear motion into electricity
- ✓ **Fuel Flexibility & Dispatchability** enabled by power electronics & software control of oscillators motion
- ✓ **Ultra-Low Emissions** enabled by low-temperature, non-combustion reaction without a flame or burning
- ✓ **Low Maintenance & High Reliability** enabled by having only two moving parts riding on air



# Comparison of onsite power options

	<b>Linear Generators</b>	Engines	Fuel Cells	Microturbines
<b>Low Lifecycle Cost</b>	✓			
Low CAPEX	✓	✓		✓
Low OPEX	✓			
High Efficiency	✓		✓	
<b>Low Emissions</b>	✓		✓	
<b>Dispatchable</b>	✓	✓		✓
<b>Fuel Flexible</b>	✓	~		~

~ limited capability

# Project Pleiades

PROJECT PLEIADES

## \$420 Million DOE Loan Part 1 *Approved*



Title 17 Loan for an aggregated project at 50 landfills across the US

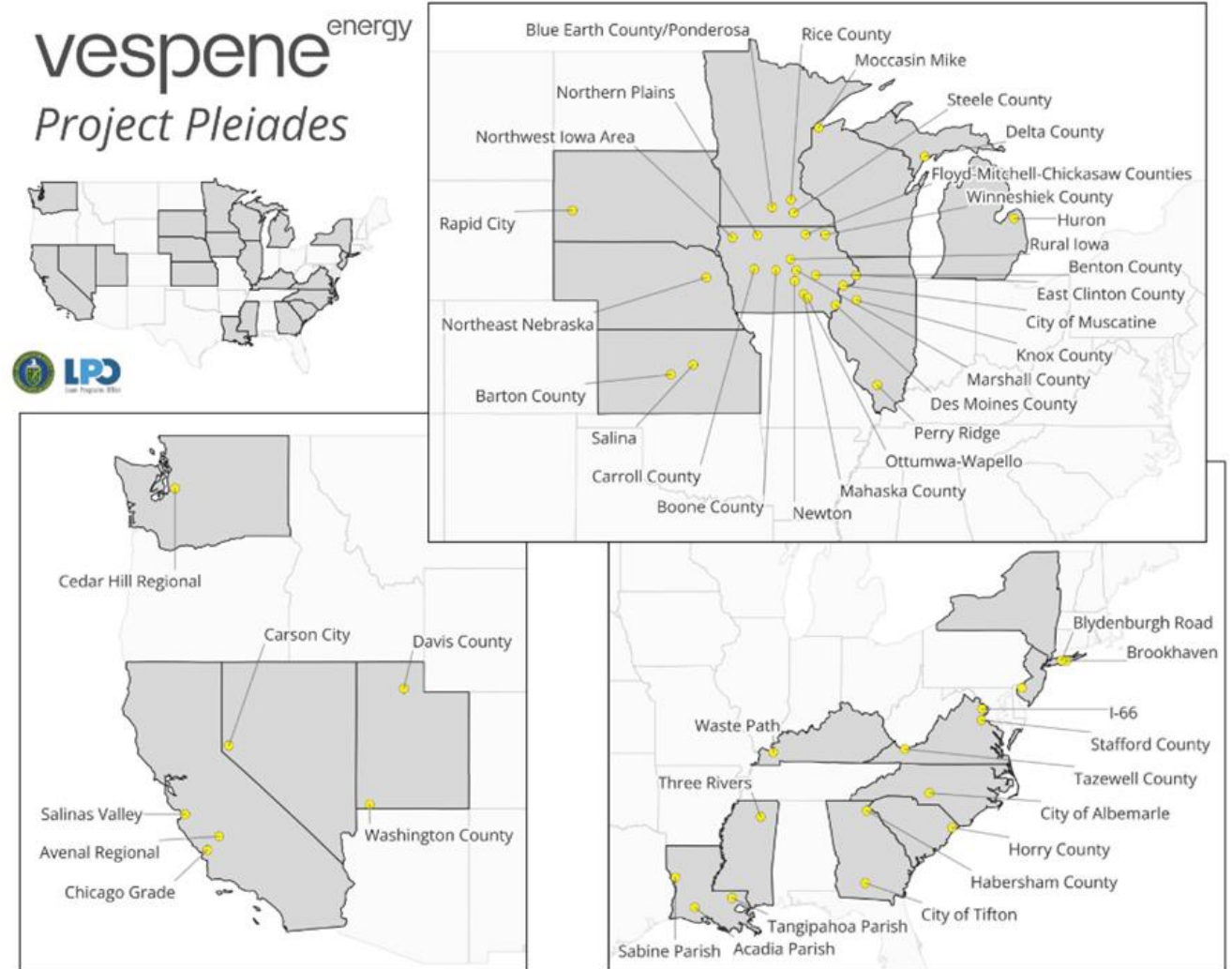
60% commitment of the project capital at treasury rates

Commitment is for lifetime of the 20 year project

# Project Pleiades

Distributed, base-load renewable energy utilizing community based landfill biogas

- Corporate or utility off-taker depending on grid region
- 80+ MW aggregated project of 50 landfills across 21 states
- Carbon-negative energy, reducing annual emissions by 1,000,000+ MT CO<sub>2</sub>e
- \$420m in project debt financing from the US Department of Energy







# Questions and Answers



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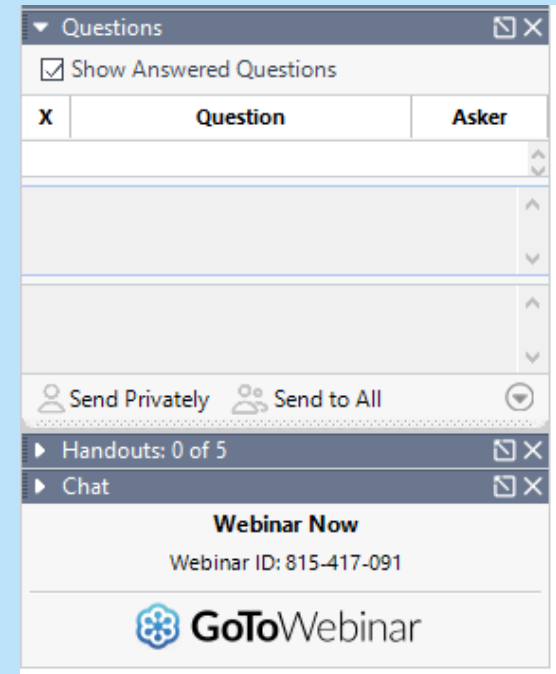


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# Thank you!



Affordable



Dispatchable



Clean