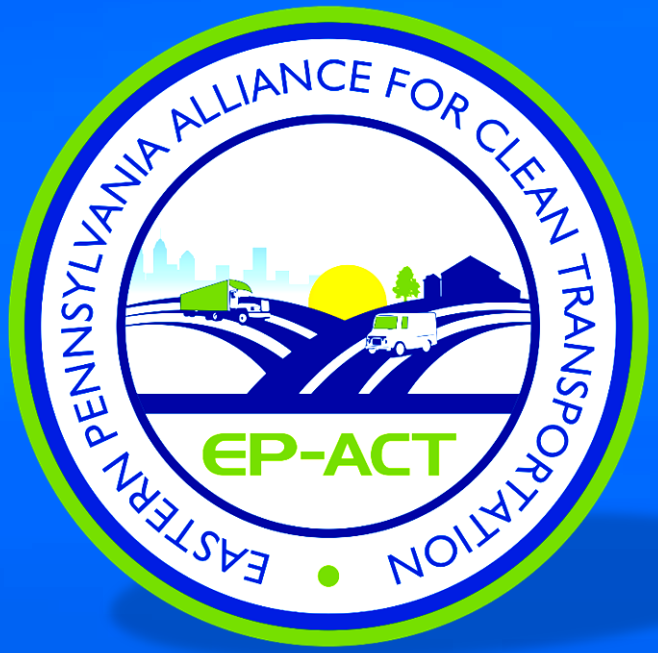
The Big 3 plus 1 for Alternatives



Annual Meeting
November 24th 2015

Special Thanks to Our Sustaining Members

AQUA
Clean Cities — U.S. Department of Energy
dvrpc — Delaware Valley Regional Planning Commission
J. Davis Inc.
Greater Philadelphia Chamber of Commerce — Get involved. Get results.
PECO — An Exelon Company
PENSKE
pennsylvania — Department of Environmental Protection
Pennsylvania American Water
ROUSH CLEANTECH
Shearon Environmental
SUNOCO
UPS
W.W. Transport
Zarwin • Baum • DeVito Kaplan • Schaer • Toddy • P.C. — Attorneys at Law

EP-ACT
Eastern Pennsylvania Alliance for Clean Transportation

EP-ACT is a member supported 501 (c) 3 non-profit organization. We rely on the generosity of our members that fund our mission of petroleum reduction within the transportation sector. We promote clean air; energy independence and economic development by using alternative fuels; vehicles; and technologies in the vehicles we drive.

www.ep-act.org 215-990-8200

For a complete list of all of our stakeholder members go to:
http://ep-act.org/stakeholders

Agenda

10:00- 10:20- *Welcome, Introductions-*
Brian Keelen- Chairman -EP-ACT

10:20- 10:35- *State of the Coalition-*
Tony Bandiero- Executive Director -EP-ACT

10:35- 10:45- *Importance of Data Collection-*
Darren Stevenson– Regional Manager -
Department of Energy

10:45- 11:00- *Fiat/Chrysler Automobiles -Alternative Fuel Vehicles*
Terri Titas– Walcott NE Region Van/Truck Manager

11:00- 11:15- *Ford Motor Company - Alternative Fuel Vehicles*
Butch Gosline- Commercial Manager

11:15- 11:30- *General Motors - Alternative Fuel Vehicles*
Tim Thompson- Fleet Account Executive

11:30- 11:40- BREAK

11:40- 11:55- *Heavy Duty Engine Platforms*
Bill Boyce- Regional Manager -
Cummins Westport Inc.

11:55- 12:10 *Freightliner –Heavy Duty Platforms*
Kevin Holland- Manager Natural Gas Vehicles Sales

12:10- 12:30 Wrap-up -Committee Info. - 2016 Planned Activities
Tony Bandiero & Caroline McCallum-
Board Member -EP-ACT

12:30- 1:30 ***Networking Luncheon***

Please join us for some early holiday cheer immediately following the event at:
Race Street Café
208 Race St, Philadelphia, PA 19106 (just down the block)

We would like to give a special thanks to our lunch sponsors :

FCA
FIAT CHRYSLER AUTOMOBILES

Ford

FREIGHTLINER

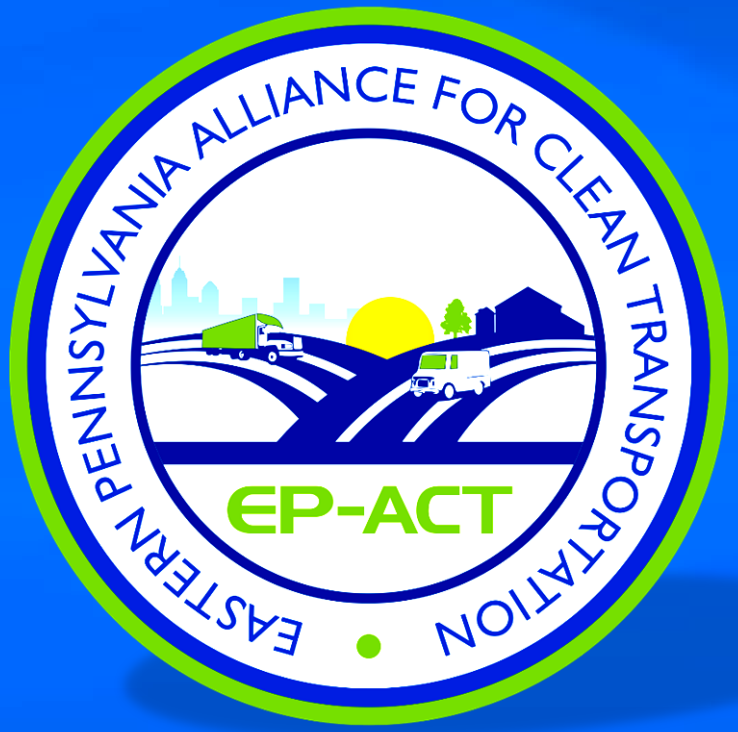
GM

Cummins Westport

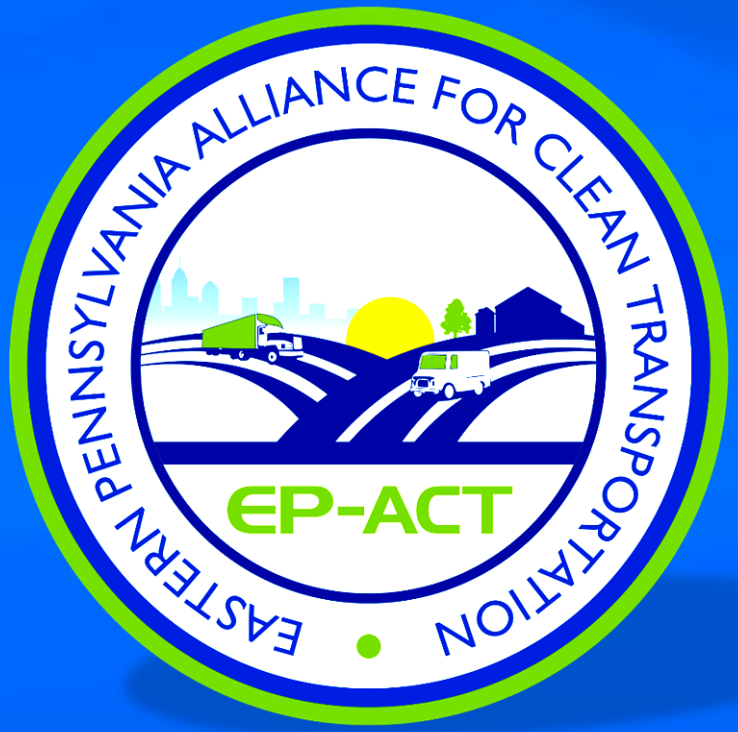
EP-ACT
Eastern Pennsylvania Alliance for Clean Transportation

Would like to wish everyone a Happy Thanksgiving and a Happy Holiday Season. We appreciate all you do to keep us

"Driving Together, Towards a Green Tomorrow®..."



Welcome & Introductions



State of the Coalition

Where are Clean Cities?

CNG Compressed Natural Gas

Electricity

Biodiesel

Ethanol

LNG Liquefied Natural Gas

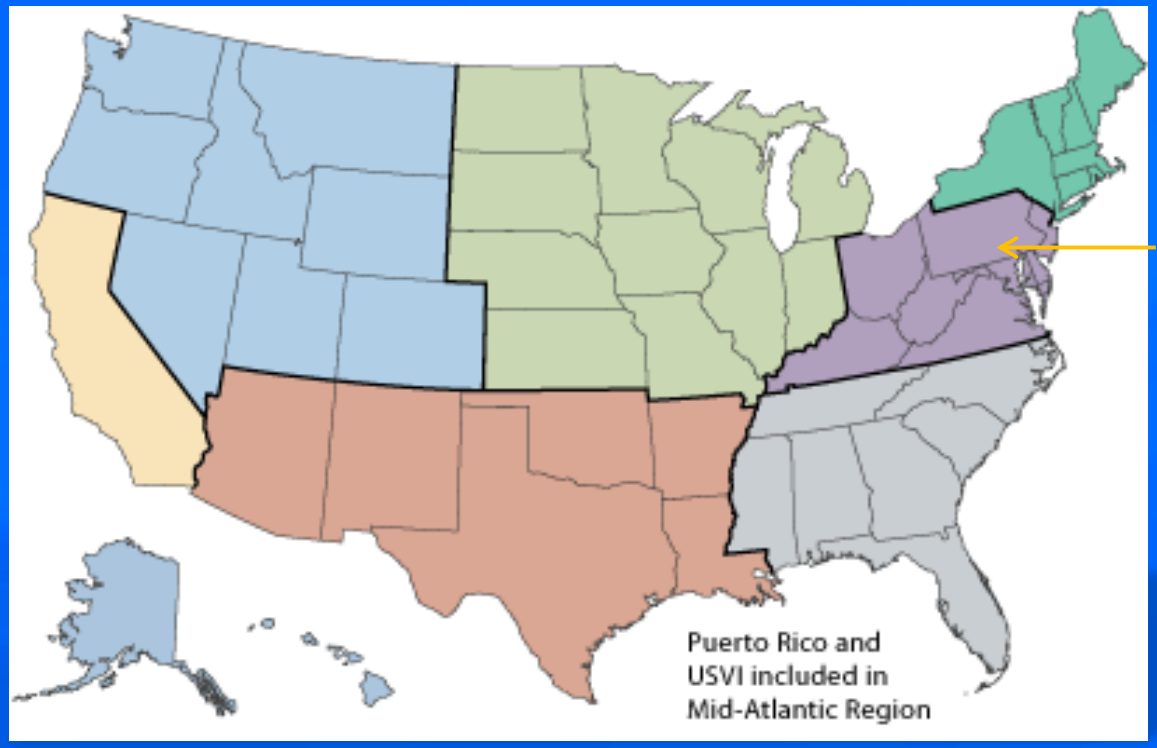
LPG Propane

H_2 Hydrogen

Idle Reduction

Fuel Economy

Where is EP-ACT?



Mid-Atlantic Region

Services

What we offer:

- Workshops/ educational seminars
- Training
- Fleet Analysis
- Facility Analysis
- Informational Resources
- Market Research
- Incentives
- Grant Writing
- Grant Administration
- Project Management
- Networking

Who is EP-ACT?


DEPARTMENT OF ENERGY
UNITED STATES OF AMERICA
pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
AQUA
DELAWARE VALLEY
dvrpc
REGIONAL
PLANNING COMMISSION
G. Davis Inc.
GREATER PHILADELPHIA
CHAMBER OF COMMERCE
Get involved. Get results.™
greaterphilachamber.com
PECO
An Exelon Company
PENNSYLVANIA
AMERICAN WATER
PENSKE
ROUSH
CLEANTECH
SHEARON
ENVIRONMENTAL
SUNOCO
ups
W.W. Transport INC
ZARWIN • BAUM • DEVITO
KAPLAN • SCHAER • TODDY • P.C.
ATTORNEYS AT LAW
AAA
Mid-Atlantic
AIR & GAS
TECHNOLOGIES
aramark
ARA
Clean Energy
Colonial
AIRPORT
PARKING
DELAWARE VALLEY
DVC
CONCRETE CO., INC.
LCSWMA
Rethink. Recover. Renew.
LOWER MERION
SCHOOL DISTRICT
MENTI
VE RI
TAS
SHARP
AUTOGAS
POWERED BY PROPANE
A Member of Alliance AutoGas
Suburban
Propane
tn
TransNet
UGI
Energy Services
Limousine and
KING
Transportation Service, Inc.
nrg
eVgo
OXFORD
Engineering Company
PGW
SCHOOL DISTRICT OF THE TOWNSHIP OF RADNOR PA
DELAWARE COUNTY
Rhoads Energy
CORPORATION
WORLEY
AND
OBETZ
PIOGA
Pennsylvania Independent
Oil & Gas Association
Bayshore
"The Truck Store"
Constellation
An Exelon Company
West
Chester
University
mobile fueling
solutions
MFS - VIRTUAL PIPELINE™
NASD
NORRISTOWN AREA SCHOOL DISTRICT
PATHS to Excellence
VNG.co
GVF
A TRANSPORTATION MANAGEMENT ASSOCIATION
LUZERNE COUNTY
TRANSPORTATION AUTHORITY
LCTA
The Partnership
TMA
AMERIgreen
Energy
TMA BUCKS
A TRANSPORTATION MANAGEMENT ASSOCIATION
TMACC
Transportation Management Association of Chester County
UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
GSA

Current Projects

The Montgomery County NGV Conversion Initiative

is a comprehensive conversion project which includes some of Pennsylvania's largest companies and a diverse set of business platforms. This project seeks to partner local transportation organizations; municipalities; public transportation; carting; construction; and service industries into one unique application, while simultaneously utilizing private investment in infrastructure to help spur the usage of Compressed Natural Gas (CNG) as an alternative to gasoline and diesel.

The Eastern Pennsylvania Propane School Bus Conversion Initiative

seeks to help 6 counties in eastern Pennsylvania, utilize 50 new school buses that run on propane. The goals and the objectives of the project are to provide air quality benefits to school children who ride these buses and fuel cost savings to those districts who utilize propane to replace diesel in their vehicles. This project will be an aggregated project with 2 private bus companies and 2 school districts brought together by The Greater Philadelphia Clean Cities Program (GPCCP).

The Keystone State LNG Conversion Initiative seeks to help fleets convert to LNG for long haul applications. Our project will utilize our centralized location near the convergence of 3 interstate highways to help construct The Commonwealths 1st public LNG refueling site. Our project will consist of building a public LNG site that will be anchored by a fleet of 20 Class 8 tractors. This project will help stimulate the use of LNG as an alternative to gasoline and diesel for long haul applications.

COMPLETED 8/2015

The Northeast Extension CNG Conversion Initiative seeks to spur the acceptance of utilizing compressed natural gas as a vehicle fuel. Our 2 project partner's unique application will convert 23 vehicles that will utilize a new CNG fueling station. This project will introduce CNG to the public and to private companies that run along the Northeast extensions of the interstate highways. The project will promote the economic and environmental benefits of CNG in the Northeastern part of Pennsylvania.

The Southeastern PA CNG Vehicle Conversion Initiative

This project will introduce CNG to southeastern PA by showcasing some of the region's most recognizable companies and their own fleets utilizing CNG as a motor fuel. The strength of this application comes from the commitment by all project partners, even business competitors, to utilizing PA's abundance of natural gas. The aggregation of all of our partners into a single application will promote the acceptance and new opportunities possible when businesses of all types support natural gas as a conventional motor fuel.

The Tinicum Township Propane Vehicle Conversion Initiative seeks to convert 3 separate fleets in Tinicum Township from gasoline to propane fuel. The aggregation of these companies together will convert 34 vehicles ranging from Ford Crown Victoria Police Cruisers to dedicated E-450 shuttle buses.

The W.W. Transport and Easton PA CNG Vehicle Conversion Project

This project seeks to expand the usage of natural gas as a domestically produced reliable vehicle fuel. This project will help spur the usage of CNG to an undersubscribed area, in both the availability of regional infrastructure and vehicle conversions. Our project will help purchase and convert 30 Class 8 diesel tractors to CNG. The development of this project will be instrumental in helping Northampton county and more specifically Easton PA with its foray into using CNG as a vehicle fuel.

The Commonwealth Energy Group CNG Vehicle Conversion Initiative

is a project assembled by the Eastern Pennsylvania Alliance for Clean Transportation (EP-ACT) which aggregates 3 unique business platforms into a single application for CNG vehicle conversions. The project will commence around a newly planned CNG fueling station located at 1325 East Drinker Street, Dunmore, PA 18512, near Scranton Pennsylvania. Our 3 project partners; Road Scholar Trucking; DeNaples Auto Parts; DeNaples Sanitation combined will convert 19 vehicles from diesel to run on CNG. This project will be the stepping stone for each of our partners foray into utilizing the Commonwealth abundance of natural gas as a vehicle fuel.

Current Projects Vehicles Deployed

The Montgomery County NGV Conversion Initiative

26 Various dedicated CNG

7 LEFT TO COMPLETE

The Eastern Pennsylvania Propane School Bus Conversion Initiative

26 dedicated Propane School Buses

24 LEFT TO COMPLETE

The Keystone State LNG Conversion Initiative

20 LNG Class 8 Tractors

COMPLETED

The Northeast Extension CNG Conversion

17 dedicated CNG

12 LEFT TO COMPLETE

The Southeastern PA CNG Vehicle Conversion Initiative

17 dedicated CNG under 14000 GVW

14 LEFT TO COMPLETE

The Tinicum Township Propane Vehicle Conversion

15 propane vehicles

19 LEFT TO COMPLETE

The W.W. Transport and Easton PA CNG Vehicle Conversion Project

Ordered 5 dual fuel, 25 dedicated CNG in 2016

30 LEFT TO COMPLETE

The Commonwealth Energy Group CNG Vehicle Conversion Initiative

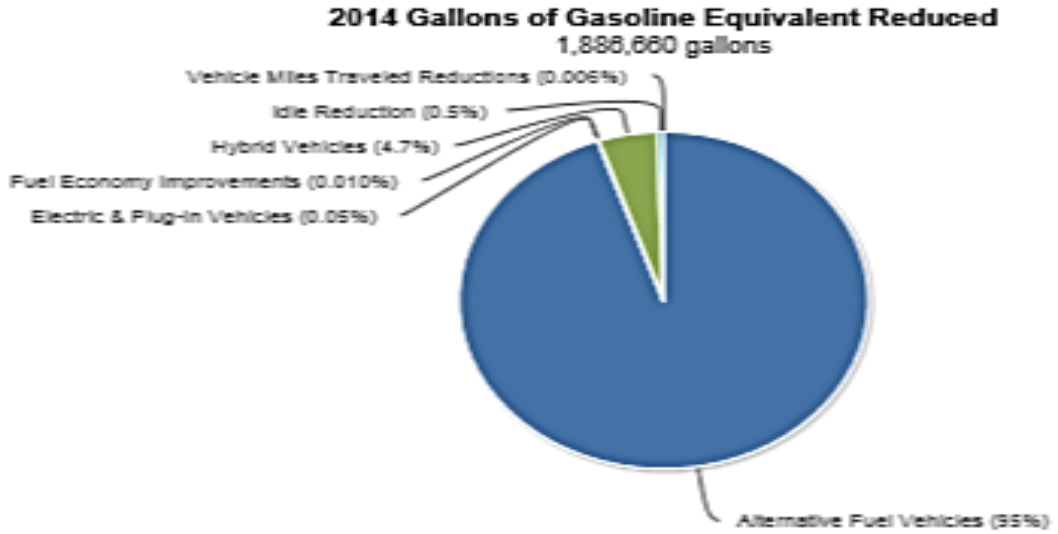
Not started

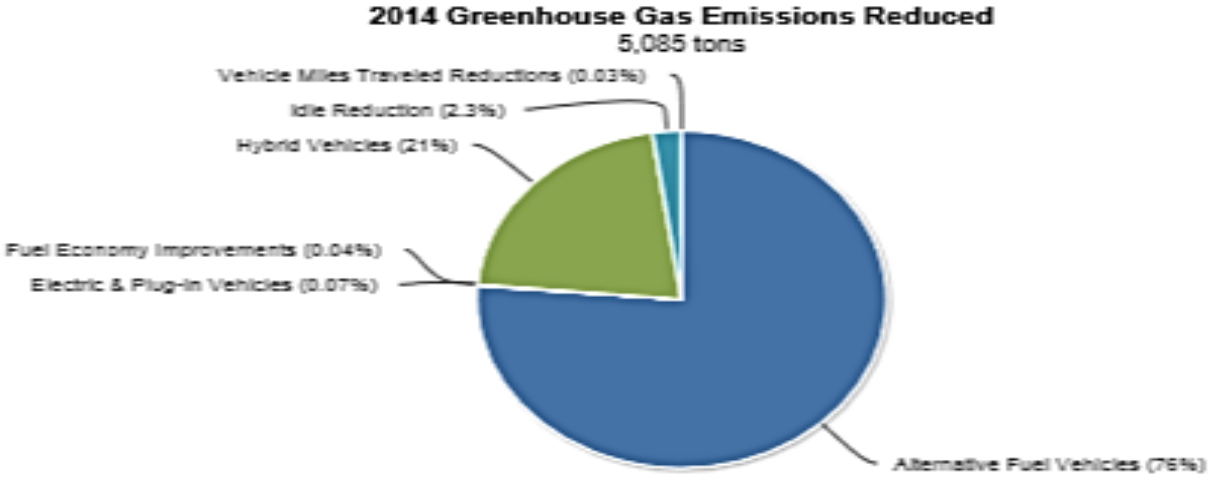
23 LEFT TO COMPLETE

121 Various alternative fuel vehicles on the road from 2014-2015

129 Alternative Fuel Vehicles remaining by end of 2016

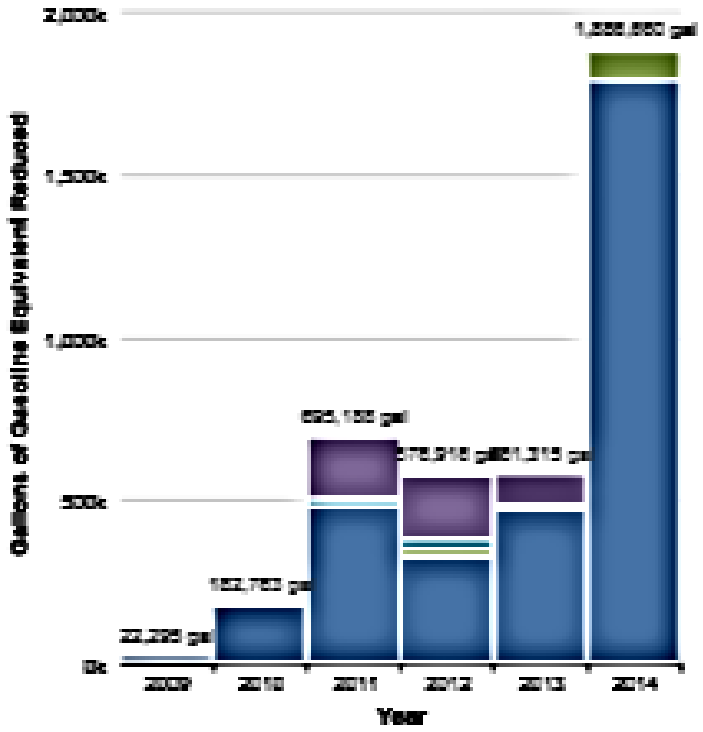
Snapshot of Performance



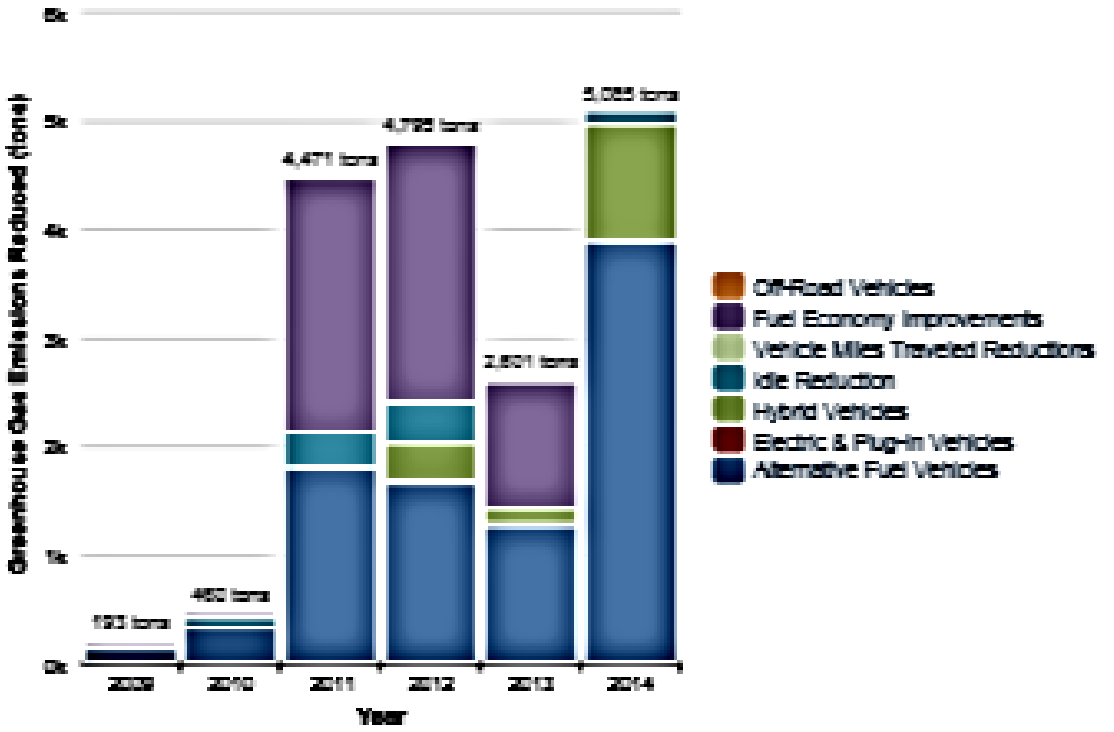


Snapshot of Performance

Historical Gallons of Gasoline Equivalent Reduced



Historical Greenhouse Gas Emissions Reduced



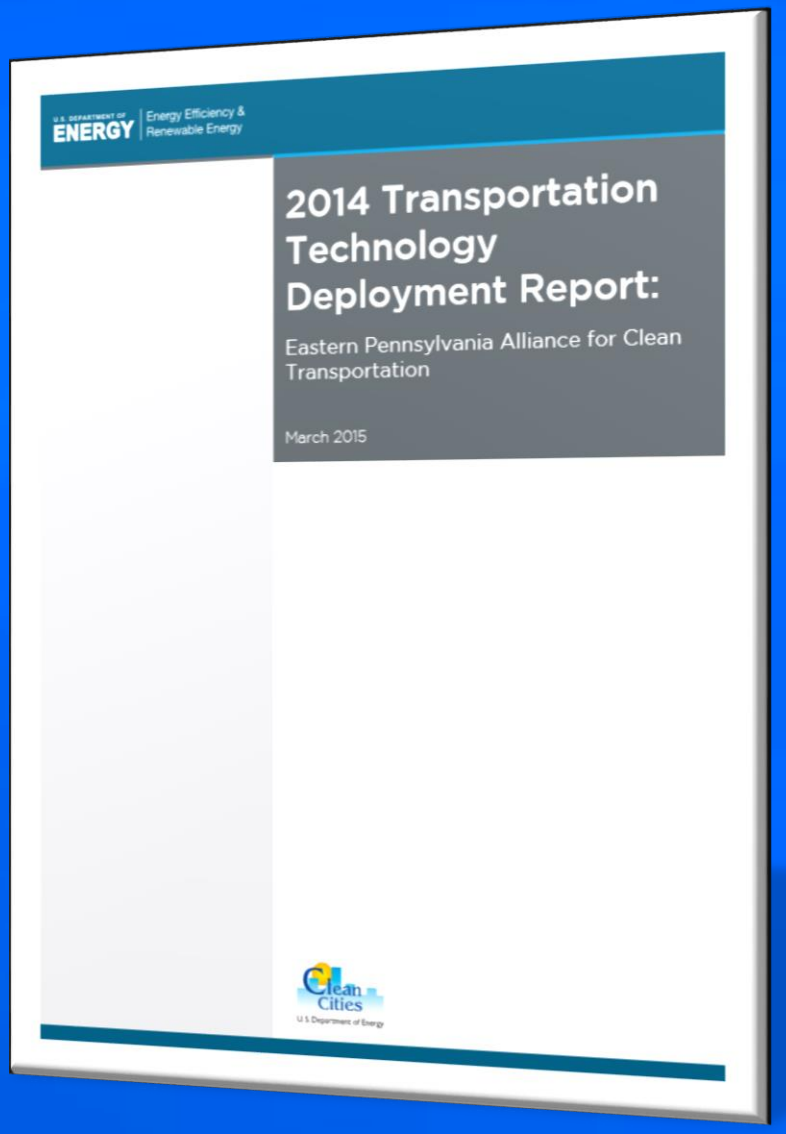
Snapshot of Performance

Last Year's Displacement (2013) = 581,315 GGE's
This Year's Displacement (2014) = 1,886,660 GGE's
Increase of Displacement = 1,305,345 GGE's
Percentage Increase = 224%

Last Year's GHG's Reduced (2013) = 2,601 tons
This Year's GHG's Reduced (2014) = 5,085 tons
Increase in Reduction = 2,484 tons
Percentage Increase = 95.5%

Snapshot of Performance

Performance Report



Importance of Data Collection

FCA

FIAT CHRYSLER AUTOMOBILES

Alternative Fuel Platforms

FCA

FIAT CHRYSLER AUTOMOBILES

Terri Titas

North East Truck and Van Manager

USA-NAFTA

12/4/2015

NAFTA

REGION


Challenger
R/T

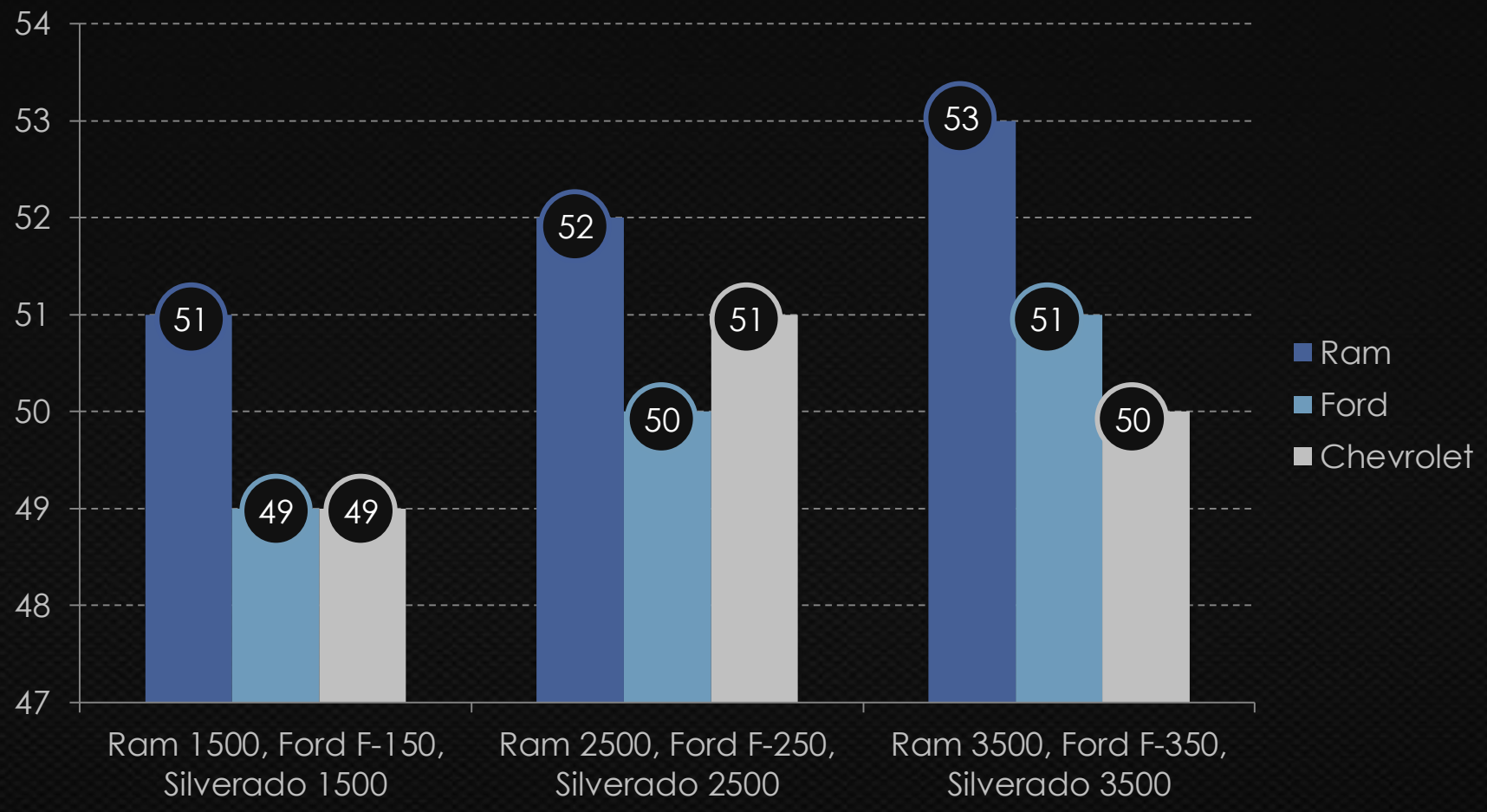
2500 CNG

2500 CNG

2500 CNG

- 703-MILE EPA COMBINED DRIVING RANGE
- SLT AND TRADESMAN
  - REGULAR CAB AND CREW CAB
  - 4X2 AND 4X4
- 5.7 HEMI V-8
- 5 LINK COIL REAR SUSPENSION
- 3 LINK FRONT HEAVY DUTY SUSPENSION

BEST DOMESTIC RESIDUAL - LIGHT AND HEAVY DUTY TRUCKS



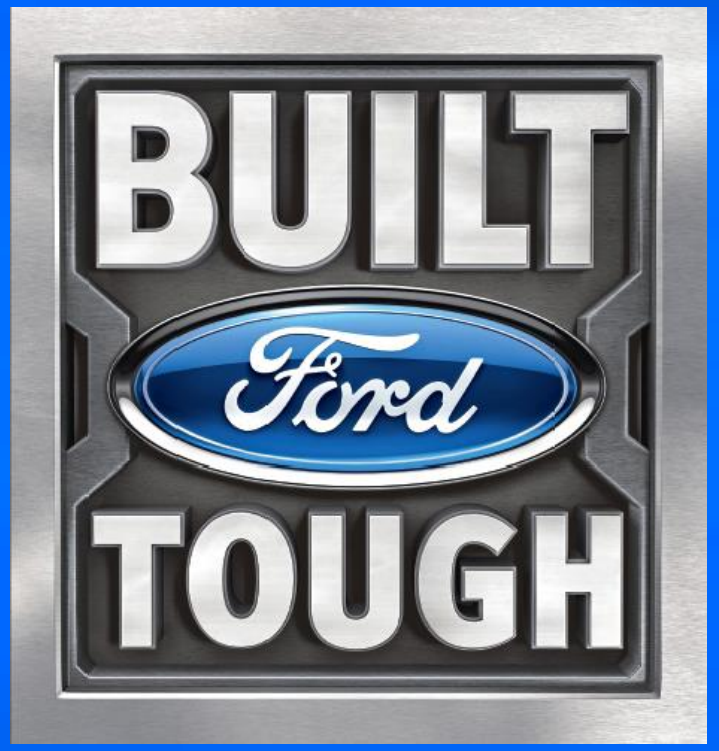
Based on Blackbook 36/months 45,000 miles

TOWN & COUNTRY

Stay Tuned for the Release of the New Town and Country Mini-Van

FIAT 500E

- 87-MILE EPA COMBINED DRIVING RANGE
- 83 KW ELECTRIC MOTOR DELIVERS 111HP AND 147 LB-FT TORQUE
- 24 KWH RECHARGEABLE LITHIUM-ION BATTERY
- STATE-OF-THE-ART ELECTRONIC PUSH-BUTTON SHIFTER
- PROJECTED LONGER BRAKE LIFE THAN CONVENTIONAL VEHICLES



Alternative Fuel Platforms

COMMERCIAL VEHICLES
FORD.COM

GENERAL MOTORS FLEET

Alternative Fuel Platforms

GENERAL MOTORS FLEET

TIM THOMPSON

GM FLEET & COMMERCIAL SALES

2016 2500/3500HD BI-FUEL CNG PICKUP

- Runs of either gasoline or compressed natural gas
- Available in Crew, Double and Regular cab styles
  - Standard or long box, 2-wheel drive or 4 x 4, single rear wheel only

2500/3500HD BI-FUEL CNG

- Single fuel gauge for both gasoline and CNG

  - Gauge changes over automatically as fuel source changes
  - Driver Information Center shows quantity of fuel not currently in use

- Fuel selector switch now integrated into center stack switch bank

PERFORMANCE

- 17 GGE Capacity CNG tank
  - Type 3, aluminum liner with carbon fiber wrap
  - CNG range is ~190 to 200 miles
  - With 36 gallon gasoline tank, combined range is more than 600 miles

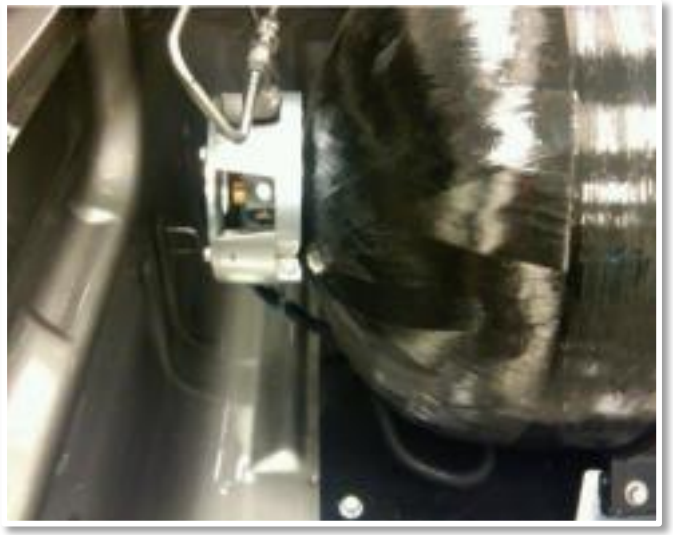
2016 CNG BI-FUEL CAB CHASSIS

- New CNG offering
- Regular cab only
  - 60” CA (C/K36003)
  - 84” CA (C/K36403)
- 2WD & 4WD
- 24 gge CNG tank
  - Type 3 construction
  - Supplied by SCI
  - Estimated 300 mile CNG range
- IMPCO is Tier 1 supplier
  - Assembly at Union City, IN facility
- SORP Q4, 2015

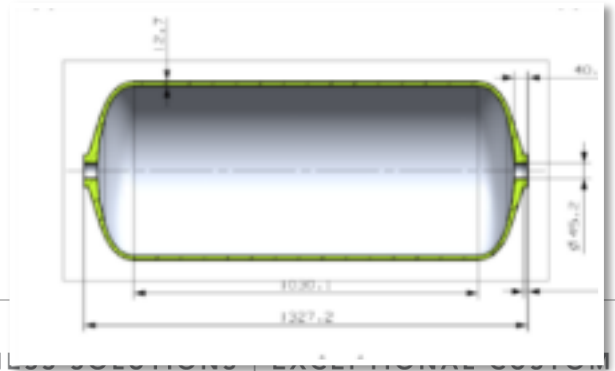
New for 2016

CRASHWORTHINESS

- Four vehicle barrier tests
  - 30MPH 0° frontal
  - 30MPH 30° offset frontal
  - 50MPH side moving deformable barrier
  - 55MPH rear 70% overlap moving deformable barrier



- Two component tests
  - Blunt object impact to tank at valve end (simulates side pole impact)
  - Sled test impact to tank and cover assembly (simulates moving objects in the bed)

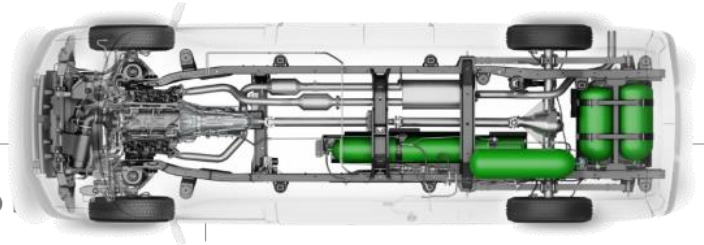


FULL FACTORY WARRANTY FOR CNG/BIFUEL

- The 2016 Bi-Fuel CNG Silverado and Sierra 2500/3500HD both feature a Compressed Natural Gas (CNG) option that is engineered, tested and validated by GM.
- This option is available with both standard and long-box beds, in 2WD and 4WD models for all cab styles.
- GM Bi-Fuel CNG vehicles are the only trucks in their classes covered by a full factory warranty.
  - CNG fuel delivery and storage system are covered by warranty, serviced at Chevrolet and GMC dealers
  - All major components have GM service part numbers

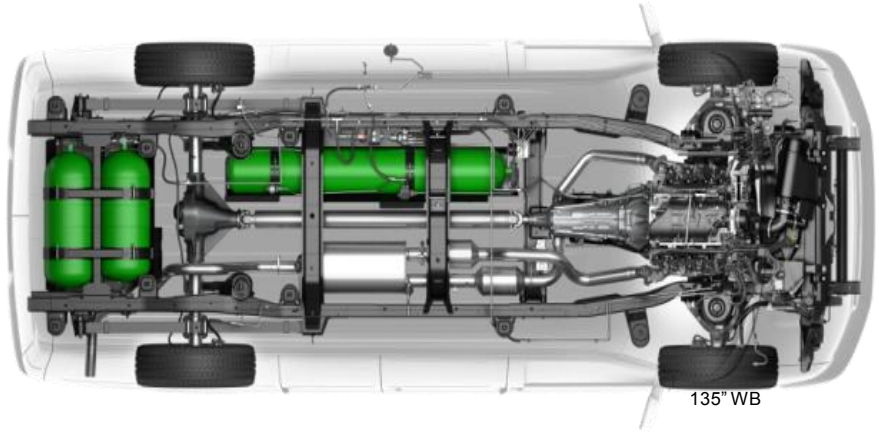
2500/3500 DEDICATED CNG CARGO VANS

- Now available in both regular and long wheel base
- Continued availability of either 3 or 4 tank versions
  - Four-tank design holds 23 GGE
    - **300+ mile range**
  - Three-tank design holds 16 GGE
    - **200+ mile range**
  - Secondary ship-thru's available

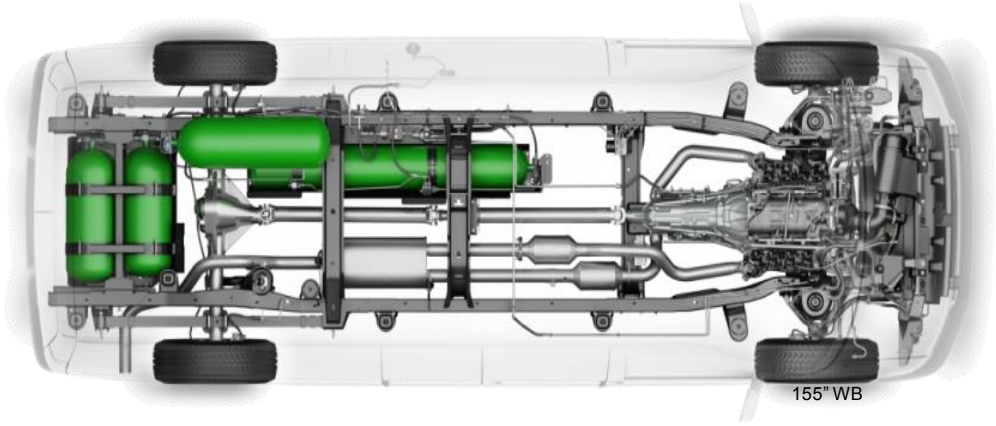


TANK OPTIONS

- Three-tank design holds 16 GGE (base)
  - **200+ mile range**
    - Depends on usage and driving style



- Four-tank design holds 23 GGE (opt.)
  - **300+ mile range**
    - Depends on usage and driving style
  - Available on cargo or passenger
  - 4th tank mounted on cargo floor inboard of left rear wheel housing
    - Dimensions available in GMUpfitter.com



2016 CNG BI-FUEL IMPALA

- 3.6L V6 (LFR)
  - Port Fuel Injection
  - DOHC with Variable Valve Timing
  - Naturally aspirated

- Horsepower/torque (lb.-ft.)
  - 230/218 (CNG)
  - 260/247 (gasoline)

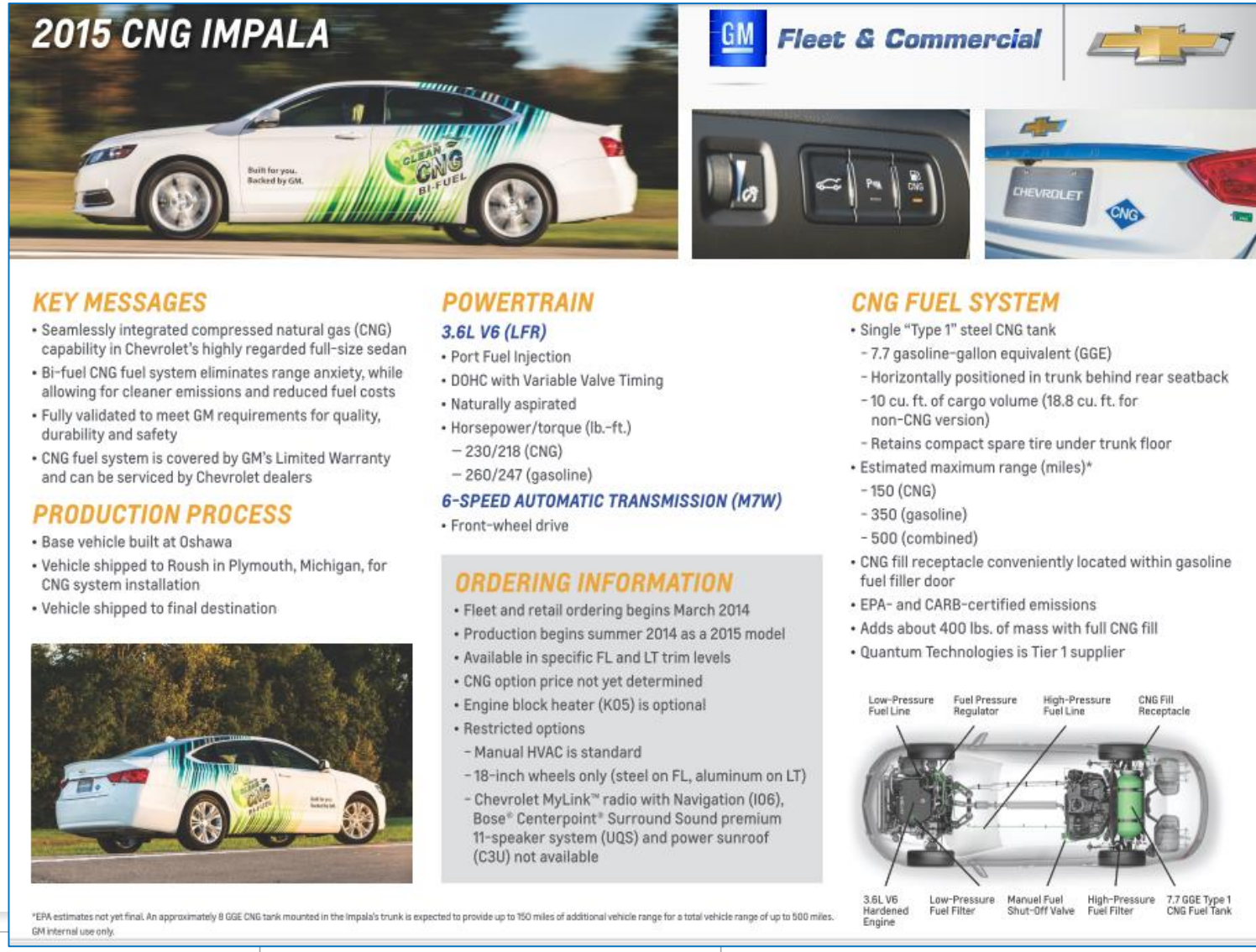
- Starts on CNG when temperature allows

- EPA and CARB-certified emissions

- Quantum Technologies is Tier 1 supplier for the CNG fuel system integration

2016 BI-FUEL IMPALA

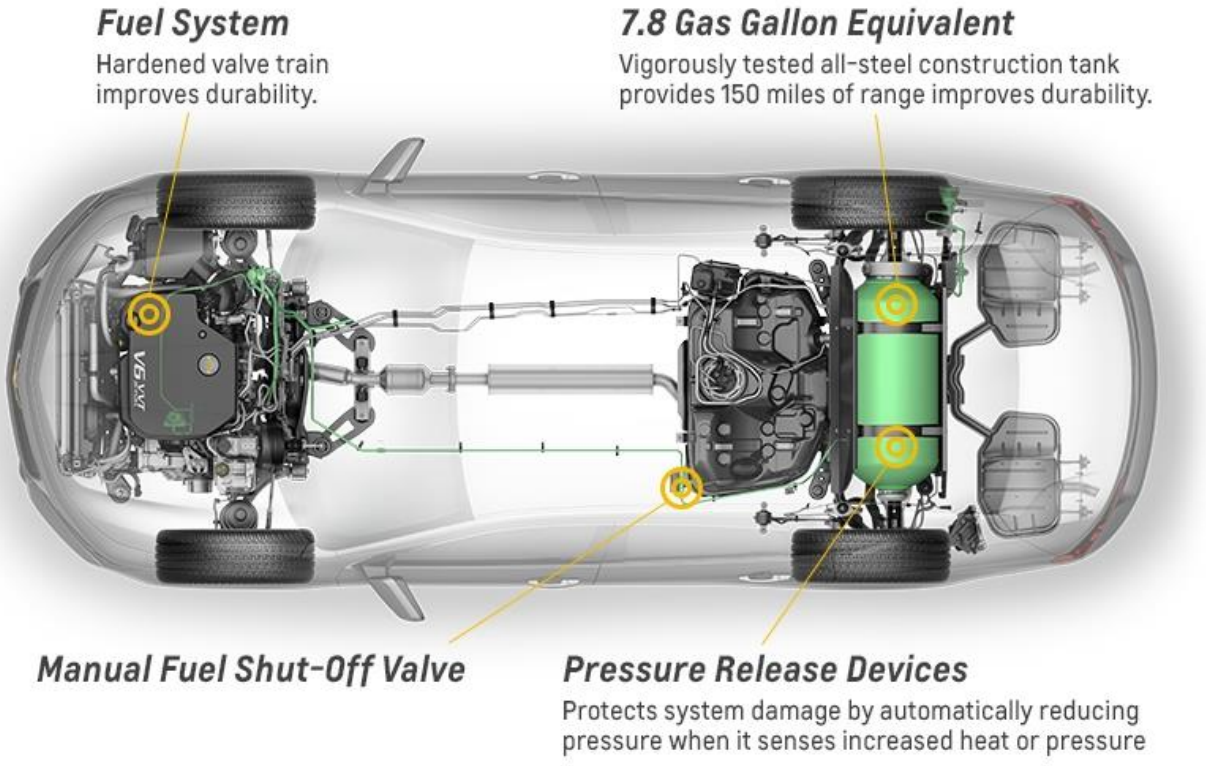
- 2016 Ordering 8/20/15
- Two models
  - 2FL (LS) base car
  - 3LT (1LT) uplevel
- 7.7 gallon CNG tank for 150 miles range
- Gasoline system is intact and adds 400 miles range
- 20 Impala's available in eFleet MY 2015



2016 IMPALA BI-FUEL SAFETY

Durability and safety testing at the tank's normal operating pressure of 3,600 PSI and higher subjected it to normal and extreme situations, exceeding federal requirements and CNG industry guidelines.

- Front barrier, side impact and rear impact crash tests were conducted on the Bi-Fuel Impala.
- Some aftermarket CNG-conversion kit manufacturers conduct only a barrier test.



TESTED BEYOND INDUSTRY STANDARDS

Barrier tests are not required by industry standards. But they are conducted by Chevrolet. Most aftermarket kits are only faced with one head-on collision test. Bi-Fuel Impala underwent six at GM's Milford Proving Grounds.

Post-test photo shows CNG tank integrity

2016 CNG BI-FUEL IMPALA

- Single “Type 1” steel CNG tank
- 7.8 gasoline-gallon equivalent (GGE)
  - 10 cu. ft. of cargo volume (18.8 cu. ft. for non-CNG version)
  - Retains compact spare tire under trunk floor
- Estimated maximum range (miles)*
  - 150 (CNG)
  - 350 (gasoline)
  - 500 (combined)

*Will vary based on driving habits, vehicle load, etc.

CNG BI-FUEL IMPALA PRODUCTION PROCESS

1. Impala produced at Oshawa, Ontario

2. Vehicle shipped to Roush Performance in Plymouth, MI for CNG installation

3. Vehicle shipped to final destination for customer delivery.

KEY ADVANTAGES OVER NON-OEM SOLUTIONS

- Entire vehicle is covered by GM New Vehicle Limited Warranty
- Can be serviced at all Chevrolet and GMC Dealers
- Validated to GM's quality, reliability and durability standards
- Consistent manufacturing, built using GM assembly processes

2016 CHEVROLET VOLT

- An all new car from the bottom - up
- 53 miles e-range and 41 mpg when on gasoline
- New 1.5L engine, aka “range extender” engine now uses regular gas
- 18.4 kWh battery is +1.3 kWh vs 2015 battery 16.1
- Seats 5 passengers

- Battery is lighter yet more powerful, combined gas and e-range is 400 miles.
- Car body is lighter, powertrain and battery are both lighter – smarter engineering

2017 CHEVROLET BOLT EV

Bolt Quick Look

- **Chevrolet Bolt an Electric Vehicle with +200 miles of range**
- **Production 4th quarter 2016, at Lake Orion, MI assembly plant as a 2017 Model year vehicle**
- **Pricing, base LT, $36,970.**
- **With tax credit of $7,500 available for $29,470**
- **Bigger than a Sonic, smaller than Nissan Leaf**
- **EPA classification – TBD Small Wagon-Crossover or Mid-size Hatchback**
- **No maintenance - just rotate tires**

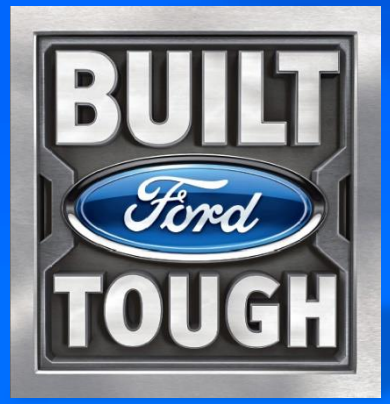
CHEVROLET COLORADO AND GMC CANYON 2.8L 4-CYLINDER DURAMAX® TURBO-DIESEL

- First turbo-diesel to U.S. market in a midsize pickup
- No compromises!
  - Performance, durability and fuel economy
    - 2.8L Duramax®:
      - 181 horsepower @ 3,400 rpm
      - **369 lbs.-ft. torque** @ 2,000 rpm
  - Fuel economy not yet announced
- Production begins Q4 2015
- Cleanest Duramax® diesel ever
- B20 compatible

New for 2016

GENERAL MOTORS FLEET


FCA
FIAT CHRYSLER AUTOMOBILES


BUILT
Ford
TOUGH


GENERAL MOTORS FLEET
GMC


BREAK


Cummins

Westport


FREIGHTLINER


CNG
COMPASS NATURAL GAS

Westport

Heavy Duty Engine Platforms

Cummins Westport
The Natural Choice

CWI Engine Update

EP-ACT
Eastern Pennsylvania Alliance for Clean Transportation

November 24, 2015

Cummins Westport Inc. (CWI)

- Cummins Westport is a 50:50 joint venture company
  - Cummins Inc. - world's largest builder of commercial diesels,
  - Westport Innovations Inc. - world leader in gaseous fuel engine technology
- CWI offers 6 to 12 litre alternative fuel automotive engines. (CNG, LNG, RNG)
- Engines are manufactured by Cummins.
- Parts, service and training support through the Cummins Distributor network.
- Over 50,000 engines in service worldwide
- Contract renewed for 10 years in 2012

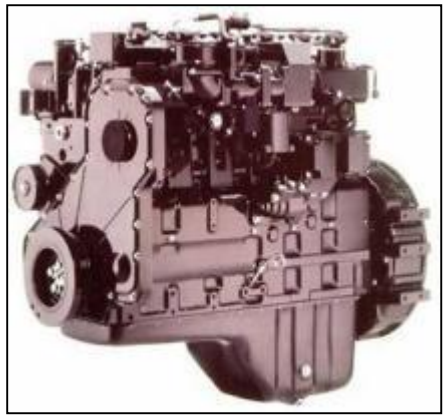
Cummins Westport

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*

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 and ISX12 G

- Introduced in June 2007
- ISX 12 G in 2013
- Stoichiometric EGR combustion, three way catalyst
- First HD engine certified 2010 NOx and PM levels

Continued Emission Leading Performance

C Gas Plus

First engine 2004 EPA Certified

1.8 g/bhp-hr. NOx

Lean Burn Combustion

2001

ISL G

First HD engine certified 2010 EPA/ARB

0.2 g/bhp-hr. NOx

SEGR Combustion

2007

ISX12 G

HD Truck engine certified EPA/ARB

0.15 g/bhp-hr. NOx

SEGR Combustion

2013

ISB6.7 G

Mid range engine certified EPA/ARB

0.1 g/bhp-hr. NOx

SEGR Combustion

2016

ISL G NEAR ZERO

First engine Certified Near Zero ARB

0.02 g/bhp NOx

SEGR Combustion

2016

Particulate Matter (PM)

All CWI engines have met the 2010 EPA/ARB Particulate Matter (PM) standard (0.01 g/bhp-hr.) with a catalyst since 2001

2015/16 Cummins Westport Products.

ISB6.7 G

6.7 Litre

Spark Ignited
SEGR
Three Way Catalyst

ISL G

8.9 Litre

Spark Ignited
SEGR
Three Way Catalyst

Up to 60,000 miles/year
66,000 lb. GVW

CNG LNG

ISX12 G

11.9 Litre

Spark Ignited
SEGR
Three Way Catalyst

Up to 80,000 lb. GVW

ISB6.7 G: The Right Applications

- Medium Duty Market
  - Type C School Bus
    - Lead OEM is Thomas Bus
  - Shuttle bus
    - ElDorado, New Flyer MiDi
  - Pickup and Delivery Truck
  - Medium Duty Specialty Vehicles
    - Street sweeper, yard spotter, etc.)

For these reasons, natural gas adoption rate will continue to increase.

- Continued low NG fuel costs
- Increased fueling infrastructure
- More NG engines & vehicles available

Market Segment	NG Market Adoption Rate	
	2014	2018 Projection
Transit Bus	25%	25-30%
Refuse Truck	49%	50-60%
HD Truck	< 1%	4-10%

Historical Success:

Urban Return-to-Base Fleets

The Next Opportunity:

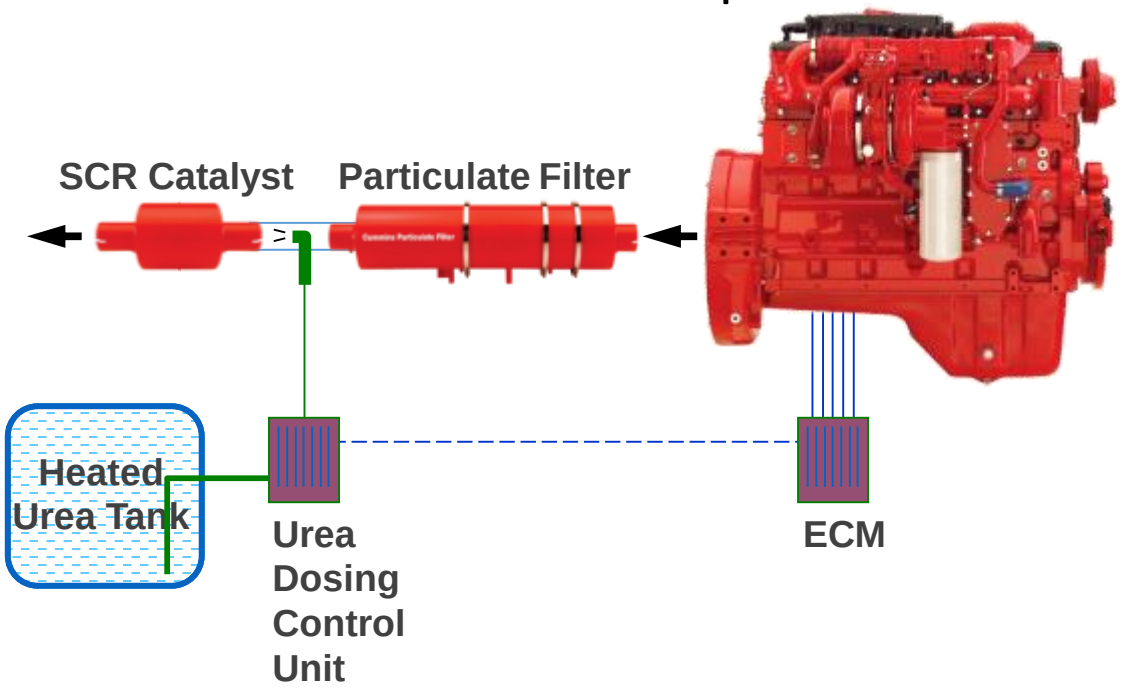
Regional and Long Haul Fleets

Natural Gas Engines: Features

- ISX12 G : 12 Liters, 80,000 lb GVW
- ISL G : 9 Liters, 66,000 lb GVW
- Use 100% Natural Gas
  - Stored as CNG, LNG, RNG
- Spark Ignited, In-line 6 cylinder
- Wastegate Turbocharger
- Charge-Air Cooled (CAC)
- Stoichiometric EGR Combustion
- Three Way Catalyst Aftertreatment
  - Maintenance Free
- Base Warranty: 2 yr/250,000 miles
- Extended Coverage Available

2015 Engines Aftertreatment Comparison

2015 Diesel



ISL G

ISX12 G

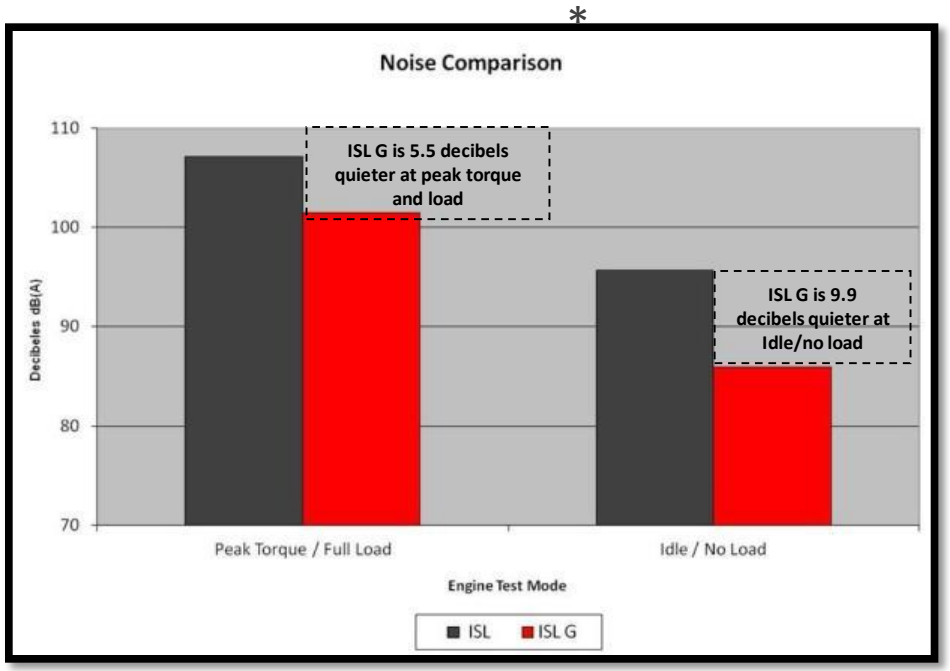
Three Way Catalyst

Reduced Noise

Spark ignition provides quiet operation

Communities notice the natural gas noise advantage.

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



* ISX12 G Noise Data TBA

Natural Gas Range

- Natural gas engine mpg lower tha
  - Lower compression
  - Throttled inlet versus fuel injected
- Example:
  - Diesel fuel economy 5 mpg
  - Natural gas fuel economy 4.5 mpg

- Diesel Fuel Storage 60 g = range 300 miles
- CNG Fuel Storage 60 dge = range 270 miles
- Important to look at cost per mile as natural gas fuel cost is typically less than diesel.

Transit Availability

TRANSIT BUS					
OEM	New Flyer	NABI	Nova	ElDorado	Gillig
					
Model	30/35/40/60 Low Floor	35/40 Low Floor 60 BRT	LFS	EZ Rider II	30/35/40 Low Floor
Engine	ISLG 280/320	ISLG 280/320	ISL G 280	ISLG 250/280	ISLG 280

COACH	
OEM	MCI
	
Model	Commuter Coach
Engine	ISLG 320 ISX12 G 400

ISL G Conventional Truck Availability

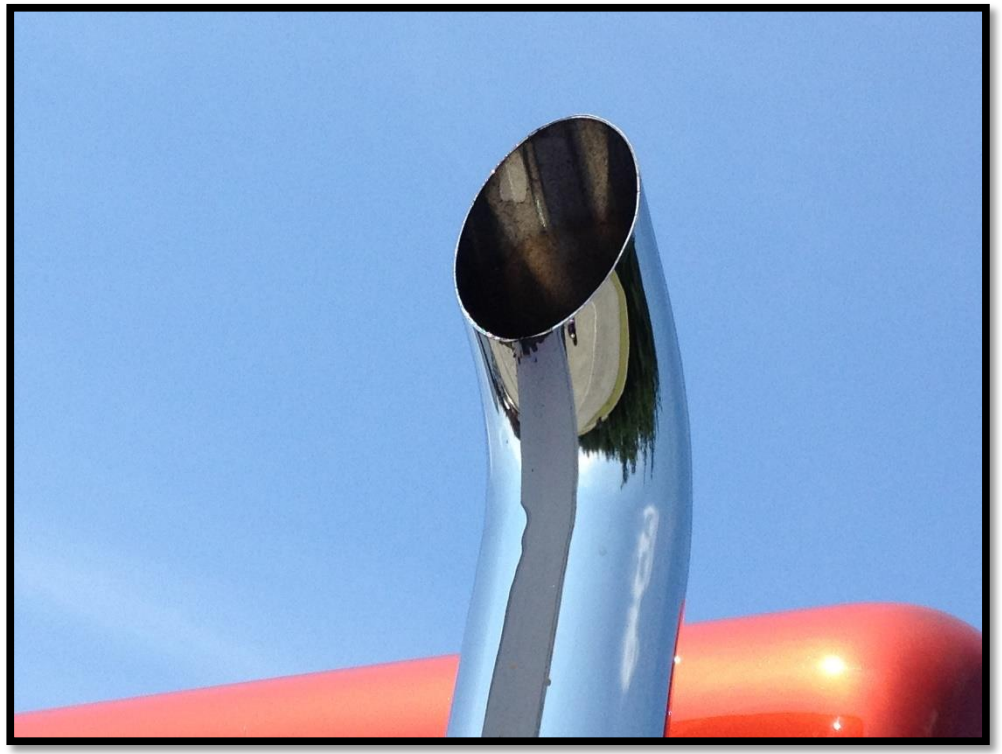
OEM	Freightliner	Peterbilt	Kenworth	Volvo	Navistar
					
Model	M2 – 112 SD - 114	320 384 365	T800SH W900S T440 T470	VNM	TranStar
Engine	ISLG 320 ISL G 300	ISL G 320	ISLG 320	ISL G 320	ISL G 320
Application	6x4 Tractor 4x2 Tractor 4x2 Truck 6x2 Truck Vocational	Tractor Vocational Mixer	Tractor Vocational Mixer	Tractor	Tractor

ISX12 G Availability

OEM	Freightliner	Peterbilt	Kenworth	Volvo	Mack	Autocar
						
Model	Cascadia Day Cab, **Sleeper ***	320 384 365 **579 *** **567***	W900S T660 T800 SH **T680 ***	VNL	Pinnacle	Xpeditor
Engine	ISX12 G	ISX12 G	ISX12 G	ISX12 G	ISX12 G	ISX12 G
Application	Tractor	Refuse Tractor Vocational	Tractor Vocational	Tractor	Tractor Vocational	Refuse
			CNG LNG			

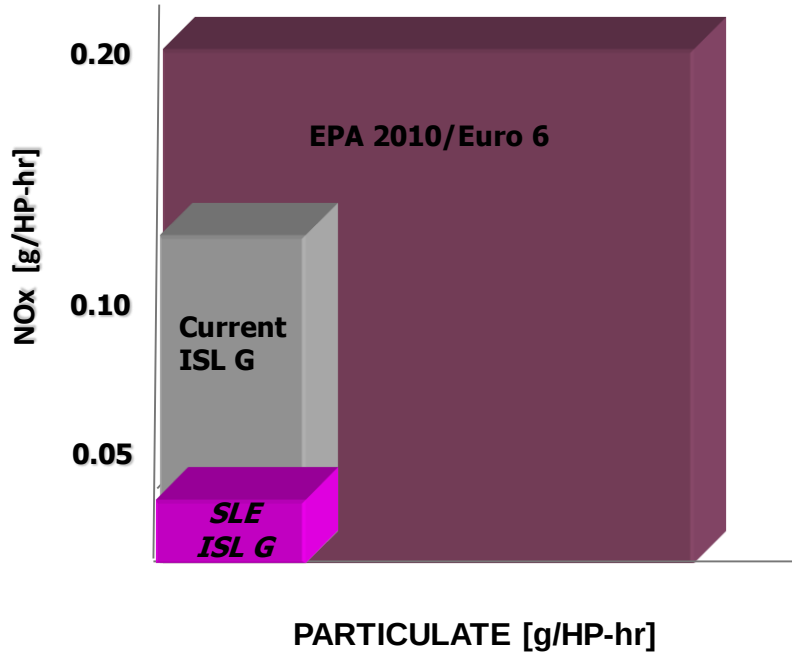
* New chassis in 2014

Coming Soon….Near Zero NOx ISL G



Near Zero NOx Internal Combustion Engine

- Low NOx Engine Development currently underway
- Product development process includes extensive field testing
  - Lower Nox and GHG
  - CWI expects to be ready for field testing by 2015



Near Zero NOx ISL G Summary

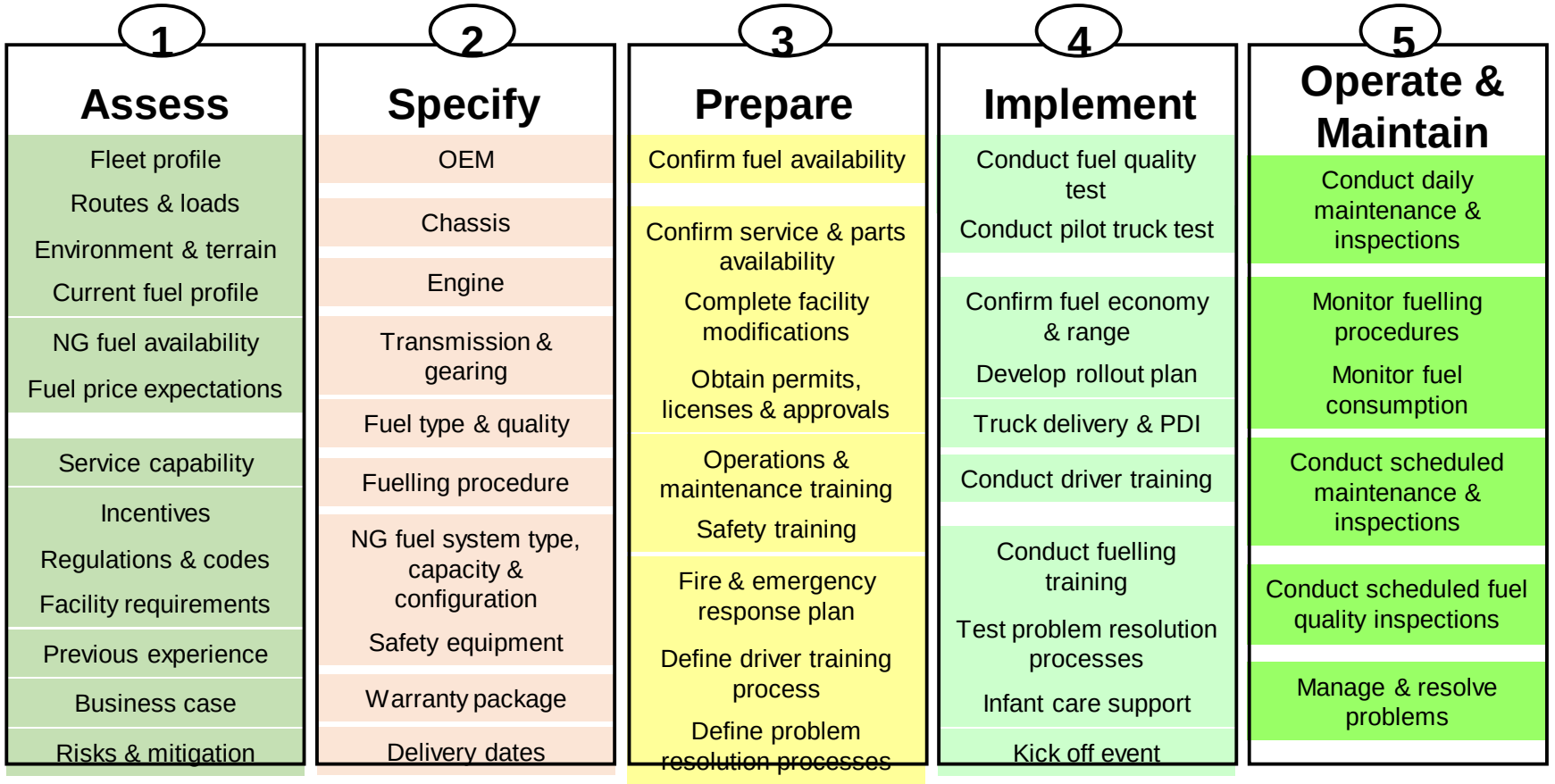
- Basic architecture remains the same
- 0.02 g/bhp-hr. NOx, 0.01 PM
- Exceed 2016 EPA HD GHG requirements.
  - Near-term potential for:
    - 90+% reduction in NOx
    - 90+% reduction in engine CH4 (crank case and tailpipe)
    - 6-8% reduction in CO2 equivalent
- Initial target markets
  - Transit
  - Refuse
- Competitive emissions to electric at much lower cost.

www.cumminswestport.com

- New Website launched May 15, 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.
  - ISX12 G engine walk around video added Sept, 2012

Cummins Westport Natural Gas Playbook

- Available only from Cummins, the 5 step Playbook provides information and resources for the key steps involved when implementing natural gas into a fleet.
- Contact your Cummins or Cummins Westport representative for details.



Thank You!

- For more information:

  Bill Boyce

  East Regional Manager

  (330) 720-9785

  or

  bill.boyce@cummins.com
- Or visit www.cumminswestport.com

Heavy Duty Engine Platforms

DAIMLER

NATURAL GAS UPDATE

Shaping Future Transportation.
CleanDrive Technologies.
A Daimler Initiative.

Kevin Holland

Manager, Natural Gas Vehicle Sales

Freightliner

Kevin.Holland@Daimler.com

Natural Gas Units Delivered / Customer Experience

Vehicles delivered:

- DAIMLER has DELIVERED over 7000 NG Vehicles
- 35% Market Share of Conventional Market
- SEGMENTS:
  - LNG & CNG port tractors
  - LNG & CNG food delivery tractors
  - CNG regional haul tractors
  - CNG Refuse tractors
  - CNG Sewer trucks
  - CNG Gas Utility trucks
  - CNG Municipal Gov't trucks
- Over 600 on order
- 900 LNG (PORTS/UPS) and 6100 CNG

Where Are We Today?

M2 112 Straight Truck and Tractor
114SD Straight Truck and Tractor






CASCADIA

114SD Straight Truck and Tractor
Cascadia 113 Day Cab Straight and Tractor
Cascadia 48", 60", and 72" Sleepers






Engine Options

ISL G

M2 112 Straight Truck and Tractor
114SD Straight Truck and Tractor

Advertised Horsepower	250-320 HP
Peak Torque	730-1000 lb-ft
Governed Speed	2200 RPM
Clutch Engagement Torque	550 lb-ft
Number of Cylinders	6
System Weight	1625 lb

ISX12 G

114SD Straight Truck and Tractor
Cascadia 113 Day Cab Straight and Tractor
Cascadia 48", 60", and 72" Sleepers

Advertised Horsepower	320-400 HP
Peak Torque	1150-1450 lb-ft
Governed Speed	2100 RPM
Clutch Engagement Torque	700 lb-ft
Number of Cylinders	6
System Weight	2750 lb
Engine (Dry)	2650 lb
Aftertreatment System	100 lb

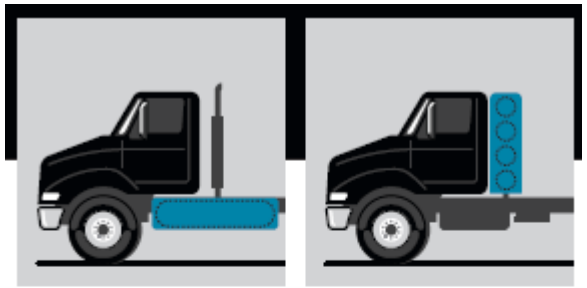
Full Factory Installation

- All Freightliner M2 and 114SD natural gas trucks & tractors manufactured on the production line at Mt Holly, NC plant
  - ISL G and fuel tanks installed on the production line
  - Orders placed through same tool and process as diesel vehicles
  - CNG compression station on site – tanks filled with fuel before shipment to customer
- Cascadia tractors full factory installation of engine, sleepers, and tanks
- CNG fueling stations on site at plants

Agility Fuel Systems Options

- Available in Saddle Mounted and Back of Cab Options
- Full Factory Installation in Cleveland, NC or Mt Holly NC
- New Agility Manufacturing and Installation Facility in Salisbury, NC Within 20 Miles of Both Freightliner Plants
- Saddle Configurations: 30, 40, 45, and 60 DGE Side Mounts. Twin Saddles Double the DGE Capacity
- Back Of Cab Mounts: 60, 75, 100, 120, 135, and 160 DGE Capacity
- Saddles and Back of Cab Systems Can Be Combined
- Possible Range Of Over 1000 Miles

Agility fuel systems



Side-Mount	Behind-the-Cab
Standard fuel capacity options of 20-120 DGE	Standard fuel capacity options of 35-155 DGE
Integrated fuel management module for ease of installation	Integrated fuel management module for ease of installation
Installation on one or both sides of vehicle depending on capacity requirements	22 to 31 inch frame rail space required
Offered in both CNG and LNG	


305
USDOT 1196553


318

Customer Case Studies

- Paper Transport
- Saddle Creek
- Frito Lay
- UPS
- Dillon Transport
- JJ Taylor
- Swift / Central
- Sheehy Mail

Shippers that account for roughly $8B in transportation business are driving carriers to adopt natural gas…

MAINTENANCE COSTS

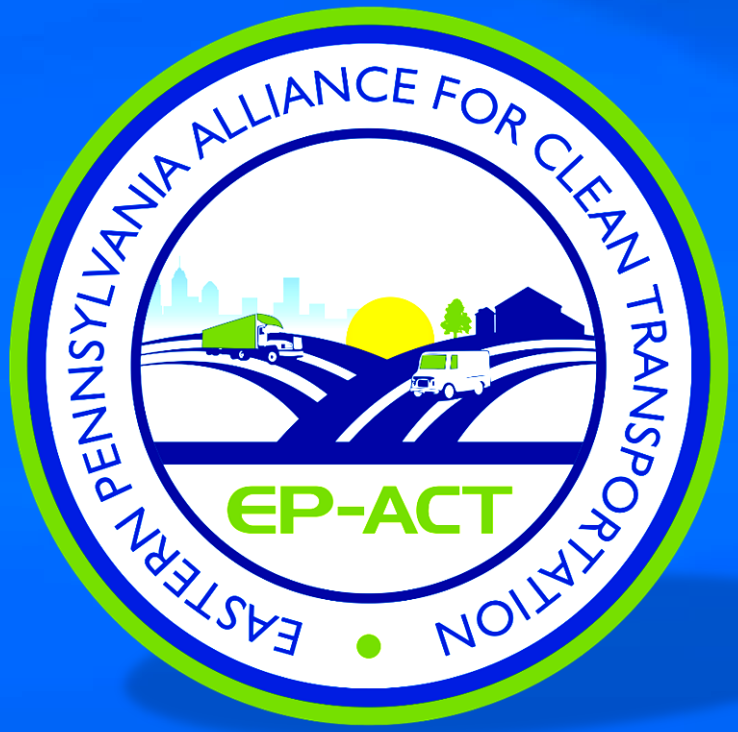
- Costs Similar to Diesel Products
- Adjust PM Cost to 18,000 Mile Schedule with ISX 12G
- Spark Plug Change and OH Adjustment – Add a Penny per Mile; $650 at 67,500 Mile Interval
- DAILY Fuel Filter Drain – VERY Important
- Inspection of Tanks and Mounts
- DEDUCT Costs for DPF and SCR Maintenance
- Net Result = Two Cents per Mile Premium
- Spec for Cold Weather Operation
- Shop Costs can be Substantial

Customer Purchase Process

- Will Products Work in Your Application and Routes?
- Fleet Standardization Fits Poorly with Natural Gas Operation
- RANGE? Don't spend $$$$ for excess fuel!
- Driver Reactions and Training
- Funding Availability – Reference WWW.NGVC.ORG
- Residuals
- ONCE AGAIN: IS FUEL READILY AVAILABLE AT COMPETITIVE COST AND PERFORMANCE?

FREIGHTLINER NATURAL GAS TECHNOLOGY

Shaping Future Transportation.
CleanDrive Technologies.
A Daimler Initiative.



Committee Info
2016 Plans
Wrap-up

Committees

- Education & Outreach
- Marketing
- Policy & Legislative
- Fund Raising
- Technical

A Look Ahead…2016

January	February	March	April	May	June
Webinar data collection TCP Annual Dinner	NAFA Autoshow TEP- EIS	Green Truck Summit- Webinar follow-up	Earth-day Events- NAFA Expo AFIG???	Golf Outing Award Banquet	Propane Workshop

July	August	September	October	November	December
TOSITA	Hydrogen Fuel Cell Workshop	Plug-in Day CNG Workshop	Odyssey Day ATA Meeting	SOTC Meeting	

A Look Ahead, Projects

Initiative for Resiliency in Energy through Vehicles

- Goal: help states and localities understand the energy security benefits of AFV vehicles and fueling infrastructure and, for interested partners, support the incorporation of AFVs into emergency response plans.
- Led by NASEO, supported by U.S. DOE and guided by a steering committee of public sector, private, and Clean Cities partners

Clean Cities
U. S. Department of Energy

NASEO
National Association of State Energy Officials

National Governors Association

IAEM
International Association of Emergency Managers

EP-ACT
Eastern Pennsylvania Alliance for Clean Transportation

American Public Gas Association

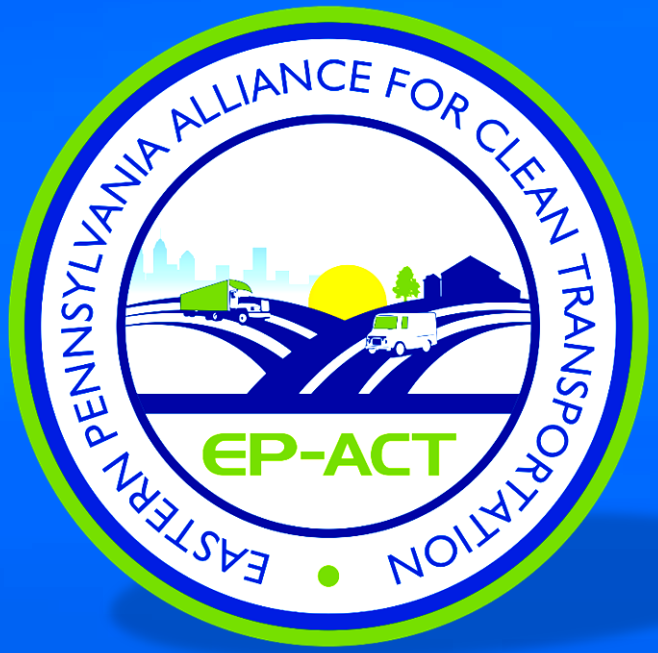
CTC Concurrent Technologies Corporation

National Biodiesel Board

A Look Ahead, Projects

Driving on Energi is a program designed to put electric vehicles (EVs) in the hands of a select group of social media influencers (EV ambassadors) to help dispel the myths surrounding EVs. By focusing on targeted vehicle demonstrations and driver experiences in the Northeast U.S., consumer will come to better understand the benefits these vehicles and technologies offer.

Thank you for attending...
The Big 3 plus 1 for Alternatives



Annual Meeting
November 24th 2015

A Special Thank You to Our Lunch Sponsors

FCA
FIAT CHRYSLER AUTOMOBILES

BUILT Ford TOUGH

GENERAL MOTORS FLEET
GMC

Cummins Westport

FREIGHTLINER

CNG
COMPASS NATURAL GAS