

Cummins Westport The Natural Choice



Alternative Fuels, Making the
right choice for your operation!

September 11, 2012



Cummins Westport Inc. (CWI)

A Cummins JV Company

- **CWI is a 50:50 joint venture company based in Vancouver, BC**
 - **Established in 2001 – Celebrating 10 Year Anniversary**
 - **Cummins Inc. - world's largest builder of commercial diesels,**
 - **Westport Innovations Inc. - world leader in gaseous fuel engine technology**
- **CWI offers 8.9 liter spark ignited alternative fuel automotive engines.**
- **Engines are manufactured by Cummins in Rocky Mount, North Carolina.**
- **Local parts and service support through Cummins Distributor network.**



Cummins Westport

Heavy Duty Engines Designed Specifically for Alternative Fuels

- *Based on Reliable Cummins Engine Platforms*
- *Common parts and design provide heavy duty performance*
- *Engineered and Optimized Specifically for Alternative Fuel*
- *Continued improvement in reliability and cost of ownership*
- *Service Support through the Global Cummins Distributor network*

Why Natural Gas for a Transit Bus?

- Lower Fuel Costs
- Natural gas transit buses now account for over 20% of total US transit bus fleets*
 - Nearly 26% of all new bus orders are for natural gas-powered buses
- Clean, reliable and cost-effective fuel choice
- Less dependence on foreign oil
 - Natural gas is a fuel abundant here in North America

*Source: American Public Transit Association



Four Generations of Natural Gas Engines

1998



C8.3G Mechanical

- Introduced in 1998
- Major improvement over 1st generation CNG L10 Series
- Over 4000 still in service
- Improved Reliability

2001



C Gas Plus

- Introduced in 2001
- State of the art spark ignition/control system
- First engine 2004 EPA Certified
- Six fold reliability Increase

2004



L Gas Plus

- Introduced in 2004
- Improved Ignition control system
- VG Turbo
- Based on 8.9 L ISL Block
- 2007 NOx and 2010 PM levels

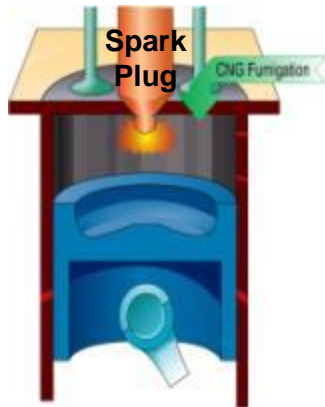
2007



ISL G

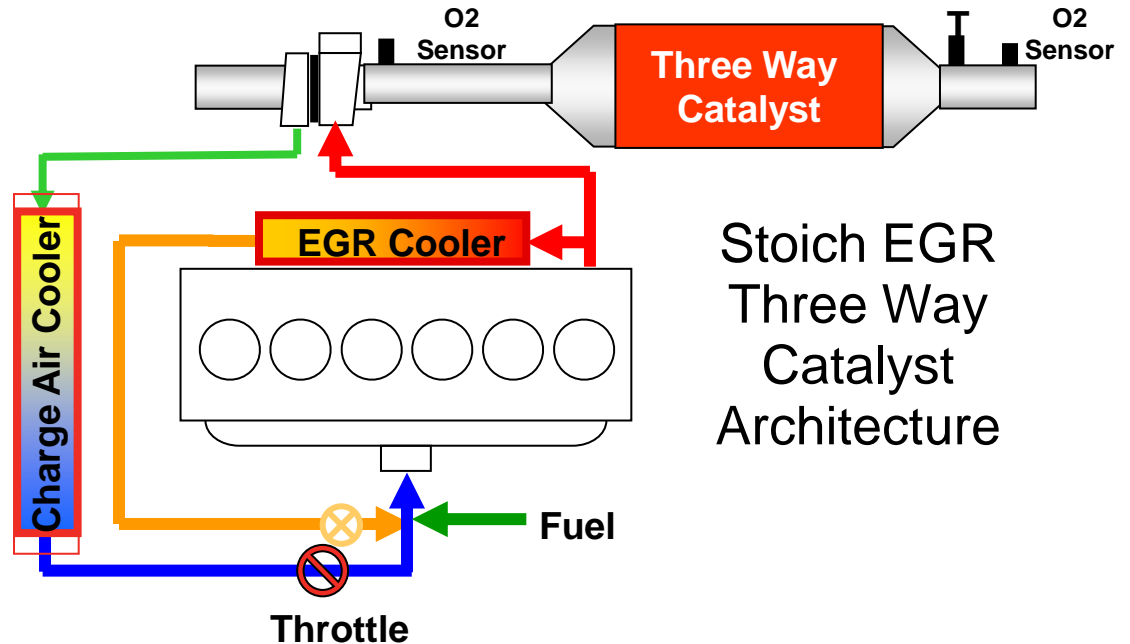
- Introduced in June 2007
- Stoichiometric EGR combustion, three way catalyst
- First HD engine certified 2010 NOx and PM levels

CWI Technology Path



Spark Ignited

- Fuel and air are premixed outside the cylinder
- Spark plug ignites the mixture
- Air flow controls fuel flow
- Air/Fuel ratio controls emissions



Stoich EGR
Three Way
Catalyst
Architecture

ISL G: The Right Applications

- Medium Duty Market
 - **Transit and School Bus**
 - Refuse / Dump / Mixer
 - Pickup and Delivery Truck
 - Medium Duty Specialty Vehicles
(street sweeper, yard spotter, etc...)
- Heavy Duty Market
 - Less Than Truck Load (LTL) applications
 - Regional / Bulk Haul applications



ISL G

ISL G Product Features and Benefits

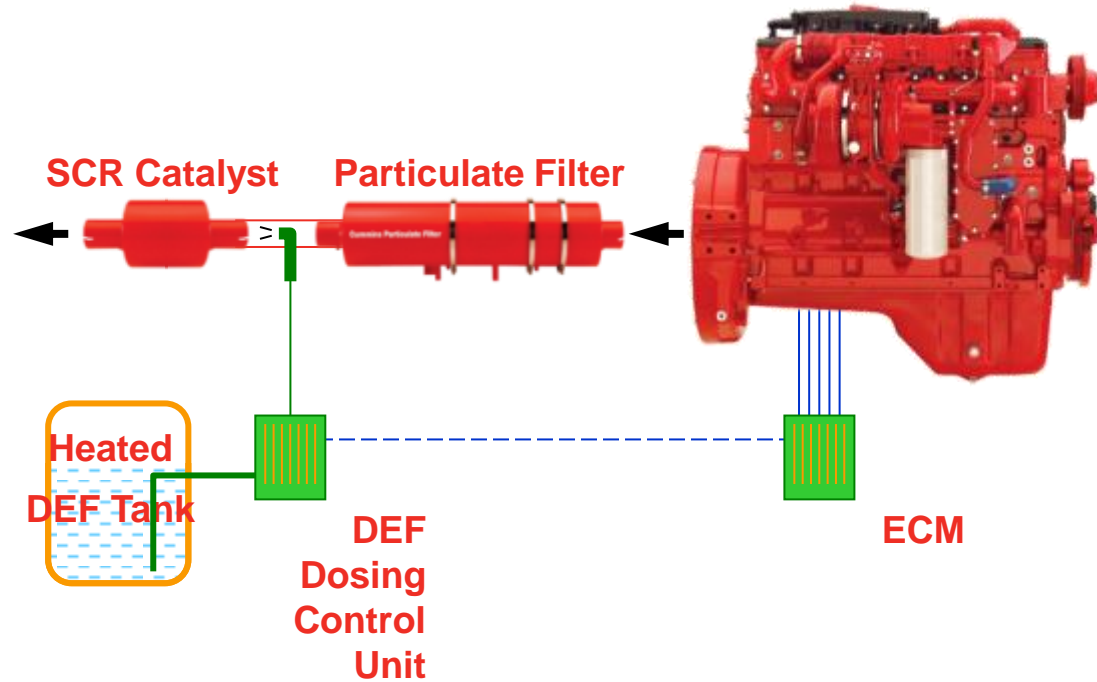
- 8.9L Stoichiometric Cooled EGR engine with spark ignition
- In production since mid-2007
- Low emissions
 - 0.20 g/bhp-hr NOx
 - 0.01 g/bhp-hr PM
- Three Way Catalyst Aftertreatment
- Diesel like Performance, Reliability and Durability
 - Same rated speed
 - Similar torque curve
 - Over 30% more torque at idle vs. lean burn
 - Improved fuel economy of 5% vs. lean burn
- Over 80% parts commonality with ISL9
- Compatible with CNG, LNG, or Biomethane (RNG) Renewable Natural Gas



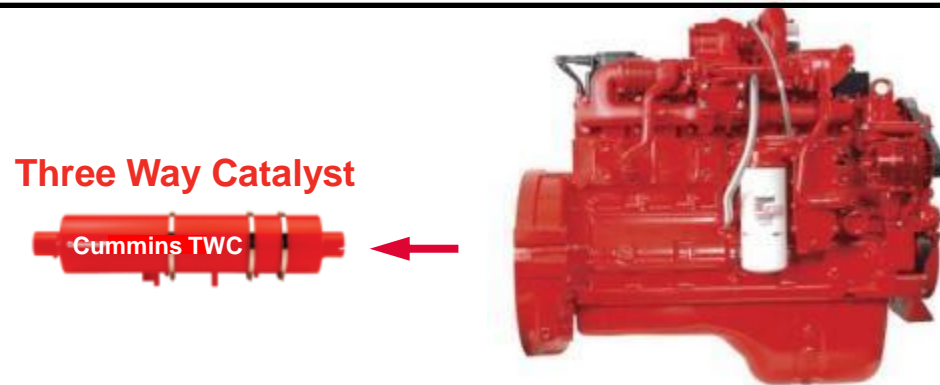
ISL G

Aftertreatment Comparison

ISL9
(diesel)



ISL G
(natural gas)



ISX12G

Natural Gas Engine Introduction

■ Target Markets

- Regional haul truck / tractor
- Vocational
- Refuse

■ Platform & Technology

- Cummins 11.9 litre ISX12 diesel is base engine
- Utilizing spark-ignition with cooled EGR & three way catalyst (TWC)
 - Same combustion technology as ISL G



ISX12G

Natural Gas Engine

■ Key Product Attributes

- 4 cycle, spark ignited, in-line 6 cylinder, turbocharged, CAC
- Displacement – 11.9 litres (726.2 cu in)
- Peak rating: 400 hp, 1450 lb-ft *
- EPA/CARB certified at or below EPA10 emission levels
- Dedicated natural gas engine
 - Will operate on CNG or LNG
 - Capable of using up to 100% Biomethane
- Three Way Catalyst after-treatment
- Engine braking
- Manual/Automatic Transmission capable
 - No AMT at launch

■ Schedule

- Commercial launch: Early 2013
- Currently in field tests

* Preliminary Rating Specification – Subject to Change



ISL G Warranty - Every Coverage



- *Base Warranty for Bus/Shuttle, School Bus and Truck are the same as Cummins ISL9 diesel engines*
- *Extended Coverage options are available for Truck, Transit and School Bus*
 - *5 yr, 200,000 mile or 300,000 mile - Transit*
 - *3 to 7 yr, 100,000 to 300,000 mile - Protection Plan 2 - Truck*
 - *3 to 5 yr, 100,000 to 300,000 mile – Protection Plan 1 –Truck*
 - *5yr to 10 yr, 150,000 to Unlimited miles – School Bus*
 - *6 yr, 300,000 mile Major Component – All applications*
- *All EC warranty programs posted on CIRCUIT*



Training: Key to Success for New NG Users

- There are operation & maintenance differences between a NG and diesel vehicle.
- New users need an orientation for proper O&M:
 - Follow Cummins maintenance guidelines
 - Use only approved Cummins parts
 - Use proper fuels and lubes
- Training can be found in the typical sources:
 - Virtual College ISL G training
 - Quick Serve On Line
 - Cummins Distributors

ISL G Availability – Transit Buses

OEM	New Flyer	NABI	Orion	EIDorado	Gillig
					
Model	30/35/40 Low Floor	35/40 Low Floor 60 BRT	Orion V HF Orion VII LF	EZ Rider II	30/35/40 Low Floor
Fuel	CNG	CNG	CNG	LNG/CNG	CNG
Engine	ISLG 280	ISLG 280 ISL G 320	ISL G 280	ISLG 280	ISLG 280

Top North American CNG Transit Fleets



LAMTA, Los Angeles, CA
Boston, MA
TransLink, Vancouver, Canada
Foothills Transit, CA
Fort Worth, TX
Tacoma, WA

OCTA, Orange County, CA
Washington DC
NY / Long Island Transit, NY
RTC Transit, Las Vegas, NV
Santa Clara, CA
St. Louis, MO

Big Blue Bus, Santa Monica, CA
Dallas, TX
San Diego Transit, CA
HSR, Hamilton, Canada



OEM Availability

OEM	Model	Segment	ISL G	ISX12 G	Comments
Freightliner Truck	Business Class M2 112 (Class 7/8)	MD/HD Truck	X		Applications: 6X4 Tractor (LNG, CNG), CNG - 4X2 Tractor, 6X2, 4X2 Truck, Vocational
	Cascadia	HD Truck		X	ISX12 G - 2013
Kenworth	W900s	MD/HD Truck	X		Vocational/Mixer
	T440 / T470	MD/HD Truck	X		Local & regional haul, vocational.
	T660	HD Truck		X	ISX12 G - 2013
Peterbilt	Model 384	MD/HD Truck	X		Model 384 - Tractor
	Model 365	MD/HD Truck	X	X	ISX12 G - 2013
Volvo	VNM	MD/HD Truck	X		
	VNL	HD Truck		X	ISX12 G - 2013
International	TranStar	MD/HD Truck	X		New 2012
American LaFrance	Condor	Refuse	X		
AutoCar	ACX	Refuse	X	X	ISX12 G - 2013
Crane Carrier	LCF	Refuse	X		
Peterbilt	320	Refuse	X		
Mack	TerraPro Low Entry	Refuse	X		
Mack	TerraPro Cab Over	Refuse	X		
NABI	35 LFW/40 LFW/60 BRT	Urban Bus	X		
New Flyer	30 LF/35 LF/40 LF	Urban Bus	X		
Orion	Orion V HF/Orion VII LF	Urban Bus	X		
Foton	City - L40 CNG	Urban Bus	X		
Gillig	LF	Urban Bus	X		New 2011
MCI	Commuter Coach 40/45	Motor Coach	X		New 2011
El Dorado National	Axess/E-Z Rider II/Transmark RE/XHF	Shuttle	X		
Blue Bird	All American	School Bus	X		
Thomas Bus	Saf-T Liner	School Bus	X		
Capacity	TJ9000 , TJ5000	Yard Spotter	X		
AutoCar	Xspotter	Yard Spotter	X		

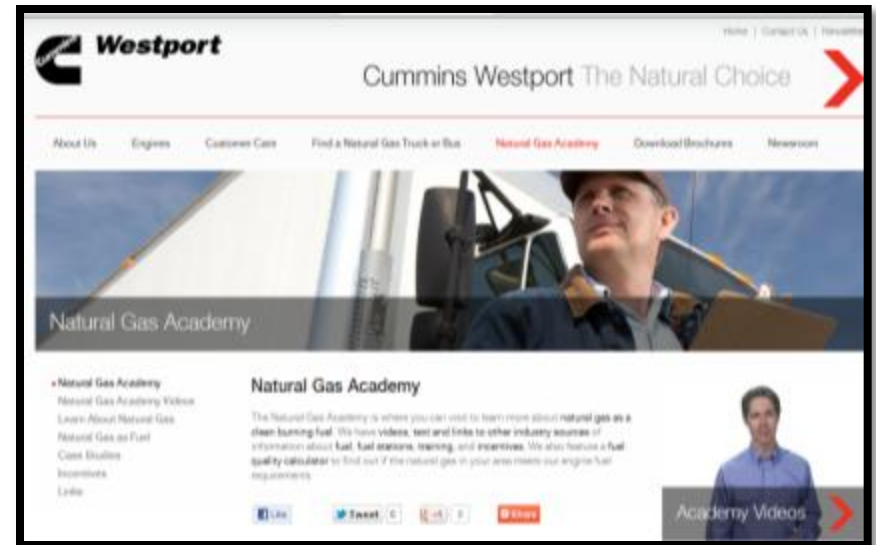
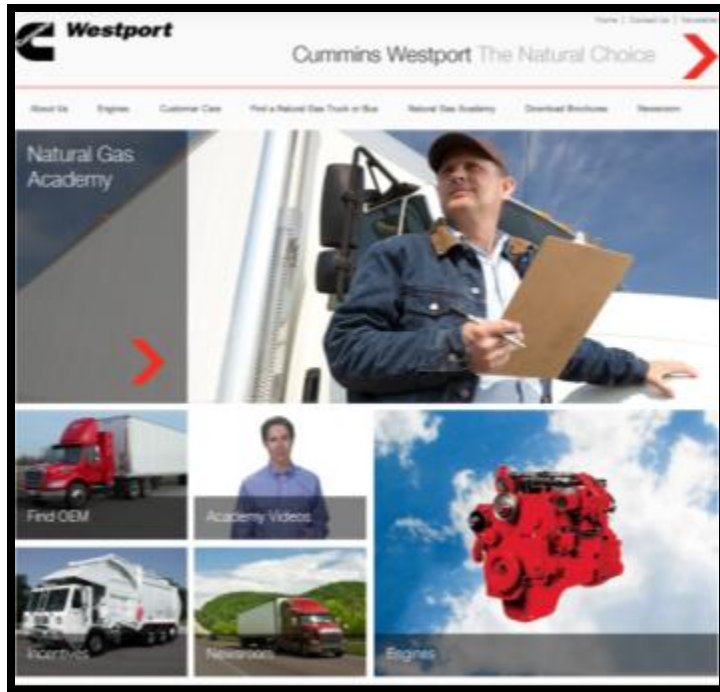
April, 2012

Natural Gas Customer Benefits

- **Lower Fuel Costs**
- **Diesel-like** responsiveness
 - Throttle response is comparable to ISL9 diesel
- **Strong** power density
 - Similar torque curves to diesel
- **Improved Fuel Economy** vs. other NG engines
 - 5% fuel economy improvement
- **Maintenance-Free** aftertreatment



www.cumminswestport.com



- New Website launched May 1, 2012
- Great source of information about natural gas engines and vehicles.
- Features the *Natural Gas Academy*, a series of instructional videos
 - Designed to provide a general overview of natural gas as a fuel whether it is compressed (CNG) or liquefied (LNG), and how it is used with vehicles.

Thank You!

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