

Cummins Westport  
The Natural Choice



# Cummins Westport

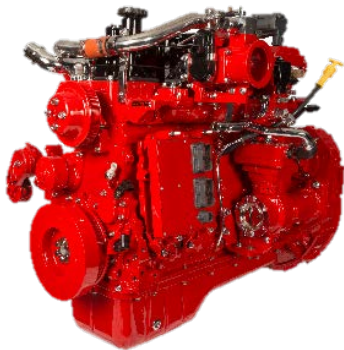
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# Cummins Westport Inc. (CWI)

- Cummins Westport is a joint venture company established in 2001
  - 50% - Cummins Inc. - world's largest builder of commercial diesels
  - 50% - Westport Innovations Inc. - world leader in gaseous fuel engine technology
- CWI offers 6 to 12 liter alternative fuel automotive engines. (CNG, LNG, RNG)
- Engines are manufactured by Cummins with over 80% parts commonality as the diesel platform
- Parts, warranty, service and training support through the Cummins Sales and Service network
- Over 70,000 engines delivered worldwide

# 2018 North America Product Line



## B6.7N™

### 6.7L

Peak Rating: 240 hp  
560 lb-ft torque  
33,000 lb. GVW

School bus/MD Truck/Shuttle  
bus/Sweeper/Yard spotter

EPA/ARB Low NOx  
0.1 g/bhp-hr (50% reduction)



## L9N™

NEAR ZERO

### 8.9L

Peak Rating: 320 hp  
1000 lb-ft torque  
66,000 lb. GVW

Refuse/Transit/Regional P&D  
Truck/Mixers

EPA/ARB Near Zero NOx  
0.02 g/bhp-hr (90% Reduction)  
Cummins Westport Inc



## ISX12N™

NEAR ZERO

### 11.9L

Peak Rating: 400 hp  
1450 lb-ft torque  
80,000 lb. GVW

Regional Haul  
Truck/Tractor/Refuse

EPA/ARB Near Zero NOx – 0.02  
g/bhp-hr (90% Reduction)



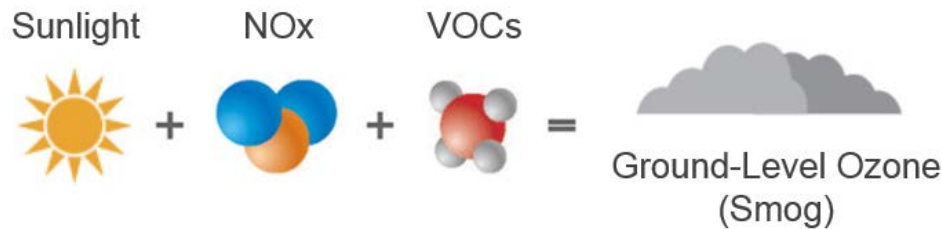
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Near Zero Emissions



# Why Lower Emissions?



- Clean Air Act is a federal law designed to control air pollution on a national level. It is one of the United States' first and most influential modern environmental laws, and one of the most comprehensive air quality laws in the world.
- Many of the largest US cities are also not meeting Clean Air standards
- The focus is NOx reduction which will reduce ground level ozone in most urban areas
- The California ARB has defined new NOx standards to reduce emissions.

NOx Standard	NOx (g/bhp-hr)	Engine
2010 Standard	0.2	Diesel
CA Optional Low-NOx	0.1	B6.7N
CA Optional Low-NOx	0.05	
CA Optional Low-NOx (Near Zero)	0.02	L9N, ISX12N

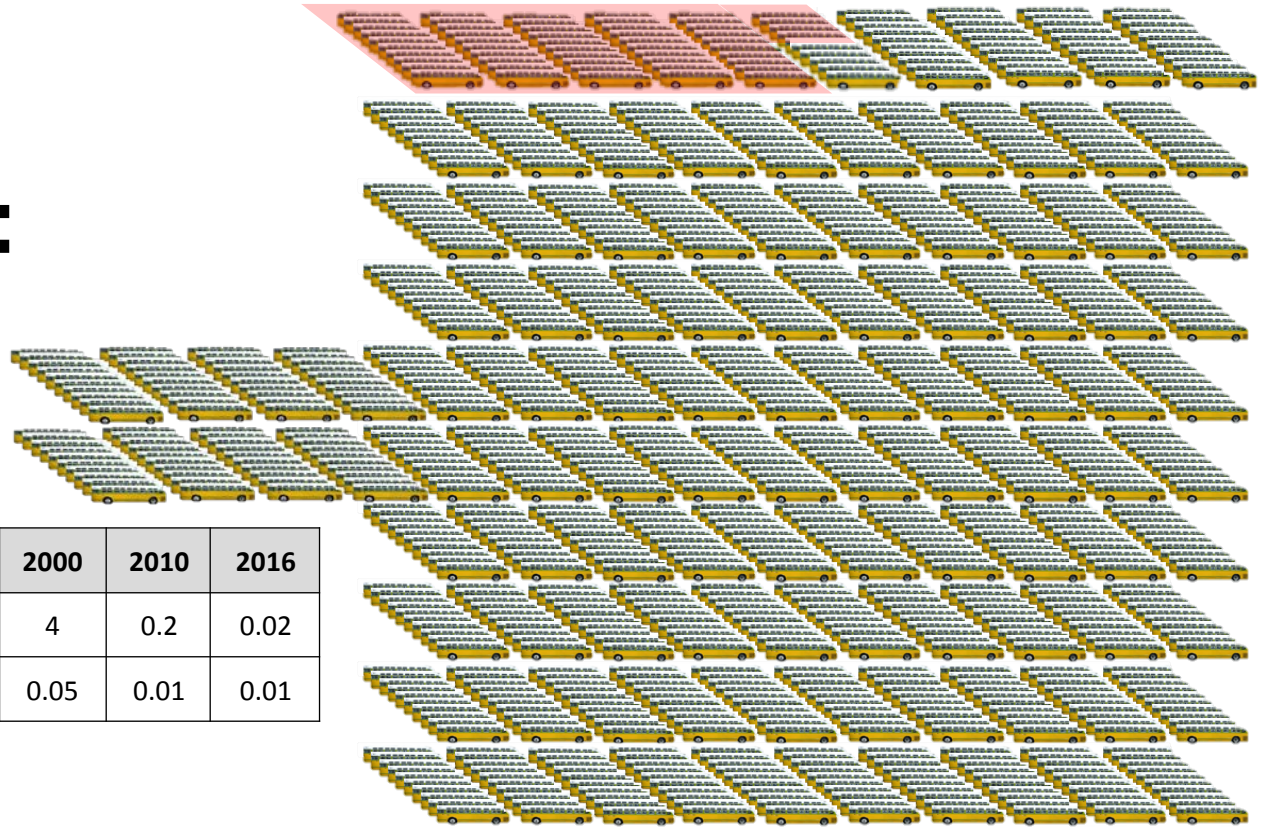
CEC has defined this certified Near Zero emission level as equivalent to a 100% battery truck using electricity from a modern combined cycle natural gas power plant.



# Emissions Reduction Impact - NOx



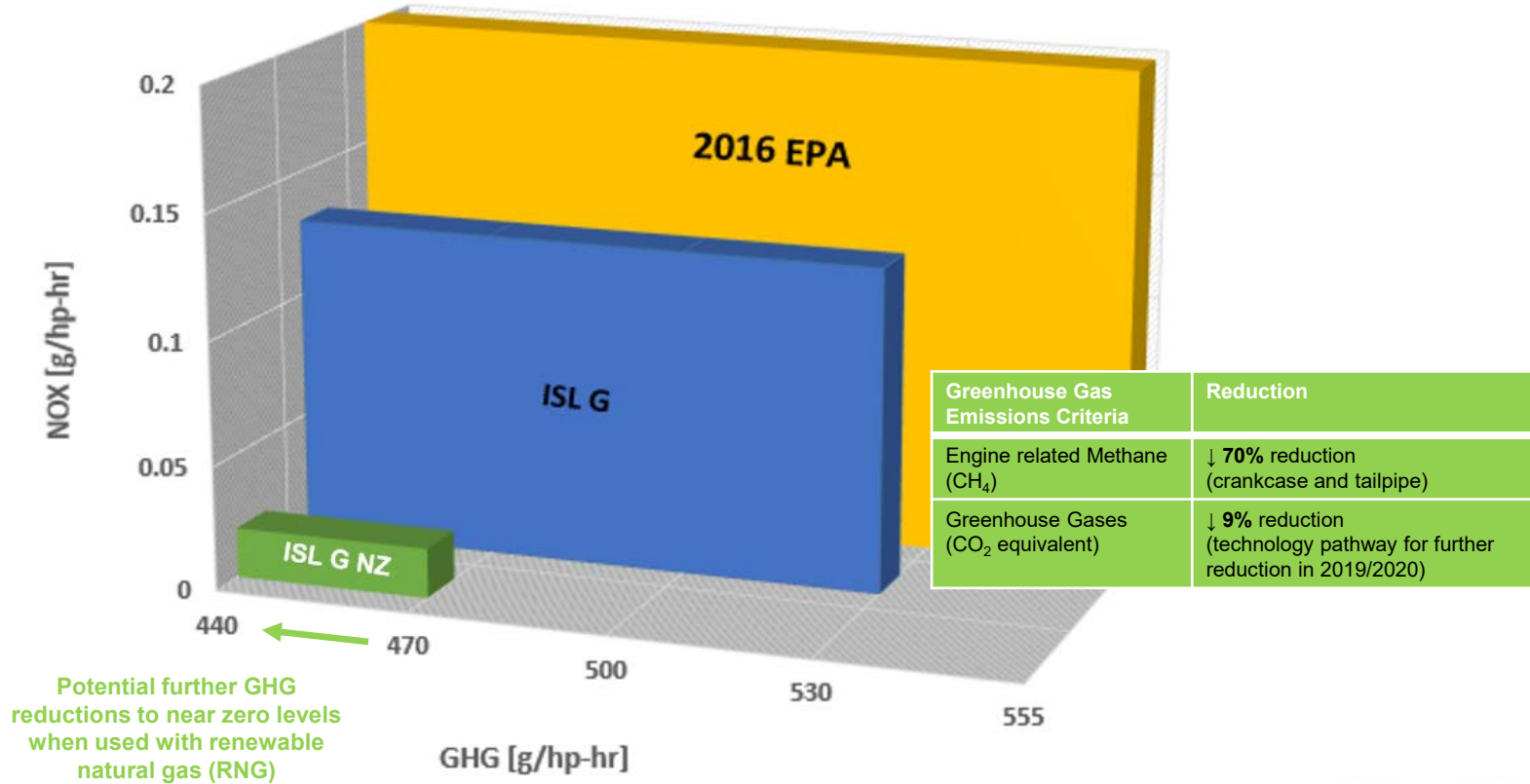
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	1985	1990	1991	2000	2010	2016
NOx (g/hp-hr)	10.8	6	5	4	0.2	0.02
PM (g/hp-hr)	0.59	0.59	0.25	0.05	0.01	0.01



# Greenhouse Gas Reduction



# Local Natural Gas Customers

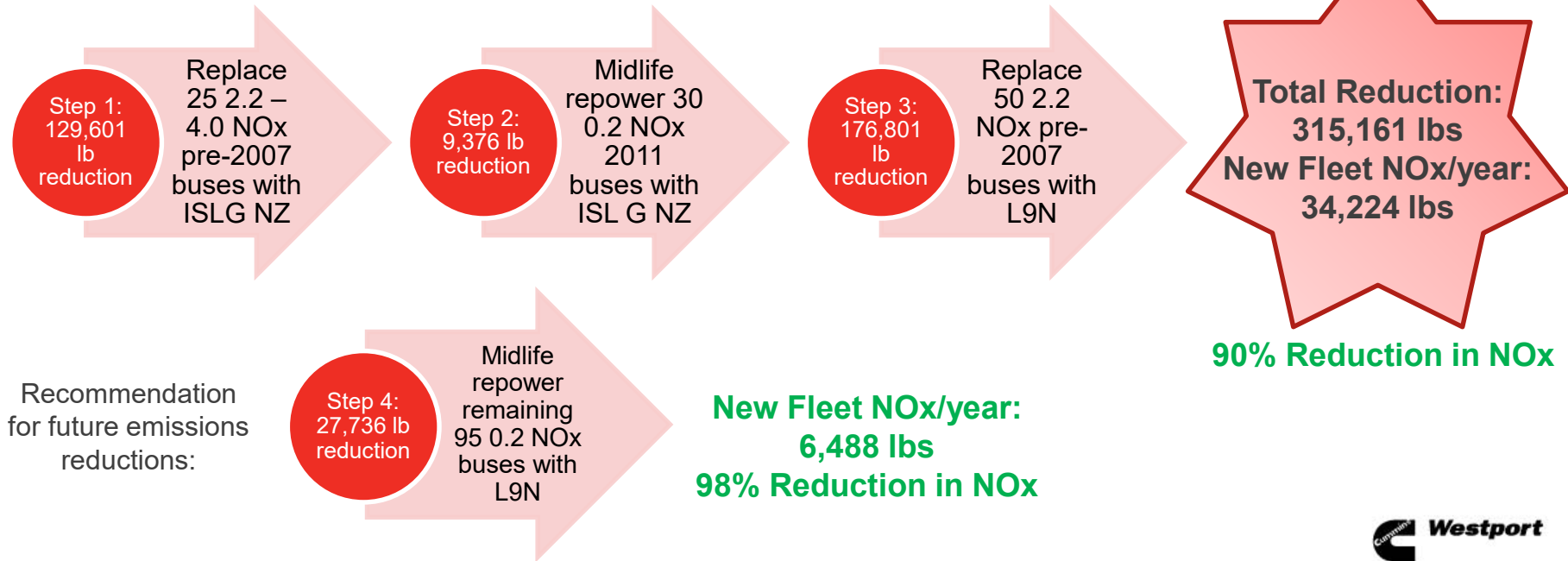




# California Transit Agency Case Study: NOx Reduction

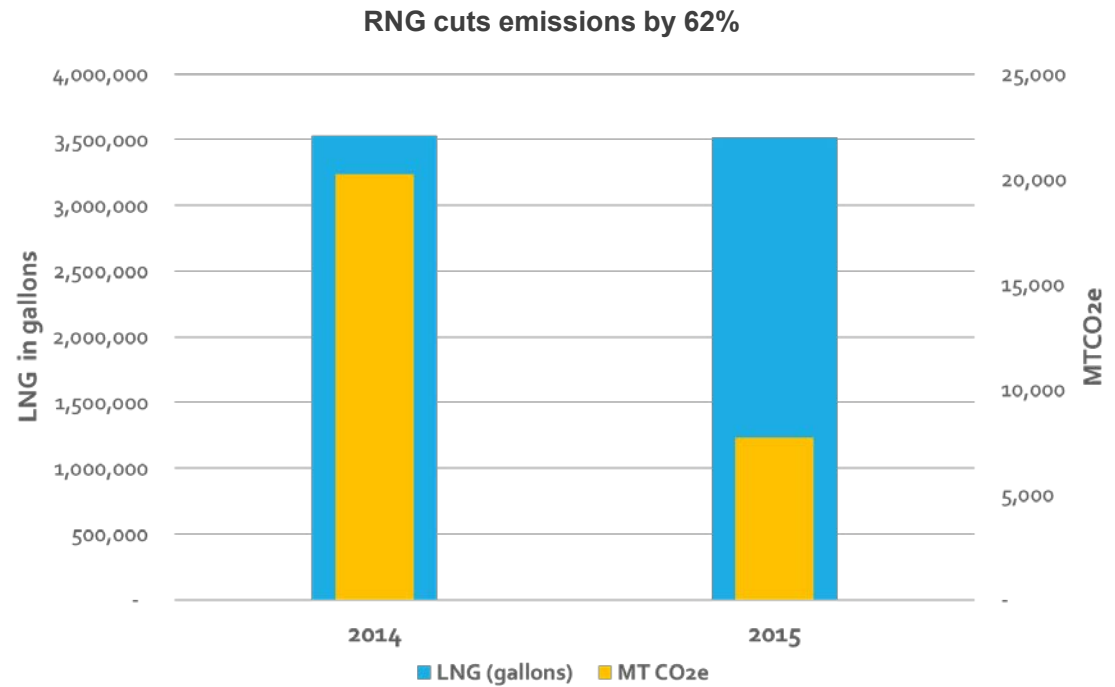
Current Fleet: 125 2007 and newer (0.2 NOx) and 75 Pre-2007 (2.2 and 4.0 NOx)

**These 200 Buses Produce 349,384 lbs NOx per year**



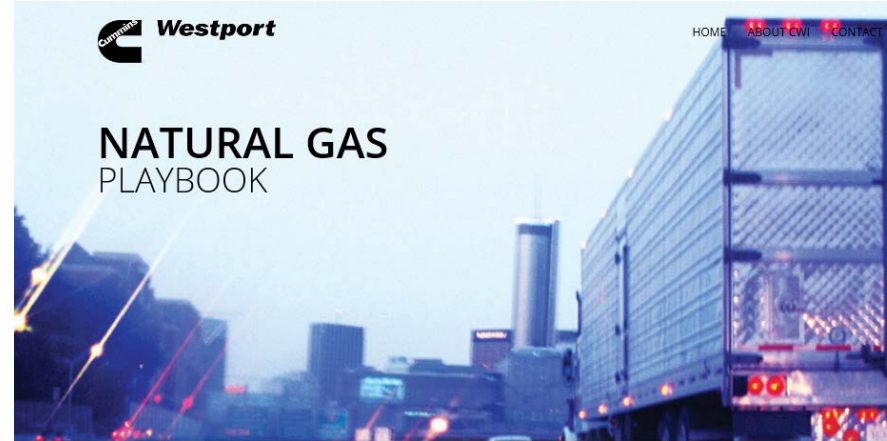
# Case Study: RNG and GHG

- In 2015, the agency changed to using 100% RNG
- Cut GHG emissions by 62%
- With LCFS credits, decreased their fuel costs by 26%



# NG Playbook

- [www.cwiplaybook.com](http://www.cwiplaybook.com)
- Helps customers assess the natural gas opportunity and successfully incorporate natural gas powered trucks and buses into their fleet operation.
  - Helps identify fleet opportunities with natural gas
  - Provides technical product information
  - Addressed questions/concerns about purchasing and operating NG engines
  - GHG Emissions Calculator
  - Diesel v. NG Payback Calculator




#### Customers often ask us many questions about natural gas.

- What is natural gas?
- How does natural gas reduce fleet emissions?
- Can I calculate the emission reductions with natural gas?
- What engines are available for my operation? What about costs and maintenance?

**Welcome to the Natural Gas Playbook** – Cummins Westport's new website designed to provide new and existing natural gas customers with guidance on evaluating and operating natural gas vehicles.

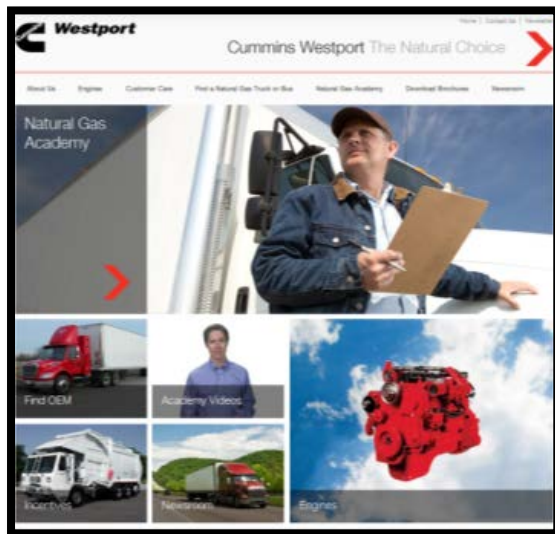
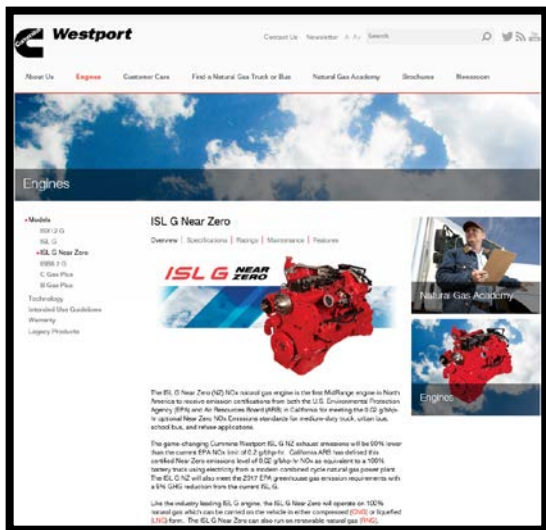
The information is separated into five sections: Assess, Specify, Prepare, Implement, and Operate & Maintain. We provide emissions and economic calculators, resources, tools, and information to help you successfully manage your natural gas fleet. You can also save and print information specific to your playbook.

Click on the Assess button below to get started.

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# www.cumminswestport.com



- More information on natural gas engines
- Features the Natural Gas Academy, a series of instructional videos
- Designed to provide a general overview of operating a natural gas fleet whether it is compressed (CNG) or liquefied (LNG)
- ISX12 G and ISL G engine walk around, service and driver training videos