Make the switch:

A guide to succeeding with natural gas for heavy-duty fleets

2025

Hexagon Agility has been an industry leader and technology innovator of compressed renewable natural gas fuel solutions for several decades.

More than **80%** of natural gas trucks in operation today are equipped with Hexagon Agility fuel systems.

By sharing the experience and expertise of some of the nation's leading fleets and providing our in-depth industry insights, as a leader in natural gas vehicle (NGV) technology, this e-book is designed to help heavy-duty fleets make an informed analysis of natural gas trucks and infrastructure availability, as well as provide a framework for developing their own business case.

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Fleet owners looking to reduce fuel costs and meet new emission standards face an array of technology choices

Perhaps at no time in the history of trucking have fleet operators had so many options to choose from. From cleaner diesels to battery and fuel cell electrics, hybrids, and natural gas trucks, the selection of alternatives can be overwhelming.

The optimal solution depends on the specific needs of each fleet. This is determined by factors such as cost, range, payload, duty cycle, maintenance, and fueling infrastructure.

Class 7 and 8 long-haul, heavy-duty trucks, which are among the most demanding segments, can find their requirements (i.e., range, payload, deployment costs) difficult to meet with current battery electric vehicles (BEVs) and other clean fuel alternatives. This leaves many over-the-road, heavy-duty (HD) fleets with a choice between "cleaner" diesel and natural gas.

Natural gas ticks all the boxes for heavy-duty long haul

- ✓ Available natural gas fueling stations
- ✓ Mature technology with OEM support
- ✓ Positive total cost of ownership for today's heavy duty truck fleets
- ✓ Renewable natural gas gives the highest carbon abatement potential

Leading heavy-duty fleets have made the switch to natural gas - follow their guide to success.

The strongest proof of concept for natural gas is its adoption by many leading fleets in North America.

Thousands of natural gas trucks are already in service, more than 100,000 supplied by Hexagon Agility alone. Major fleets like UPS, Paper Transport, Food Express, Estes, Anheuser-Busch, and Frito-Lay have adopted natural gas as a key alternative fuel solution for their regional and long-haul routes.

According to the U.S. Department of Energy (DOE), there are more than 175,000 natural gas vehicles on the road today in the U.S, and the number is growing.

There are several reasons leading fleets have adopted natural gas in a big way. Natural gas has a positive return on investment (ROI) compared to diesel. Renewable natural gas also provides a significant reduction in emissions, enabling fleets to quickly and cost-effectively meet or exceed their sustainability targets.

Succeeding with natural gas is about more than the fuel cost savings. There are several factors for fleets to consider. In the following chapters, we will go through each of them.

Guide to succeeding with natural gas

When developing a business case for natural gas, fleets need to consider the following factors:

- Compliant and future proof
- Natural gas truck performance
- Cost of ownership
- Fueling solution
- Maintenance and reliability
- Driver retention
- Sustainability goals

UPS

"Natural gas has **been UPS' most effective** and scalable solution to reduce greenhouse gas emissions from our trucks.

We **are the largest** user of renewable natural gas in the country and are continuing to grow our alternative fleet."

- Andrew Okuyiga, Vice President of Public Affairs, UPS

6,500 **natural gas** trucks

Food Express

"The addition of the new truck with Cummins' latest X15N technology into our **fleet falls nicely with our decarbonization plans.**

Having **the power and torque** of a larger engine makes it ideal for many of our routes and has the added benefit of operating with an ultra-low carbon fuel such as renewable natural gas."

— Kevin Keeney, President, Food Express

88 natural gas trucks

Paper Transport

"In 2010, Paper Transport became **the first trucking company outside of the Port of Los Angeles to** run natural gas-powered trucks.

Over the past 13 years, we have developed expertise in the operation and the **optimal fueling strategies** for our shippers to achieve their sustainability goals. Natural gas is here today in many markets as a **viable alternative** to diesel-powered trucks."

-Ben Schill, CEO, Paper Transport

60 natural gas trucks

Introduction to renewable natural gas and its climate-protection benefits

Renewable natural gas (RNG), also known as biomethane, is a biofuel produced from organic materials such as agricultural waste, municipal solid waste, landfill gas, and wastewater treatment and plant biosolids. Unlike conventional natural gas, which is a fossil fuel extracted from underground reserves, RNG is derived from renewable sources.

The production process for RNG typically involves the anaerobic digestion of these organic materials. During anaerobic digestion, microorganisms break down the organic matter in the absence of oxygen, producing biogas. This biogas primarily consists of methane, which is then purified to a higher quality to meet commercial natural gas standards that can be injected into natural gas pipelines or used directly as fuel.

Sustainable alternative to conventional natural gas

RNG is considered a sustainable and environmentally friendly alternative to conventional natural gas because it utilizes waste materials that would otherwise release methane into the atmosphere as they decompose.

Addressing methane emissions from organic waste is essential for immediate climate change action. Methane is a potent greenhouse gas (GHG) that is 28 to 38 times more effective at trapping heat in the atmosphere than carbon dioxide (CO_2) during the first 100 years after its release.

Fleet sustainability goals

Using RNG as transportation fuel is the fastest way for heavy-duty fleets to achieve emissions goals and reduce climate change impacts.

Understanding renewable natural gas

According to the California Air Resources Board (CARB) emissions comparison chart, RNG has the lowest carbon intensity (CI) score among all transportation fuels.

The CI of a fuel is calculated by evaluating the total carbon emissions produced throughout its lifecycle — from extraction and processing of the feedstock, through transportation, to its ultimate consumption. A negative CI value signifies that the fuel's usage actively decreases the global warming potential in the atmosphere.

In California, a significant proportion of the growth in domestic production is coming from dairies, driving the energy weighted CI value of the in-state supply of RNG down to around -118 gCO2e/MJ.3.

Why is this important?
Using RNG as transportation fuel is the fastest way for fleet operators to achieve net-zero emission goals and reduce climate change impacts. RNG not only allows for improved sustainability reporting, but it also offers carriers a competitive advantage when its customers are looking to reduce their indirect carbon emissions in the supply chain.

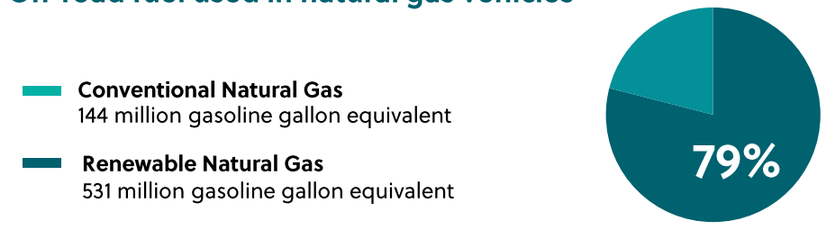
Source: The Transport Project

The adoption of RNG as a fuel is accelerating

In 2023, RNG accounted for 79% of the on-road fuel used in natural gas vehicles across the U.S., exceeding the record set in the prior year. In California specifically, RNG accounted for 96% of the on-road fuel that powers natural gas vehicles.

An April 2024 report from The Transport Project confirmed that the nation's RNG supply will only continue to grow. The report notes that 338 RNG production facilities are already in operation across North America, with 165 more under construction, and another 324 in development.

On-road fuel used in natural gas vehicles

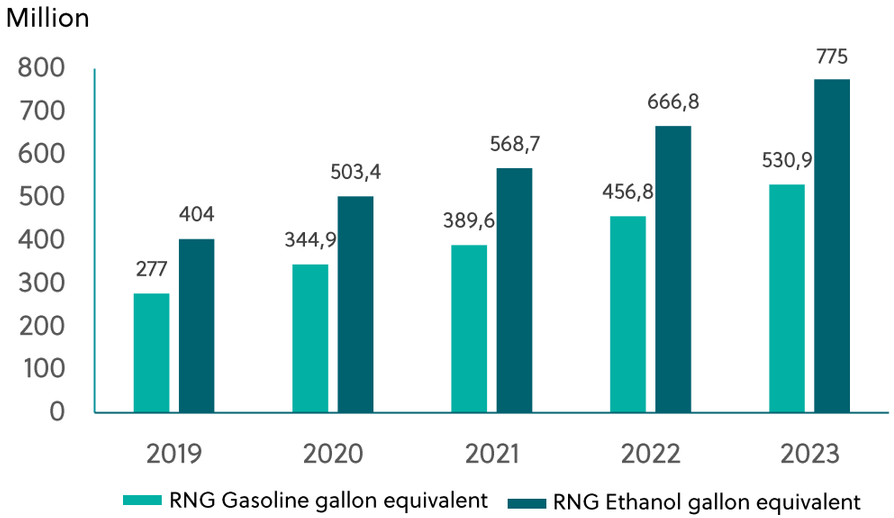


Compliant and future proof

RNG is a compliant and future proof clean fuel solution for heavy-duty fleets. RNG for US markets is sourced in the US. Its production adds value to local communities across the US.

RNG growth (2019 - 2023)

RNG use as a transportation fuel grew 16% over 2022, volumes, and volumes have increased 92% over the last five years. RNG offset a total of 6.96 million tons of CO2e in 2023.



Source: 2023 On-Road RNG Use Report
The Transport Project and RNG Coalition

Get the right application for your operations

Natural gas trucks are a mature technology with a wide range of applications available to fleets in North America. Natural gas truck's range and performance allows new adopters to seamlessly introduce them into their fleet operations.

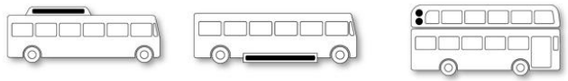
Over the past two decades, natural gas technology leaders like Cummins and Hexagon Agility have partnered with truck manufactures to ensure natural gas heavy-duty trucks are spec'd right for duty cycle and operation, resulting in diesel like performance. This includes heavy payloads and more than 1,200 miles range before refueling.

Over 15 global OEMs offer over 100+ factory installed natural gas platforms, covering a complete range of fleet needs.

Heavy-duty

Refuse

Bus & coach



Medium-duty

KENWORTH FREIGHTLINER Peterbilt VOLVO MACK

IVECO SCANIA

The future of heavy-duty trucking: Natural gas goes head-to-head with diesel in the heavy-duty arena

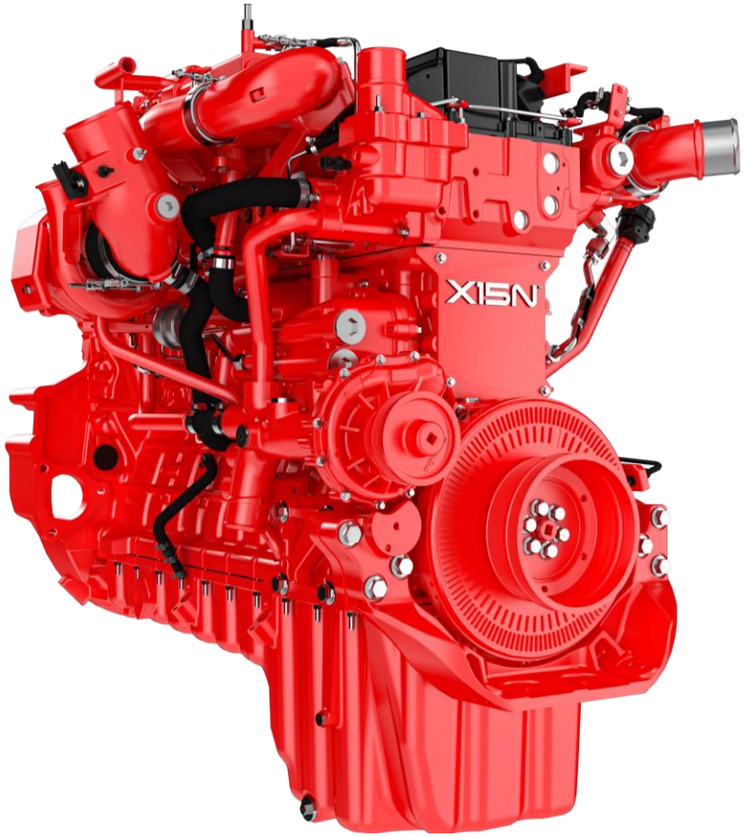
The new Cummins 15-liter natural gas engine (X15N), meets the needs of all heavy-duty operations. With power ratings up to 500hp and torque up to 1850 lb, this heavy-duty engine brings the future of transportation to you.

Clean, compliant and future proof

Fleets considering the deployment of natural gas trucks must consider whether the strategy is compliant and future proof. Will natural technology in heavy-duty trucks meet future regulations?

According to OEM's, trucks equipped with the Cummins' X15N engine are capable of meeting current and future regulations.

Nitrogen oxides (NOx) tailpipe emissions are considered some of the most polluting and environmentally harmful emissions. Natural gas engines significantly mitigate this issue by offering emissions so low that they are practically undetectable, often referred to as near-zero emissions. This substantial reduction contributes not only to environmental protection but also to public health.



The optimal choice for long-haul, heavy-duty fleets

Natural gas vehicles fueled with RNG prove to be the optimal choice for long-haul, heavy-duty fleets seeking to minimize their carbon footprint while also reducing total cost of ownership. This is attributable to RNG's exceedingly low emissions and lower fuel costs.

With nearly all the natural gas used in transportation now coming from ultra-low and carbon negative RNG sources in the US, there has never been a better time for heavy-duty fleets to make the switch to natural gas vehicles.

1)https://www.cummins.com/engines/x15n-2024

A dynamic duo: X15N + Hexagon Agility fuel system

Cummins X15N engine with Hexagon Agility's high-capacity fuel systems provides the power, range, and reliability of diesel.

From heavy- and medium-duty trucks to refuse to coach and bus, Hexagon Agility has extensive side-mount and behind-the-cab fuel system configurations to meet your fleet's range payload requirements.

Pure performance

- **1,200+ mile range** when equipped with ProCab® 175 and dual ProRail®45
- Fuel economy improved up to **10% over** ISX12N
- Optimal simplicity with the maintenance free Three-Way Catalyst aftertreatment system from Cummins

Cost comparison: Natural gas vs diesel trucks

Higher mileage, high fuel consumption vehicles are a strong fit for natural gas and provide a fast payback on investment.

Class 8 natural gas trucks come with a higher purchasing price than Class 8 diesel trucks, costing around $100,000 more upfront. This price difference can be recovered quickly, as natural gas fuel prices are typically up to $2.00 less per gallon than diesel. Resulting in a positive cashflow for fleets.

Natural gas and the future of emissions standards in the U.S.

The Environmental Protection Agency (EPA) has announced plans to reconsider and potentially roll back several current emissions regulations, including the Phase 3 Greenhouse Gas (GHG) Emissions Standards for Heavy-Duty Vehicles and the 2022 Heavy-Duty Nitrous Oxide (NOx) rule.

While the specific changes to the rules are forthcoming, EPA has indicated it will embrace alternative, renewable energy sources. Particularly when it comes to meeting NOx requirements, the price of diesel trucks is expected to increase due to additional technological advancements and components necessary to meet emission standards.

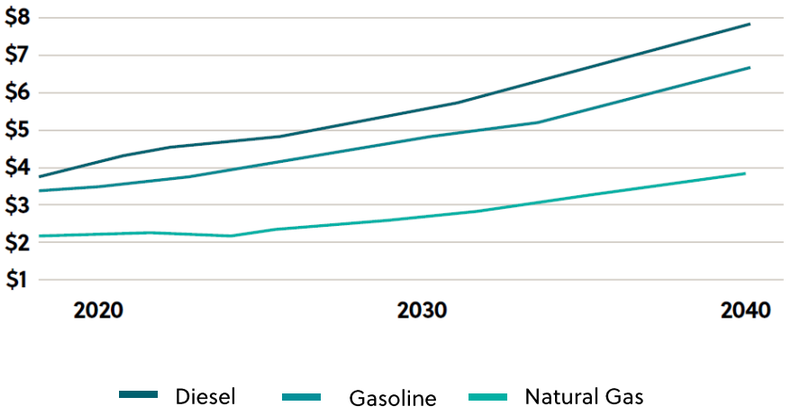
For heavy-duty trucking fleets, the regulatory revisions/reforms will provide fleets flexibility to choose the energy source that best suits each application, while also achieving emission-reduction targets. The cumulative effect of this changing landscape makes natural gas the best choice for fleet owners to retain power and reliability, while also reducing operational costs, lowering emissions and ensuring compliance with future environmental regulations.

With the advancement of natural gas truck technology and the stability of low fuel prices, natural gas fleets can confidently strategize for future business expansion and procurement.

Increase in diesel truck cost

The estimated cost increase per truck to achieve the new diesel emissions standards is $25,000 to $35,000.

Fuel price development



Fueling at the right place and price

Selecting the right fueling infrastructure is an important part of the equation when making the switch to natural gas. There are two primary options depending on size, location and usage patterns of the fleet: *public* or *private.*

With nearly 800 public and more than 600 private natural gas fueling stations across U.S.A. and growing, fleets should evaluate the existing locations of public access stations to ensure convenient refueling options for drivers near depots or along operational routes.

Both refueling at public stations and building your own behind the-fence fueling station offer distinct advantages.

Public refueling stations

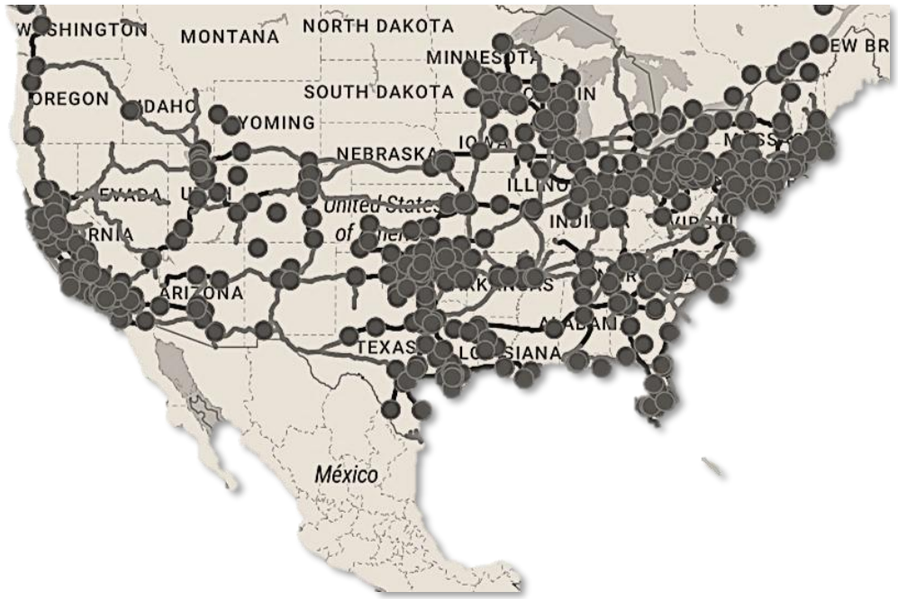
Public access stations are ideal for fleets located near existing public networks, or in route. Most public access stations are open 24/7/365 and accept all major fleet and credit cards.

Available along major transport corridors

Natural gas is accessible at numerous public fueling stations situated along major transportation corridors, offering drivers a variety of refueling choices. Drayage, regional, or long-haul fleet accessible.

Public fuel providers

Various fuel providers like Clean Energy, Opal Fuels, Trillium, Chevron, GAIN and others will assist fleets with mapping out existing infrastructure near truck depots and routes.



Constructing your own fuel station

Constructing a private station (behind-the-fence) to fuel trucks can enhance your fleet's fuel savings and convenience.

There are two types of fueling options:

Time-fill is typically ideal for fleet vehicles with large tanks that return to a central location for an extended period, overnight, or between shifts.

Fast-fill is equivalent to a typical diesel refueling experience.

Partner with a fuel provider expert to evaluate these options.

What is the sweet spot to build your own station?

- **20** natural gas trucks or **200,000** DGE annually generally results in positive payback
- Fleets with return to base operations that are familiar with fueling onsite
- Larger fleets that can finance the $1-3 million cost of constructing a private station

Natural gas engine maintenance and reliability

For most fleets, maintaining and servicing a clean fuel vehicle must be as easy, if not easier, than maintaining its vehicles powered by traditional fuels.

With range and performance of natural gas and diesel engines now on a level playing field, maintenance and reliability becomes a determining factor for many fleets.

The good news is that natural gas engines have evolved to offer comparable maintenance and reliability to diesel engines without the need for complex exhaust gas after-treatment systems.

Minimize vehicle downtime by using genuine parts

Using genuine Cummins and Hexagon Agility parts can significantly reduce unexpected issues and downtime of natural gas vehicles. All Cummins and Hexagon Agility components have undergone validation to ensure they meet the company's standards.

According to Cummins, a maintenance-free three-way catalyst exhaust treatment system eliminates the necessity for filter changes or replacing exhaust control systems. This minimizes maintenance costs and complexity, resulting in decreased fleet downtime.

Ensure regular maintenance

Components like the low-pressure fuel filters should be drained regularly as a routine maintenance practice. This is a quick process that involves loosening the filter and allowing the fuel to drain out. This helps to protect the engine and allows for the identification of any issues in the compressor.

Federal regulatory agencies have also established standards for natural gas vehicle maintenance that ensure safety and reliability. The ongoing development of diagnostic tools specifically designed for natural gas systems help technicians quickly identify any maintenance issues and proactively troubleshoot problems, streamlining the maintenance process and minimizing vehicle downtime.

Trucks can quickly and safely be serviced by your dealership or trained onsite technicians, as well as Hexagon Agility's FleetCare team.

Support from Hexagon Agility FleetCare

Hexagon Agility FleetCare provides a national network of comprehensive lifecycle service programs, and fleets can take advantage of our suite of services for the total lifecycle of your Hexagon Agility system.

Services includes onsite annual cylinder inspections, post-accident review and response, fuel system replacement, and system diagnostics and repair.

Hexagon Agility Training Academy

Hexagon Agility technician and driver training academy, has trained more than **1,400+** technicians and drivers across the country, giving fleets a deeper understanding and appreciation for all the benefits of using natural gas to fuel their vehicles.

Hexagon Agility FleetCare offering:

- Technical Support Center
- Training Academy
- Genuine Parts
- Mobile Field Service

Natural gas driver experience and retention

The traditional commercial trucking industry has driver retention issues. Drivers of natural gas vehicles show a more positive trend in retention. Natural gas drivers highlight that the vehicles run quieter and do not have the same fuel odor as diesel trucks, while still offering substantial power on the road.

Driver training

Hexagon Agility has you covered when it comes to driver training. Offering online or in-person training available to get driver's comfortable with this cleaner fuel option through Hexagon Agility FleetCare.

Training involving the fueling of the natural gas tanks is minimal, and experienced drivers have not issues learning how to connect to and fill their new tanks.

The refueling process takes 15 minutes or less and should take little to no time for drivers to become comfortable filling their trucks.

The future is now: Make the switch to natural gas fueled trucks

Natural gas has emerged as a standout choice for heavy-duty fleets, offering not only environmental benefits but also low total cost of ownership. Running clean is an increasingly important competitive advantage.

Natural gas ticks all the boxes

- ✓ Positive business case compared to diesel
- ✓ Mature technology with OEM support
- ✓ Available public and private stations
- ✓ Interchangeable with RNG
- ✓ Compliant and future proof
- ✓ Highest carbon and GHG abatement potential

Business Case template

Succeeding with natural gas requires a holistic strategy, and this e-book has covered the main elements that fleets need to consider to develop their RNG business case.

A fleet's RNG business case will typically have two parallel calculations:

- Return of investment (ROI)
- Sustainability benefit compared to diesel

For fleets looking to make the switch the following model provides a template for structuring the business case calculation.

Return of investment

Step 1: Quantify your trucking needs

This is similar to a conventional fleet planning analysis. Most fleets will have detailed data on their operational profile, including size of fleet, depot and maintenance setup, range and load. Other key factors to consider is regional operations, routes and truck buying patterns.

Combining these parameters provides the foundation for your further calculations:

- Specifications for what trucks and fuel systems you need in your fleet
- Basis for planning your natural gas fuel solution
- Basis for planning your maintenance

Step 2: Truck specification

Truck specification is also similar to planning a diesel fleet, with a few important exceptions. With the X15N engine natural gas trucks now have performance parity with diesel trucks, and fleets can source a full spectrum of class 7 & 8 trucks from leading OEMs.

A key difference is that fleets need to consider the natural gas fuel systems more carefully to ensure their trucks will have the necessary range. Natural gas fuel systems are a choice between a side mounted, back-of-cab mounted or a combination of both, enabling 1200+ miles before refueling.

In addition to selecting the right fuel system for your truck, specifying a natural gas truck involves some differences from diesel. Since the fuel system is mounted behind the cab or side-mounted, dealers and fleets need to allow for additional wheelbase. The rear axle and gear ratio are key considerations. Hexagon Agility experts and trained natural gas truck dealers will assist you throughout this process.

Finally, fleets must take into consideration the higher cost and complexity of diesel trucks expected when new NOx regulations come into effect.

Truck specification provide two key business case data points:

- CAPEX: The cost of natural gas trucks compared to diesel trucks
- Fuel consumption

Who can help fleets spec the truck?

Most leading truck dealer groups have the expertise to advise fleets on natural gas truck specification. Hexagon Agility also has long experience helping fleets plan their natural gas fuel solutions.

Step 3: Fuel solution

Planning the fuel solution is where an natural gas business case differs from a diesel only fleet. With more than 1,400 public stations across the U.S, and growing, most fleets will be able to plan their operation around existing public and private stations. For fleets running 20 natural gas trucks or more, it is also worth considering constructing their own private fueling station.

Fuel solution provides the most important OPEX data points:

- The cost of fuel, natural gas vs. diesel
- Save up to $2.50 per DGE compared to diesel

Who can help fleets plan natural gas fueling?

Fuel providers like Clean Energy, Opal Fuels, Trillium, Chevron, GAIN and others will assist fleets with mapping out existing infrastructure near truck depots and routes.

Fuel providers can also negotiate fuel purchase deals and help fleets evaluate alternatives for building private (behind-the-fence) stations.

Step 4: Maintenance

Maintenance is another parameter that fleets need to consider. Natural gas is a mature technology and the new generation of natural gas trucks equipped with the X15N engine have comparable maintenance and reliability to diesel.

Natural gas trucks are expected to grow in the coming years, resulting in maintenance to be widely available at truck dealerships. Fleets who run their own maintenance may incur some investment required in training and infrastructure.

Maintenance solution provides another OPEX data point:

- The cost of maintenance vs diesel

Step 5: 7-year return on investment calculation

Step 1
Trucking needs

This example is based on a Class 8 day-cab.

100,000 miles per year.

Step 2
Truck specification

Vehicle cost

Diesel Truck	$160 000
Natural Gas Truck	$260 000
Incremental costs	$100 000

Fuel consumption
Per diesel gallon equivalent

Diesel	7.2
Natural gas	6

Step 3
Fuel solution

Cost of fuel

Diesel	$5.15
CNG ($/DGE)	$2.75

Step 4
Maintenance solution

Cost of maintenance

Diesel Truck	$0.18
Natural Gas Truck	$0.15

Step 5:
7-year ROI calculation

Break even:
4.56 years

Truck lifetime savings:
$53,350

Sustainability calculation

Step 1: Fleet sustainability goals

Most leading fleets have implemented fleet or transport sustainability goals. Other heavy-duty fleets are increasingly committing to sustainability goals. Now more than ever, the sustainability profile of a fleet provides a competitive edge when competing for new business. Fleets are also under increasing pressure from their customers to provide clean fuel transport for goods.

Step 2: Calculate sustainability benefit vs diesel

Sustainability benefit can easily be calculated using the same data points from the OPEX and CAPEX calculations. CO_2, NO_X and GHG emissions are directly linked to fuel consumption.

5,578
metric tons of CO_2 reduced

90%
reduction in NOx

Who can help fleets calculate emissions reductions of RNG vs. diesel?

Fuel providers like Clean Energy, Opal Fuels, Trillium, Chevron, and others will assist fleets with calculating the sustainability benefit of RNG vs diesel. Several fuel providers have online sustainability calculators available for this purpose.

About Hexagon Agility

With decades of experience, Hexagon Agility leads the industry in clean fuel solutions for fleets worldwide.

The company plays a crucial role in helping fleets make the switch from diesel to natural gas by providing advanced natural gas fuel systems that are now the backbone in over 80% of natural gas trucks.

Our proven technologies, such as the ProCab® and ProRail® fuel systems are helping fleets across the nation enhance the range and fuel efficiency of their natural gas vehicles. As the industry moves forward, the adoption of natural gas fuel systems supplied by Hexagon Agility will play a pivotal role in helping fleets implement a successful and cost-effective sustainable strategy.

We are happy to connect you with natural gas trained dealers or work with your dealer of choice.

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