OptiFuel SYSTEMS

Total-Zero™ Diesel Series Locomotives

Achieving Low Risk Fleet Transitions to Zero Emissions

PRESENTED BY:

Scott Myers
CEO & President

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Overview: OptiFuel Announces Breakthrough Technology: Two New Total-Zero™, 5000 hp, Diesel-Powered Locomotives Achieving Zero Emissions – No Tender Required!

- **Model 1:** OptiFuel Modular 5000 hp Diesel Hybrid Line Haul Locomotive With **No Tender Required** - Available in 2026 with FRA Concurrence
- **Model 2:** OptiFuel Modular 5000 hp Diesel-RNG Dual Fuel Hybrid Line Haul Locomotive with **ZERO GHG Emissions** - Available in 2028 with FRA Concurrence
- **Either Model Can Be Retrofitted To Any Existing Line Haul Platform** and Built In Modularity Allows Updating to New Technology at Any Time by Just Swapping Out the Module
- **Technology Already in Production:** Focus on Reliability, Safety Testing, FRA Concurrence, and Preproduction (2025-2029)
- Integrating Off-the-Shelf RNG Dispensers to Diesel Islands at **Existing Railroad Refueling Stations** Across the Entire Class 1 Network - Expected Capital Expenditure Totals $1.2 Billion
- OptiFuel's Approach Enables the Railroad to **Choose Any Blend of Diesel and RNG** to ZERO Carbon Intensity to Achieve Their SBTi Targets **On Time and Within Budget**
- OptiFuel Total-Zero™ Locomotives **Dramatically Reduces CARB Spending Account Fines**, Even When Operated on 100% Diesel

11 Years of Advancing Alternative Fuel Technology in Locomotives

- OptiFuel is 100% focused on **zero emission** switcher and line haul locomotives
- OptiFuel locomotives are engineered to achieve FRA concurrence for alternative fuels locomotives - Projects: Diesel-CNG Dual Fuel locomotives (IHB) and Hydrogen Hybrid switchers (SNR)
- Contract with DOE for **RNG Hybrid 5,000 hp line haul locomotive,** set to undergo testing at TTC from 2025 to 2026, aiming for FRA concurrence by 2027
- Only company to develop and install CNG refueling station for rail, integrated with diesel at IHB Railroad

OptiFuel's Successful Diesel-CNG Dual Fuel Locomotive Program at the Indiana Harbor Belt (IHB) Railroad

Overview: OptiFuel built four dual fuel locomotives that have successfully been in service for over five years. These locomotives have achieved both FRA concurrence and EPA approval, and they are refueled onsite at a dedicated CNG refueling station

- **Converted CAT C18 Tier 4 Interim engines (750 hp) to dual fuel mode, achieving EPA certification**
- **First company to obtain FRA concurrence with CNG storage onboard the freight locomotive**
- **Integrated CNG/RNG refueling equipment into existing diesel refueling islands in just 9 months**

Go to https://optifuelsystems.com/media to see a video of the refueling of the CNG locomotive at the IHB Railroad



Completed in 1 Hour and 45 Minutes:

Installation of Battery, Fuel Cell, Hydrogen Storage, and Cooling Modules on the Sierra Northern Railway Hydrogen Switcher Locomotive

OptiFuel's Use of Modular Engineering and ISO-Locks Ensures Exceptional Speed, Value, and Consistency for Customers



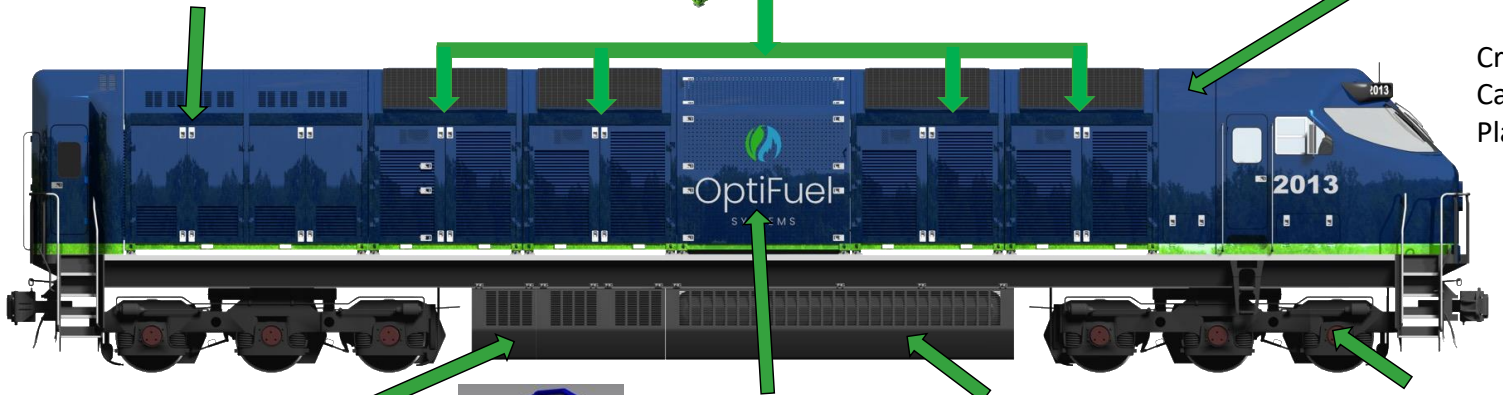
OptiFuel's Total-Zero™ 5,000 hp Diesel-RNG Dual Fuel Hybrid Line Haul Locomotive is Scheduled to Begin Testing in 2025 at FRA's TTC

- CAF AC Traction System Inverters
- Dynamic Braking Grid
- 500 hp LFP Batteries with Regenerative Braking

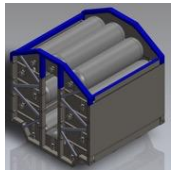
Baseline: Eight 690 hp Diesel-RNG Dual Fuel Quick-Power™ QD Modules (5,500 hp total)

Bathroom

Crashworthiness Cab and Platform



Below deck RNG/H2 Onboard Storage QD Modules with 500 DGE of RNG



RNG Onboard Storage QD Module with 1,000 DGE of RNG

4,500 Gallons of Diesel

Six CAF AC Traction Motor and Gearbox Combos

The U.S. Locomotive Fleet Emits 652,000 Short Tons of NOx, 15,845 Tons of PM, and 43 Million Metric Tons (MMT) of CO2eq. Annually

As of September 2016, there are over 1000 U.S. railyards located in densely populated, urban areas classified by the EPA as "nonattainment" areas for particulate matter and ozone

- Over 119 million people (nearly 40% of the U.S. population) living in these nonattainment areas are experiencing acute and chronic adverse health outcomes, including exacerbation of respiratory and cardiovascular disease
- **North American freight locomotive fleet FY2021 statistics:**
  - At the end of 2021, the locomotive fleet totaled 37,988 and the average age is 29.2 years old
  - Fleet By Horsepower:
    - Locomotive up to 1,999 horsepower comprise 11% (4,179)
    - Locomotives between 2,000 and 2,999 horsepower comprised 13% (4,938)
    - Locomotives between 3,000 and 3,999 horsepower comprised 20% (7,598)
    - Locomotives between of 4,000 or higher comprise 56% (21,272)
- **Fleet By Use and Configuration:**
  - **Switchers** with four axles and up to 2,500 horsepower make up 23.5% (8,927)
  - **Four-axle road locomotives** over 2,500 horsepower make up 9% (3,419)
  - **Six-axle road locomotives** over 2,500 horsepower make up 67.5% (25,642)
  - Locomotives with fuel capacity of more **than 4,500 gallons make up** 57% (21,653) of the fleet
- **US Line Haul Locomotive Fleet Average Emissions:**
  - **NOx 5.5 g/bhp-hp, PM 0.2 g/bhp-hp, GHG Carbon Intensity 105**

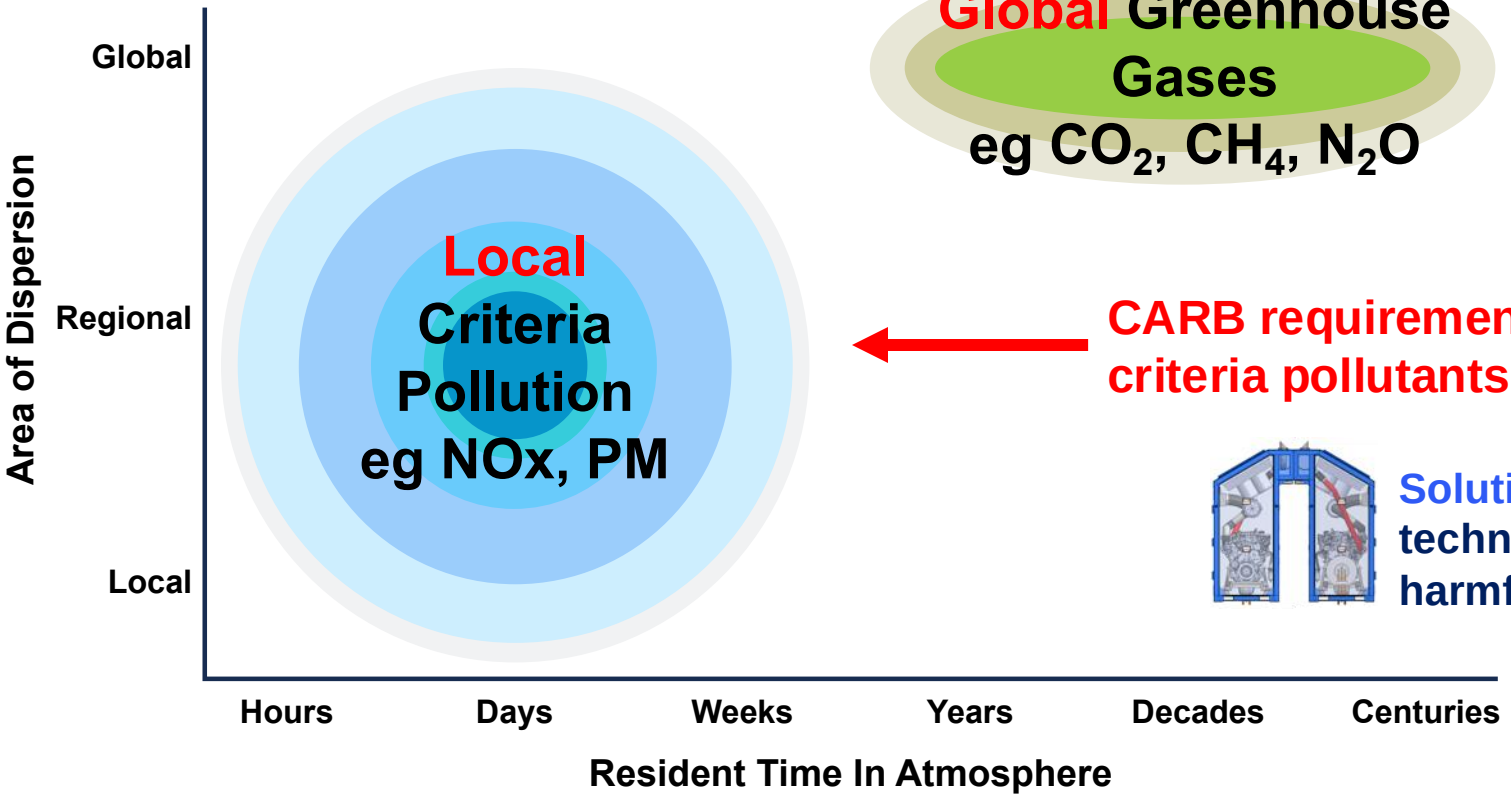
The Importance of Recognizing and Differentiating Between the Two Types of Emissions: Criteria Pollutants vs Greenhouse Gases

LOCAL Criteria pollutants (emissions) that create smog and ozone causing negative health effects are:

- **NOx - Nitrous Oxides**
- **PM - Particulate Matter**
- CO - Carbon Monoxide
- NMHC – Non-Methane Hydro-Carbons

SBTi Targets are based on Greenhouse Gas (GHG) emissions, which significantly impact climate change

Solution: Select or blend with clean fuels to reduce GHG emissions

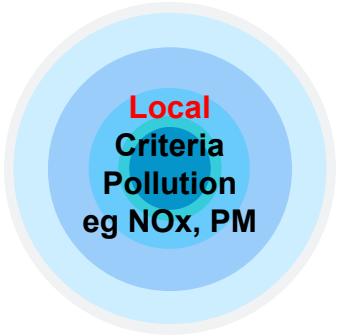


CARB requirement are based on NOx and PM emissions, criteria pollutants which negatively affect public health

Solution: Implement modern power system technology to effectively eliminate these harmful emissions

The Importance of Recognizing and Differentiating Between Emission Types: Locomotive Power System Technology is the Key to Controlling NOx & PM Emissions

Local criteria pollutants contribute to smog and ozone formation, leading to adverse health effects.



The primary **LOCAL** Criteria Emissions that affect health are:

- **NOx -** Nitrous Oxides
- **PM -** Particulate Matter
- **CO -** Carbon Monoxide
- **NMHC -** Non-Methane Hydrocarbons

CARB Fines & CRISI Grants

EPA and CARB measure criteria emissions from power sources in grams per brake horsepower-hour (g/bhp-hr) at the tailpipe

All **regulations and grant programs for locomotives focus on local criteria emissions**—specifically NOx and PM. Currently, there are no locomotive regulations addressing GHG emissions.

- **EPA Tier 4 Standards**
- **Proposed EPA Tier 5 Standards:** 0.2 g/bhp-hr for NOx and 0.01 g/bhp-hr for PM
- **CARB In-Use Locomotive Regulations** and other potential state regulations
- **South Coast AQMD In-Use Rail Yards Regulation**
- **Grant programs** such as CRISI and DERA

Avoid the Disconnect: CARB Focuses on Tailpipe Emissions to Address NOx and PM, While Class 1 Railroads Currently Prioritize GHGs

To avoid CARB fines and achieve SBTi targets, it's essential to integrate both tailpipe (criteria) and well-to-wheel (GHG) solutions

Remember, technology tackles NOx and PM, while clean fuels eliminate GHG emissions

Well-to-wheel is a method to evaluate efficiency and GHG emissions of an energy source like fuel or batteries by considering its entire life cycle. Well-to-wheel emissions include all emissions related to fuel production, processing, distribution, and use. This method provides the most complete and accurate way to measure energy consumption and greenhouse gas emissions.

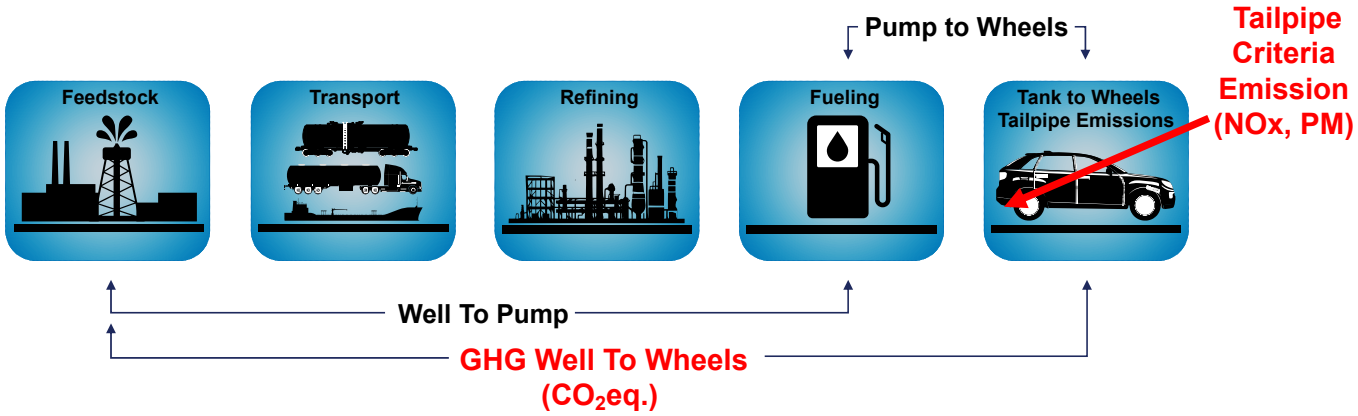
The terms **Tank-to-Wheel** and **Tailpipe Emissions** are subsets of well-to-wheel analysis, focusing specifically on a power source's criteria emissions during operation.

A Closer Look at Battery and Hydrogen-Powered Locomotives

CARB compliance is based on **tailpipe emissions**, focusing on the elimination of harmful NOx and PM emissions from local communities. Consequently, many railroads are considering battery and hydrogen-powered locomotives as primary options.

However, **this approach neglects a significant portion of local and global emissions released daily**. Here's the risk: while battery-electric and hydrogen systems eliminate NOx and PM tailpipe emissions, they introduce critical oversights.

Battery-electric technology merely shifts the problem, moving NOx and PM emissions from the locomotive to power generation at the electric grid. Although hydrogen systems may resolve NOx and PM emissions, they can worsen GHG emissions, **hindering progress toward SBTi targets**. Currently, only gray hydrogen is available, which emits higher GHG levels than diesel.



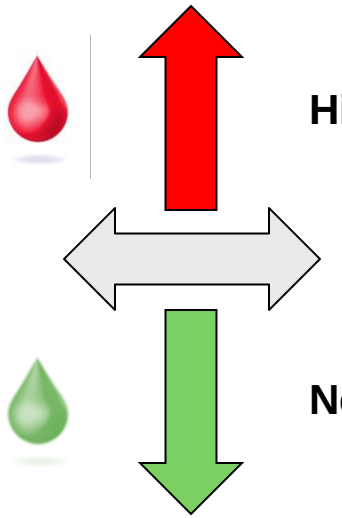
The Importance of Recognizing and Differentiating Between the Two Types of Emissions: Fuel Choice Determines GHG Emissions

Global Greenhouse Gases
eg CO_2, CH_4, N_2O

The primary **GLOBAL** Greenhouse Gas (GHG) that affect climate change are:

- **CO_2** – Carbon Dioxide
- **CH_4** – Methane
- **NO_2** – Nitrous Oxide

GHG emissions are measured by the Carbon Intensity (CI) of the fuel, fuel blend, or power source utilized



Higher CI = Worse GHG Emissions

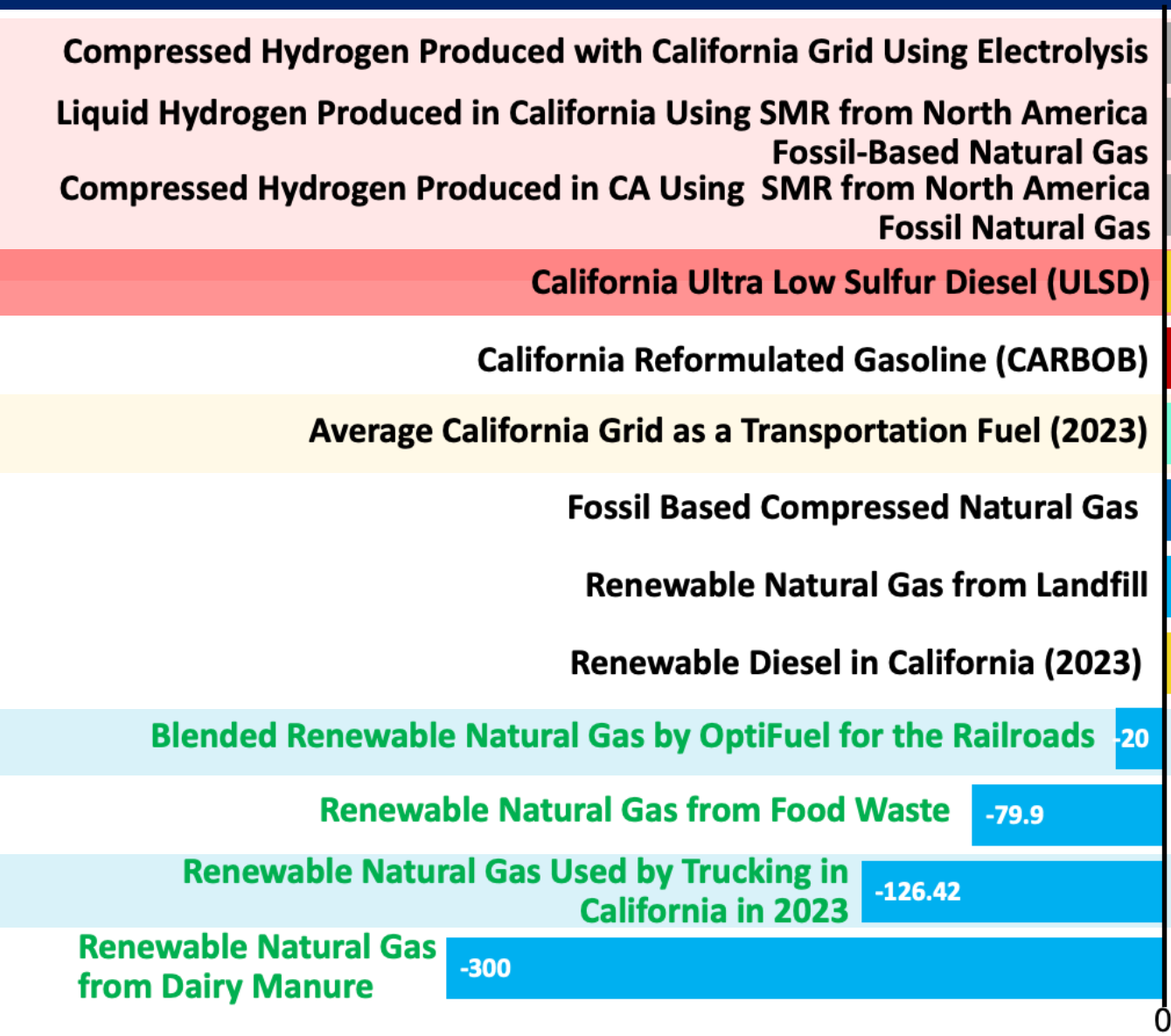
Zero CI = Zero GHG Emissions

Negative CI = Net Negative GHG Emissions

CO2eq is a metric used to compare emissions from various greenhouse gases based on their global-warming potential (GWP). It converts the amounts of different gases into their carbon dioxide equivalent, allowing for a direct comparison of their contributions to global warming with the same global warming— "providing an "apples to apples" comparison.

Carbon Intensity (CI) is the grams of CO2eq for a given Well-To-Wheel activity or process – measured in **gCO2eq/MJ**

Fuel Choices for Managing GHG Emissions in Rail: Grey Hydrogen Has the Highest Carbon Intensity (CI), Resulting in the Worst GHG Emissions, and Renewable Natural Gas (RNG) Has the Lowest CI, Capable of Net Negative Emissions



Less than 1% of all hydrogen produced in the world is **Green**, the remainder is **Grey** manufactured from natural gas, coal, or oil with a Carbon Intensity greater than diesel

DIESEL BASELINE

California electrical grid is 81 CI, but 200% fuel efficiency effectively becomes 40 CI for BEL cars, trucks, and switcher locomotive

Low-cost, readily available, landfill RNG

20% Consumption of Biodiesel and Renewable Diesel by 2034 by Class 1s – NOx is still the same as diesel

OptiFuel's CI Goal

RAILROAD'S COMPETITION FOR THE NEXT 20 YEARS

Low-cost, readily available, low CI RNG to blend with landfill RNG

Source: CARB 2022 Carbon Intensity (CI) Lookup Table for Gasoline and Diesel and Fuels that Substitute for Gasoline and Diesel (gCO_2eq/MJ)

The Physics Behind Battery and Fuel Storage Significantly Impacts Cost, Operations and Public Safety in Line Haul Operations – The Use a Tender Should be the Last Option

Increased Risk with Tenders: The use of tenders for line haul operations introduces higher risks. They are costly to build, test, refuel, and operate, contributing to overall congestion and reducing public safety

Challenges in Transporting Hydrogen: Transporting large amounts of hydrogen presents significant challenges. According to the U.S. Department of Energy, it would require 14 hydrogen tanker trucks to deliver the same energy as one diesel tanker truck

Switching to a **catenary system** across the U.S. would involve trillions in infrastructure costs and **cannot guarantee 24/7 operations across the U.S. without including a large number of battery tenders as backup**

An **ideal solution** would combine the zero NOx, PM, and GHG emissions of RNG-powered locomotives with the cost, operational, and safety advantages of diesel-powered locomotives – no tender required

DIESEL

Two Tier 4, 4500 hp diesel line haul locomotives, each holding **4,700 gallons of diesel**, will go **1,500 miles**.

RNG

Two 5600 hp RNG-Electric line haul locomotives, each holding **2,500 DGEs of RNG**, and **ONE 11,800 DGE RNG tender**, will go approximately **2,500 miles**.

LA→CHICAGO without refueling!

L-HYDROGEN

Two 4500 hp hydrogen fuel cell line haul locomotives, each holding **350 kg of hydrogen**, and **Two 5,000 Kg liquid hydrogen tenders**, will go approximately **1,500 miles**.

G-HYDROGEN

Two 4500 hp hydrogen fuel cell line haul locomotives, each holding **350 kg of hydrogen**, and **Four 2,250 Kg gaseous hydrogen tenders**, will go approximately **1,500 miles**.

BATTERIES

Two 4400 hp 100% battery line haul locomotives, each with **2,400 kW-hr of battery storage** and **Eight 8,000 kW-hr battery tenders**, will go approximately **750 miles**.

Evaluating Emissions and Horsepower Ratings Across Locomotive Options

LINE HAUL LOCOMOTIVE OPTIONS	FUEL TYPE	NOx EMISSIONS (g/bhp-hr)	PM EMISSIONS (g/bhp-hr)	GHG EMISSIONS (gCO2eq/MJ) Carbon Intensity (CI)	COMMENTS: Emissions figures do not account for the threefold efficiency of rail transport over trucking. To make a direct comparison with trucking, divide all emission numbers by three.
Current Average US Line Haul Fleet	Diesel	5.5	0.2	105	• 5,000-gallon diesel range
Wabtec and Progress Rail Tier 4 - Available Now	Diesel or Renewable Diesel	1.3	0. 03	105/40	• 5,000-gallon diesel range • About 1300 produced • Cost around $3.5 Million in 2015 to 2019
OptiFuel Total-Zero™ Modular Locomotive Series Options					
OptiFuel CARB Tier 5, Modular, 5,000 hp Diesel Hybrid - Available 2026	Diesel or Renewable Diesel	<0.2	<0.01	105/40	• 5,000 to 6,500-gallon diesel range • SCR & DEF Required • Cost around $4.75 Million
OptiFuel EPA2027, Modular, 5,000 hp Diesel Hybrid- Available 2027	Diesel or Renewable Diesel	<0.035	<0.005	105/40	• 5,000 to 6,500-gallon diesel range • Dual SCR & DEF Required • Cost around $5 Million
OptiFuel EPA2027 Modular, 5,000 hp Dual Fuel Hybrid – Avail. 2027	Diesel / RNG (up to 33% RNG)	<0.035	<0.002	0 (can vary the overall CI from 0 to 105 depending on the RNG)	• 5,000 to 6,500-gallon diesel range • Dual SCR & DEF Required • Cost around $5.5 Million
OptiFuel Modular, 5600 hp, Modular RNG Hybrid - Available 2028	RNG	0	0	0	• 15,000-gallon diesel range using one tender for every two locomotives • NO SCR Required • Cost around $5.5 Million
OptiFuel Modular, 4500 hp Hydrogen Fuel Cell Hybrid – Available 2027	Grey Hydrogen	0	0	117 to 165	• Requires two tenders for each locomotive • Very expensive per kg. • No easy way to transport to refueling sites

OptiFuel Announces Breakthrough Technology: Two New Diesel-Powered Locomotives Achieving Zero Emissions – No Tender Required!

5000 hp Total-Zero™ Diesel Line Haul Locomotive - Available in 2026

5000 hp Total-Zero™ RNG-Diesel Dual Fuel Line Haul Locomotive - Available in 2027

Both systems can also be retrofitted to any existing line haul platform

While both new diesel-powered OptiFuel Total-Zero™ Series Locomotives will eliminate NOx and PM criteria emissions, the **RNG-Diesel Dual Fuel Series** will enable railroads to select any blend of RNG and diesel to achieve their SBTi targets for GHG emissions.

OptiFuel Total-Zero™ Locomotives Achieve Near-Zero NOx and PM Criteria Emissions, Even When Operated on Fossil Fuels, Enabling Railroads to Confidently Meet CARB and EPA Regulatory Compliance

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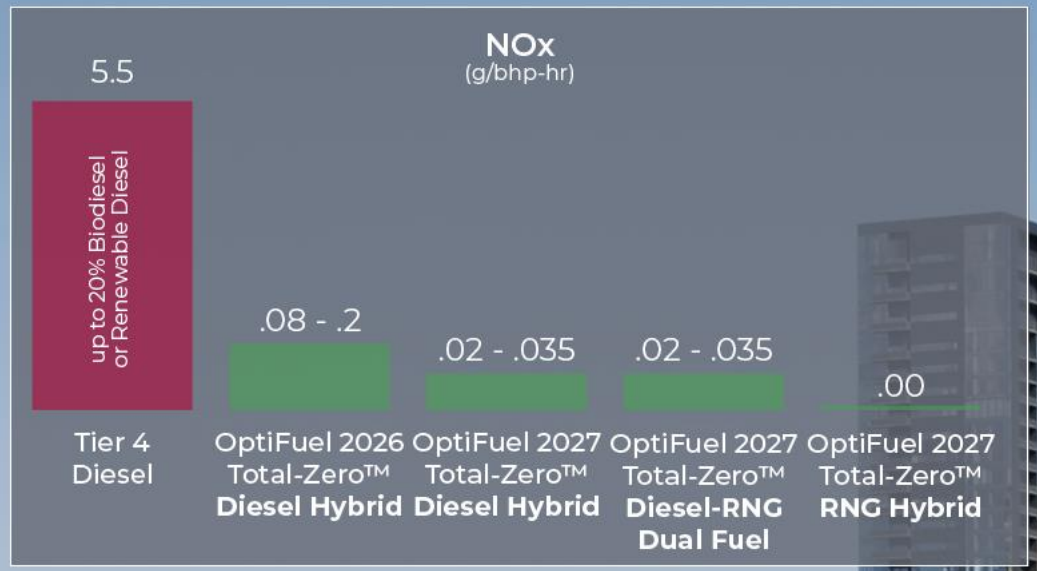
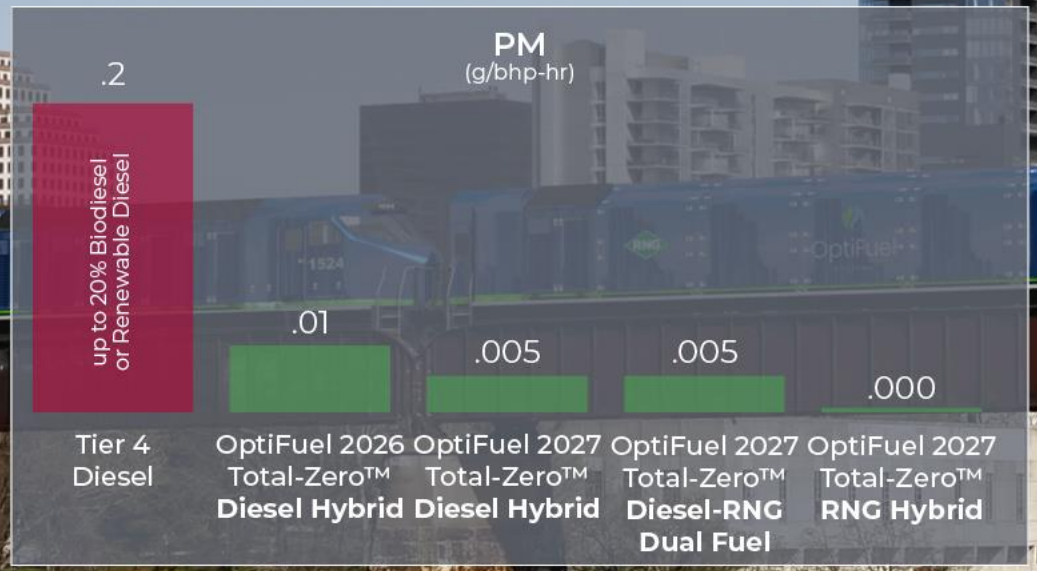




Comparison of CARB Annual Spending Account Fines per Locomotive: OptiFuel Total-Zero™ Diesel Series vs. Tier 4 Diesel

OptiFuel Total-Zero™ Locomotives Dramatically Reduces CARB Spending Account Fines, Even When Operated on Tier 4 Diesel

Locomotive Type and EPA Emission Tier	Fuel	Last Year to Operate	EPA Standard - NOx (g/bhp-hp)	EPA Standard - PM (g/bhp-hr)	Gallons Used in California Annually	MWhr Equivalent	PM Factor	NOx Annual factor	Annual Spending Account Fines Per Fiscal Years
FY 2027 Operating									
Pre-Tier 0 Switcher	Diesel	2030	17.4	0.44	**20,000**	226	13.1	96.2	$503,613.16
Tier 4 Switcher	Diesel	2052	1.3	0.02	**20,000**	226	13.1	96.2	$33,959.75
OptiFuel TOTAL-ZERO Switcher	Diesel	2052	0.035	0.005	**20,000**	226	13.1	96.2	$2,184.99
Tier 4 Line Haul	Diesel	2058	1.3	0.02	**150,000**	2325	13.1	96.2	$349,364.73
OptiFuel TOTAL-ZERO Line Haul	Diesel	2058	0.035	0.005	**150,000**	2325	13.1	96.2	$22,478.33
FY 2035 Operating									
Tier 4 Switcher Diesel	Diesel	2052	1.3	0.02	**20,000**	226	13.2	130.1	$45,985.67
OptiFuel TOTAL-ZERO Switcher	Diesel	2052	0.035	0.005	**20,000**	226	13.2	130.1	$2,969.66
Tier 4 Line Haul	Diesel	2058	1.3	0.02	**150,000**	2325	13.2	130.1	$473,082.63
OptiFuel TOTAL-ZERO Line Haul	Diesel	2058	0.035	0.005	**150,000**	2325	13.2	130.1	$30,550.73
FY 2045 Operating									
Tier 4 Switcher Diesel	Diesel	2052	1.3	0.02	**20,000**	226	13.2	193.3	$68,324.59
OptiFuel TOTAL-ZERO Switcher	Diesel	2052	0.035	0.005	**20,000**	226	13.2	193.3	$4,412.27
Tier 4 Line Haul	Diesel	2058	1.3	0.02	**150,000**	2325	13.2	193.3	$702,896.79
OptiFuel TOTAL-ZERO Line Haul	Diesel	2058	0.035	0.005	**150,000**	2325	13.2	193.3	$45,391.67

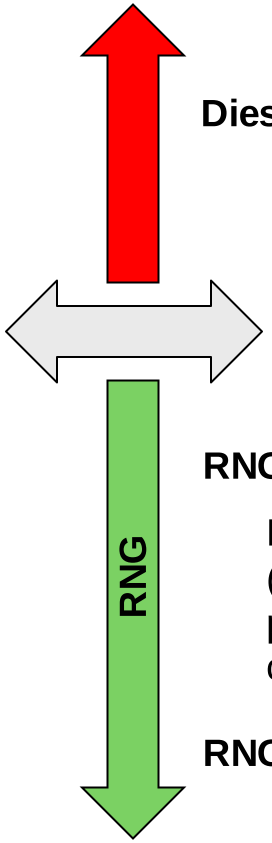
*** Emissions ratings for OptiFuel Total-ZeroTM Diesel Locomotives are based on the 2027 Diesel Hybrid and Diesel-RNG Dual Fuel models**

By Combining Fuels with a Positive Carbon Intensity (CI) With a Small Percentage of NEGATIVE CI Fuels, One Can Effectively Neutralize GHG Emissions

OptiFuel SYSTEMS

OptiFuel's approach enables you to choose any blend of diesel and RNG to achieve your SBTi targets on time and within budget

Global Greenhouse Gases
eg CO_2, CH_4, N_2O



Diesel CI = 104

Zero

RNG CI = -100

Renewable Natural Gas (RNG) is available for purchase in various carbon intensity levels

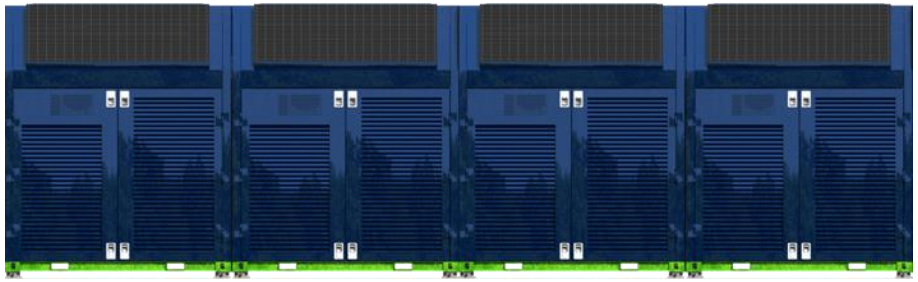
RNG CI = -300

CRITERIA EMISSIONS (g/bhp-hr)		CARBON INTENSITY (CI) DUAL FUEL BLEND CALCULATIONS (gCO2eq/MJ)						
NOx	PM	Total Gallons Fuel in DGE	Diesel Gallons (CI:100)	RNG Gallons	RNG CI	% RNG	Blended CI	CI Compared to Class 8 Trucks - Divide by 3
0.035	0.001	6600	4400	2200	-200	33%	0.00	0.00
0.035	0.001	6000	5000	1000	-300	17%	33.33	11.11
0.035	0.001	6600	4400	2200	-200	33%	0.00	0.00
0.035	0.001	6000	5000	1000	-300	17%	33.33	11.11
0.035	0.001	6600	4400	2200	-200	33%	0.00	0.00
0.035	0.001	6000	5000	1000	-300	17%	33.33	11.11
0.035	0.001	6600	4400	2200	-200	33%	0.00	0.00
0.035	0.001	6000	5000	1000	-300	17%	33.33	11.11
0.035	0.001	6600	4400	2200	-200	33%	0.00	0.00
0.035	0.001	6000	5000	1000	-300	17%	33.33	11.11

FRA Concurrence Expected by 2027 for 3 Standardized Switcher and Line Haul Locomotive Power Modules – Diesel, RNG, & Hydrogen

- **Diesel and Diesel-RNG Dual Fuel Power Module**
  - **Power:** Up to 670 hp IC engine with 750 hp motor/generator
  - **Fuel:** Biodiesel blends up to 20% and renewable diesel blends up to 100% (up to 33% RNG in dual fuel)
  - **Emissions:**
    - **Compliance with 2027 EPA and CARB regulations**
    - **NOx: <0.035 g/bhp-hr, PM: <0.005 g/bhp-hr**
    - **88% cleaner than proposed CARB Tier 5 Locomotive Standard**
    - **In Dual Fuel Mode – GHG emissions can achieve ZERO Carbon Intensity (CI)**
  - **Concurrence Target:** 2026 (diesel), 2027 (dual fuel)
- **RNG Power Module**
  - **Power:** Up to 500 hp IC engine with 750 hp motor/generator
  - **Fuel:** Renewable Natural Gas (RNG)
  - **Emissions:**
    - **NOx: 0.001 g/bhp-hr, PM: 0.000 g/bhp-hr**
    - **GHG emissions can achieve ZERO Carbon Intensity (CI)**
  - **Active Program:** DOE 5600 hp RNG Hybrid Line Haul Locomotive Program
  - **Concurrence Target:** 2027
- **Ballard FCMove™-XD Hydrogen Fuel Cell Module**
  - **Power:** 360 kW (480 hp)
  - **Fuel:** Hydrogen
  - **Emissions:**
    - **NOx: 0.00 g/bhp-hr, PM: 0.000 g/bhp-hr**
  - **Active Program:** Sierra Northern Railway (SNR) Hydrogen Switcher Locomotive Program (4 units)
  - **Concurrence Target:** 2025

5500 hp Diesel Configuration



35 feet (8 Modules)

5500 hp Diesel-RNG Dual Fuel Configuration

45 feet (9 Modules)

OptiFuel Quick-Power™ Quick-Disconnect (QD) Power Modules are 102” Wide

- **Standardized Module is used across all switcher & line haul locomotives**
- **Modules Typically in Pairs – Available 123” Across with Center 20” Walkway**

Eight 102” OptiFuel Quick-Power™ Quick-Disconnect (QD) Diesel Power Modules

Eight 102” OptiFuel Quick-Power™ Quick-Disconnect (QD) Diesel-RNG Dual Fuel Power Modules with One RNG Fuel Storage Module

- **1,000 to 1,500 DGE storage capacity**

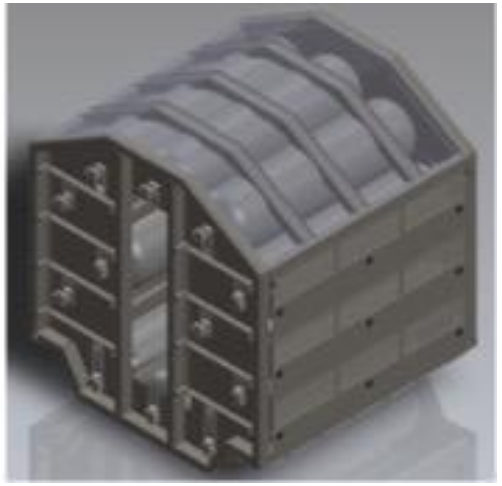
All RNG/Hydrogen Locomotive Storage Systems Required for Different Locomotive Sizes Will Have FRA Concurrence by 2027

- Onboard RNG Storage for Switchers (IHB)
- **Received FRA Concurrence in 2020**

- Onboard RNG/Hydrogen Storage (Storage) for Switchers (SNR)
- **FRA Concurrence for Testing End of 2024**
- **Expected FRA Concurrence for Operations Early 2025**

- Version 2 Onboard RNG/Hydrogen Storage (Storage) for Switchers (SNR)
- Testing at TTC
- **Expected FRA Concurrence for Operations Early 2026**

- Onboard RNG/Hydrogen Storage (Storage) for Line Haul (DOE)
- Testing at TTC
- **Expected FRA Concurrence for Operations Early 2027**

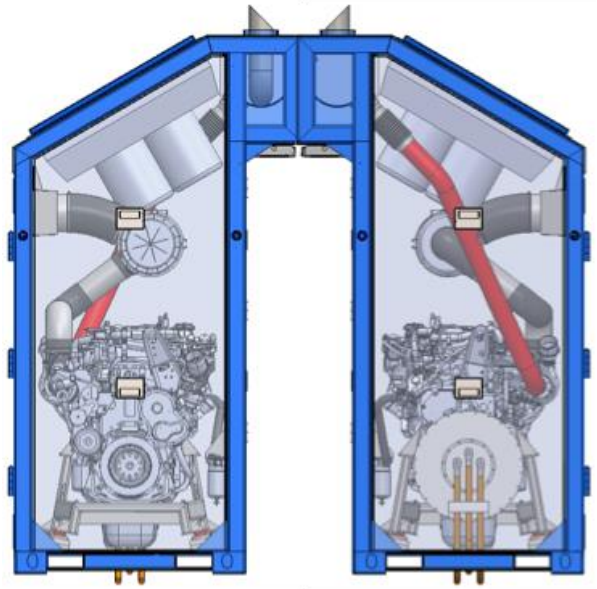


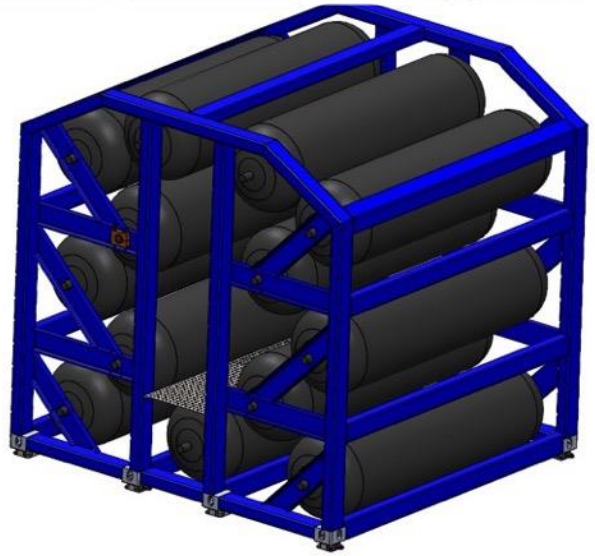
2 to 10 Diesel, RNG or Hydrogen Power and Fuel Storage QD Modules Are Used To Assemble 1000 hp to 5,000 hp OptiFuel Total-Zero™ Hybrid Locomotives

690 hp **Diesel** (2026) or **Diesel - RNG Dual Fuel** (2027) QD Module

460 hp **RNG** (2027) QD Module

480 hp **Hydrogen Fuel Cell** QD Module (Switcher – 2025, Line Haul – 2027)





Gen 3 Onboard Fuel Storage Module
Capacity: RNG: 990 DGE, Hydrogen: 226 kg

5000 hp Commuter Diesel – RNG Dual Fuel Hybrid

80’ 5000 hp Diesel – RNG Dual Fuel Hybrid Line Haul

72’ 5000 hp Diesel - RNG Hybrid Line Haul

62’, 2000 - 4000 hp switcher RNG - Diesel Hybrid Switcher or Road Switcher

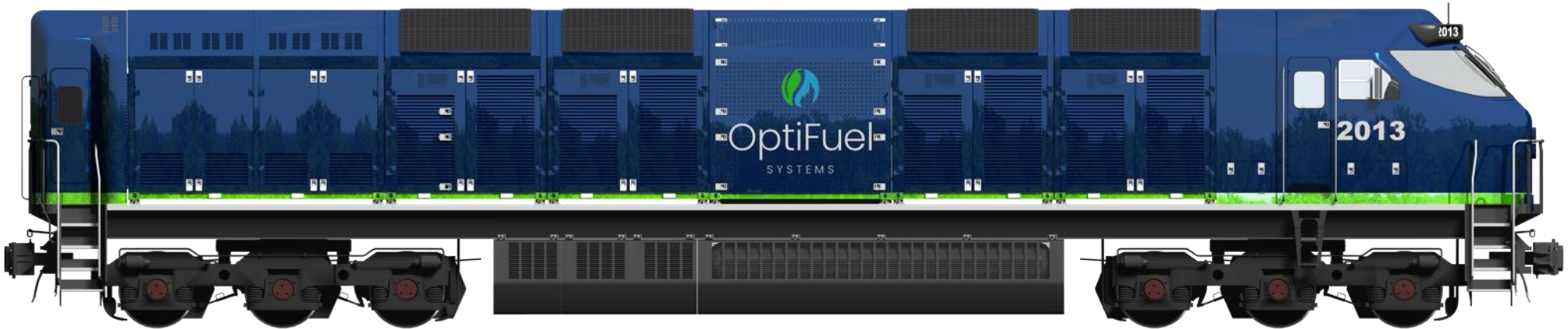
52’ 1,000 - 2,500 hp Diesel - RNG Hybrid Switcher

OptiFuel Modular 5000 hp Diesel Hybrid Line Haul Locomotive With No Tender Required - Available in 2026 with FRA Concurrence

- **CAN BE RETROFITTED TO ANY EXISTING LINE HAUL PLATFORM**
- Criteria Emissions –
  - Available in 2026 : **NOx: <0.2** g/bhp-hr and <**PM**: <**0.01** g/bhp-hr
  - Available in 2027 with FRA Concurrence: **NOx: <0.035** g/bhp-hr and **PM**: <**0.005** g/bhp-hr
- Up to **20% Less Diesel Use Than Tier 4 Diesel**, Reducing GHGs by the same amount
- Redundant Power for Extreme High Availability and Reliability to Guarantee Tractive Power – 5500 hp IC Diesel and 500 hp Battery Total Power for a total Peak Power of 6000 hp
- CAF AC Traction with Regenerative Braking - Maintains Full Tractive Effort Even with Loss of One Traction Motor
- 5,000 Gallon Diesel Range with 72’ Platform - 5,500 Gallon Diesel Range with New 80’ Platform
- SCR & DEF Required - 30 gallons of DEF per 1,000 Gallons of Diesel
- Cost Around $2.75 Million Retrofitted to Older Locomotives to $4.75 Million for New Locomotives
- Our modularity allows us to update to new technology at any time by just swapping out the module

OptiFuel Modular 5000 hp Diesel-RNG Dual Fuel Hybrid Line Haul Locomotive With ZERO GHG Emissions - Available in 2027 with FRA Concurrence

- **CAN BE RETROFITTED TO ANY EXISTING LINE HAUL PLATFORM**
- Dual Fuel System That Can Run 100% Diesel and Dual Fuel Mode That Can Run 65% Diesel and 35% RNG
- **GHG Emissions with Carbon Intensity of ZERO Running 65% Standard Diesel with CI of 100 and 35% RNG with a CI of Negative 200**
- **Criteria Emissions – Available in 2027 with FRA Concurrence: NOx: <0.035 g/bhp-hr and PM: <0.002 g/bhp-hr**
- Up to 20% Less Diesel Use Than Tier 4 Diesel, Reducing GHGs by the same amount
- Redundant Power for Extreme High Availability and Reliability to Guarantee Tractive Power – 5500 hp IC Diesel and 500 hp Battery Total Power for a total Peak Power of 6000 hp
- CAF AC Traction with Regenerative Braking - Can Maintain Full Tractive Effort Even with Loss of One Traction Motor
- 6,500 Gallon Range - 4,400 Gallons of Diesel and 2,100 DGE of RNG - **NO TENDER REQUIRED**
- SCR & DEF Required - 30 gallons of DEF per 1,000 Gallons of Diesel
- Cost Around $3.25 Million Retrofitted to Older Locomotives to $5.5 Million for New Locomotives
- Our modularity allows us to update to new technology at any time by just swapping out the module

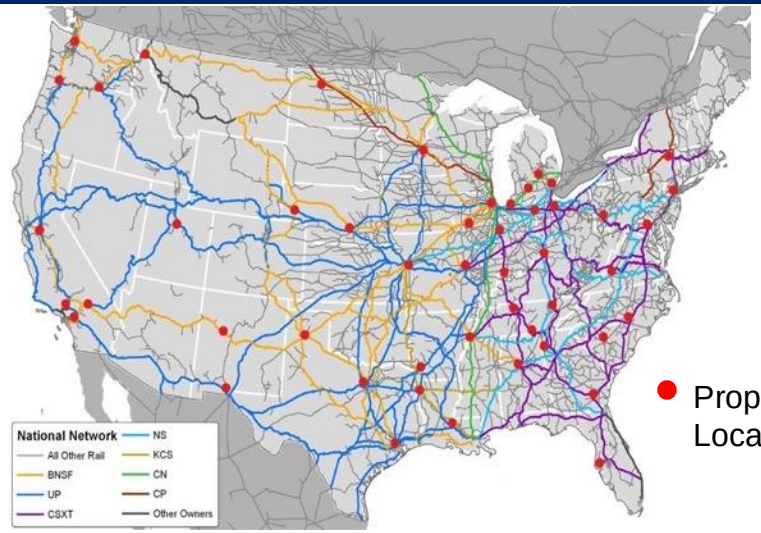


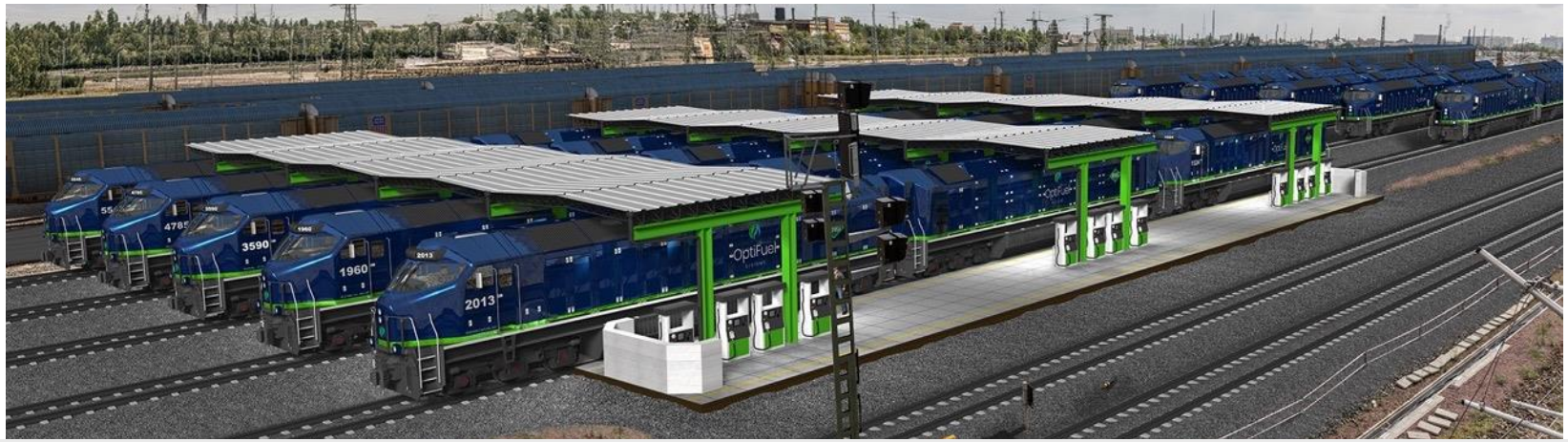
Expected Benefits of OptiFuel's Total-Zero™ Diesel-RNG Dual Fuel Hybrid Line Haul Locomotives

- **NOx <0.03 g/bhp-hr NOx and 0.000 g/bhp-hr PM emissions**
- **ZERO CI greenhouse gas (GHG) emissions**
- **Eliminates Scope 3 emissions for railroad customers**
- Capable of traveling 2,500 miles—from the Port of Los Angeles or Long Beach to Chicago—without refueling
- Uses approximately 20% less diesel fuel per locomotive compared to current diesel line haul locomotives
- 30-year locomotive lifespan, with the flexibility to transition to alternative fuels like green hydrogen if available
- Expected 95% operating uptime, surpassing the industry average of 81% for diesel locomotives
- On-track maintenance and 1-hour module replacement minimizes disruptions and out-of-order assets
- Lower lifetime operating expenses
- Less than 8 to 16 hours of engine module maintenance every 180 days, with costs covered by OptiFuel

Infrastructure Expansion: Integrating RNG Dispensers to Diesel Islands at 60 Railroad Refueling Stations

- Each RNG dispenser can refuel 2,500 diesel gallon equivalents (DGE) of RNG into the line haul locomotives every 30 minutes, allowing for a total of 48 locomotives (120,000 DGE) to be refueled per day
- The refueling systems are scaled-up versions of OptiFuel's 2013 refueling station at the Indiana Harbor Belt Railroad. Additionally, OptiFuel offers scaled-down versions for bulk transfer and trailer-based mobile refueling
- The expected capital expenditure for each station is $20 million, totaling $1.2 billion across the entire Class 1 network
- Watch an IHB Railroad employee refuel their dual fuel locomotives in this video: https://youtu.be/QSkvFhauUAw





Technology Already in Production: Focus on Reliability, Safety Testing, FRA Concurrence, and Preproduction (2025-2029)

OptiFuel SYSTEMS

Suggested Commitment from Each of the Six Class 1 Railroads:

An annual contribution of $10 million over a 4-year period from 2025 to 2028, amounting to a collective investment of $240 million (various business models & structures can be explored to accommodate the investment)

Step 1 - Demonstration and FRA Testing (2025-2026) - $40 million

- (In process now) Build Total-Zero™ 5000 hp RNG Hybrid Line Haul Locomotive and install an RNG refueling station at the Technology Transportation Center (TTC) to refuel locomotives
- Conduct year-long testing in 2025 at the Federal Railroad Administration's TTC to obtain full FRA concurrence
  for the locomotives

Step 2 - Reliability Testing and Data Collection (2026-2029) - $200 million

- Build 12 Total-Zero™ 5000 hp Diesel-RNG Dual Fuel Hybrid Line Haul locomotives
- Construct RNG refueling system and integrate 4 RNG refueling dispensers into existing diesel islands, each capable of refueling 120,000 diesel gallon equivalents (DGE) of RNG per 24 hours
- Perform "Million Mile" operational testing from 2027 to 2029 on both the East and West Coasts

All participating railroads will have full transparency and engage their staff 100% in these activities

Regulatory Recommendations for Affordably Converting Class 1 Locomotives to Zero Emissions by 2050

- **Recommendation: Support a new Federal EPA Tier 5 locomotive standard for all new locomotives (line haul and switchers) to replace CARB proposed Tier 5, effective in 2031 with:**
  - **NOx: 0.035 g/bhp-hr**
  - **PM: 0.002 g/bhp-hr**
  - **Carbon Intensity: 20 gCO2e/MJ or lower**
- **Allow any solution that will meet the EPA Tier 5 standards - not just batteries or hydrogen**
- **Class 1 Railroads: Aim to begin replacing 2,000 existing line haul locomotives and switchers every year starting in 2030**

Considering the threefold efficiency of rail transport compared to on-highway trucking, the effective GHG emissions will be three times lower than those of new battery-electric trucks operating on the California electric grid

- **Collaborate with Federal and State Governments to Expand On-Road Vehicle Incentives for Class 8 trucks to the Off-Road Locomotive Market:**
  - ***By 2027: Modify the Federal RIN Credit to include all classes of locomotives through 2050***
  - ***By 2027: Modify the Federal Alternative Fuel Tax Credit (AFTC) Program (26 USC 6426 and 6427) to include all classes of locomotives, increase the credit to $1.00 per DGE, and extend the program until 2050***
  - ***By 2026: Adjust any state-specific Low Carbon Fuel Standard (LCFS) RNG subsidies/credits to include all classes of locomotives through 2050 - Locomotives already have this in California***
  - ***Support any federal or state tax credits for building or fabricating locomotive refueling equipment through 2050***

OptiFuel's innovative modular locomotive systems facilitate rapid and efficient production, retrofits, and maintenance - empowering railroads to customize locomotives, efficiently trial and integrate new technologies and fuels, and easily swap power systems as needed

The Path to Growth and Market Leadership: **Why Class 1 Railroads Must Act NOW to Transition to Zero Emission Locomotives**

- **Decisions for the Future Must Be Made Today:** To meet emissions goals starting in 2045, railroads need to solidify their plans now. No new disruptive technologies are expected within the next 20 years that would alter decisions made today
- **Hydrogen Is Not a Near-Term Solution:** Significant volumes of green hydrogen won't be available to railroads for at least 30 years, if ever, and producing 4.5 billion kilograms annually would cost trillions. Additionally, there are no viable transport options for delivering hydrogen to refueling sites
- **Battery and Catenary Alternatives Are Cost-Prohibitive:** While solid-state batteries are expected by 2029, converting to battery-electric locomotives would cost trillions in construction and maintenance. Similarly, switching to a catenary system would involve trillions in infrastructure costs and cannot guarantee 24/7 operations across the U.S.
- **RNG - The Most Affordable and Low-Risk Approach:** Just as the trucking industry has realized, renewable natural gas (RNG) offers the most practical, affordable, and scalable solution for zero-emission locomotives. The technology exists today to build 18,000 zero-emission diesel-RNG dual fuel line haul locomotives over 12 years (starting in 2030), along with the national RNG refueling infrastructure, which can be established in 10 years starting in 2028
- **FRA Concurrence by 2028:** All necessary approvals from the FRA can be secured by 2028, clearing the path for widespread adoption
- **Financially Feasible:** This is an achievable, forward-thinking investment that will drive long-term benefits including lower operating cost and supporting market share growth

OptiFuel

SYSTEMS

ACCELERATING THE PACE TO

TOTALZERO™

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