



Westport

Clean Cities Transportation

March 30-31, 2011

Workshop for Almaty

John Burgess General Manager CWI

March 2011

Explore Every Alternative.

Contents

- Who is Cummins Westport.
- CGas+ Technology Evolution.
- Significant Fleet populations.
- The Benefits of NGV's
 - Fuel cost savings
 - Regulated emissions
 - Noise

Cummins Westport Inc. (CWI)

A Cummins JV Company

- CWI is a 50:50 joint venture company based in Vancouver, BC
 - Cummins Inc. - world's largest builder of commercial diesels,
 - Westport Innovations Inc. - world leader in gaseous fuel engine technology
- Globally, CWI offers 6 to 9 litre alternative fuel automotive engines. (CNG, LNG, LPG)
- Engines are manufactured by Cummins.
- Over 28,000 engines in service worldwide
- Local parts and service support through Cummins Distributor network (5,200 dealer locations)

C Gas Plus - Natural Gas History

1985



C8.3 Mechanical

- Outstanding Product
- Over 500,000 in Service
- Still used in off-highway & some international
- Reliable & Durable

Base Platform for C Gas and C Gas Plus

1995



C8.3G Mechanical

- Lean Burn Combustion
- Introduced in 1998
- Major improvement over 1st generation CNG L 10 Series
- Over 4000 still in service
- Improved Reliability

2001



C Gas Plus

- Introduced in 2001
- Lean Burn combustion
- State of the art spark ignition/control system
- First engine 2004 EPA Certified- 1.8 NOx
- Six fold reliability Increase

2007



ISL G

- First 2010 HD Engine
- 8.9 litre, Stoich EGR
- 30% more torque at idle and 5% better fuel economy than C Gas Plus
- Maintenance free three way catalyst aftertreatment



Why is the *C Plus* Better

Engine Designed for Gaseous Fuels

- Improved drive by Wire actuator
- Lower emissions
- Wide range fuel composition capability
 - 65 Methane number for gas
- Knock sensing and control
- Robust oxygen sensor design
- Adaptive learn through control system
- Modern engine controller
- Improved controls
- More sensed parameters
- Humidity sensing and compensation

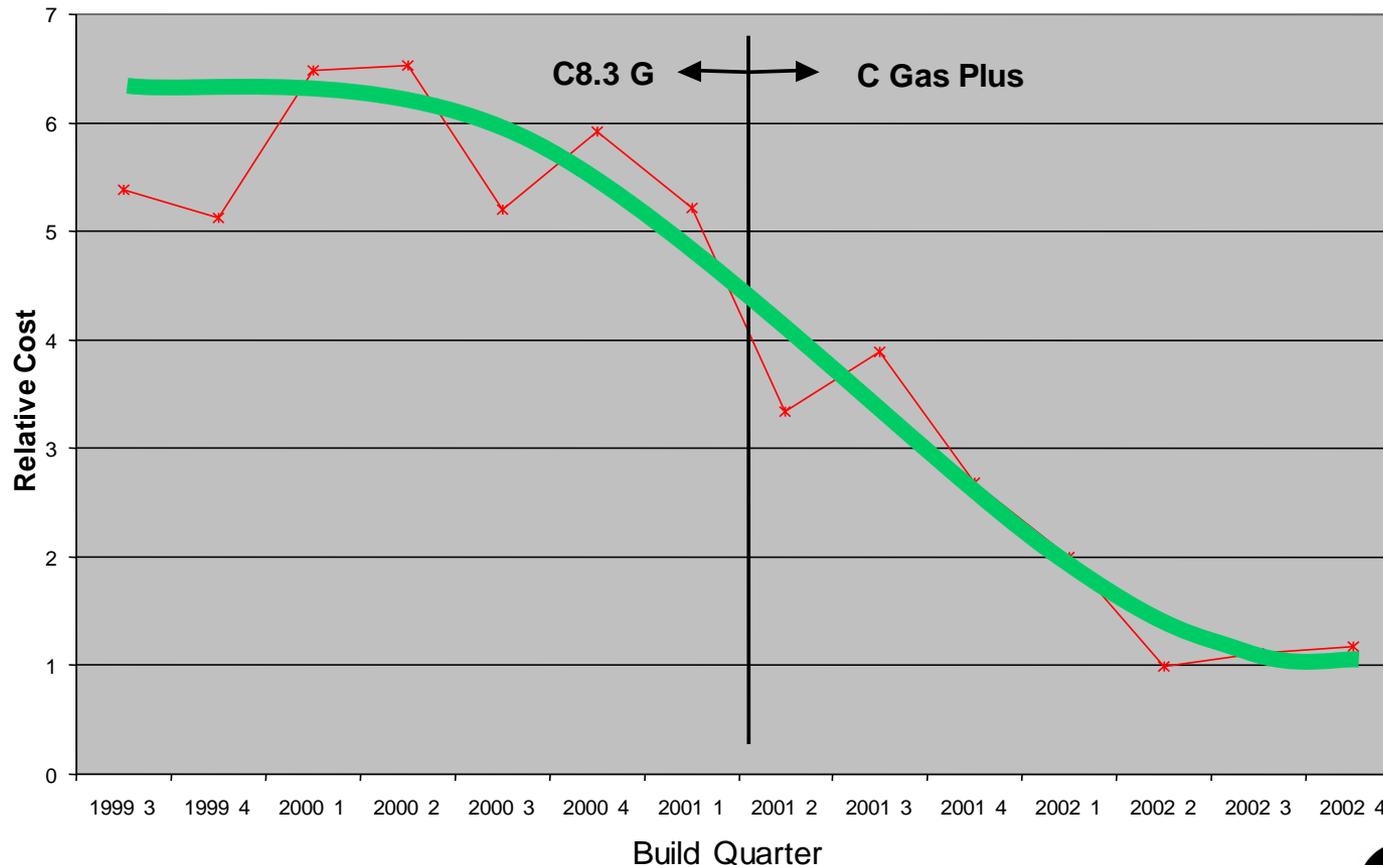


Holset Wastegate Turbo



CWI Engine Reliability Improvement: Legacy C 8.3 G Compared to Current C Gas Plus

C8.3G / C Gas Plus - Reliability



Six Fold
Reliability
Improvement

Significant Fleets with CWI Lean Burn Engines

BJPT – 2500 units inclusive of the fleet for the 2008 Olympics



Deli – 3700 units in process of being delivered through TATA & Ashok Leyland

Some 1400 CGas+ supplied through Chinese vehicle builders for export.



300 CGas+ engines supplied to Liaz for Russia including Moscow Transport



190 CGas+ in Kayseri Turkey in BMC city buses.



Benefits – Fuel Consumption Costs

Assumptions:-

- Diesel price 74 tenge/litre
- CNG price 37 tenge/litre *

The Example: CGas+ vs C8.3 diesel in a bus application in Turkey.

CGas+ consumed:-

57.82 DEL over 100 Km
2140 tenge over 100 Km

C8.3 Diesel consumed:-

45 Litres over 100 Km
3330 tenge over 100 Km

36% saving for the Natural Gas Vehicle.

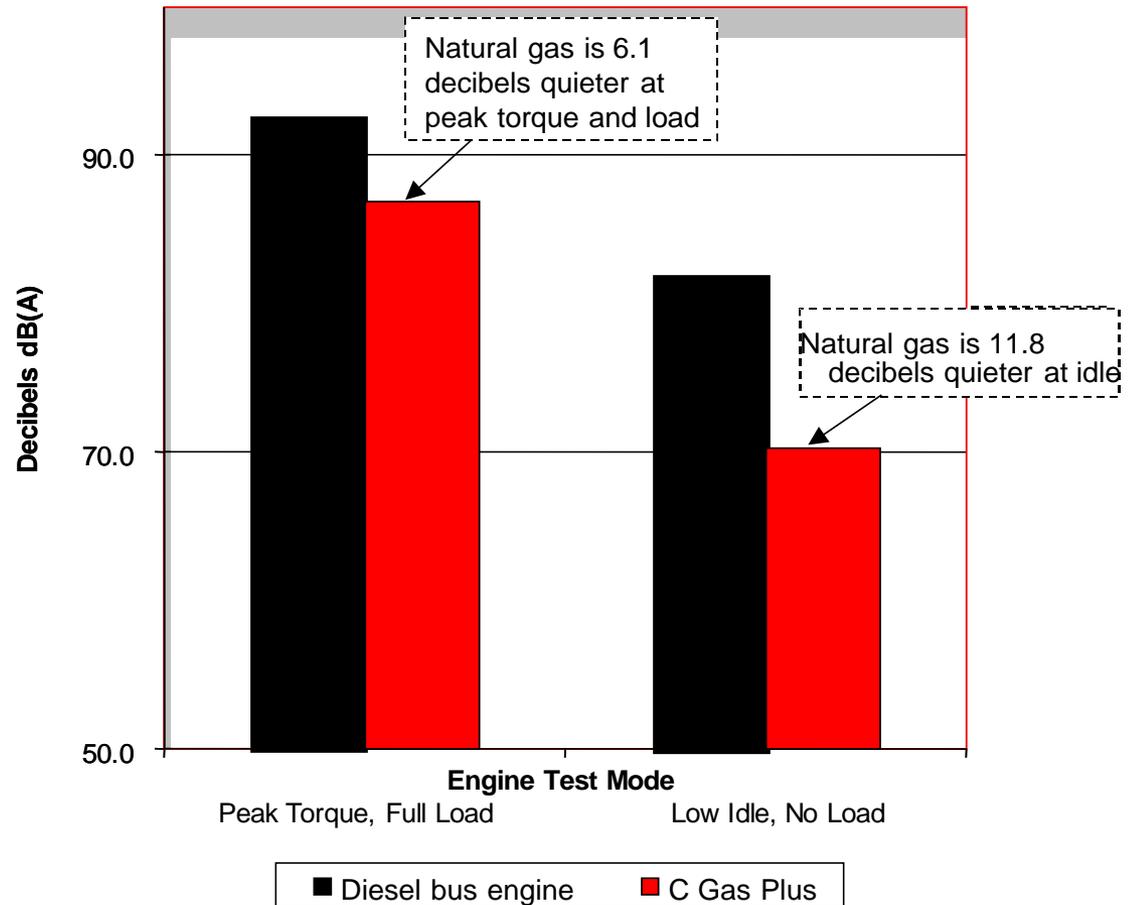
Annual Fuel Saving
depends on duty cycle
~ 30 – 40%

*Typically CNG is approximately half the price of diesel on a Diesel Equivalent Litre basis where DEL = 0.756 Kg of CNG.

Natural Gas Engines Reduce Urban Noise Pollution

Communities notice the natural gas noise advantage

ONE Diesel engine idling is louder than TEN natural gas engines idling together



TOO Cummins - Kazakhstan



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- 100% Cummins owned distribution branch
 - Established November 2010
 - Branch of OOO Cummins – Distributor for Russia & CIS

- Objective to develop Cummins business and support in Kazakhstan

- Working with our dealer TOO Kaztechnopol to develop CGas+ support





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