

Cummins Westport
The Natural Choice



Advanced Clean Transit Technology Symposium



8 February, 2016



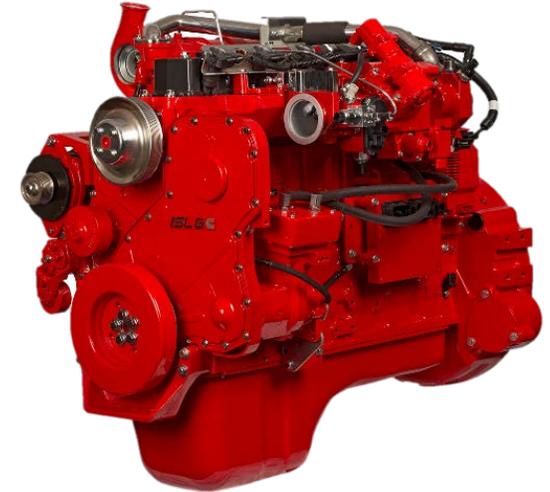
Special Thanks To :

California Environmental Protection Agency
 **Air Resources Board**



ISL G Near Zero Natural Gas Engine

- 8.9 Litre (540 cu. In.)
- In line 6 cylinder
- Charge Air Cooled (CAC)
- Spark ignition
- Peak Rating:
 - HP-320 hp Torque -1000 lb-ft
- Certified to CARB Optional Low NOx 0.02 Standard (Near Zero)
 - NOx: 0.02 g/bhp-hr
 - PM: 0.01 g/bhp-hr
- Certified to 2016 EPA / NHTSA GHG standards
- Three Way Catalyst Aftertreatment
- Manufactured by Cummins in Cummins Engine Plant- Rocky Mount, North Carolina



ISL G NEAR ZERO



ISL G Near Zero - Introduction

■ Target Markets

- Transit
- Refuse
- Medium Duty Truck – Class 6-8
- Vocational
- Shuttle Bus
- School Bus



Changes from ISL G EPA 2013

- **Certification**

- New agency approval (AP) option (data plate)

- **ECM Calibration**

- 0.02g NOx calibration
- Delegated Assembly protected via catalyst / ECM connection

- **Three Way Catalyst (TWC)**

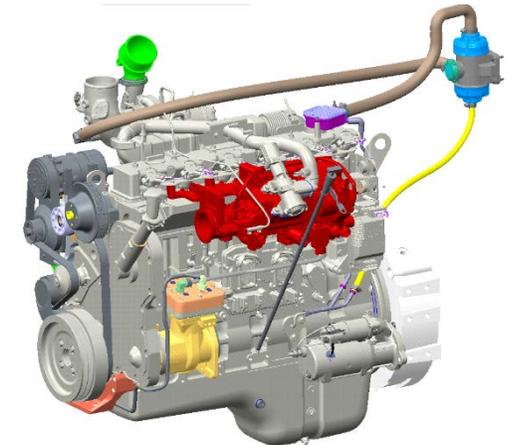
- Same as ISX12 G and ISL G Euro VI
- Has extra mid bed temperature sensor that must be added to OEM harness

- **New Closed Crankcase Ventilation (CCV) System**

- Remote mount CCV filter – to be installed by OEMs
- Similar to ISL G Euro VI, but with coolant heating (same as ISB6.7 G)
- Requires OEM installed air/oil and coolant plumbing to and from the engine

- **Crankcase Pressure Sensor**

- New for diagnostic and OBD purposes



ISL G Near Zero Launch Info

Launch Timing

- ARB & EPA emissions certification received
- Full production from Rocky Mount Engine Plant (RMEP) Q2 2016

ENGINE MODEL	ADVERTISED HP(KW) @ RPM	PEAK TORQUE LB-FT @ RPM	GOVERNED SPEED
ISL G NZ 320	320 (239) @ 2000	1000 (1356) @ 1300	2200 RPM
ISL G NZ 300	300 (224) @ 2100	860 (1166) @ 1300	2200 RPM
ISL G NZ 280	280 (209) @ 2000	900 (1220) @ 1300	2200 RPM
ISL G NZ 260	260 (194) @ 2200	660 (895) @ 1300	2200 RPM
ISL G NZ 250	250 (186) @ 2200	730 (990) @ 1300	2200 RPM

ISL G Near Zero – End Customer Impact

- **Fuel Economy**

- No change in fuel economy
- Exceeds EPA / DOT 2016 GHG standards
- Clear path to exceed EPA / DOT proposed Phase II GHG standards

- **Drivability**

- Offering same ratings as current ISL G, ideal for shuttle & school bus, urban transit, vocational and medium duty truck and tractor applications
- Same power and torque curves to meet customer demands
- Field tests underway with positive driver feedback

ISL G Near Zero – End Customer Impact

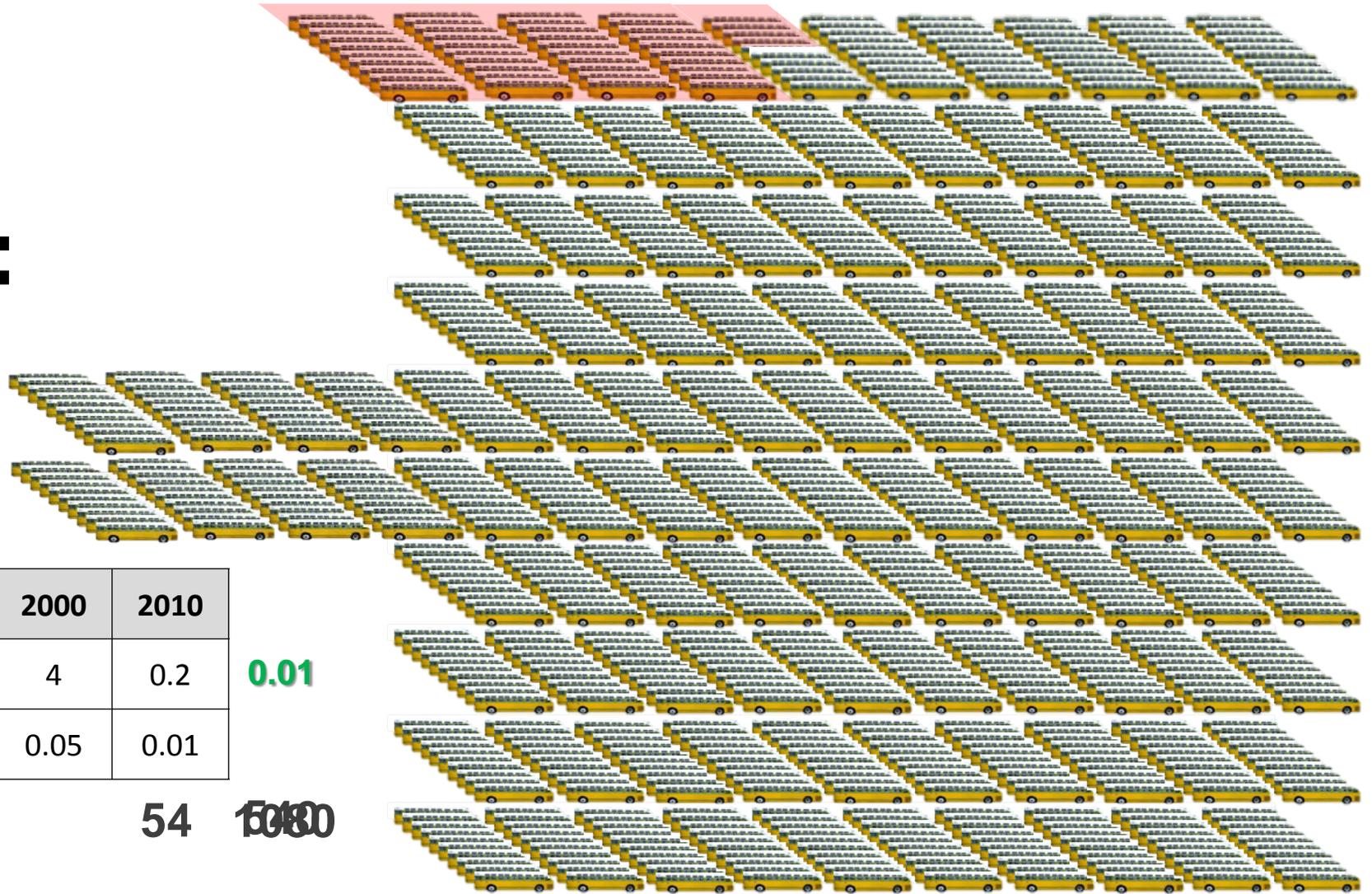
- **Durability**

- Continued high durability with minimal engine changes and use of existing larger TWC
- Fully compliant with ARB and EPA Heavy Duty engine certification requirements including emissions through engine useful life
- Same Base Warranty and Extended Coverage as current ISL G

- **Maintenance**

- New Closed Crankcase Ventilation system has 2000 hour change interval for CCV filter (see QSOL)
- No other maintenance schedule changes from current ISL G
- Technician certification requirement is same as current ISL G

Emissions Reduction Impact - NOx



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

0.01

54 150/180

Thank You !

