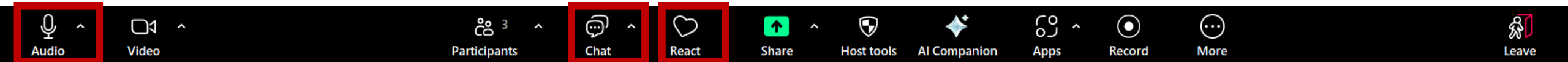


WEBINAR REMINDERS

- Please **Mute** your microphone unless speaking.
- You can place questions in the **Chat** which will be answered in the chat and during the Panel Discussion Session at the end.
- You can use the **“Raise Hand”** feature to ask questions or make a comment during the Panel Discussion portion of the webinar.
- This meeting will be **Recorded**.





Saving Money and Reducing Truck Emissions Webinar Series

Sustainability Metrics & Reporting: Best Practices for Fleets

Date: Wednesday, September 16, 2026

Time: 1 PM – 2 PM Central Time

Hosted by the North Central Texas Council of Governments (NCTCOG)

Register at <https://forms.cloud.microsoft/r/vpr8JmvkPV>

Webinar will be presented through **ZOOM**

Contact: Trey Pope, tpope@nctcog.org

Jason Brown, jbrown@nctcog.org

Presenters:

Mario Sanchez-Lara
Cummins Inc.

Rebecca Schenker
TRC Member of WSP

Overview



Image provided by Getty

Welcome, Introduction

Presenter: Trey Pope, Transportation/Air Quality Planner, NCTCOG

Sustainable Fleets: Best Practices

Presenter: Mario Sanchez-Lara, General Manager, Private Carriers, Cummins Inc.

Fleet Sustainability Reporting Strategies and Considerations

Presenter: Rebecca Schenker, Vice President, Regulatory Compliance – Commercial Transportation Solutions

Discussion

Updates and Close



Saving Money and Reducing Trucking Emissions Program



GOALS

Promote emissions reduction and cost saving strategies within the trucking industry



INITIATIVES

Build relationships within the trucking industry

Share information about emission reduction strategies

Connect SmartWay verified technology to trucking owner/operators and fleet managers

SMARTe

Saving Money and Reducing Truck Emissions





Destination **Zero**[™]

Our commitment to sustainability and helping our customers navigate the energy transition while growing our business

Sustainable Fleets Best Practices

Mario Sanchez-Lara

General Manager, Private Carriers

Cummins Inc.

September 16, 2026

Cummins - Public



Our Story

A History Rooted in Innovation

Founded in 1919

Cummins was founded by Clessie Cummins and W.G. Irwin, who believed in the power of ideas and had a shared vision of what ingenuity and hard work could achieve.

The Power of Diesel

Cummins took the available technology and transformed diesel into a reliable and everyday power source.





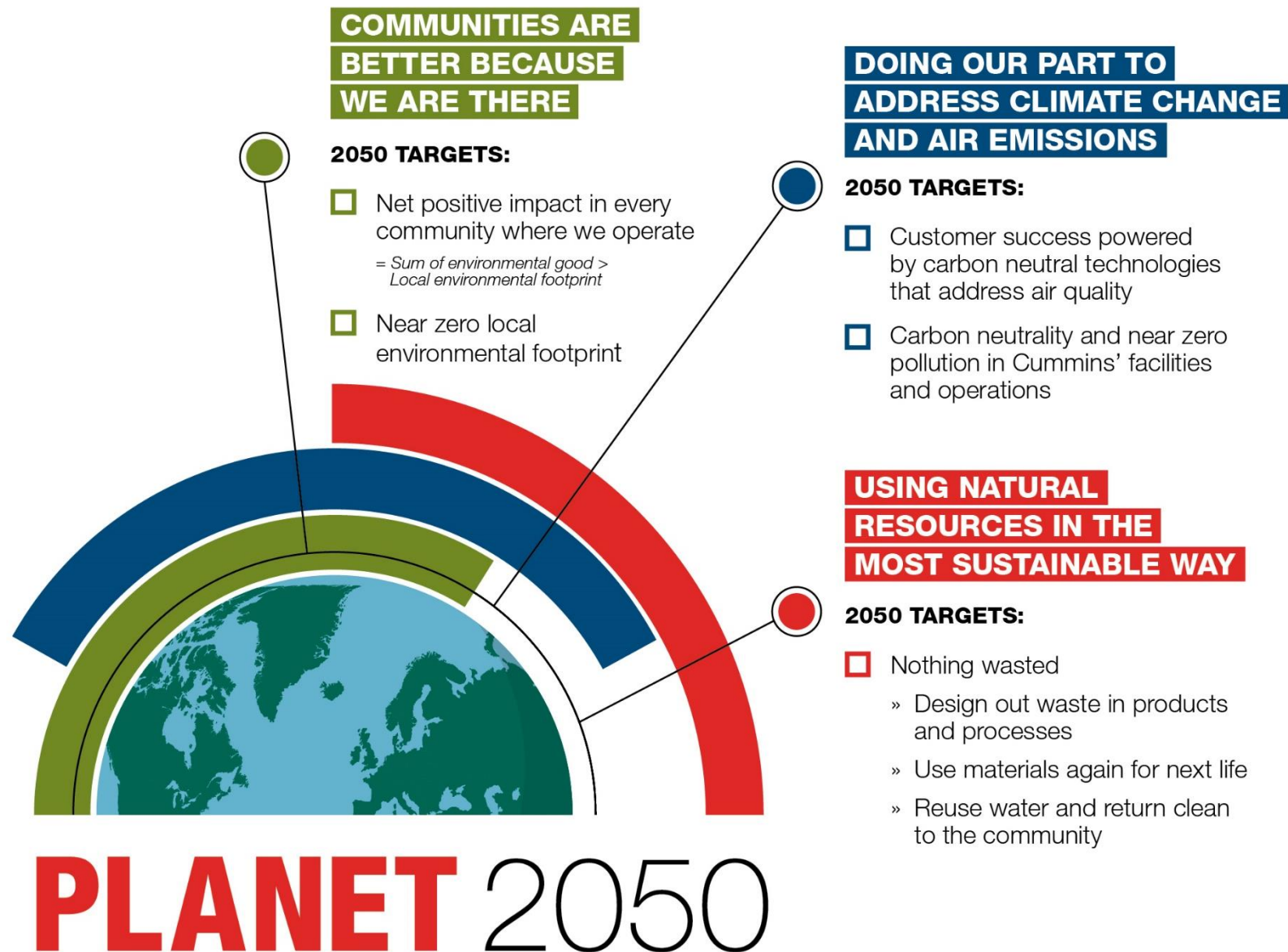
Our Story

Powering a More Prosperous World

190	Countries and territories*	↗
69,600	Global employees	↗
106	Years of industry leadership	↗
19,000	Cummins certified dealer locations	↗
\$1.4B	Invested in research and development in 2024	↗

* Approximation of countries and territories with Cummins service. As published in the 2024 10K found on cummins.com.

OUR 2050 ASPIRATIONAL TARGETS



Destination ZeroTM

Destination Zero is our commitment to sustainability and helping our customers navigate the energy transition while growing our business.

Decarbonization

2030 GOALS



FACILITIES ENERGY

GHG emissions ↓ 50%
(Scope 1 & 2)



PRODUCTS

GHG emissions ↓ 25%
(Scope 3, Category 11)



SUPPLIERS

Key supplier engagement
(Scope 3, Category 1)

2050 TARGETS

Achieving net-zero emissions across Cummins' facilities and operations

Delivering low-carbon and zero-emissions technologies across all markets we serve to power customer success while aligning with market needs

Materials

2030 GOALS



FACILITIES WASTE

Zero waste growth and minimize single-use plastics



CIRCULARITY

90% material circularity plans for new products

2050 TARGETS

Design out waste in products and processes

Use materials again for next life

Communities

2030 GOALS



FACILITIES VOC

Volatile organic compounds (VOCs) ↓ 50%



FACILITIES WATER

Water consumption ↓ 30%



COMMUNITY WATER

Net water positive across Cummins regions

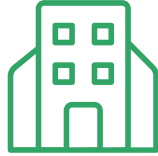
2050 TARGETS

Net positive impact in locations that account for 80% of total water consumption

Near-zero pollution across Cummins' facilities and operations

Reuse water and return clean to the community

Emissions Simplified



Criteria Pollutants

Contributes to smog and negative public health outcomes

- Particulate matter (**PM**) and other emissions like nitrogen oxides (**NO_x**)
- Criteria pollutants are close to zero with today's engine technologies

Example: EPA-2010

Leverage Technology for Cleaner Fuel Combustion



Greenhouse Gases (**GHG**)

Trapped heat contributes to climate change

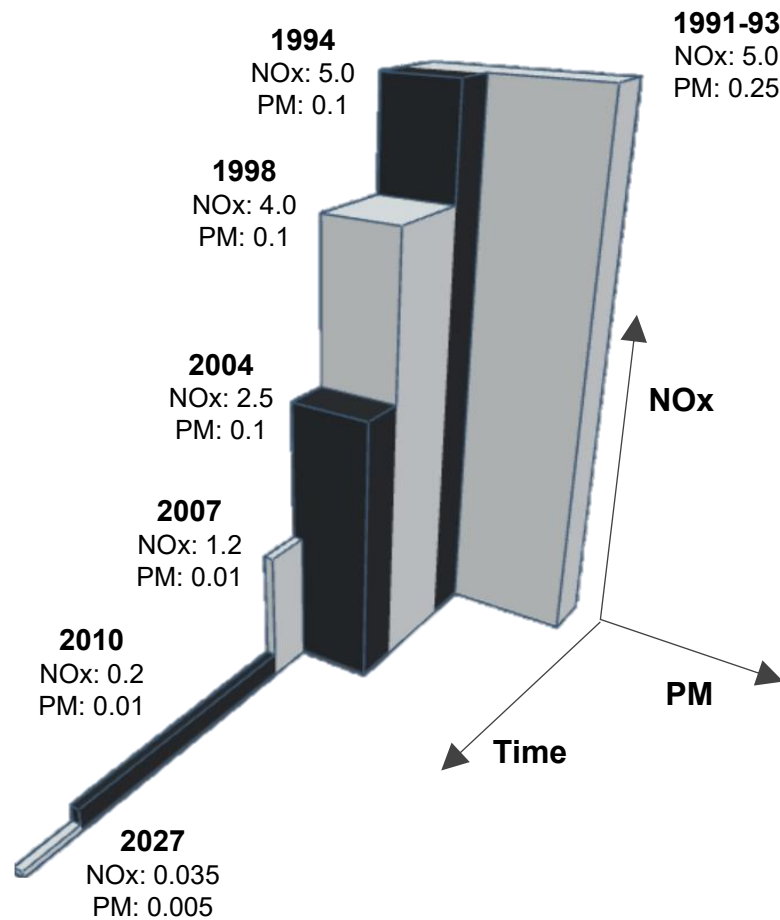
- Carbon dioxide (**CO₂**), methane (**CH₄**), nitrous oxide (**N₂O**), and others
- Current regulations evaluate GHG reductions based on a tank to wheel basis
- Using a well to wheel approach (renewable fuels) can contribute to reduced GHG emissions

Example: EPA's Phase 2 GHG regulations.

Use Less Fuel or a Lower Carbon Content one



Criteria Pollutants Reduction, Great Progress in 30 Years





Our mission

To accelerate the shift to net zero by pursuing the most promising paths forward



Alternative Technologies

We have what you need

Natural Gas



H2-ICE



Octane



FCEV



Biodiesel



BEV



Renewable Diesel



Fuel Providers

Applications & Challenges

		Positioning	Applications		Challenges
	Diesel	▪ Proven / Reliable / Durable ▪ Long Future ▪ Versatile ▪ Technology to Beat	▪ All Applications ▪ Heavy Haul		▪ Rising costs and complexities
	Natural Gas	▪ Near Zero-Emissions ▪ Carbon Negative with RNG ▪ Low TCO	▪ Transit ▪ School Bus ▪ Vocational	▪ Refuse ▪ Regional Haul ▪ Long Haul (new with X15N)	▪ High initial price and limited infrastructure will limit mass adoption
	Hydrogen (IC)	▪ Zero-Carbon ▪ Fast Fueling ▪ Long Range / Versatile	▪ Regional Haul ▪ Long Haul		▪ High initial price and limited infrastructure will limit mass adoption
	Gasoline	▪ Reliable / Durable ▪ Diesel like Performance	▪ School Bus ▪ Pickup & Delivery ▪ Recreational	▪ Utility ▪ Yard Spotters	▪ Applications with high fuel consumption will benefit from lower OpEx technologies
	Battery electric / BEVx	▪ Zero-Emissions / Range ▪ Scalable Powertrain ▪ Low Maintenance	▪ Transit ▪ School Bus ▪ Vocational	▪ Refuse ▪ Regional Haul	▪ Battery weight and charge time will limit adoption in Long Haul and some Regional Haul applications
	Hydrogen (Fuel Cell)	▪ Zero-Emissions ▪ Fast Fueling ▪ Long Range / Versatile ▪ The Future of Heavy Duty	▪ Rail ▪ Transit (long routes) ▪ Vocational	▪ Regional Haul ▪ Long Haul	▪ High initial price and limited infrastructure will slow mass adoption



Cummins HELM™

HIGHER EFFICIENCY. LOWER EMISSIONS. MULTIPLE FUELS.

Unified Global Platform

Benefit:

- Similar vehicle integration touchpoints

Cummins HELM™ is the industry's **first series of engine platforms** – the **X15**, the **X10** and the **B** – that allows customers to **choose the fuel type that best suits their needs**. These platforms have been designed not as a compromise, but with the entitlement of what each fuel can deliver.



X15 Series

Advanced Diesel
Natural Gas
Hydrogen



X10 Series

Advanced Diesel
Natural Gas



B Series

Advanced Diesel
Durable Gasoline





3: Strategize

After identifying the most promising opportunities to reduce petroleum consumption at each fleet location then determine reduction strategies at each fleet location by evaluating the most appropriate combination of the four core principles of petroleum reduction.

These principles, detailed on [FEMP Best Practices: Sustainable Fleet Principles](#), are summarized as:

- Principle I—Right-Size Fleets and Vehicles to Mission
- Principle II—Reduce Vehicle Miles Travelled
- Principle III—Increase Fleet Fuel Efficiency
- Principle IV—Optimize Cost-Effective Alternative Fuel Use



4: Implement

The fleet- and location-specific petroleum reduction strategies identified in the strategize framework step, in a manner that most effectively achieves the overarching fleet management vision and annual targets of operation and reduction.

Five components:

Acquiring Fleet Vehicles

Improving Fleet Operation and Maintenance

Deploying Alternative Fuel Infrastructure

Monitoring Performance and Meeting Targets

Refining Plans to Meet Fleet Objectives and Goals



Natural Gas

• Why Natural Gas?



Natural
Gas

Natural gas engines help **lower emissions** and reduce a vehicle's overall environmental impact **without sacrificing the performance** needed to get the job done.

The Cummins B6.7N, L9N, ISX12N and X15N (2024) set the standard for natural gas engine performance and reliability while offering **near-zero emissions**.

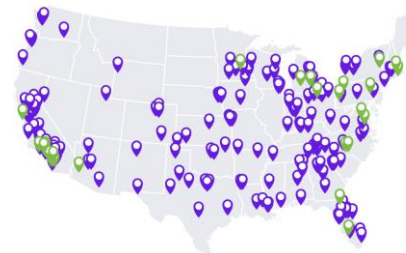
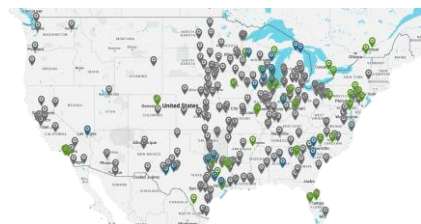
- CO₂ equivalent is **16% below** current EPA standards
- Can achieve **sub-zero emissions** when using renewable natural gas (RNG).

Natural gas engines are also the most mature, proven and least disruptive alternative power technology available today.

[Read the Section](#)

• US Natural Gas Infrastructure

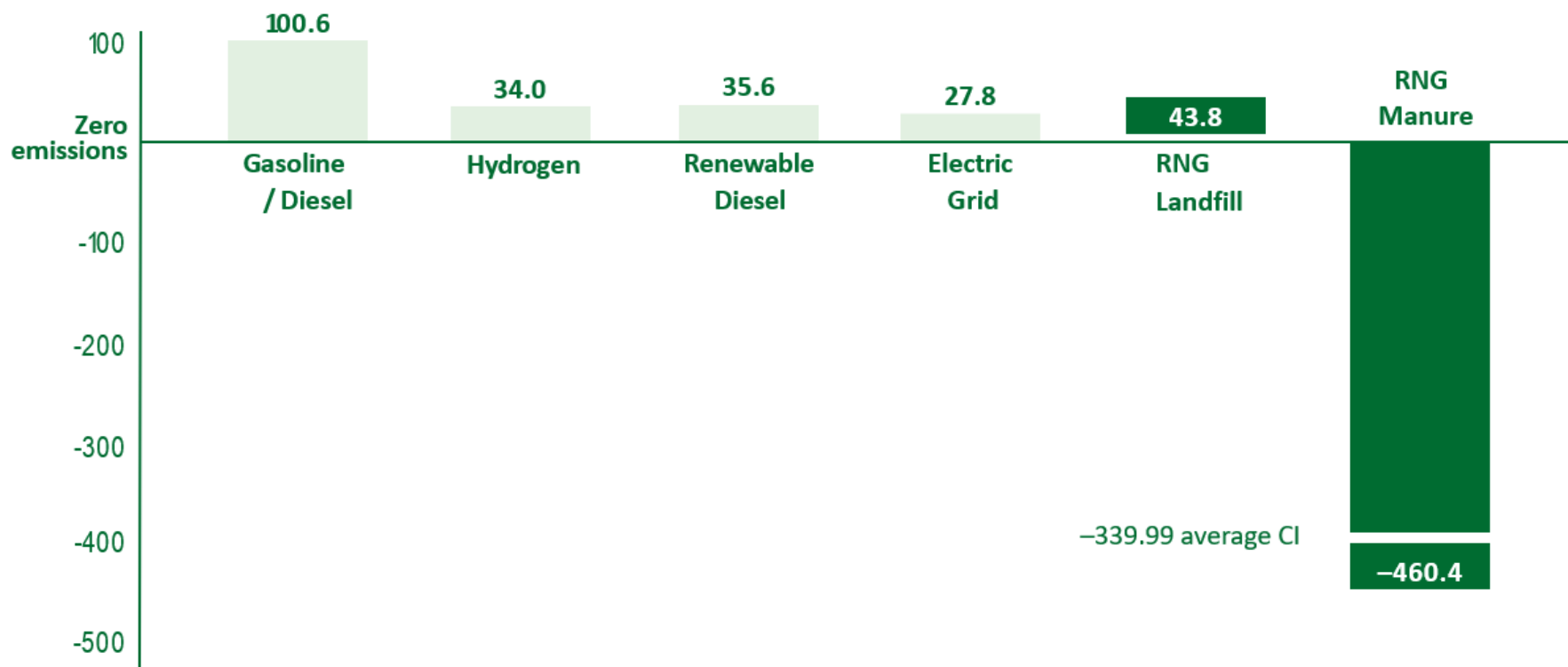
Leading fuel providers in Natural Gas Infrastructure (public & private)





• The RNG Advantage: Carbon Intensity

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.



Renewable Diesel

- Why Renewable Diesel ?



Hydrotreated vegetable oil (HVO), also known as renewable diesel, is a drop-in replacement for diesel. Its use is only constrained by its availability, which is currently fairly limited. According to the U.S. Department of Energy, there are sixteen plants producing renewable diesel in 2024, with a combined capacity of 2,856 million gallons per year. Although it may seem like a lot, it is just a drop compared to the overall diesel use—about 122 million gallons per day in the United States alone.

Renewable diesel offers many benefits, including:

Engine and infrastructure compatibility — It meets the conventional petroleum ASTM D975 specification allowing it to be used in existing infrastructure and diesel engines.

Fewer emissions — It reduced both carbon dioxide and nitrogen oxide emissions when compared with petroleum diesel. California's LCFS Certified Carbon Intensities shows it reduces carbon intensity on average by 65% when compared with petroleum diesel.

More flexibility — It is a replacement for diesel and can be used to fully replace diesel or blended with any amount. Renewable diesel can be made from multiple feedstocks, and it can be made at plants that also produce sustainable aviation fuel.

Renewable Diesel

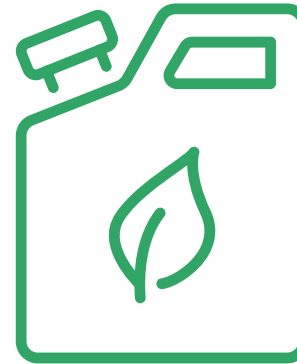
- HVO Vs. Biodiesel (Fame): Different Processes, Better Stability



While both HVO and biodiesel are low carbon fuels and can be made from the same renewable sources as vegetable oils or fats, **the production process makes a big difference.**

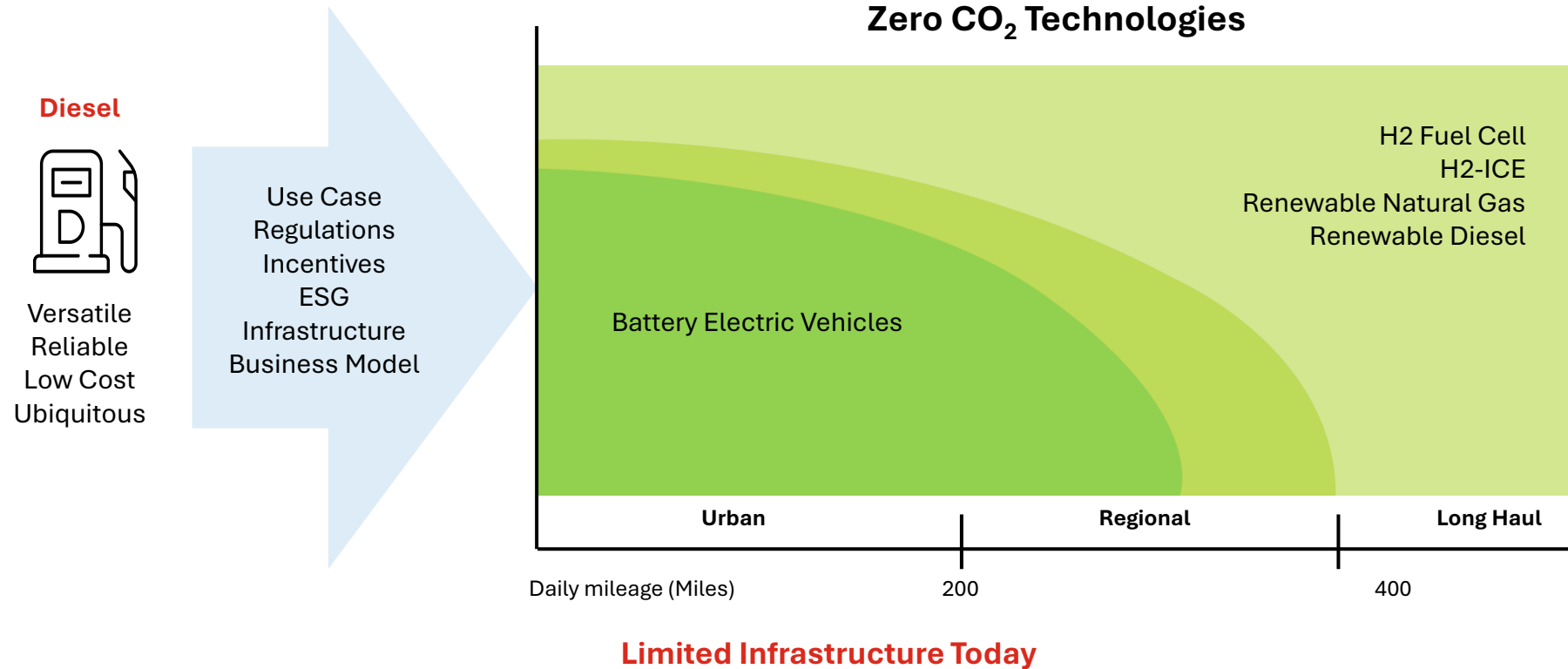


Biodiesel uses a transesterification process, which **leaves oxygenated groups in the fuel**. These oxygen groups can **affect stability** and potentially lead to issues like bacterial growth.



HVO, on the other hand, is produced through a hydrotreated process that **removes these oxygenated groups**. This results in a **more stable fuel with improved oxidation resistance**. This makes HVO a better choice for long-term storage and applications where fuel quality and stability are crucial.

- Market Drivers: How Far Can You Go?



- Get it done with smaller engines ? !

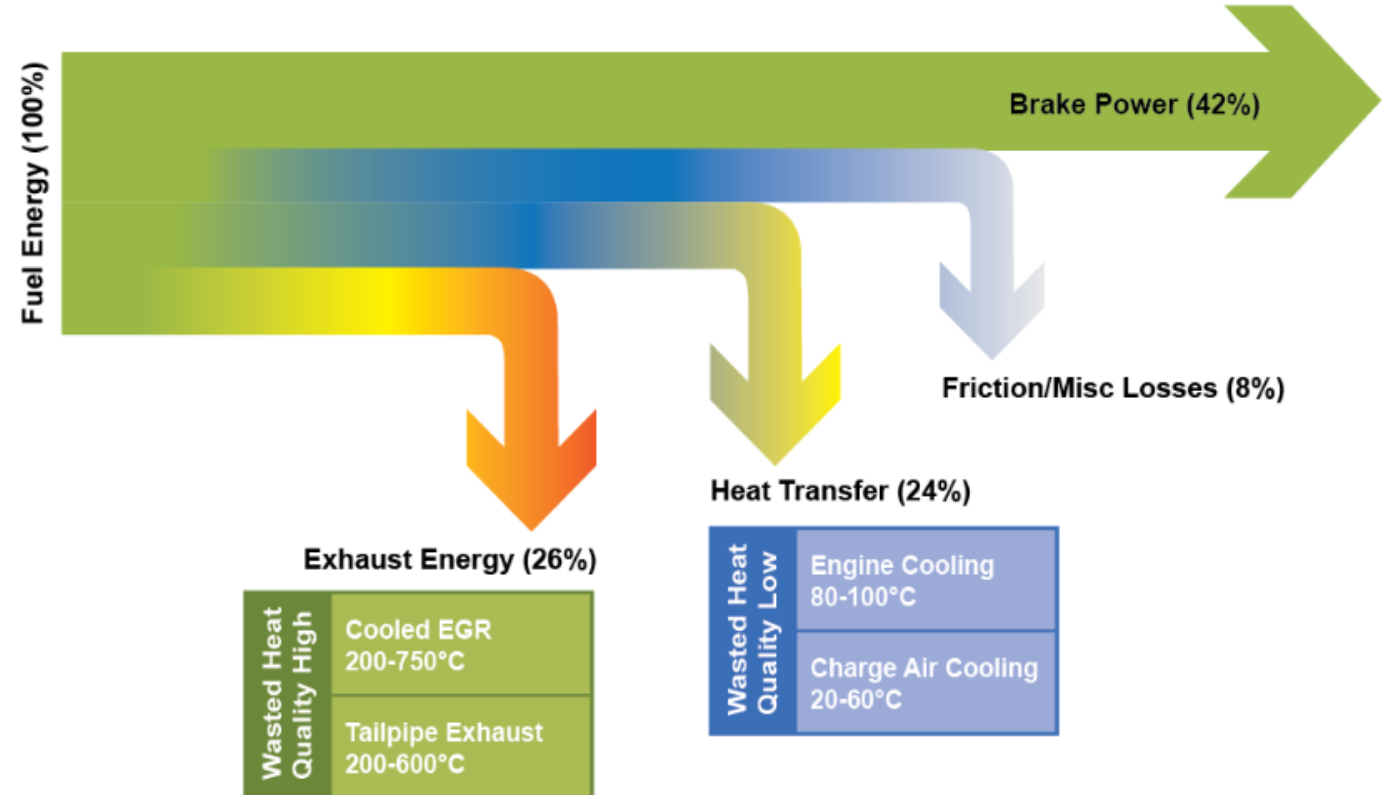
Key ICE Characteristics:

$$\text{BMEP} = 2 \times \text{Torque} / V_{\text{dis}}$$

- Higher BMEP means your engine is doing more work for its volume, but this typically comes at a cost of reliability.
- No replacement for displacement – larger displacement engines generate more torque and power at lower RPMs under lower stress, which translates into durability.

Brake Thermal Efficiency (BTE)

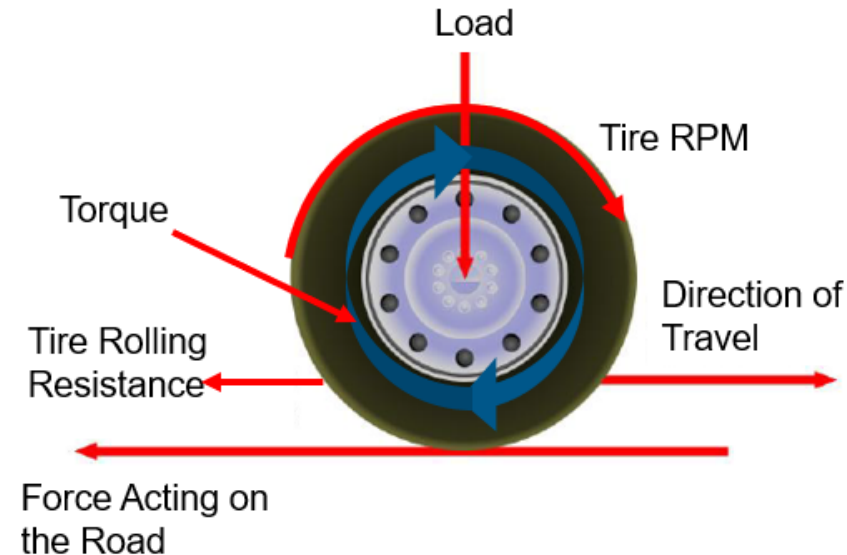
- Is the amount of energy you can extract from the fuel and convert to energy.
- Higher compression ratios generate more torque with a lower amount of fuel.



- Do tires matter ? Big time

Powertrain | Applying Power to the Road

- Power is applied to the road through the tires on the drive axles.
- The tires spin at a certain rotations per minute (RPM) and the torque applied from the axles creates a force on the road.
 - The torque and RPM is created by the engine and changes as it goes through each component of the drivetrain.
- Tire rolling resistance is the losses of energy due to internal friction as the tire deflect/flexes due to the load and motion.
 - Energy spent generating heat in the tires is energy that does not contribute to moving the vehicle.
 - Cooler running tires are more fuel-efficient than tires that run hotter.





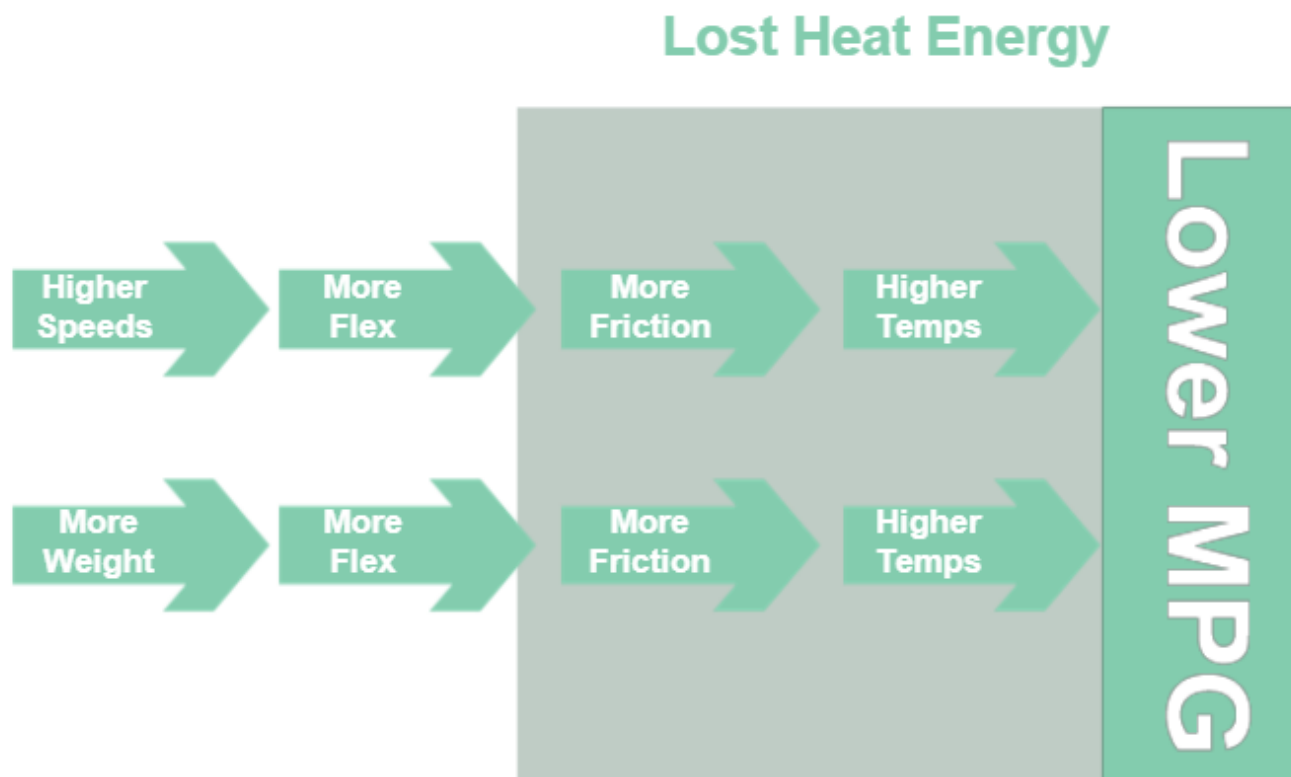
Tire Rolling Resistance: Tire Flex

Tires flex more at higher speeds.

- This leads to more friction, higher tire temperatures and reduced fuel economy.

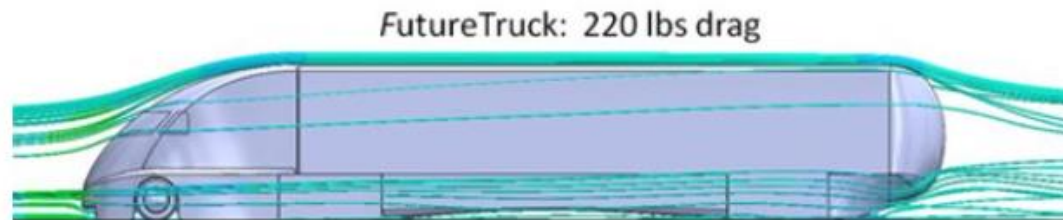
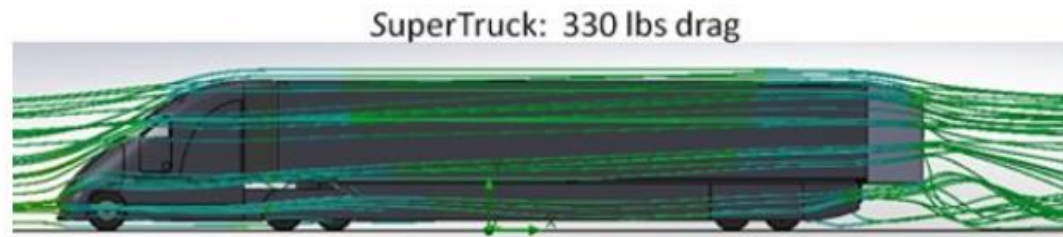
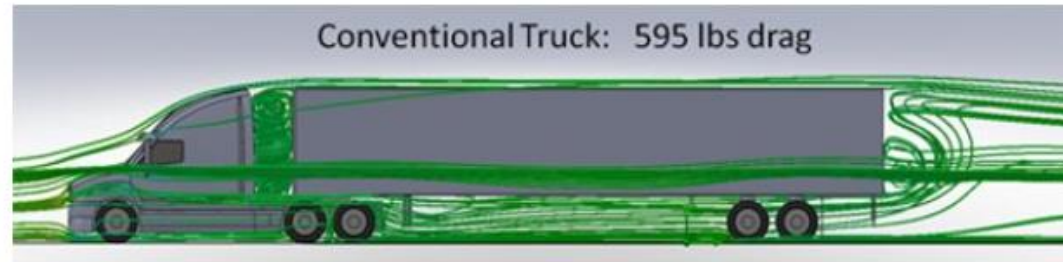
The weight of the vehicle also affects rolling resistance.

- As weight goes up, so does flexing of the tires, resulting in more energy lost as heat instead of power to the road.
- Reducing weight of components can result in either better fuel economy, or increased payload for same amount of fuel consumed.



Aerodynamic Efficiency

While today's aerodynamic packages can improve fuel economy, further improvements are being developed.





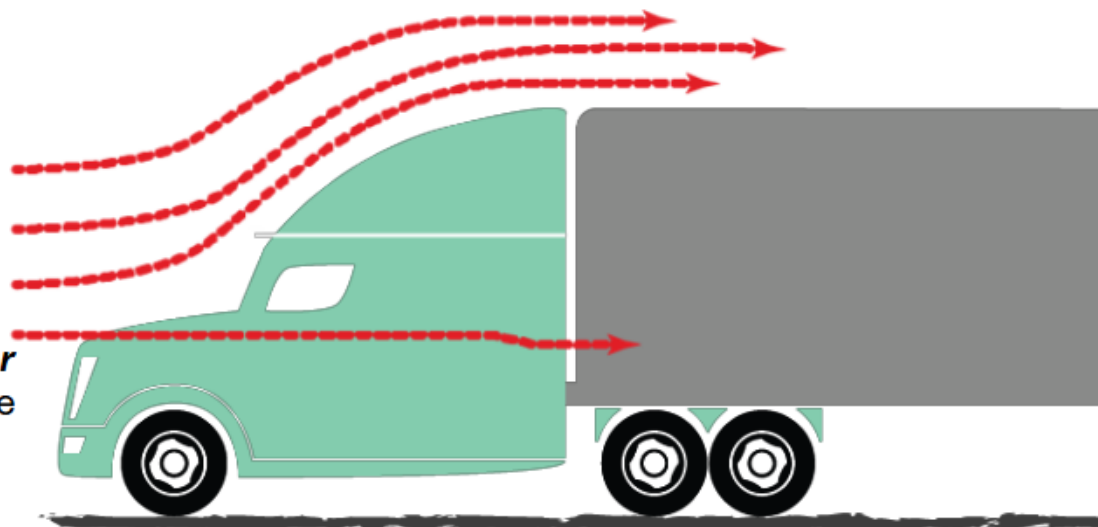
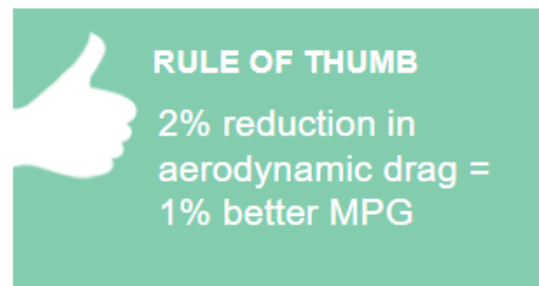
Aerodynamic Drag: What is it?

Aerodynamic drag is the result of forces acting on a vehicle as it passes through the air.

The amount of force acting on a vehicle depends on its:

- Speed
- Frontal area
- External shape

It's the most **significant contributor** to vehicle power requirements above the speed of 50 miles per hour.



Aerodynamic Drag: Features

Not every truck has to be fitted with all of the aerodynamic features available.

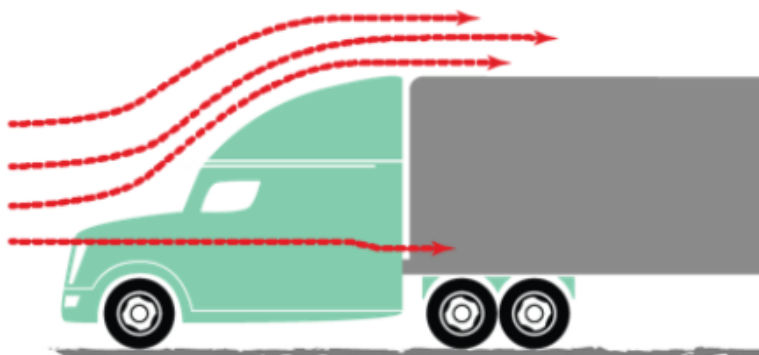
- To improve aerodynamic efficiency, customers can select from these items.
- The effectiveness of a particular item is determined by trailer type and loads hauled, and average vehicle speed.

- | | |
|-----------------------|-----------------------------|
| • Full Roof Deflector | • Aero Mirrors |
| • Fairings | • Side Extenders |
| • Sloped Hood | • Side Skirts |
| • Round Corners | • Under Hood Air Cleaner(s) |
| • Aero Bumper | • Concealed Exhaust System |
| • Air Dam | • Recessed Door Hinges |
| • Aero Headlights | • Grab Handles |
| • Slanted Windshield | |
| • Curved Windshield | |

**Worse
Fuel
Economy**



**Better
Fuel
Economy**



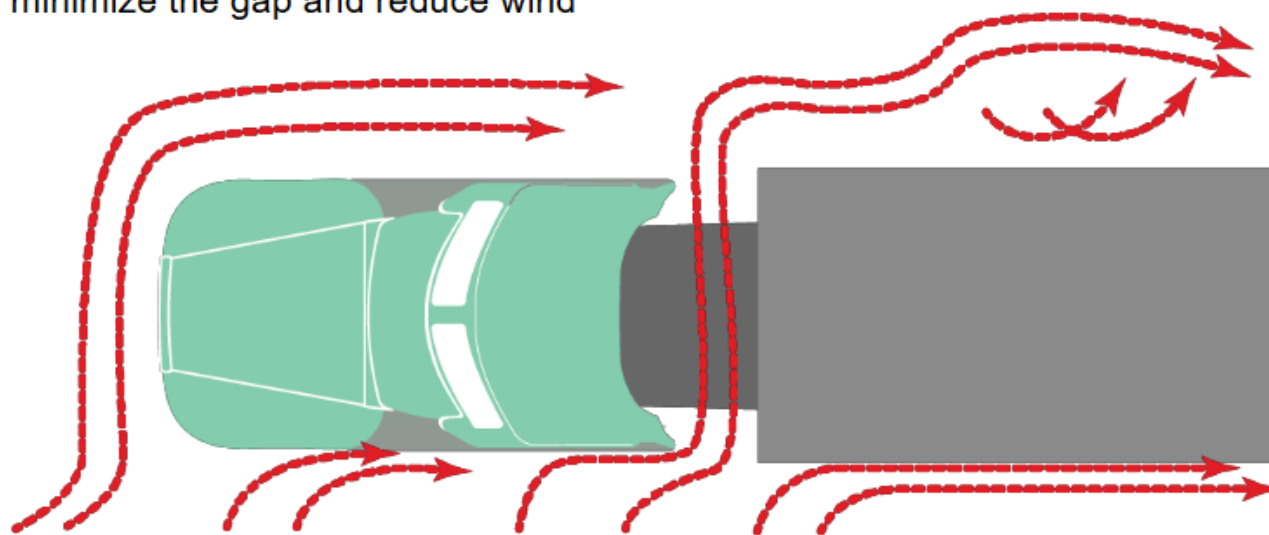
Aerodynamic Drag: Features



The gap between the tractor and trailer is another source of aerodynamic drag.

- To minimize drag from crosswinds and turbulent air, gaps should be minimized or aeroskirts should be used to smooth the airflow.
- If axle weights allow, customers should slide the fifth wheel forward to minimize the gap and reduce wind resistance.

 **RULE OF THUMB**
Every 10" greater than 30" =
2% increase in drag





Aerodynamic Drag: See the Impacts

Aerodynamic aids can have:

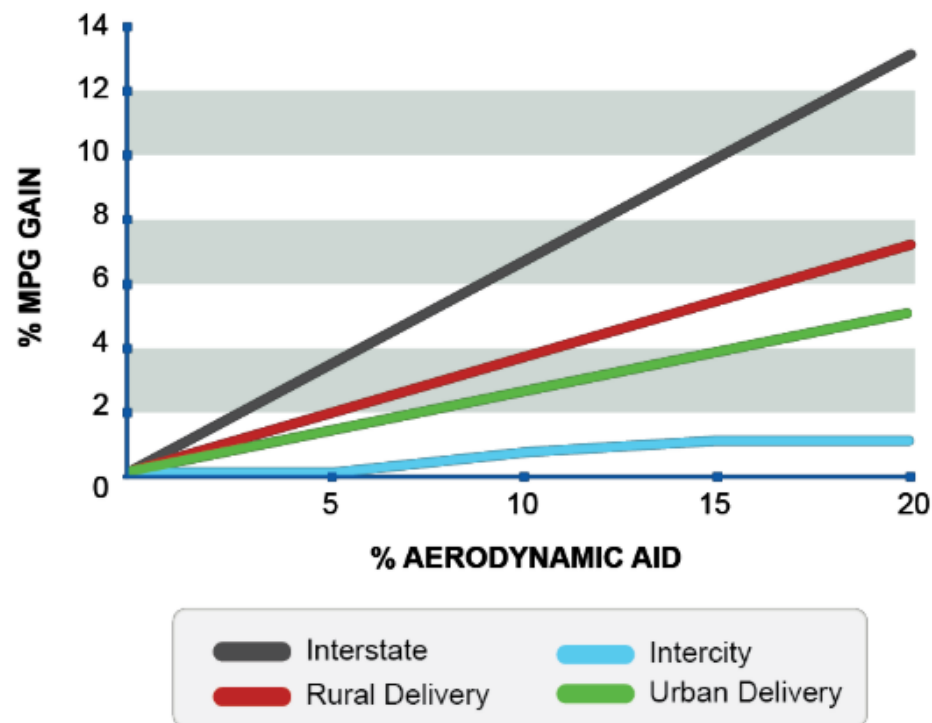
- Major impact on fuel economy on an interstate duty cycle
- Very little impact when on an intercity duty cycle

For trucks in pickup and delivery operation in urban areas:

- Cost and maintenance of aerodynamic treatments may outweigh benefits

For an over-the-road tractor and trailer:

- Fuel savings from aerodynamic treatments may quickly offset the higher initial purchase price of the equipment



1

Spec gearing ratios properly

X15 Engine Family	Linehaul at Target Cruise Speed
X15 Efficiency Series	1050 – 1350 rpm
X15 Productivity Series below 500HP	1150 – 1350 rpm
X15 Performance Series	Not recommended for Fuel Economy

2

Recommended powertrain for fuel efficiency

Cummins X15 Efficiency Series with Endurant HD transmission offers access to full ADEPT/EX rating features suite

3

Spec advanced aerodynamics

An aerodynamic truck-and-trailer configuration versus a non-aerodynamic configuration can result in a fuel economy improvement of approximately 13%.

1

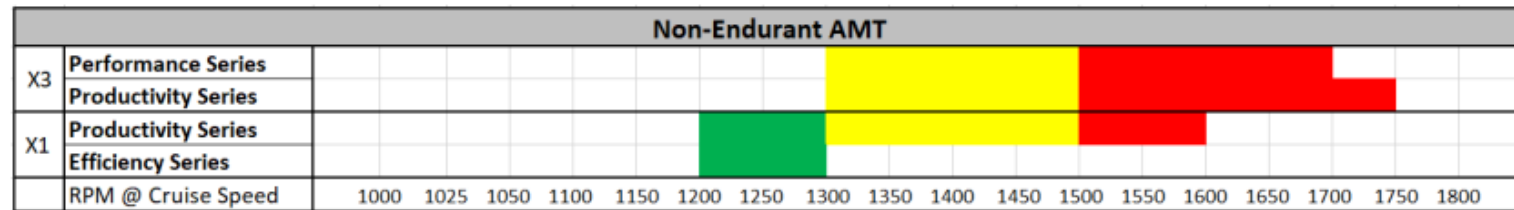
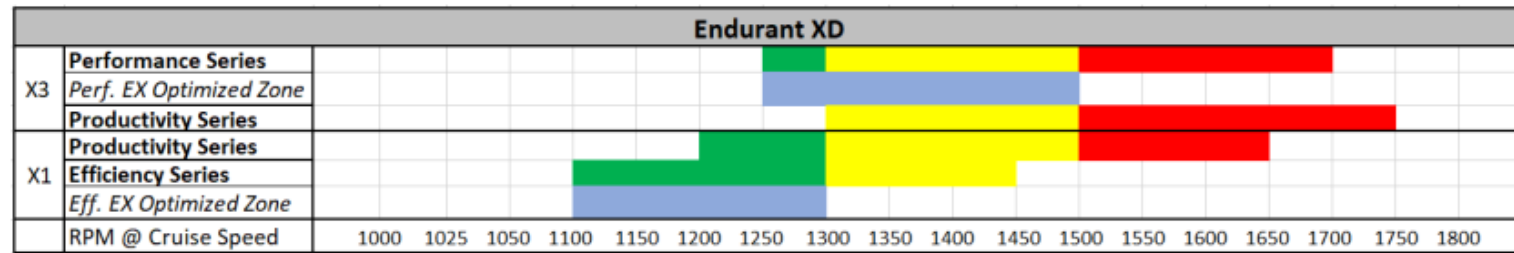
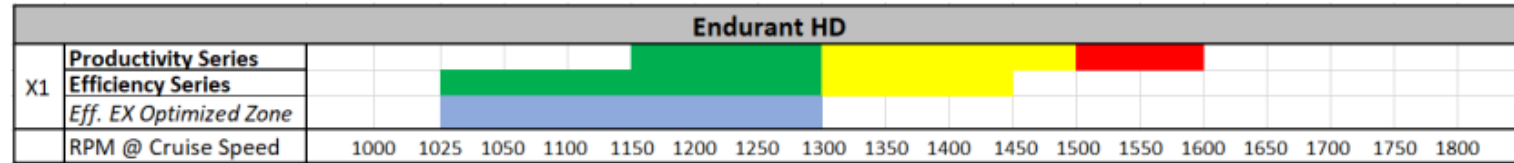
Powertrain | Key Calculations when Spec'ing a Powertrain

- Engine RPM at Cruise Speed
 - Recommended range of engine speed by intended operation that is calculated from your intended vehicle cruise speed and gearing hardware selections.
 - $\text{RPM} = \text{Cruise Speed (mph)} \times \text{Top Gear Ratio} \times \text{RAR} \times \text{Tire Size (rev/mile)} / 60$
- Start ability
 - The maximum road grade (in %) the vehicle is capable to start in (or launch) and maintain forward motion without throttle pedal.
- Gradeability at Cruise Speed
 - The maximum road grade (in %) the vehicle can ascend while maintaining intended vehicle speed in top gear at 100 % throttle pedal.
- Gradeability at Peak Torque
 - The maximum road grade (in %) the vehicle can ascend while operating at 100 % throttle in top gear at peak torque RPM.



Cummins X15 Gearing Recommendation

Fuel Economy Balanced Performance



1000 1100 1200 1300 1400 1500 1600 1700 1800

4

Lower drive speeds

At interstate speeds, each 1.0 mph (1.6 kph) increase = 0.1 mpg (0.04 km/L) loss. For example, driving at 65 mph instead of 75 mph can save 1 mpg (0.43 km/L).

5

Run in top gear more than 90% of the time

Every 10% drop of time in top gear = 0.5% mpg (0.22 km/L) loss.

6

Decrease idle rpm and idling time

Using the lowest idle speed possible helps reduce fuel use by up to 0.5 gal/hr (1.89 L/hr). Every hour of idle time that you eliminate can raise your vehicle's fuel economy by as much as 1%.

7

Follow proper driving habits

Sudden braking, rapid acceleration, downshifting too early and other poor driving habits can negatively impact fuel economy by as much as 30%. Following proper driving techniques is critical to maximizing fuel economy.

8

Enable ADEPT

The ADEPT(Advanced Dynamic Efficient Powertrain Technology) suite of advanced electronic features provides vehicle controls to help drivers operate vehicles in a fuel-efficient manner while maintaining the desired level of productivity and performance.

Load Based Torque Control (Smart Torque 2)

Load Based Torque Control Feature is designed to provide the engine torque required to maintain the vehicle operating conditions without allowing the driver to access torque above what is required.

SmartCoast

The SmartCoast feature works in conjunction with an Eaton AMT to disengage the driveline and preserve vehicle momentum. SmartCoast operation can significantly improve fuel economy in rolling hills condition.

Predicted Cruise Control

Predictive Cruise Control dynamically adjusts the vehicle speed profile while the vehicle is operating in cruise control. The vehicle speed profile is optimized for fuel economy based on the upcoming road grade.

Predicted Gear Shifting

Predictive Gear Shifting is a performance feature that works with Eaton Endurant transmissions that improves vehicle speed tracking by actively selecting optimum gear and advancing shift times during Cruise Control.

Predicted Road Speed Governor

Predictive Road Speed Governor dynamically adjusts the road speed governor when cruise control is inactive. The road speed governor is continuously optimized for fuel economy based on the current and upcoming road grade.

Hill Roll Out

Hill Roll Out allows early disengagement of engine brakes and a temporary vehicle speed increase based on upcoming terrain.

Dynamic Power

Evolution of Smart Torque 2 utilizing look ahead data, grade, mass, and speed calculations to provided maximum fuel economy in rolling hills.

Road Speed Governor (RSG) And Cruise Control

Setting a lower road speed limit improves fuel economy. Using cruise control to maintain a desired road speed (eliminating throttle input variance) also improves fuel economy. RSG can be set independently to encourage cruise-control use.

Idle Speed Control.

Lower rpm settings reduce fuel use in all idling situations. Use the lowest idle speed possible.

9

Adjust for seasonal variations

Seasonal fluctuations from winter to summer can account for a gain of 8% to 12% in fuel economy. A comparable decrease happens when going from hot weather back to colder temperatures.

Ambient Temperature

For every 10° F drop in temperature, aerodynamic drag increases by 2%. Thus, fuel efficiency will drop by 1%. Overall, fuel economy tends to be higher in the summer than the winter.

Tire inflation tends to fall when the temperature drops. Running tires low on air pressure in hot weather is more of a safety issue than a fuel economy problem. When seasons change and temperatures fluctuate, increase the frequency of inflation pressure checks.

Wind

Headwinds and crosswinds can significantly increase aerodynamic drag and reduce fuel efficiency. For every 10 mph of headwind or crosswind, mpg is reduced by nearly 13%. You cannot cheat increasing wind resistance.

Rain and Snow

Precipitation such as rain or snow increases rolling resistance because the tires must push their way through the water, slush or snow on the pavement. Also, water is a more effective coolant than air, so the tires, transmission lubricant and axle lubricant operate at cooler (less efficient) temperatures. Rolling resistance and drivetrain friction in light rain increase fuel consumption by 0.2 to 0.3 mpg, per SAE testing.

10

Tires and maintenance are critical

Tire tread and casing design can account for 12% difference in fuel economy. Proper chassis alignment and tire inflation are critical to getting better fuel economy.

EPA Greenhouse Gas Emission Phase 2

The latest EPA GHG emission and fuel efficiency regulation recognizes and sets fuel efficiency guidelines for the following vehicle technologies.

Engine Improvement	Aerodynamics	Tire Rolling Resistance
Automated & Automatic Transmission	Efficient Driveline & Downspeeding	Vehicle Speed Limiter
Weight Reduction	Idle reduction	Smart Accessories



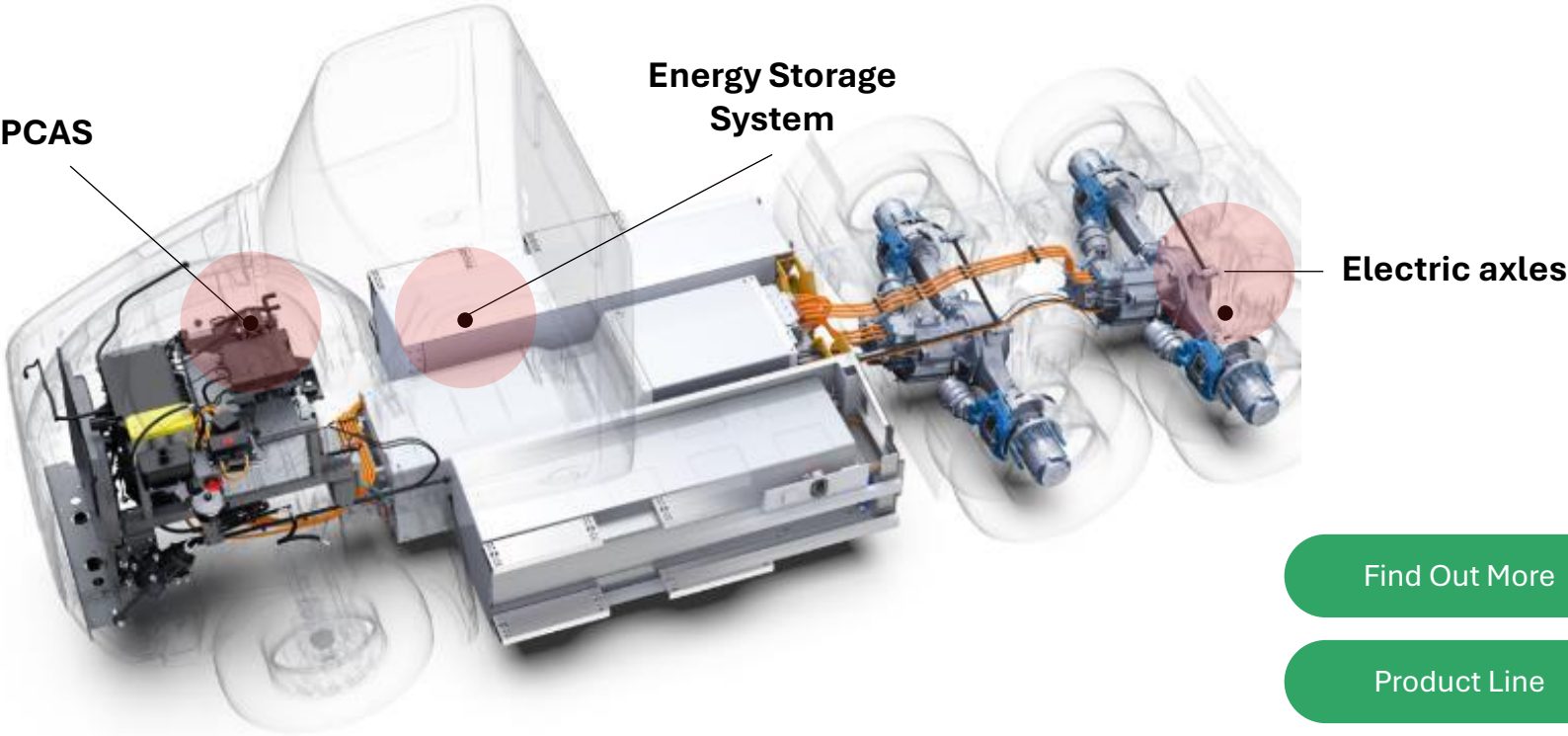
Cummins Electrified Power

- Electrified Energy Solutions

ePowertrain – Zero Emission

Integrating carbon-free solutions through ePowertrain and fuel cell technology to accelerate the shift to clean transportation and mobility.

- Power Agnostic
- Optimization & Scalability
- Shared Power Electronics



Find Out More

Product Line



Five Operating Segments

Cummins has a long track record of delivering leading power solutions. As we look ahead, we know our industries and regions will continue to change, and we are committed to bringing our customers the right technology at the right time.



Engines



Power Systems



Components



Distribution



Accelerator™ by Cummins

Click on the images to read the section

Powertrain | Gross Combined Weight

- Gross Combined Weight (GCW) or Gross Combined Vehicle Weight (GCVW)
 - Intended weight of the vehicle including tractor, trailers, and the weight of the freight being transported.
 - This plays a critical role in creating powertrain specs.
- This is different from the GCWR and GVWR
 - GCWR – Gross Combine Weight Rating – maximum allowable weight that the combination vehicle can haul. This includes the tractor, trailer, freight, and all other fluids and personal/equipment.
 - GVWR – Gross Vehicle Weight Rating – maximum allowable weight of the vehicle (i.e. truck tractor) but does not include any towed trailers.
- A truck may not haul its rated weight due to application/market needs. Many fleets haul well below the provincial/federal weight limits/regulations and the GCWR/GVWR as set by the OEM.



Aerodynamic Drag: Calculating the Cost

The cost of excessive aerodynamic drag can be significant for fleets operating over-the-road trucks.

- By using various aerodynamic treatments, fuel costs can be reduced by more than enough to justify initial cost and added weight.
- At 65 mph, aerodynamic treatments can reduce the horsepower required to move the truck by at least 30 horsepower.

Fuel Savings: Pounds per Hour	Fuel Savings: Gallons per Hour	Fuel Savings: Gallons per Day
$0.3 \times 32 = 9.6 \text{ lbs/hr}$	$9.6 \div 7.1 = 1.35 \text{ gallons/hr}$	$1.35 \times 10 = 13.5 \text{ gallons/day}$
Let's start by taking an average fuel consumption of 0.3 pound per brake horsepower-hour. If we assume there's a reduction of 32 brake horsepower required to cruise at 65 mph, a truck will save about 9.6 pounds of fuel every hour of operation.	Since diesel fuel weighs about 7.1 pounds per gallon, this amounts to a savings of 1.35 gallons of fuel saved per hour.	For a truck running 10 hours per day, that's 13.5 gallons of fuel saved per day. That's a substantial savings for a fleet, especially when multiplied across many units.





Fleet Emissions Data Management Considerations

A Practical Framework for Fleet Managers and
Operations Leaders

TRCCOMPANIES.COM



Member of **WSP**

TRC Clean Transportation Solutions



Clean Fleet Strategy

Achieve economic and environmental sustainability goals for public and private fleets



Creative & Events

Build brand awareness, influence key decisionmakers, and increase project success and market share



Funding & Incentives

Maximize the financial benefits of advanced vehicles and clean fuels



Policy & Regulatory Support

Navigate regulatory and legislative initiatives that impact the commercial transportation sector and progress towards sustainability



Market Analysis & Development

Assess the market landscape for clean transportation and energy products and services



Sustainability Strategy

Establish a comprehensive sustainability strategy to future-proof your operations and deliver benefits across your value chain

Agenda

WHAT WE WILL COVER TODAY

- Setting the Stage and Defining Your Goals
- Internal Data Collection and Analysis
- External Data Disclosures



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Setting the Stage and Defining Your Goals

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Understanding Your Goals



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EXTERNAL DRIVERS VS. INTERNAL MOTIVATORS

External Drivers

- **Compliance-Driven Goals:** Meeting regulatory deadlines, avoiding penalties, and maintaining operating permits
- **Air Quality Requirements:** Achieving emissions reductions in nonattainment areas and meeting fleet reporting obligations
- **Procurement Mandates:** Government contracts requiring zero-emission percentages or sustainability scoring

Internal Motivators

- **Organizational Commitments:** Political commitments/goals, net-zero pledges, science-based targets, and ESG disclosures to stakeholders
- **Operational Drivers:** Reducing fuel costs, improving fleet reliability, and modernizing aging assets
- **Brand and Talent:** Attracting customers and employees who value sustainability leadership

Common Sources of Mandates and Commitments

- **Federal:** EPA emissions standards, Inflation Reduction Act incentives, FHWA sustainability directives
- **State:** Zero-emission vehicle mandates (e.g., ACF rules), air quality attainment plans, low-carbon fuel standards
- **Local:** Municipal fleet electrification ordinances, clean air zones, building electrification codes
- **Internal:** Corporate net-zero pledges, ESG reporting commitments, board-level sustainability directives

Translating Goals into Target Metrics



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FROM ASPIRATION TO MEASURABLE TARGETS

Examples of potential targets

- **Deployment Targets:** Percentage of zero-emission or low-emission vehicles by year (e.g., 30% ZEV by 2028)
- **Emissions Reduction:** Greenhouse gas reduction targets in metric tons CO₂e, measured against a baseline year
- **Financial Benchmarks:** Total cost of ownership parity timelines, fuel cost savings targets, capital investment ceilings
- **Operational Reliability:** Uptime thresholds, range, and maintenance schedules
- **Infrastructure Readiness:** Number of fueling or charging sites deployed, utilization rates

Understanding Data to Support Goals and Metrics



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EXTERNAL REPORTS VS. INTERNAL PLANNING

Internal Analysis

- **Technical Feasibility**
- **Infrastructure/Energy Needs**
- **Total Cost of Ownership**

External Disclosures

▪ **Compliance**

- Inventory – vehicles and facilities
- Fuel Use
- Energy Use
- Contracting Agreements (Motor Carrier, Brokerage)
- Procurement and Delivery Documentation (Vehicles, Equipment)
- Procurement and Use Documentation (Fuel and Energy)
- Retirement/Sale Documentation
- Permits
- Utility Agreements
- Emissions Certifications
- Reporting Certifications

▪ **Incentives**

- Business/Organization Documents
- Vehicle Registration, Title Insurance
- Emissions
- Energy/Fuel Use
- Quotes

Stakeholder Engagement



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IDENTIFYING KEY PARTNERS AND DATA SOURCES



Fleet Management

Key resource for vehicle inventories, purchase and maintenance costs, equipment specs, and operational data.



End Users

Involve drivers and departments to understand how equipment is used and what features are required vs. optional.



Leadership

Secure executive champions for top-down collaboration across departments and clarity on priorities.



Facilities

Critical partner for technologies involving new fueling and charging infrastructure.



Procurement

New technologies require new procurement strategies, onboarding vendors, and alternative delivery methods.



Legal

Charging-as-a-service, renewable fuel credits, pilots, and demonstrations require new contract T&Cs.

Internal Data Analysis

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Technology Fit and Planning



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DATA FOR TECHNOLOGY FEASIBILITY ASSESSMENTS



Understand the Daily Mission

- What work needs to be done?
- When is that work happening?
- What equipment is needed to complete that work?
- What are the daily, weekly, and seasonal peaks?
- Where do vehicles park and for how long?



Identify Data Sources

- Telematics
- Fuel management system records
- Maintenance records
- Driver surveys
- Dispatch logs



Conduct Analysis

Conduct duty cycle analyses to determine:

- Vehicle energy consumption
- Range
- Performance
- Refueling requirements

What a Duty Cycle Assessment Involves



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BUILDING THE DATA FOUNDATION FOR FLEET TECHNOLOGY TRANSITION ANALYSIS

- **Daily Mileage and Range:** Track actual daily distances driven for each vehicle to determine if alternative technologies can meet range needs
- **Dwell Time and Scheduling:** Identify where and how long vehicles sit idle to determine fueling and charging windows
- **Route Patterns:** Analyze fixed vs. variable routes, highway vs. urban driving, terrain, and seasonal variations
- **Payload and Towing:** Document weight requirements and towing demands that impact alternative fuel vehicle performance
- **Ambient Conditions:** Consider climate impacts on battery range, fuel efficiency, and HVAC loads

Don't overanalyze if it is clear that the duty cycles are well within the candidate technology's capabilities. Instead, focus on understanding energy demands and dwell times/locations.

Segmenting Your Fleet into Transition Tiers

A READINESS SCORING FRAMEWORK



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Tier 1: Ready Now

Low daily mileage, long dwell times, depot-based operations, predictable routes, commercially available alternatives



Tier 2: Near-Term

Moderate range needs, some infrastructure investment required, technology maturing within 1-3 years



Tier 3: Wait and Watch

High daily mileage, demanding duty cycles, limited alternatives today, or prohibitive infrastructure costs

Data Sources

Telematics, fuel card records, dispatch logs, driver surveys, and maintenance records

Natural Replacement

Align with planned replacement schedules where possible. Avoid early retirements to minimize cost.

Output

A prioritized vehicle group list ranked by transition readiness — the backbone of your phased rollout plan

Infrastructure Assessment Essentials



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EVALUATING YOUR FACILITIES FOR TECHNOLOGY TRANSITION READINESS

- **Electrical Capacity:** Audit existing service panels, transformer ratings, and utility interconnection limits
- **Space and Layout:** Assess available area for equipment, vehicle turning radii, ADA compliance, and future expansion
- **Permitting and Codes:** Identify local building codes, fire safety requirements, environmental reviews, and utility coordination timelines
- **Utility Coordination:** Engage your utility early to discuss rate structures, demand charges, service upgrades, and incentive programs
- **Safety and Compliance:** Plan for hazmat storage, ventilation requirements, emergency shutoffs, and first responder training

Total Cost of Ownership Across Emission Pathways



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DATA TO COMPARE TECHNOLOGIES ON A LEVEL PLAYING FIELD

Total Cost of Ownership (TCO) is a valuable tool for comparing costs across technologies.

- **Acquisition Cost:** Purchase price or lease cost, including upfitting, ancillary equipment, and delivery
- **Fuel and Energy:** Per-mile fuel or energy cost, accounting for efficiency differences, rate structures, and price volatility
- **Maintenance:** Scheduled and unscheduled maintenance costs; BEVs have lower brake and drivetrain wear but need battery monitoring
- **Infrastructure Amortization:** Spread charging or fueling infrastructure costs across the vehicles and years they support
- **Residual Value:** Resale and salvage projections; emerging technology resale markets remain uncertain

Utilize Discounted Cash Flow modeling to assess the magnitude and timing of expenditures.

Detailed Cash Flows						
Diesel	Purchase					
Year	2024	2025	2026	2027	2028	2029
Vehicle Purchase Cost	\$ (145,000)	\$ -	\$ -	\$ -	\$ -	\$ -
Federal Excise Tax	\$ (17,400)	\$ -	\$ -	\$ -	\$ -	\$ -
Sales Tax	\$ (12,834)	\$ -	\$ -	\$ -	\$ -	\$ -
Vehicle Maintenance	\$ (4,072)	\$ (4,072)	\$ (4,072)	\$ (4,072)	\$ (4,072)	\$ (4,072)
Insurance (Collision)	\$ (4,764)	\$ (4,271)	\$ (3,778)	\$ (3,286)	\$ (2,793)	\$ (2,300)
Fuel Costs	\$ (14,301)	\$ (14,715)	\$ (15,142)	\$ (15,581)	\$ (16,033)	\$ (16,499)
Infrastructure Access Fee	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Depreciation Tax Benefit						
Vehicle	\$ 4,902	\$ 4,902	\$ 4,902	\$ 4,902	\$ 4,902	\$ 4,902
Incentives						
Upfront Grant	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
IRA Tax Credit	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Clean Truck Fund Rate	\$ (18,144)	\$ (18,144)	\$ (18,144)	\$ (18,144)	\$ (18,144)	\$ (18,144)
CA LCFS Credits	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
OR CFS Credits	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Tires	\$ (927)	\$ (927)	\$ (927)	\$ (927)	\$ (927)	\$ (927)
Vehicle License Fee	\$ (943)	\$ (848)	\$ (754)	\$ (660)	\$ (566)	\$ (471)
Other Operating Costs	\$ (20,362)	\$ (20,362)	\$ (20,362)	\$ (20,362)	\$ (20,362)	\$ (20,362)
Charging Labor Costs	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Residual Value						
Vehicle	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Net Cash Flow	\$ (233,845)	\$ (58,438)	\$ (58,277)	\$ (58,129)	\$ (57,995)	\$ (57,874)
Discounted Cash Flow	\$ (233,845)	\$ (54,109)	\$ (49,963)	\$ (46,145)	\$ (42,628)	\$ (39,388)
CapEx	\$ (175,234)	\$ -	\$ -	\$ -	\$ -	\$ -

External Disclosures

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Incentives Data Preparation

- The level of effort required to submit a grant application can fluctuate based on the requirements of the program and application.
 - **Narrative based applications:** answer key questions presented in the solicitation about the project and applicant.
 - **Document based applications:** fill out fleet sheets, provide quotes, emissions certifications
 - EPA's Clean School Bus (CSB) Program (Grants) required **15-page narrative** while the EPA CSB Program (Rebates) was a lottery that required much **less documentation to apply**.
- Almost all vehicle grant applications require the applicant to submit:
 - Business Documents (W9)
 - Vehicle Registration, Title Insurance
 - Fleet Sheet (documenting existing vehicles, new vehicles to be procured through the grant)
 - Quotes
- Some grants require emissions calculations using baseline and projected lower-emission technologies with standard emission factors and energy use documentation
- Infrastructure grants often require fleet commitments or proof of usage for either publicly or privately accessible infrastructure.

Harder: Competitive

- Narrative
- Community Benefits Plans
- Cost Effectiveness Calculations
- Scoring Criteria

Easier: Rebate, Lottery

- Fleet Sheets
- Quotes
- Vehicle Titles, Insurance, Registration



Clean Transportation Policy Snapshot



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Policy Environment Shifts in 2025 – Present

- Federal emphasis on **fossil fuel production, nuclear energy, critical minerals** mining and resources, and road resilience
- **Pullback on federal funding**, through state funding remains
- Congress **repeal of CARB's EPA waivers** for California rules and ongoing lawsuits over CARB emission standards
- **Rollback** of GHG standards
- **Rollback** of fuel economy requirements
- **Delay** on certain aspects of criteria pollutant standards
- **Public fleet zero-emission rules remain in place**
- **States and regions** considering ISR expansion, Climate Disclosures, Climate Liability, Low Carbon/Clean Fuel Standards, and Vehicle Miles Traveled pilots as local emission reduction tools.

De-regulatory environment federally; certain states and local regions establishing new environmental strategies and incentives.

CARB SB 253 GHG Disclosure Overview



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US-based entities doing business in California with more than \$1 billion in annual revenue to publicly disclose their greenhouse gas (GHG) emissions

Scope 1 and 2 beginning with the 2026 reporting cycle (**November 10, 2026**). No 3rd Party Verification required for 2026 reporting

Scope 1, 2, and 3 beginning with the 2027 cycle

- **Scope 1 and 2:** Limited Assurance (*including biogenic CO₂*)
- **Scope 3: Phase in with 5 of 15 Scope 3 Categories**
 - Purchased Goods and Services (Category 1)
 - Fuel- and Energy-Related Activities (Category 3)
 - Waste Generated During Operations (Category 5)
 - Business Travel (Category 6)
 - Employee Commuting (Category 7)

Proposed General Reporting Requirements (Scope 1, 2, and 3)

- Disclose the quantification methods and measurement approaches used for the calculation of emissions
- Assess and disclose measurement uncertainty, using a qualitative explanation where a quantitative estimate isn't feasible or would be unreasonably burdensome
- Identify and document any missing data and any substitute sources or estimation methods used to fill those gaps
- **Report biogenic CO₂ emissions separately from Scope 1, 2, and 3 totals (i.e. renewable fuels)**
- Separately disclose any voluntary emissions reductions or removals (e.g., carbon credits or land-management sequestration), rather than netting them against reported totals
- Justify and disclose the basis for any data exclusions, including an estimate of the excluded emissions where quantifiable
- Disclose material changes in methodology from year-to-year and recalculate prior-year data if cumulative structural or methodological changes exceed 5% of base-year emissions

Key Takeaways

WHAT TO REMEMBER FROM TODAY

- Start with clearly defined goals; everything else flows from what you are trying to achieve and why
- Use duty cycle data to prioritize which vehicles and routes are best suited to technology and emission reduction efforts
- Infrastructure planning should be as technology-agnostic as allowed for by your policies until your goals and data point to specific pathways
- Build a TCO-based cost assessment with multiple scenarios and phased deployment milestones
- Collect and set up data programs that match your internal and external needs; involve all stakeholders early
- Monitor for changing regulatory needs and incentive opportunities, with data management aligned to internal resources and potential external needs.



Thanks!



Call Us:

Rebecca Schenker
310-721-3548



Email Us:

rschenker@TRCcompanies.com



Visit Us:

TRCcompanies.com

TRCCOMPANIES.COM



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Contact Us



Trey Pope

Air Quality Planner

tpope@nctcog.org | 817-695-9297



Jason Brown

Program Manager

jbrown@nctcog.org | 817-704-2514

