

Renewable Natural Gas

The Pathway to Net Zero
Carbon Emissions

Sustainable Fleet
Technology Conference
& Expo 2023

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What is renewable natural gas?



Replacement for diesel

RNG is an alternative fuel for heavy-duty trucks, buses and other large vehicles

Not a fossil fuel

Reduces carbon by an average of 300% versus diesel and gasoline.

Renewal

We capture the naturally-occurring biomethane released from landfills and dairies and turn it into RNG.

Decarbonizing fuel

RNG reduces carbon both at the source where it's made and on the road, making it the only fuel that can be carbon-negative.



Here's how RNG is made



Farm

Organic waste is collected and taken to a digester.

Digester

The digester processes the waste and captures the biogas.

Upgrading

The biogas is purified into RNG and injected into the local pipeline.

CE stations

CE distributes the RNG to our stations nationwide, including 200+ in California.

The remaining digestate can be used as fertilizer and dry bedding for the farm.

RNG benefit points, for fleets:



Sustainable:
lowers carbon emissions
by an average of 300%



Renewable:
made from organic waste,
not drilling



Cleaner air:
reduces smog-forming NO_x
emissions by 90%



Accessible:
extensive network of fueling
stations nationwide



Affordable:
stabilized prices and lower
maintenance costs



Proven:
Trusted by companies like Amazon, UPS,
WM, and major transit fleets in NY & LA



Quieter:
quiet, odorless natural gas engines

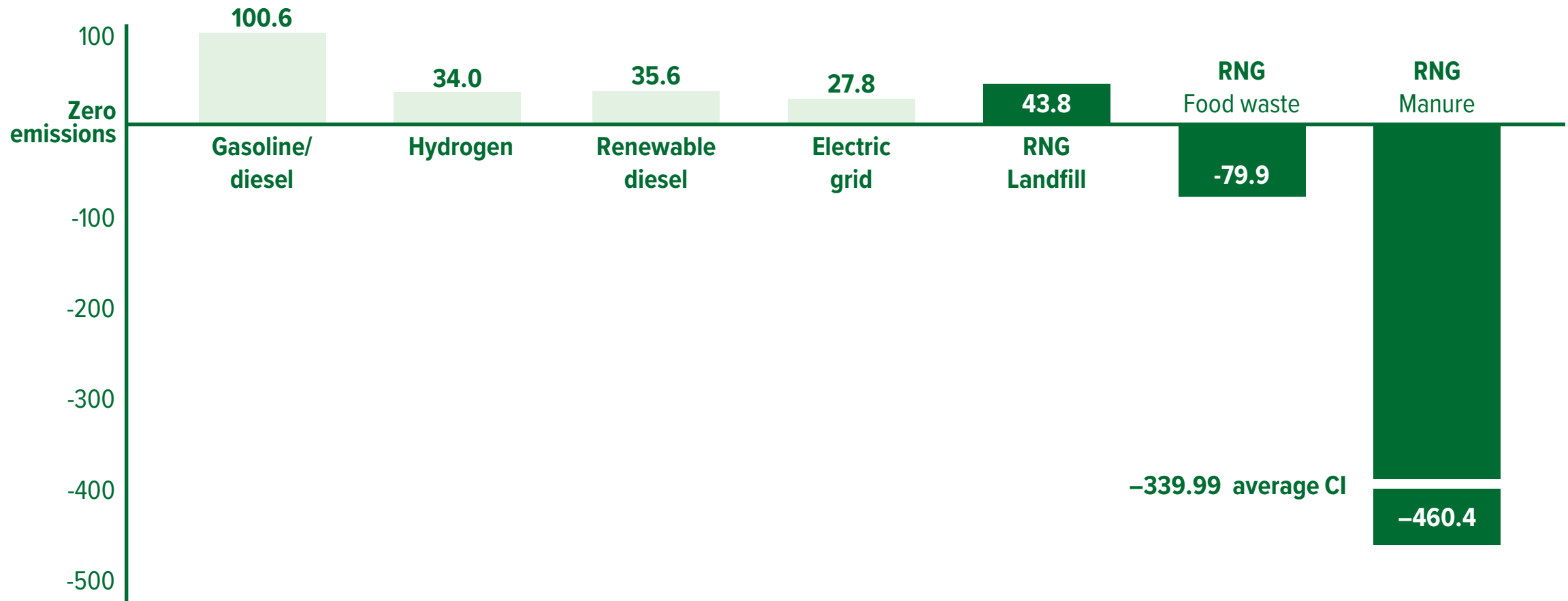


Less maintenance:
No high maintenance DPF-SCR
diesel emissions control system

RNG is the lowest carbon alternative fuel



Carbon emission by fuel type (gCO₂e per MJ)



Source: California Air Resources Board, Q1 2022 LCFS data, and certified pathways as of June 18, 2022.

Who is using RNG?



amazon



FedEx



KAG
KENAN ADVANTAGE GROUP, INC.

Airgas.
an Air Liquide company

CEVA
LOGISTICS

BIMBO



WM
WASTE MANAGEMENT



Hertz



Coca-Cola



CALPORTLAND

RUAN



P&G

Metro



enterprise



CUMMINS NATURAL GAS ENGINES

B6.7N™



L9N™



ISX12N™



X15N™



Coming in 2024

Certified Near Zero Optional Low NOx 0.02 g/bhp-hr

X15N Product Introduction

Design and deliverables to be confirmed through pending and final verification

X15N™

- ❖ Industry-first & market-defining **Big Bore Natural Gas** Powertrain
- ❖ Capable to **meet stringent CARB24/27 and future EPA** NOx regulations
- ❖ **Compact 15 Liter** – Targeting fit in ISX12N & 13L chassis installations, 500 lbs lighter than current 15L diesels
- ❖ Up to a **10% Fuel Economy/GHG improvement** over ISX12N
- ❖ 12L-15L Diesel matching ratings - **up to 500hp & 1850lb-ft** of torque
- ❖ Compact **passive TWC aftertreatment** system
- ❖ **Integrated with Industry HD transmissions** – Endurant and Allison
- ❖ Incorporates Cummins **Powertrain Features & Strategies**
- ❖ Potential for **Carbon Negative Solution with RNG**

Base Engine

- EPA and CARB
- Rear Geartrain
- Advanced combustion management

Air Handling

- Dual Wastegate Turbocharging
- Advanced Cooled EGR

Lube and Cooling

- Closed Crankcase Breather
- Elimination of Coolant Filter

Exhaust System

- Single unit, maintenance free & fluid free, chassis mounted Three-Way Passive Catalyst

Vehicle Integration

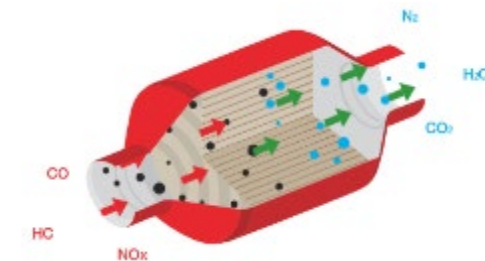
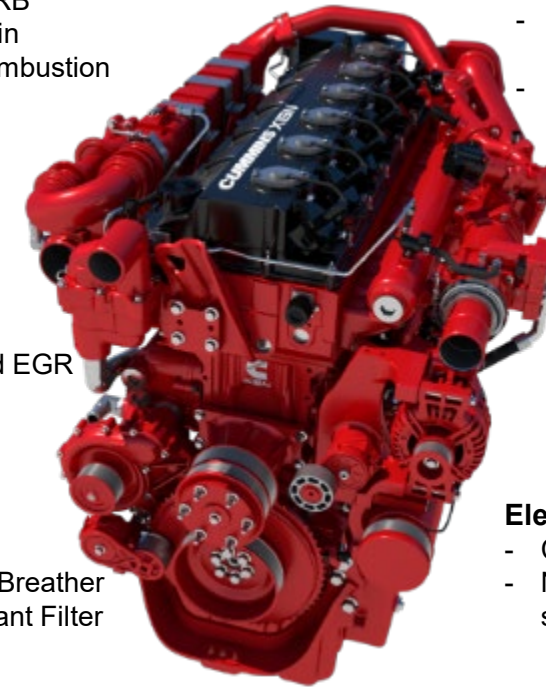
- Compact 15L design and reduced weight
- Integrated with Endurant (& Allison) transmissions
- Full powertrain feature suite

Fuel System

- Next generation fuel system
- Integrated with vehicle fuel system partners

Electronics System

- CM2380 ECM
- Next generation connectivity solutions

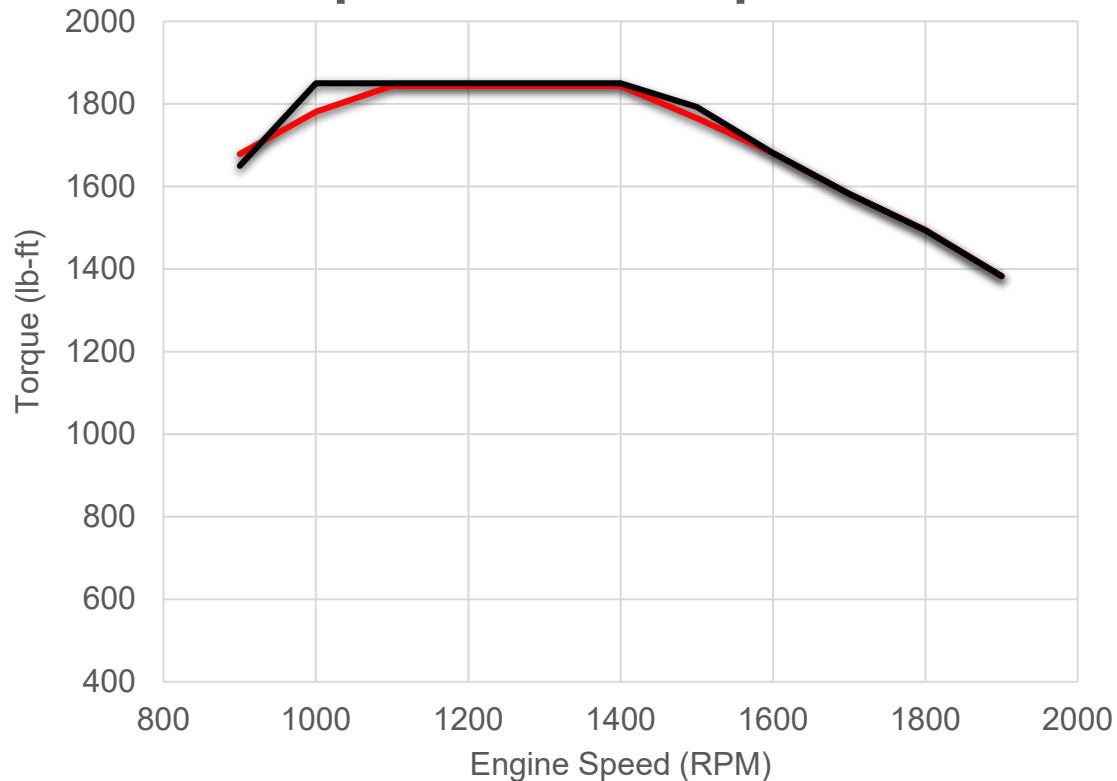


Product details are preliminary and may be subject to change at any time without notice.

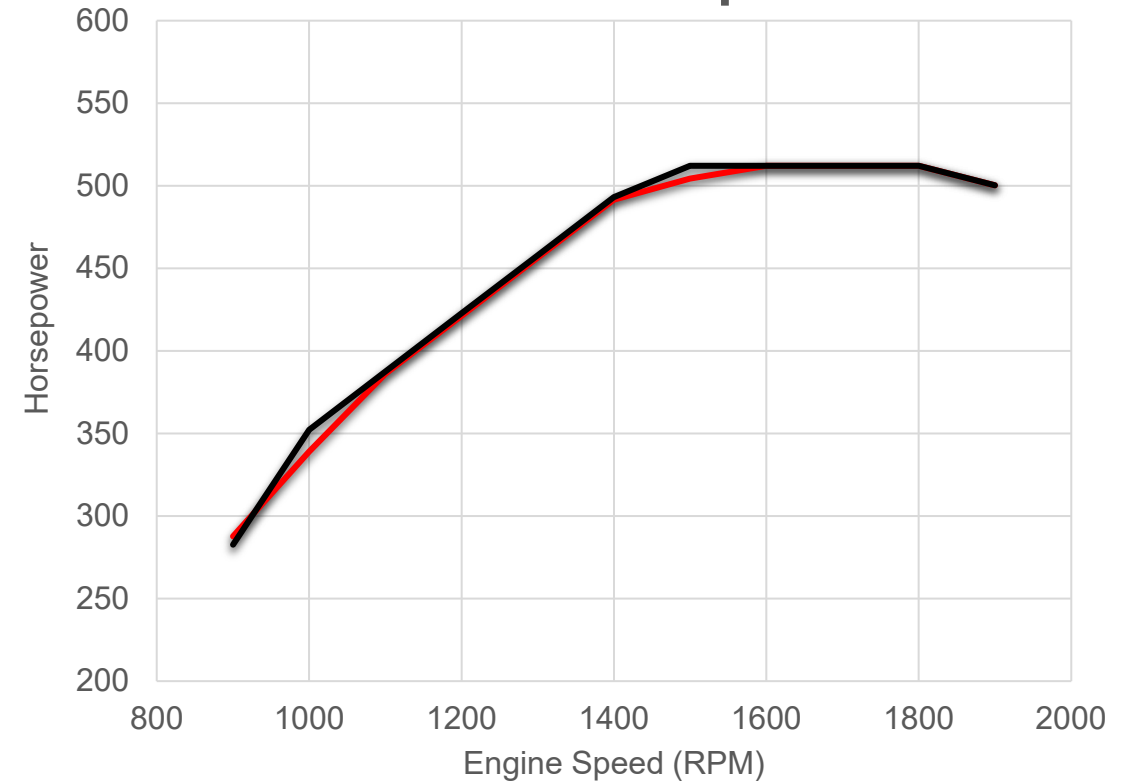
Public

DIESEL-LIKE PERFORMANCE

Torque Curve Comparison



Power Curve Comparison



— New X15N (Natural Gas)

— X15 Productivity Series (Diesel)

The road to net zero for a 1,000-truck fleet

	RNG	Battery Electric	H2 Fuel Cell
Carbon Intensity (CI) A uniform way to compare the total lifecycle of transportation fuels, measured in gCO ₂ e/MJ	-320.25 Average CI for duty RNG A negative CI value means that more greenhouse gas emissions are avoided than generated.	15.2 Emissions are from the California power grid to charge batteries	10.51 Hydrogen made via electrolysis using 100% renewable electricity and the California power grid
Percentage of fleet Percentage of fleet to be replaced in order to reach or approach net-zero lifecycle fuel emissions	22% Switching only 22% of the fleet to RNG avoids the same amount of emissions as are generated by the remaining diesel trucks.	100% The entire 1,000-truck fleet must transition to battery electric to approach net zero.	100% The entire 1,000-truck fleet must transition to hydrogen fuel cell to approach net zero.
CAPEX Capital investment needed for truck replacements to reach or approach net-zero lifecycle fuel emissions	\$46M	\$478M	\$717M
Cost per metric ton reduced	\$212.03	\$2,317.91	\$3,372.76
Transitional time Number of years it takes to reach or approach net zero, investing the same amount of \$46M per year	1 year	11 years	16 years
Emissions generated during transition period Metric tons of CO ₂ e generated during the time it takes to reach or approach net-zero lifecycle emissions	0	1,084,346	1,611,612
Annual emissions after transition Metric tons of CO ₂ e generated yearly once the fleet transition is completed	-414	10,347 Battery electric never fully reaches net-zero lifecycle emissions unless the grid is 100% renewable.	3,983 Hydrogen never fully reaches net-zero lifecycle emissions unless the grid is 100% renewable.
Land required for solar panels Square miles needed to provide 100% renewable electricity for a 1,000-truck fleet	N/A	469 That's the size of the City of Los Angeles.	1,409 That's 5x the size of New York City.

Assumes Battery Electric and Fuel-Cell trucks achieve the same duty cycle as RNG trucks with a one-for-one replacement of diesel trucks
 CAPEX is plus hauling infrastructure and grid upgrades. Grid costs estimated at \$25 per \$1 of charging infrastructure (from U.S. Electric Grid Summit)
 CI scores are from California Air Resources Board, "Current Fuel Pathways" as of May 2021
 Vehicle truck prices are from research by Craig Haffam
 Lifecycle emissions based on California carbon accounting

Clean Energy at a glance



550+ Stations throughout the U.S. and Canada



Blue chip customer base



Leading RNG player in the US



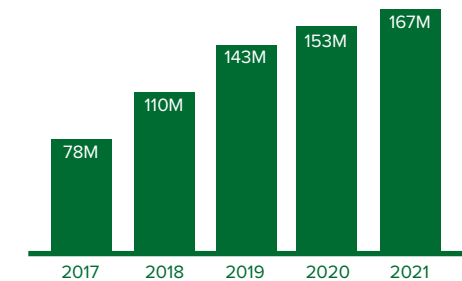
Partnerships with global energy leaders



Environmental credit leader



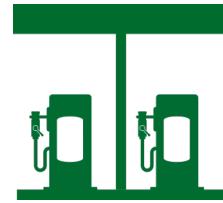
Growing RNG fuel volumes





RNG Supply

- Dairy/RNG production
- 3rd party RNG supply contracts



Distribution

- 550+ stations
- Capacity to double volumes
- Fleet + marine customers
- Maintenance + construction
- 2 owned LNG plants



Clean Energy

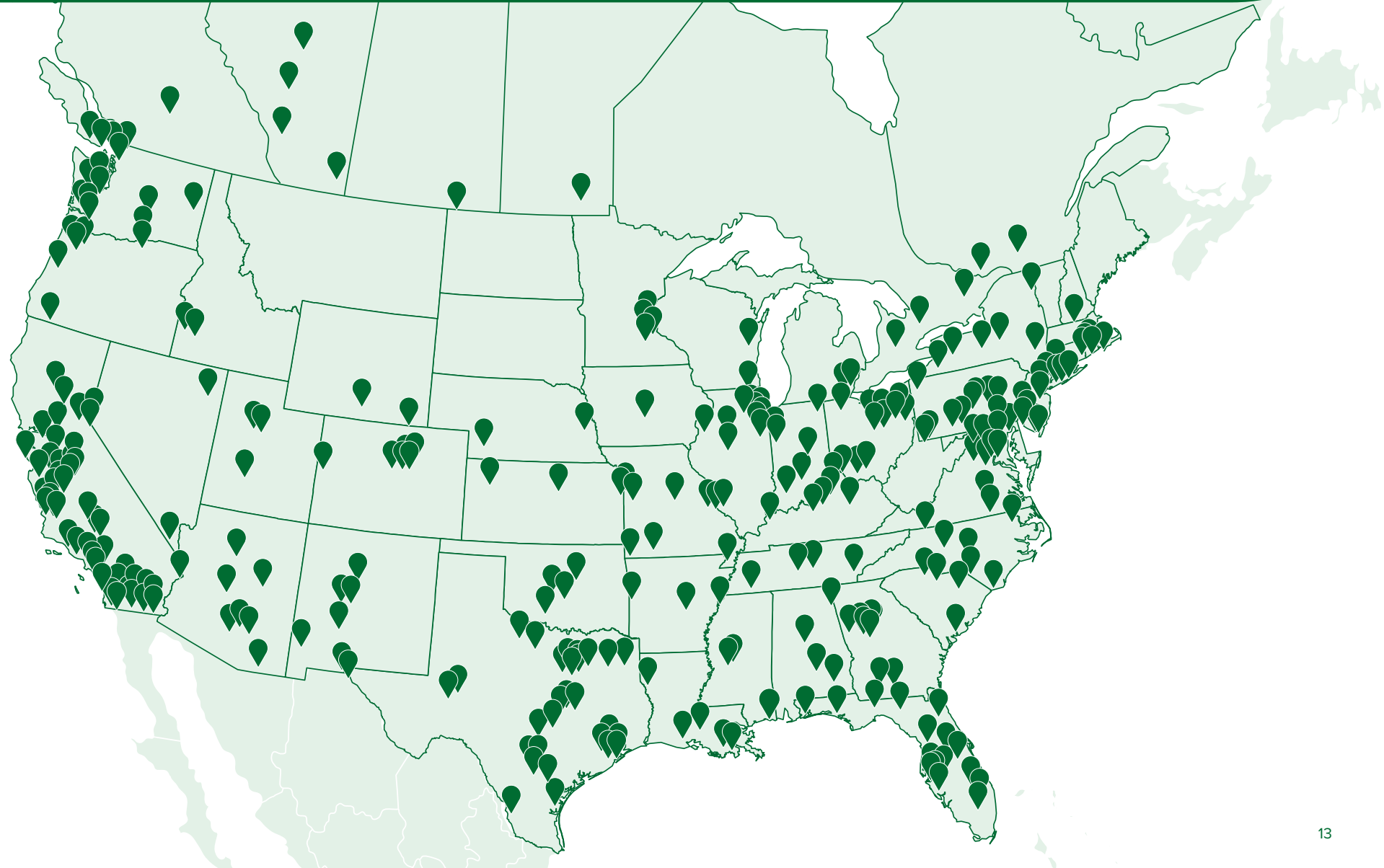
- Vertically integrated RNG solutions
- 25+ years of experience
- Invented RNG as a commercial fuel

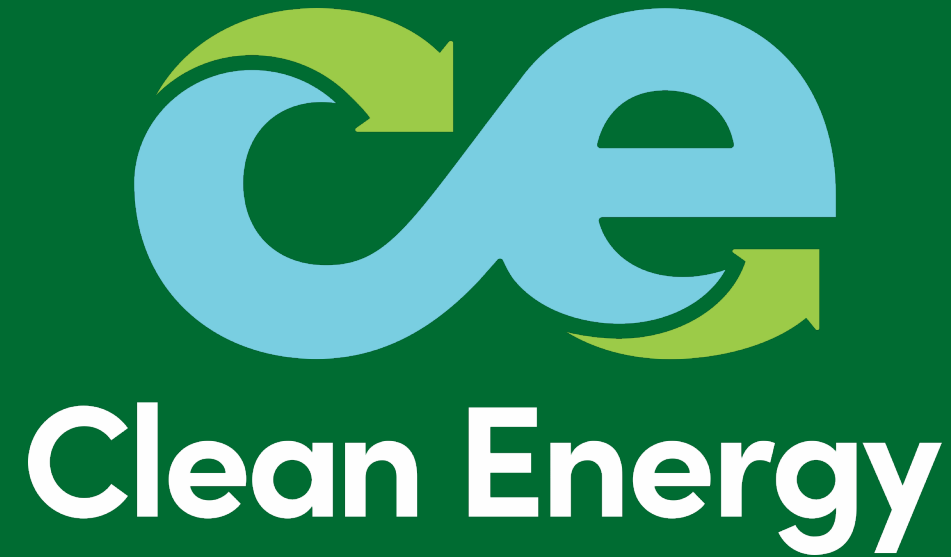
Clean Energy has the key RNG station infrastructure



**Public
and private
stations**

550+
Natural gas
fueling stations





We turn sustainability goals into reality.

Thank you