

# X15N™

# ISX12N™

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Cummins Inc.

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Public



# NATURAL GAS VALUE DRIVERS



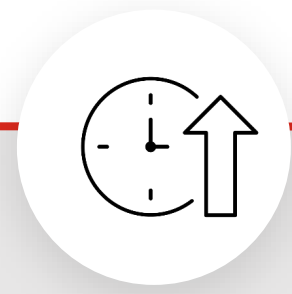
## Environmental & Sustainability Benefits

- Lower GHG and NOx levels at the tailpipe
- Potential to reach sub-zero wheel to wheel emissions with Renewable Natural Gas (RNG)
- Start reducing total transportation footprint today



## Economic Benefits

- Low cost of fuel
- Can provide competitive advantage to help you win business
- Much lower incremental vehicle cost than BEV / Fuel Cell



## Operational Benefits

- Least disruptive and most mature alternative fuel technology (for all applications and routes)
- Only alternative fuel that can supply required range and power for long-haul/heavy-duty vehicles
- Suitable for multishift operation
- Optimized powertrain and fuel system
- High level of parts commonality with diesel



# Cummins Natural Gas Engines

**B6.7N™**



**EPA only 2024**

**L9N™**



**EPA & CARB24**

**ISX12N™**



**EPA only 2024**

**X15N™**



**EPA & CARB24**

**NOW!**



*The Future of Natural Gas Power IS NOW*

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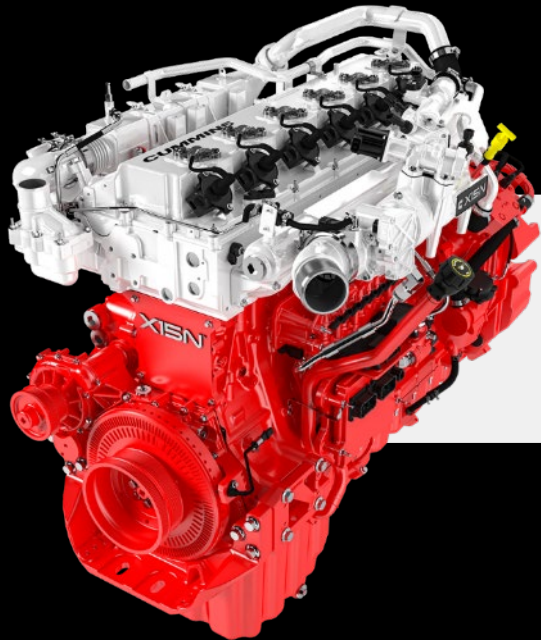


# HELM™

HIGHER EFFICIENCY. LOWER EMISSIONS. MULTIPLE FUELS.

## UNIFIED GLOBAL PLATFORM: X15 SERIES

Reliable | Durable | Scale | Common



Natural Gas



Advanced Diesel



Hydrogen





# ISX12N Applications: Foundation of the HD Market



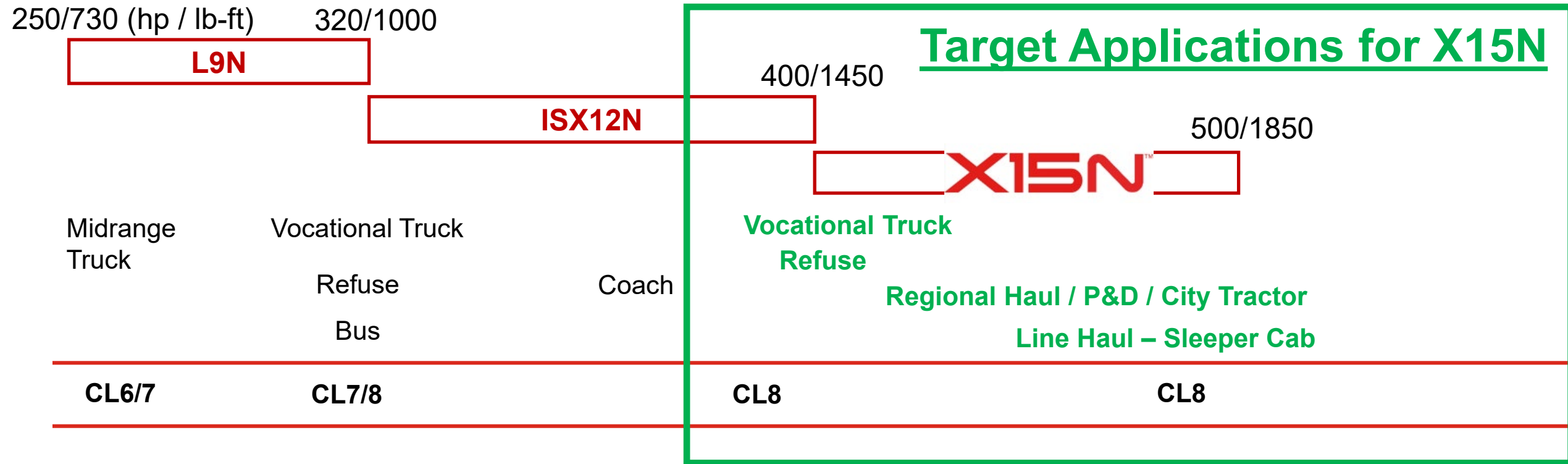
10+ years  
Over 27K Vehicles



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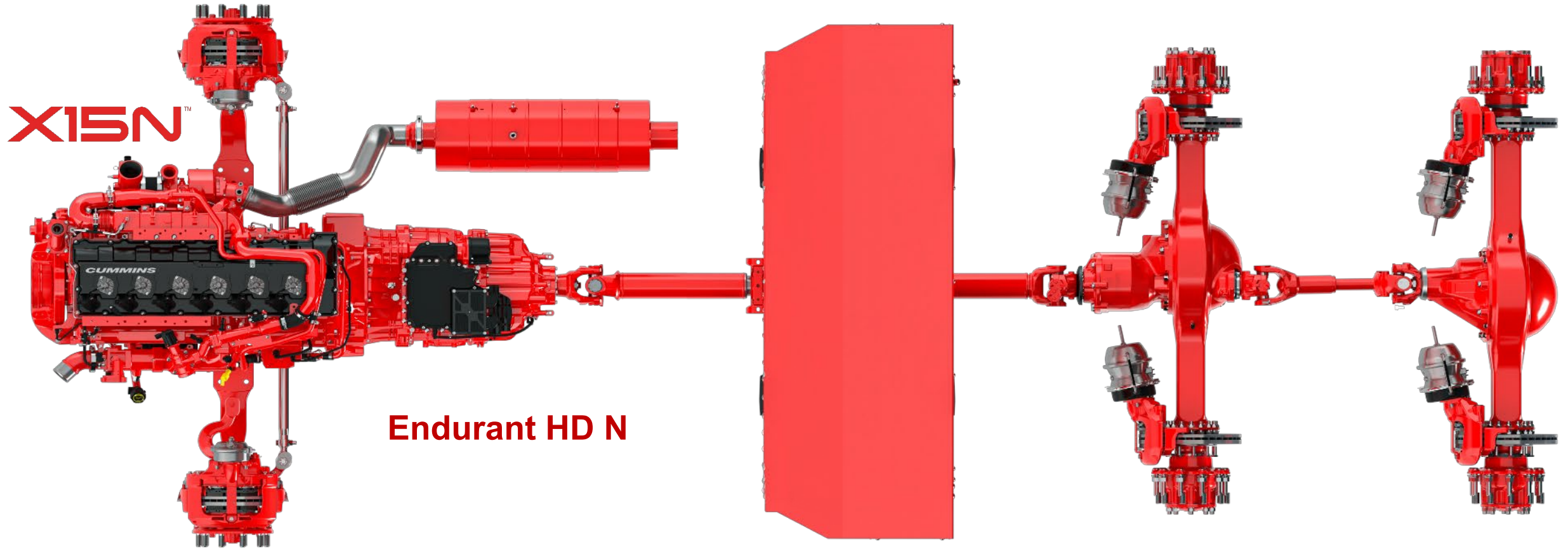
# Natural Gas Applications

## The Natural Gas Power Landscape





# Cummins Integrated Powertrain



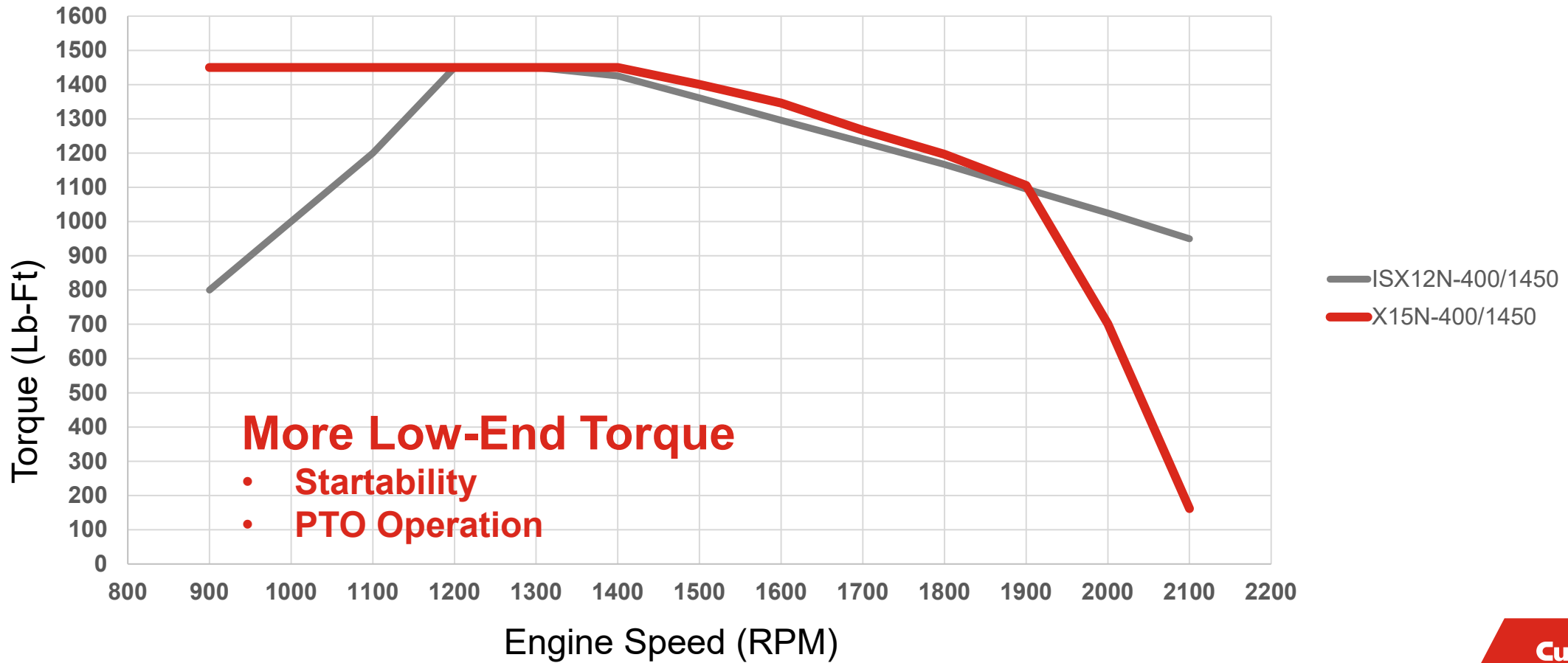
X15N™

Endurant HD N

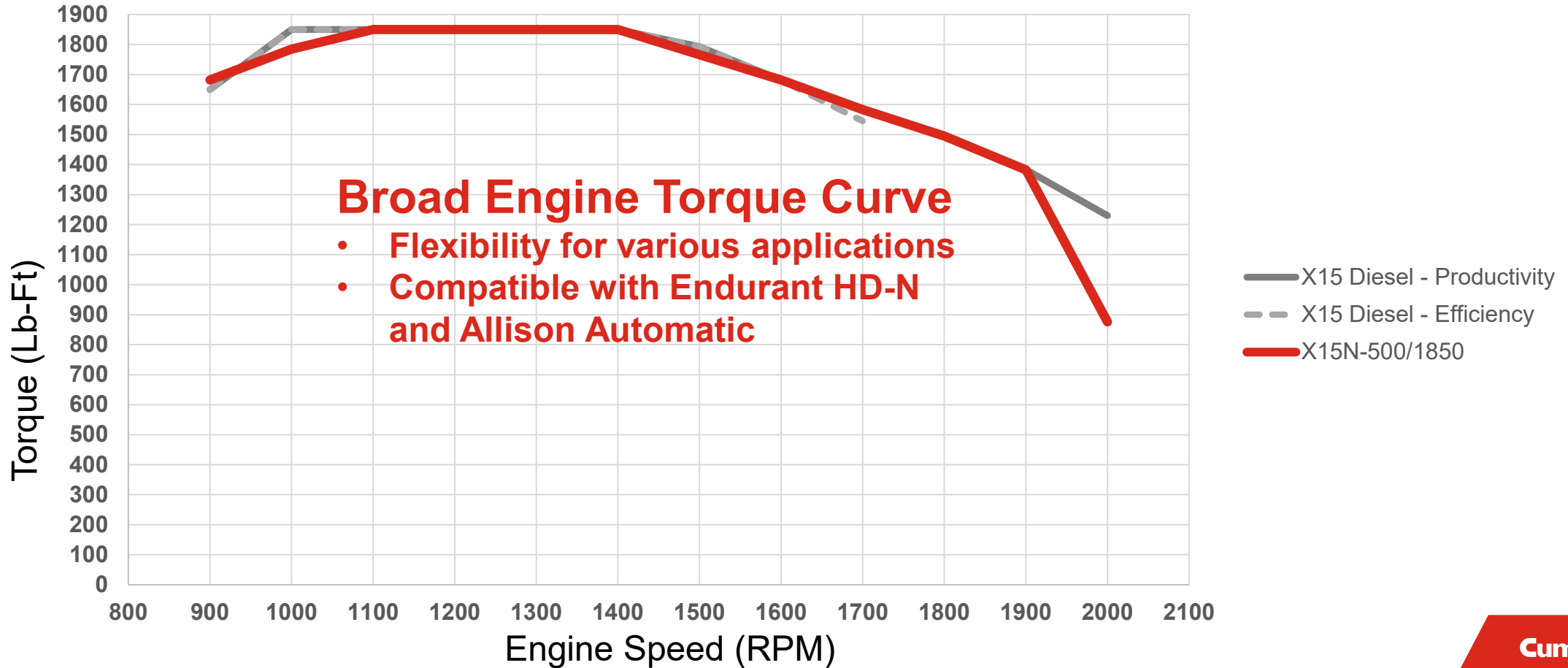




# X15N™ COMPARISON TO ISX12N™ @ 400 hp / 1450 lb-ft

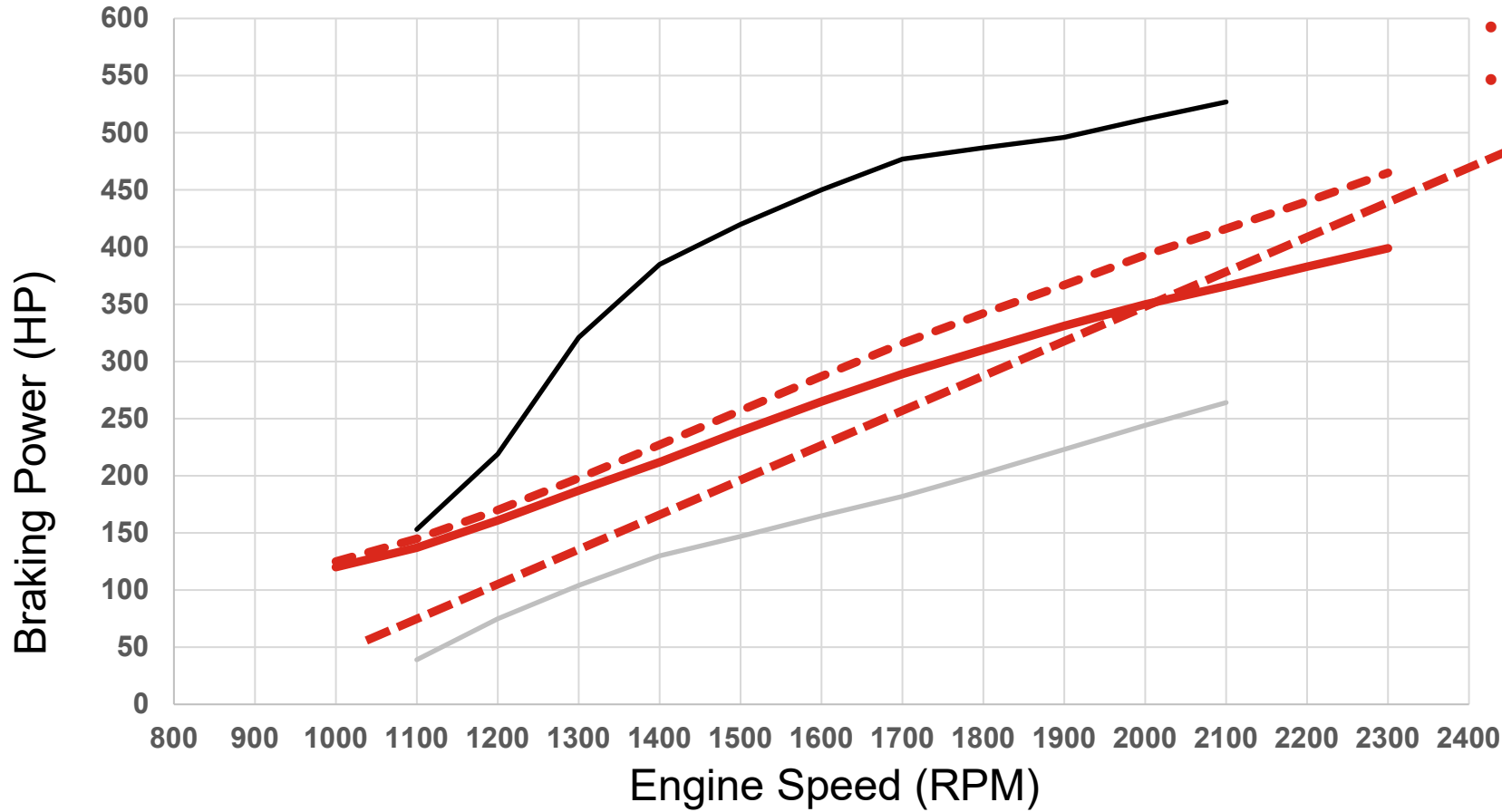


# X15N™ COMPARISON TO X15 DIESEL (500 hp / 1850 lb-ft)





# X15N™ BRAKING POWER



## More Braking Power

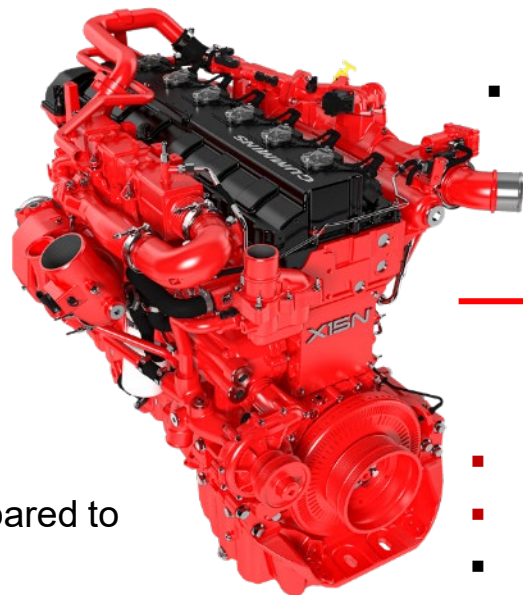
- 39% more than ISX12N
- Additional HP with Fan On

— ISX12N  
— X15N - Base Engine

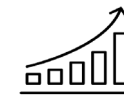


## RELIABLE AND DURABLE

- **Power, torque and performance for the HD market**
- Built on **30+ years** of natural gas experience
- Integrated powertrain for a full Cummins solution
- **Full OE network and Cummins service channel support**
- Known maintenance practices
  - Simple aftertreatment
  - Familiar engine technology
  - **X15N** Extended Service Intervals vs. ISX12N
- **X15N** Reliability improvements over ISX12N



## SCALABLE



- **Natural Gas is the least disruptive alt fuel technology**
- **1-to-1 vehicle replacement for diesel**
- Established supply chain for product production
- Over 800 + public stations
  - Behind the fence refueling options
- Known technology
  - Familiar engine architecture
  - Incremental technician training



## COMMERCIALLY VIABLE

- **Over 1,000-mile range for line-haul applications<sup>2</sup>**
- Lower incremental acquisition cost for the vehicle compared to BEV and fuel cell
- **Multi-shift operation capable**
  - No additional downtime
  - Fast fill refueling time
- **Stable, low-cost fuel means price predictability**
- Natural Gas is available NOW!
  - 85,000+ NG vehicles operating in North America today

## SUSTAINABLE



- **Best well-to-wheel GHG reduction option**
- **Net carbon negative solution when using RNG**
- ~ 750 new RNG production projects coming online<sup>3</sup>
- **X15N** Up to 10% fuel economy & GHG improvements over ISX12N<sup>4</sup>
- **X15N** CARB and EPA emissions solution for '24 at launch

<sup>1</sup> Driver education needed

<sup>2</sup> Dependent on tank configuration, driving behavior

<sup>3</sup> Includes sites that are currently operational, under construction or planned

<sup>4</sup> With equivalent rating and comparable duty cycle



# X15N™ Maintenance Intervals

Oil Drain Interval by Fuel Consumption					
	Extreme Severe (< 3 mpg)	Severe (< 3-5 mpg)	Short Haul (5 – 5.9 mpg)	Normal (> 6 mpg)	
Oil Classification	Miles (Kilometers)	Miles (Kilometers)	Miles (Kilometers)	Miles (Kilometers)	ISX12N Hours (Miles)
CES 20092	15,000 (24,000)	25,000 (40,000)	50,000 (81,000)	60,000 (97,000)	1000(40,000*)
Valvoline™ Premium Blue™ One Solution™ Gen 2	15,000 (24,000)	30,000 (48,000)	55,000 (89,000)	65,000 (105,000)	N/A

\* Assumes average speed of 40mph for Regional and Line-haul tuck

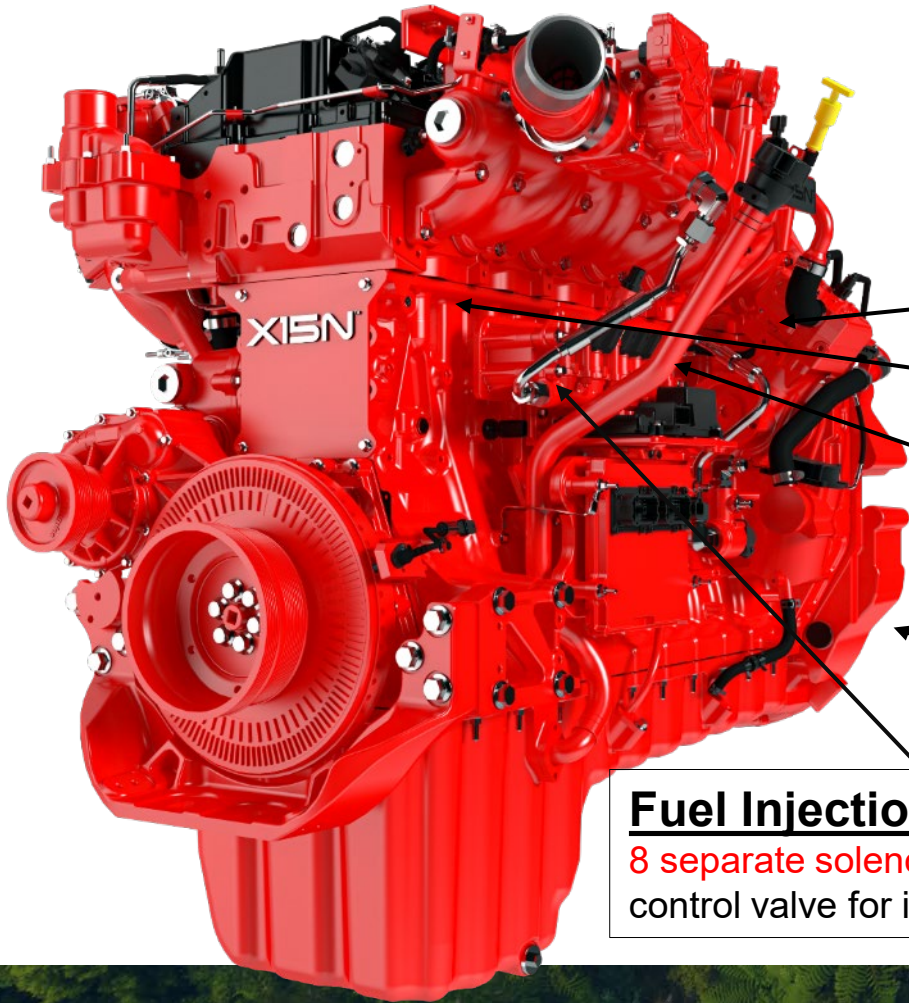
### Spark Plug Life:

- X15N - 60K miles on a Normal duty cycle (aligned with ODI)
  - ISX12N – 1000HRS(assume 40K\* miles) on a Normal duty cycle (aligned with ODI)

### Over-head Reset:

- X15N - 60K miles for the initial reset
  - ISX12N – 1000HRS(Assume 40K\* miles) for the initial reset
- X15N -180K for subsequent resets
  - ISX12N – 3000HRS(assume 120K\* miles) for subsequent resets

# X15N™ ENGINE WALKAROUND



## Increased Power & Torque

New platform with 15L displacement and engine management system to deliver up to **500 hp / 1850 lb-ft** of torque

## Power Cylinder

Improved oil control – **Improved Oil drain intervals, reduced oil consumption** and improved combustion control

## Pistons

**Steel pistons** for durability and improved combustion chamber and component temperature control

## Ignition and Injection Control System

**New integrated ignition and injector control system** vs two independent systems

## Fuel Injection System

**8 separate solenoids** vs. large single fuel control valve for improved fuel control

## CCV System

Incorporates **improved motor, bearing system** from ISX12N



# X15N™ ENGINE WALKAROUND

## Turbocharger

Dual entry wastegate and upgraded materials for improved durability and altitude capability and performance

## Spark Plugs

Increased ceramic strength and electrode geometry and material for improved spark plug life

## Cylinder Head

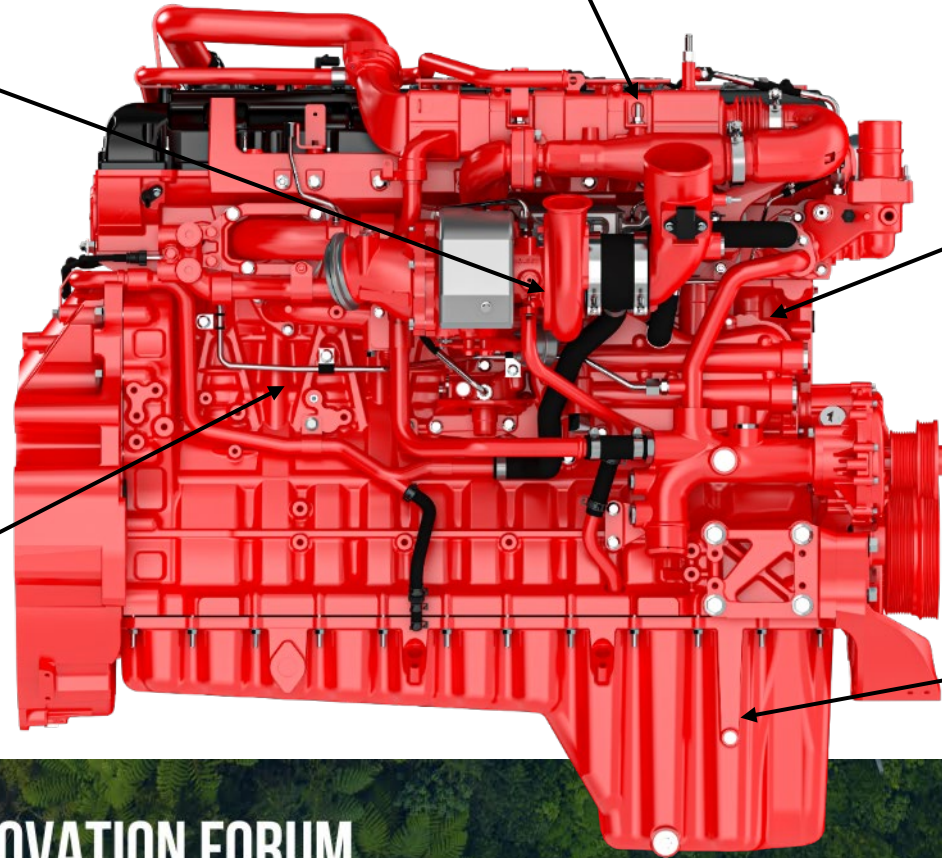
Natural gas specific head allowing for improved thermal distribution and improved spark plug life

## Sculpted Block

Compact design and reduced weight vs ISX12N

## High-Capacity Oil Pan

Increased oil capacity for extended oil drain intervals



# X15N™ Reliability & Durability

## Cummins HELM™ PLATFORM

**10** Years of research and development

**57K+** Hours of in-house and overload testing

**13M** Miles of global pre-production on-road testing

## 15N PLATFORM

**45 K+** Production engines operating globally

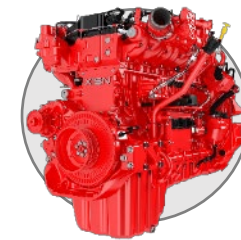
**4 B+** Miles logged by production engines globally

*\*As of July 2024*

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# X15N™ NORTH AMERICA FIELD TEST UNITS



## 3 Applications

- Linehaul
- Regional Haul
- Vocational - Refuse

## 24 Units

## 16 Fleets

## 1.6+ Million miles\* driven

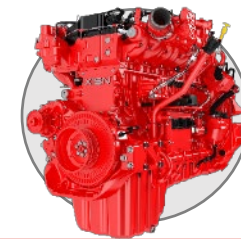
12,000 ft. of elevation – Loveland Pass, CO

107° F – Summer test (Las Vegas, NV)

- 5° F Winter Test (Jackson, WY)



# X15N™ FIELD TEST FLEETS



**OZINGA**®

**WWM**®

**Ryder**®

**ROBERT**



**Walmart** 

**WERNER**  
ENTERPRISES

**KNIGHT**  
TRANSPORTATION



**NATIONAL**  
Ready Mixed Concrete Company

**FXI**  
FOOD EXPRESS, INC.

**SWIFT**  
TRANSPORTATION

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# X15N™ FIELD TEST FEEDBACK



*“Very viable option.”*

*“It shifts better and better each time it gets driven.”*

*“I love this truck.”*

*“Pulled 55 (mph) up Donner Pass fully loaded.”  
(7,056 ft elevation)*

*“Really good on the highway.”*

*“The more they drive it, the better it’s getting all the way around.”*

*“The drivers love the truck. The engine has a nice pull, very quiet, plenty of torque.”*

*“It feels and drives like a diesel which is a good thing.”*

*“Pulling power like diesel. Quiet. Short refueling times.”*

*“They love the torque of the engine - noticeably different compared to the ISX12N”*

*“The truck responded well and handled the load similarly to the X15s he has driven. All while being noticeably quieter.”*



***“We’re thrilled to be the first company to acquire the T680 with the X15N 15-liter natural gas engine. This new truck enhances our worldwide fleet of over 18,000 alternative fuel and advanced technology vehicles, which are essential for achieving our target of 40% alternative fuel in our ground operations by 2025 and carbon neutrality by 2050.”***

***- Anthony Marshall, VP of Maintenance and Engineering,  
UPS***



<https://www.fleetowner.com/emissions-efficiency/article/21283794/ups-receives-first-15-liter-natural-gas-powered-truck>





*“As a top five truckload carrier in North America, we are committed to implementing sustainability initiatives creating long-lasting and industry-wide impacts. **These [X15N powered] vehicles can greatly reduce emissions when running renewable natural gas, and we are eager and willing to help validate this new technology.**”*

*- Derek Leathers, Chairman, President and CEO, Werner Enterprises*

<https://investor.werner.com/news-and-events/press-releases/news-details/2023/Werner-Among-First-Group-of-Carriers-to-Test-Renewable-Natural-Gas-Through-Cummins-Engines/default.aspx>



***“The addition of the new truck with Cummins’ latest clean technology [X15N] into our fleet falls nicely into our decarbonization plans. Having the power and torque of a larger engine is ideal for many of our routes, and it is an added benefit for it to operate with an ultra-low carbon fuel like RNG.”***

*- Kevin Keeney, President of Food Express*



<https://www.cleanenergyfuels.com/press-room/food-express-welcomes-truck-equipped-with-the-new-cummins-15-liter-natural-gas-engine-into-fleet>





*“The 15-liter [X15N] has been performing great. So far from what we’ve seen, the horsepower and torque is comparable to **diesel**. If you do things right, it’s a technology that is working and has been proven. CNG and RNG is the only alternative energy available on the market that we can apply now.”*

*- Jonathan Royal, Senior Director of Asset Management for C.A.T.*

<https://www.trucknews.com/sustainability/near-zero-natural-gas-can-help-fleets-meet-decarbonization-objectives/1003184569/>



*“At Robert, we have great expertise with Eaton automated transmissions and with the Endurant/CNG engine combination. We know that a natural gas truck reacts differently than a diesel truck. **The efficiency we obtain with the X15N is very comparable to what we have with the equivalent diesel engine.**”*

*- Kevin Lambert, Sector Manager, Motorized Equipment and Permits Groupe Robert*



<https://www.transportroutier.ca/nouvelles/de-ses-entrepots-a-ses-vehicules-comment-groupe-robert-optimise-son-bilan-environnemental/>





***“We’re moooooo-ving ahead with the new and innovative Cummins Inc. X15N engine! Powered by dairy gas RNG, this big block engine is proving its capabilities!”***

*- Rich Mulder, Director of Logistics, Ozinga Energy LLC*

[https://www.linkedin.com/posts/rich-mulder-733b6454\\_were-mooooooo-ving-ahead-with-the-new-and-activity-7208467706654674944-6xyS/](https://www.linkedin.com/posts/rich-mulder-733b6454_were-mooooooo-ving-ahead-with-the-new-and-activity-7208467706654674944-6xyS/)



# XISN™ Cummins User Experience (UX) Fleet



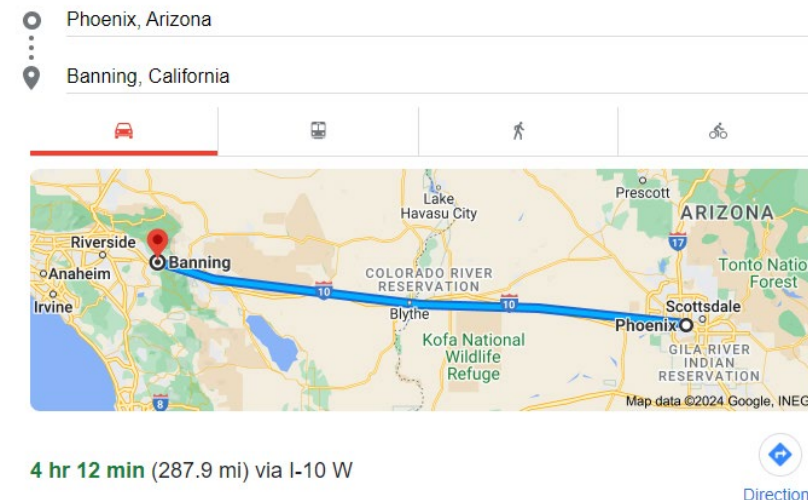
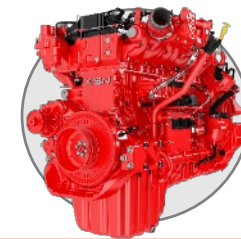
Peterbilt 579



Kenworth T680







### ***Driver had zero range anxiety***

- ***Trip from Banning, CA to Phoenix, AZ (~ 290 miles each way)***
- ***Easy to refuel in Phoenix before return trip***

### ***The X15N climbed grades easily at 45+ MPH.***

- ***A welcome improvement over the Detroit Diesel he normally runs***