

Virtual Pipelines

Two-plus decades **safely moving natural gas** beyond our nation's conventional pipeline system

Virtual pipelines enable critical connections safely and reliably by:

- Linking renewable natural gas (RNG) production sites to end use
- Improving energy system resilience
- Providing emergency energy services
- Creating jobs
- Reducing greenhouse gas (GHG) emissions

Why Virtual Pipelines?

Virtual pipelines play an important part in our nation's energy economy, resiliency, and emergency preparedness by expanding access to natural gas and increasing its reach into areas underserved by conventional pipelines.

Also known as mobile pipelines®, distributed natural gas, or off-system portable delivery, virtual pipelines serve to distribute CNG and LNG - sourced from either conventional or renewable natural gas (RNG) - in mobile containers from a wide variety of sources such as the conventional natural gas pipeline infrastructure and natural gas processing plants that produce LNG or RNG.

Heavy-duty trucks are used to haul these high-tech bulk container trailers to a wide variety of destinations for a wide variety of purposes and applications nationwide including on- and off-road transportation fueling, industrial and commercial operations, residential usage, emergency and storm response, and energy infrastructure repair.



Why Natural Gas?

Whether fueling vehicles and equipment or powering institutional customers like hospitals and manufacturing plants, natural gas is a cleaner, more climate-friendly and cost-stable alternative compared to traditional petroleum-based fuels and even the majority of electricity generated in the U.S. When used as a motor fuel, natural gas buses and trucks are zero emission equivalent and 90% cleaner than the cleanest available diesel technology. According to the U.S. EPA, natural gas is 63% cleaner than the national average carbon dioxide output rate for generated electricity.¹



¹Based on U.S. EPA home energy use data, 2018. Accessible at: <https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references>.

Virtual Pipelines: Enabling Customer Productivity with Safe, Practical, and Low-Cost Clean Energy Delivery Solutions
Learn more at [NGVAmerica.org](https://www.NGVAmerica.org).

NGVAMERICA
Natural Gas Vehicles for America

Valuable, Cost-Effective & Safe



Based on a survey of the major virtual pipeline companies in the U.S., **over 225 million GGE of CNG and close to 180 million GGE of LNG** were transported via virtual pipelines in 2019. This is the equivalent of 99,000 truckloads of CNG and LNG hauled each year.²

Virtual pipeline operations are conducted in accordance with strict regulatory standards as they apply to all motor fuels and hazardous materials transported on-road. With a consistent and strong safety record and culture, on-road natural gas delivery is less hazardous than other transported motor fuels such as gasoline and diesel.



While special safety features are built into virtual pipeline tanks and trailers, should a vehicle accident occur, damaged systems are designed to vent safely; and methane disperses upwards when released instead of dangerously pooling like petroleum-based fuels.



Achieving Net-Zero Now

Virtual pipelines enable the transmission of captured renewable natural gas (RNG), or biogas, from agricultural sites and other off-network production locations to end users. No traditional gas pipeline connection? No problem; virtual pipeline operators fill the void and deliver an estimated 35% of all animal-waste-derived RNG to end-use applications across the U.S., achieving GHG emission reductions that would otherwise be unrealized.³ And RNG used as a transportation fuel can result in a carbon-neutral, even negative, mobility solution depending on the feed stock.⁴



Diversifying Energy Delivery

In regions where fixed natural gas transmission capacity is limited or unavailable, virtual pipelines provide a safe and dependable pathway for transporting energy and ensuring operational redundancy.



Ensuring Uninterrupted Supply

When frigid weather or natural disasters trigger sudden spikes in demand, virtual pipelines are a responsive, resilient, and reliable solution to meeting critical energy delivery needs.



Supporting Safe System Upgrades

Virtual pipelines are essential for gas distribution companies to promptly ensure uninterrupted supply during system upgrades or emergency repairs.

²Data compiled from responses to 2020 survey conducted by NGVAmerica of all major virtual pipeline companies operating in the U.S.

³Transportation data of animal-waste-derived RNG based collected from partnering engineers, project developers, and equipment suppliers to the RNG industry.

⁴California Air Resources Board, LCFS Pathway Certified Carbon Intensities.

Solutions Snapshots



Dairy Gas Delivered: U.S. Gain transports semitruck loads of upgraded biogas from manure digesters at several Wisconsin dairies — Deer Run Dairy in Kewaunee, Clover Hill Dairy in Campbellsport, East River Dairy in Hilbert and S&S Dairy in Sturgeon Bay — to Holsum Elm Dairy in Hilbert. There, the biogas is further cleaned along with Holsum-produced biogas to remove any impurities and injected into a stationary natural gas pipeline that runs from Green Bay to Chicago through the dairy's property. Holsum's 8,400 cows alone provide enough carbon-free RNG to power, heat, and cool 1,860 Wisconsin homes each year. Wisconsin households use 130 million Btu of energy per home per year, 15% more than the U.S. average.⁵

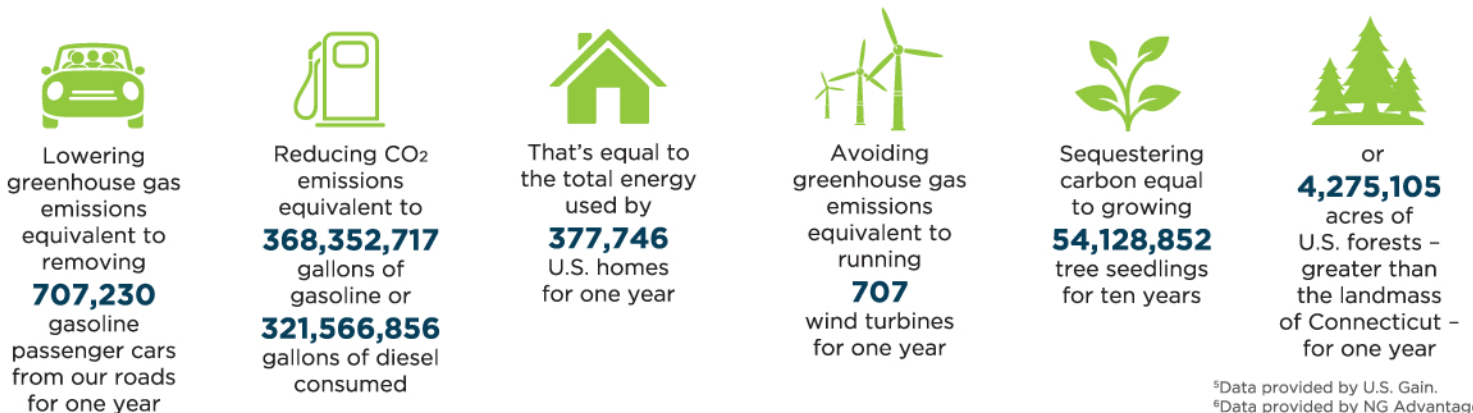


Clean Fuel Fired: In 2013, Vermont's second largest healthcare facility converted its massive heating and hot water boiler plant from #2 fuel oil to clean burning natural gas with the expectation that a promised fixed supply pipeline would soon be constructed. When those plans failed to materialize, virtual pipeline provider NG Advantage stepped in to regularly supply the CNG, saving the medical center \$400,000 annually in energy costs and reducing its CO₂e emissions by 1,300 tons.⁶

Cutting Carbon Emissions Today

Natural gas delivered by virtual pipeline helps achieve ambitious carbon reduction goals. The total volume of natural gas transported via virtual pipeline in 2019 – equal to 405,173,000 gallons of gasoline – displaces carbon-intensive energy sources like diesel fuel, fuel oil, propane, and the existing electricity grid. Considering displacement of diesel fuel at the low end of the various energy usage scenarios and residential electricity generation at the high end, the range of GHG reduction benefits made possible by virtual pipelines is between 512,059 tons and 6,704,885 tons of carbon dioxide equivalent (CO₂e), respectively.

Assuming an average GHG reduction between these upper and lower limits is **3.6 million tons of CO₂e** eliminated annually from the atmosphere, that's equal to:



⁵Data provided by U.S. Gain.
⁶Data provided by NG Advantage.

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