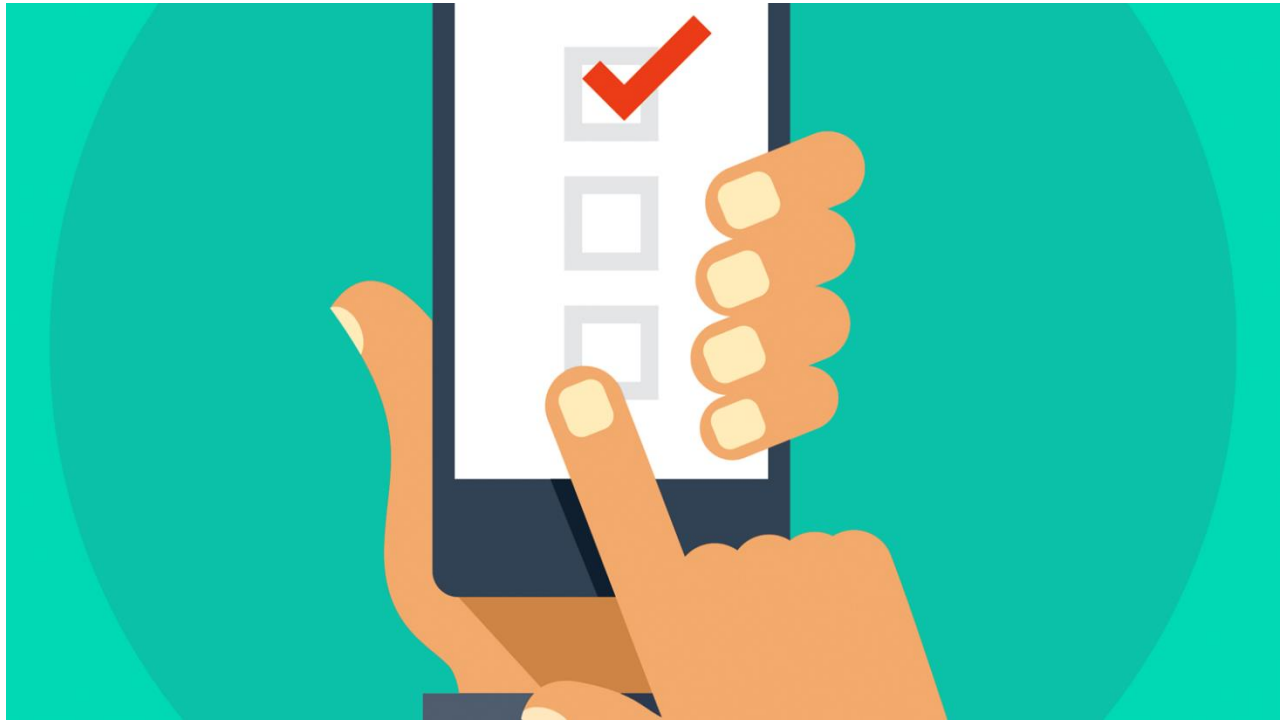
Propane Autogas Answers Virtual Event

South Shore Clean Cities, Inc.
NORTHERN INDIANA

Quick Poll!



Autogas Answers

Achieving Environmental and Economic Goals Cost-Effectively

Stephen Whaley

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864-606-2290

Successful Alternative Energy Adoption

What Makes an Alternative Energy Adoption Successful?

- There is a reduction in emissions over the lifecycle of the energy used in the vehicle without increasing cost or losing efficiency.
- Total cost-of-ownership reduction or a return on investment long before the end of the vehicle lifecycle.
- The vehicle performs as well or better than the original fuel without compromising range.
- There must be a high volume supply of energy domestically sourced.

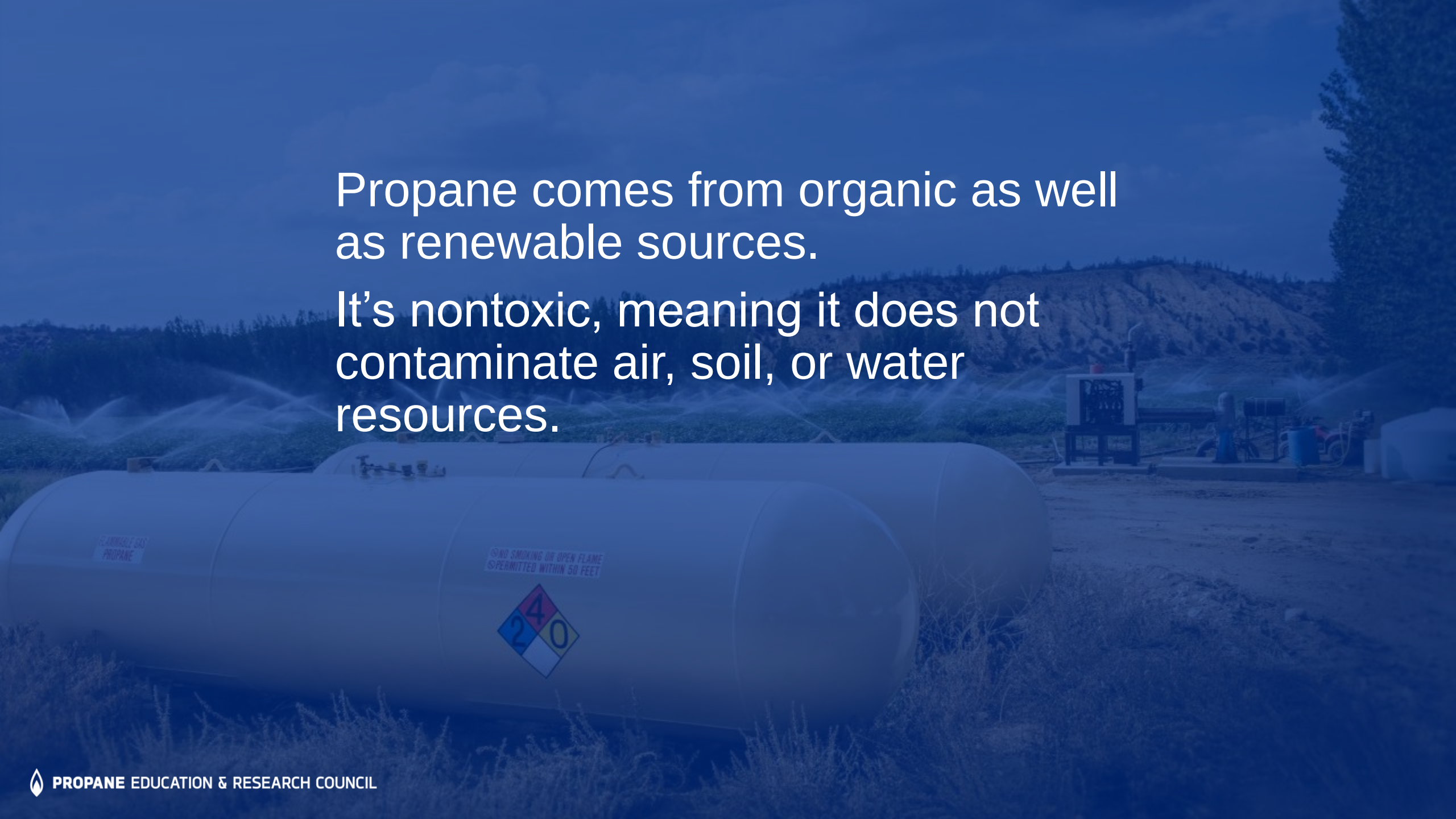
How Does Autogas Fit Into The Conversation?

- Propane autogas is the most cost-effective energy source to reduce NOx emissions.
- Propane autogas provides the lowest total cost-of-ownership of any fueled vehicle.
- Propane autogas offers comparable or improved performance without compromising range.
- Propane production in the U.S. was 28 billion gallons in 2019, nine billion used domestically and 19 billion gallons were exported.

WHAT IS PROPANE?

- Affordable, Clean, American-Made Fuel
  - C3H8
  - Byproduct of natural gas processing.
  - 100% Domestic
  - Commonly used for space and water heating, cooking, and as engine fuel.

- Using Propane
  - 48 million Households
  - 900,000 Farms
  - 600,000 Forklifts
  - 25,000 Commercial Mowers



Propane comes from organic as well as renewable sources.

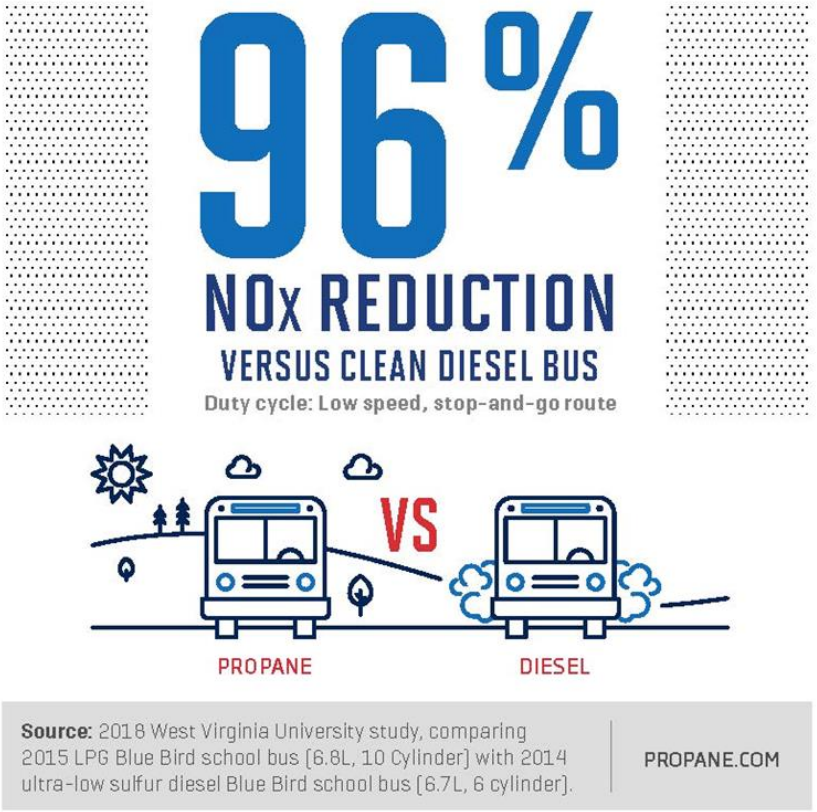
It’s nontoxic, meaning it does not contaminate air, soil, or water resources.

WHY FLEETS CHOOSE PROPANE AUTOGAS

Total Cost-of-Ownership
Lower Emissions
Reduce Noise
Less Maintenance/Increased Uptime
Improve Corporate Image
Employee Morale/Driver Retention

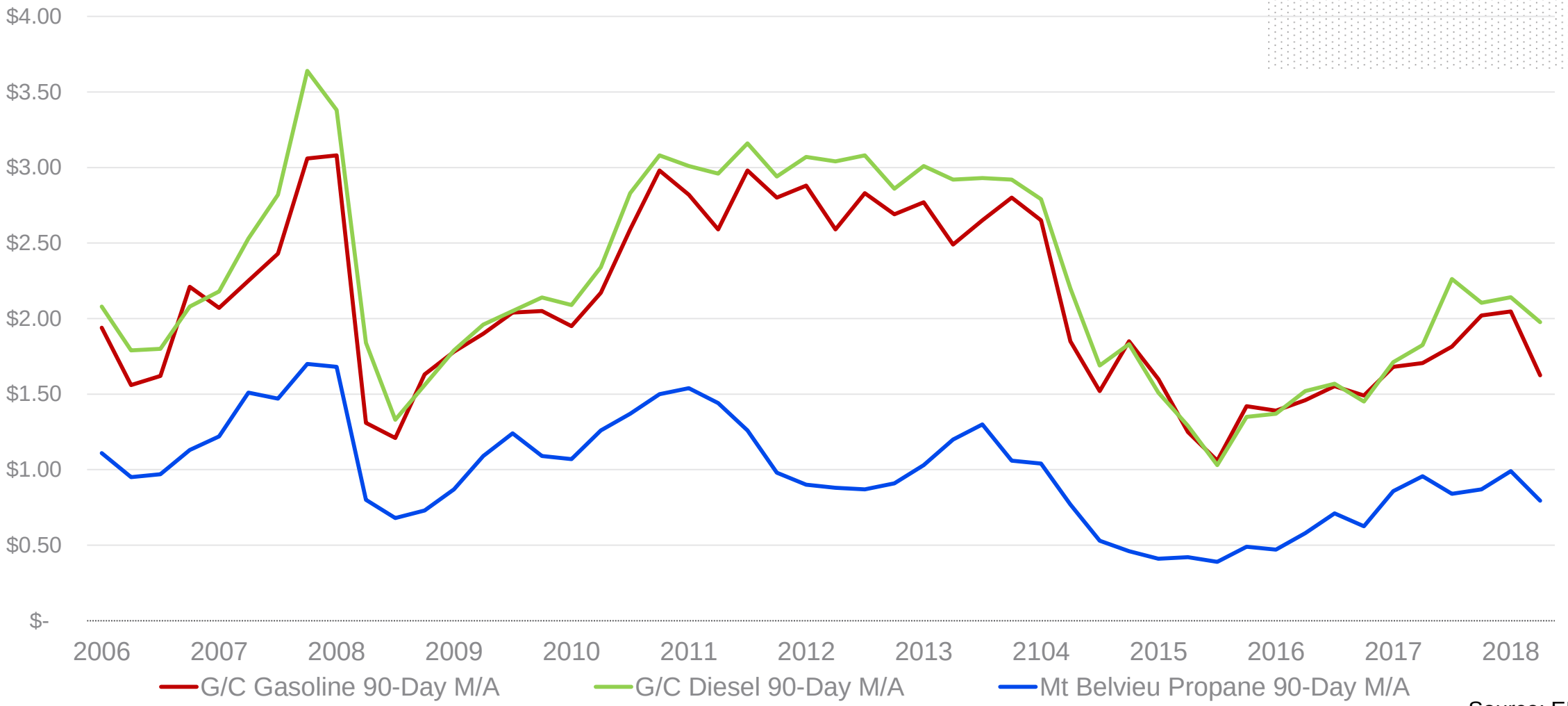
Path to Zero Emissions

- Particulate Matter
  - Virtually zero
  - Zero with renewable propane
- NOX
  - 96% reduction from best in class diesel
  - Certifying to .02, operating at 0.01, full duty cycle
- GHG
  - New technologies 25% reduction from next best technology



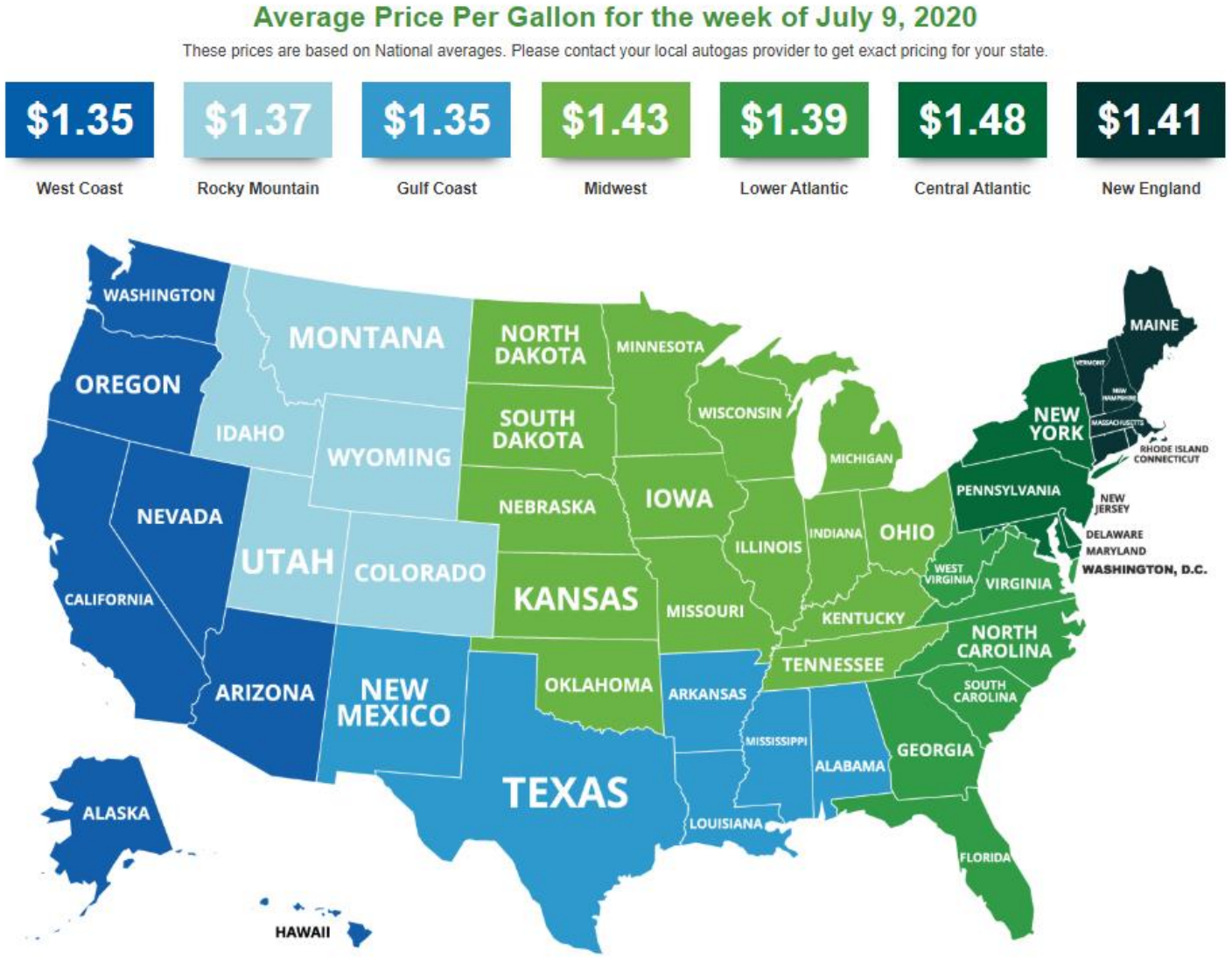
Fuel & Maintenance Cost Reductions

US ENERGY PRICE COMPARISON 2006 – 2018



Source: EIA.gov

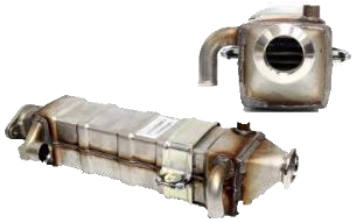
Today's Propane Autogas



Increased Inventory

- Propane eliminates the need for DEF and the possibility of putting the wrong fluid in a tank

The Diesel We Know Today











Engine Components: Diesel

Cummins ISB 6.7L

Part	Quantity	Price	Total
NOx Sensor	1	$480.00	$480.00
NOx Sensor	1	$560.00	$560.00
Pressure Sensor	1	$140.00	$140.00
Doser Injector	1	$290.00	$290.00
Catalyst Assembly w/ DPF	1	$10,554.11	$10,554.11
Temperature Sensor	1	$78.90	$78.90
Temperature Sensor	2	$84.90	$169.80
Turbo	1	$2,731.20	$2,731.20
Injector	6	$755.56	$4,533.36
EGR Valve	1	$590.15	$590.15
EGR Cooler	1	$923.72	$923.72

Total
$21,051.24

Preventative Maintenance

Ford V10
Gas and Propane
7 Quarts

Various Engines
Diesel
17 – 30 Quarts

Preventative Maintenance

Ford 6.8L V10

Part	Quantity	Price	Total	
Element Air Cleaner	1	$15.75	$15.75	Total $70.94
Oil Spin On Filter	1	$4.11	$4.11	
Element, PSR, 510 Filter	1	$24.90	$24.90	
Mobil Special 5W-20	7	$3.74	$26.18	

Cummins ISB 6.7L

Part	Quantity	Price	Total	
Oil Filter	1	$13.75	$13.75	Total $277.15
Fuel Spin-On Filter	1	$37.90	$37.90	
Power Steering Spin Filter	1	$9.86	$9.86	
Fuel Filter	1	$20.53	$20.53	
Allison Control Filter	1	$8.49	$8.49	
Mobil Fleet 15W-40	18	$2.59	$46.62	
Cleaner, Air Element	1	$140.00	$140.00	

Current Autogas Vehicle Offerings

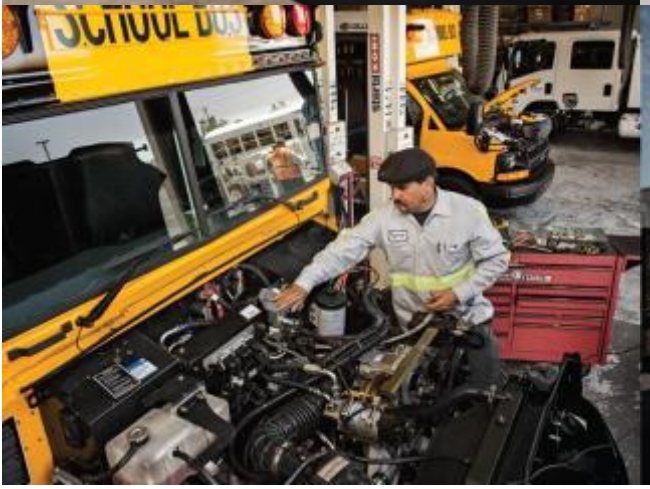

SCHOOL BUS


Jean


SANDY SPRINGS
FIRE-RESCUE


0
PROPANE


POLICE




Powered by
Clean
Propane


SCHOOL BUS
SCHOOL BUS
R415
STOP


SCHOOL BUS


SCHOOL BUS


SCHOOL BUS

SNAPSHOT OF PROPANE AUTOGAS SCHOOL BUS MARKET

1,200,000+
STUDENTS TRANSPORTED
DAILY

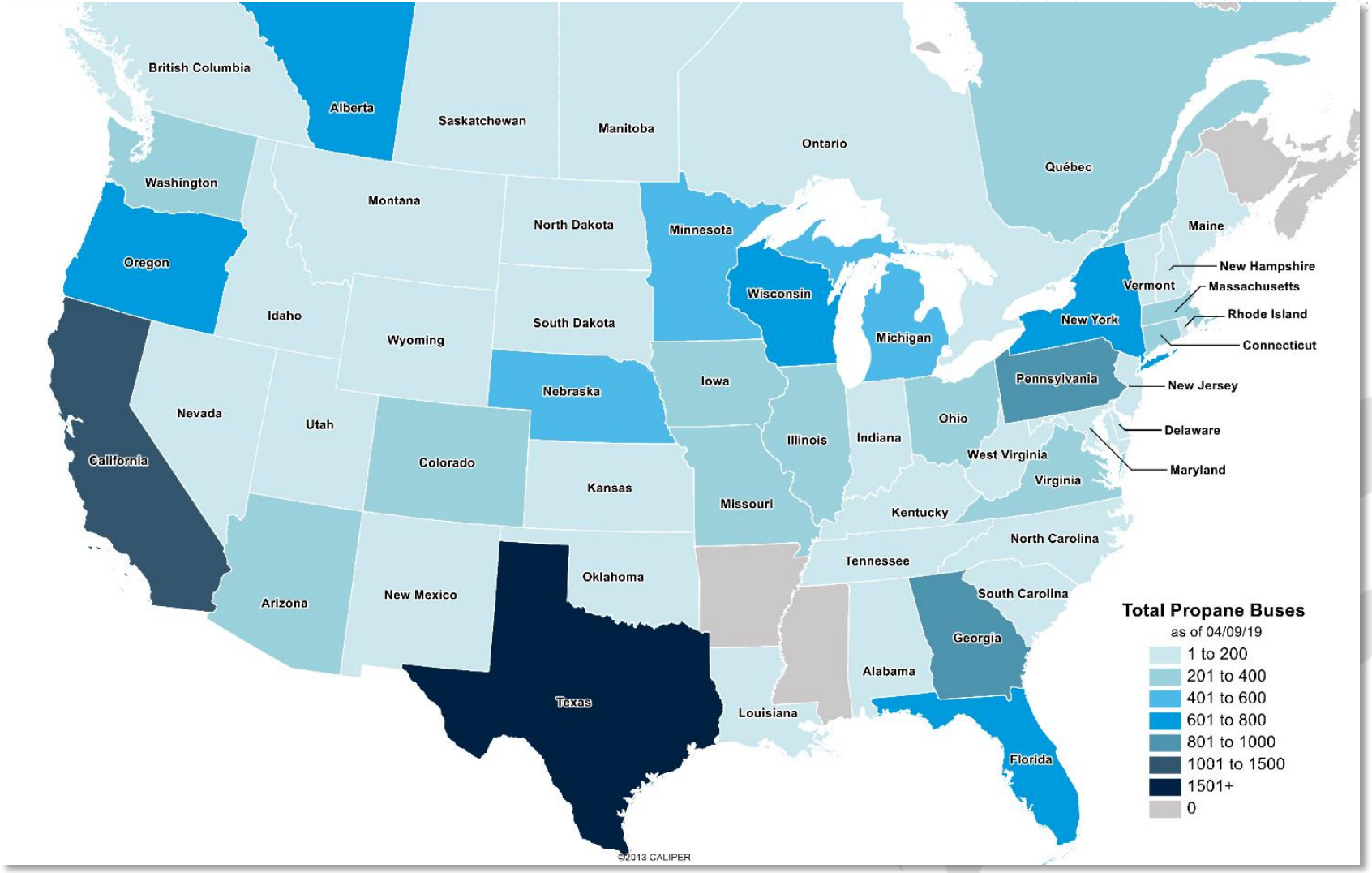
13 STATES WITH

500+ BUSES

981 DISTRICTS & CONTRACTORS
OPERATE PROPANE AUTOGAS BUSES

19,700+
PROPANE AUTOGAS BUSES
ON THE ROAD

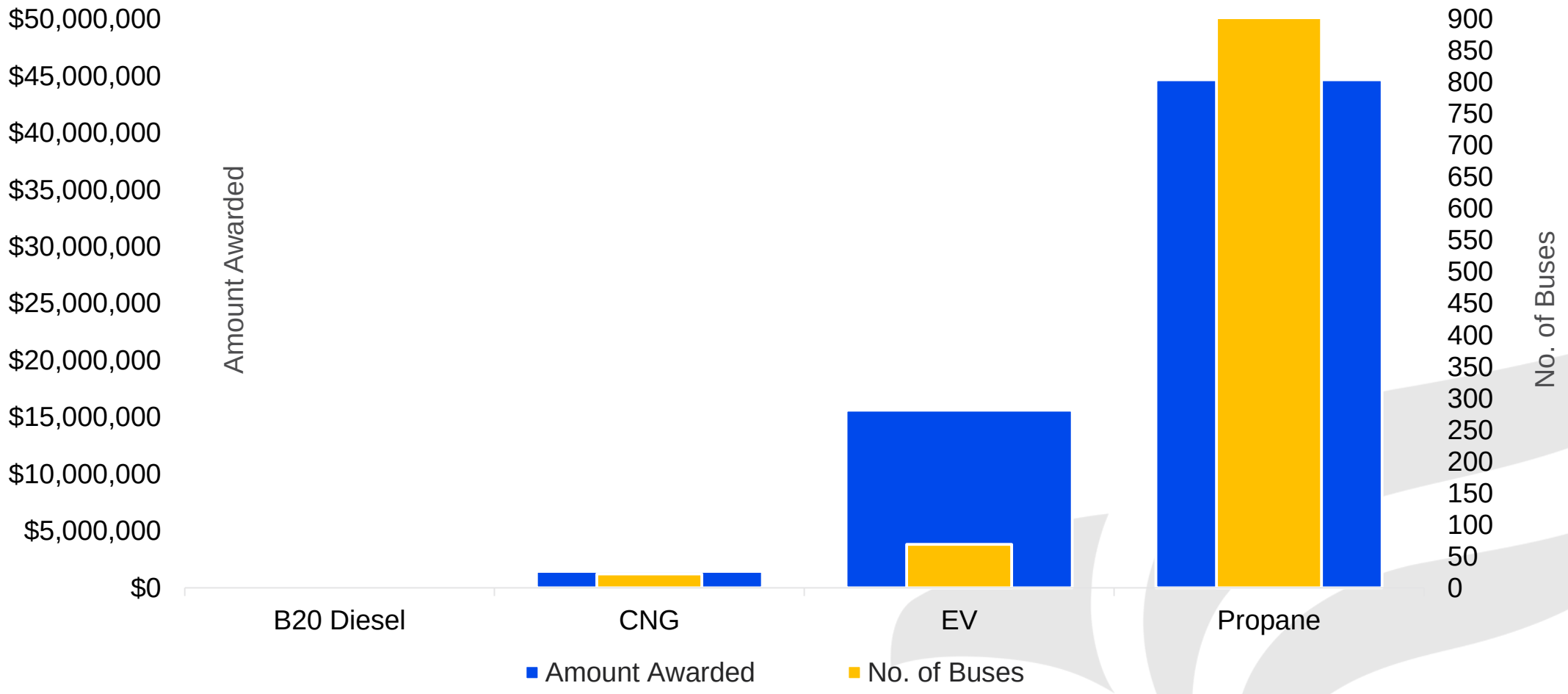
Propane School Bus Deployments



Similarly Equipped Blue Bird Type C Bus

Diesel, Cummins, ISB, 6.7L	$98,500.00
LPG, Ford/Roush, 6.8L	$107,000.00
CNG, Ford/Roush, 6.8L	$134,000.00
Electric, Adomani,	$385,000.00

VW: School Bus Funding & No. of Buses Through July 20, 2020



Source: Propane Education & Research Council

Emerging Vehicle Markets

Top Targets For Alternative Fuel Adoptions

- Medium duty trucks.
  - Class 3-7.
- High volume fuel consumption.
  - 300 to 900+ gallons per month.
- Regional routes.
  - 75 to 300+ miles per day.

Food/Beverage

- Major companies have already validated propane autogas in this market.
  - ReadyRefresh by Nestlé Waters.
  - Schwan’s Home Delivery.

Paratransit

- 25,000 paratransit vehicles nationwide.
- 600 gallons per month average fuel consumption.
- ADA requires every county in the U.S. to provide service.

Parcel/Package

- USPS has 92,000 routes for moving mail.
  - Over 70,000 routes are performed by independent contractors.
- There are approximately 10,000 class 6-7 straight box trucks operated by USPS contractors.
- Contractors bidding on USPS routes score higher with alternative fuel vehicles.
- 1,000 gallons per month average fuel consumption.

TCO Box Truck example

Total Cost of Ownership Calculator	Class 6/7 Diesel	Class 6/7 Propane	Class 6/7 Gasoline
FUEL			
Annual Miles	60,000	60,000	60,000
Years Operated	5	5	5
Total Miles Lifetime Miles	300,000	300,000	300,000
Fuel Economy (mpg)	7	5	6
Gallons Used Annually	8,571	12,244	10,909
Gallons Used Total	42,857	61,224	54,545
Fuel Price / Gallon	$2.42	$1.39	$2.19
PREVENTATIVE MAINTENANCE			
Oil Interval	7,000	5,000	5,000
Oil Capacity (Quarts)	21	7	7
Oil Filter Cost	$9.36	$4.00	$4.00
Oil Cost Per Quart	$2.55	$2.55	$2.55
Cost Per Oil Change	$62.91	$21.85	$21.85
Lifetime Oil Change Total Cost	$2,696.14	$1,311.00	$1,311.00
Lifetime DEF Gallons	1,500	0	0
DEF Cost per Gallon	$1.89		
DEF Total Cost Over Lifetime	$2,834.99		
Fuel Filter Change Interval	15,000	50,000	15,000
Fuel Filter Cost	$12.99	$264.00	$15.00
Total Filter Changes	20	6	20
Fuel Fiter Cost Lifetime	$259.80	$1,584.00	$300.00
ACQUISITION COST			
Acquisition Cost without body	$65,000.00	$50,000.00	$50,000.00
Incremental Cost (Fuel System)	$0.00	$17,900.00	$0.00
Vehicle Rebate per Unit		$0.00	

TOTAL COST OF OWNERSHIP	Class 6/7 Diesel	Class 6/7 Propane	Class 6/7 Gasoline
Lifetime Operational Cost	**$174,504.87**	**$155,896.36**	**$171,064.55**
Lifetime Savings	0	**$18,608.51**	**$3,440.32**
Cost per Mile to Operate (CPM)	$0.37	$0.29	$0.40

Customer Information

Propane Fuel Price
$1.39

Diesel Fuel Price
$2.42

Gasoline Fuel Price
$2.19

GGE Fuel Price CNG
$0.00

Propane MPG
4.90 70%

Diesel MPG
7.00

Gasoline MPG
5.50 79%

CNG MP GGE
0.00 0%

Years Operated
5

Annual Miles per Year Truck
60,000

Incremental Cost (Propane)
$17,900.00

Rebate Per Unit (Propane)
$ -

Rebate Per Unit (CNG)
$ -


Agility
fuel solutions


ALKANE
TRUCK COMPANY


Alliance AutoGas
POWERED BY PROPANE


BLUE BIRD


C P
CAMPBELL - PARNELL


COLLINS
BUS CORPORATION


FREIGHTLINER
Custom Chassis
Driven By You


Greenkraft Inc
The Green Automotive Future


ICOM
NORTH
AMERICA


ISUZU
Commercial Truck of America, Inc.


PSI
POWER SOLUTIONS
INTERNATIONAL


ROUSH
CLEANTECH


Thomas
BUILT BUSES
Because every mile matters.


Westport
Here and Now.

OEM Propane Options

- Light & medium duty Ford trucks & vans, school bus.
- Factory Ford warranty maintained.
- No loss of HP / torque / towing capacity.
- Serviceable with existing diagnostic equipment.
- EPA & CARB Certified.

ROUSH® CLEANTECH


Ford F-53 / F-59


Ford E-350/450

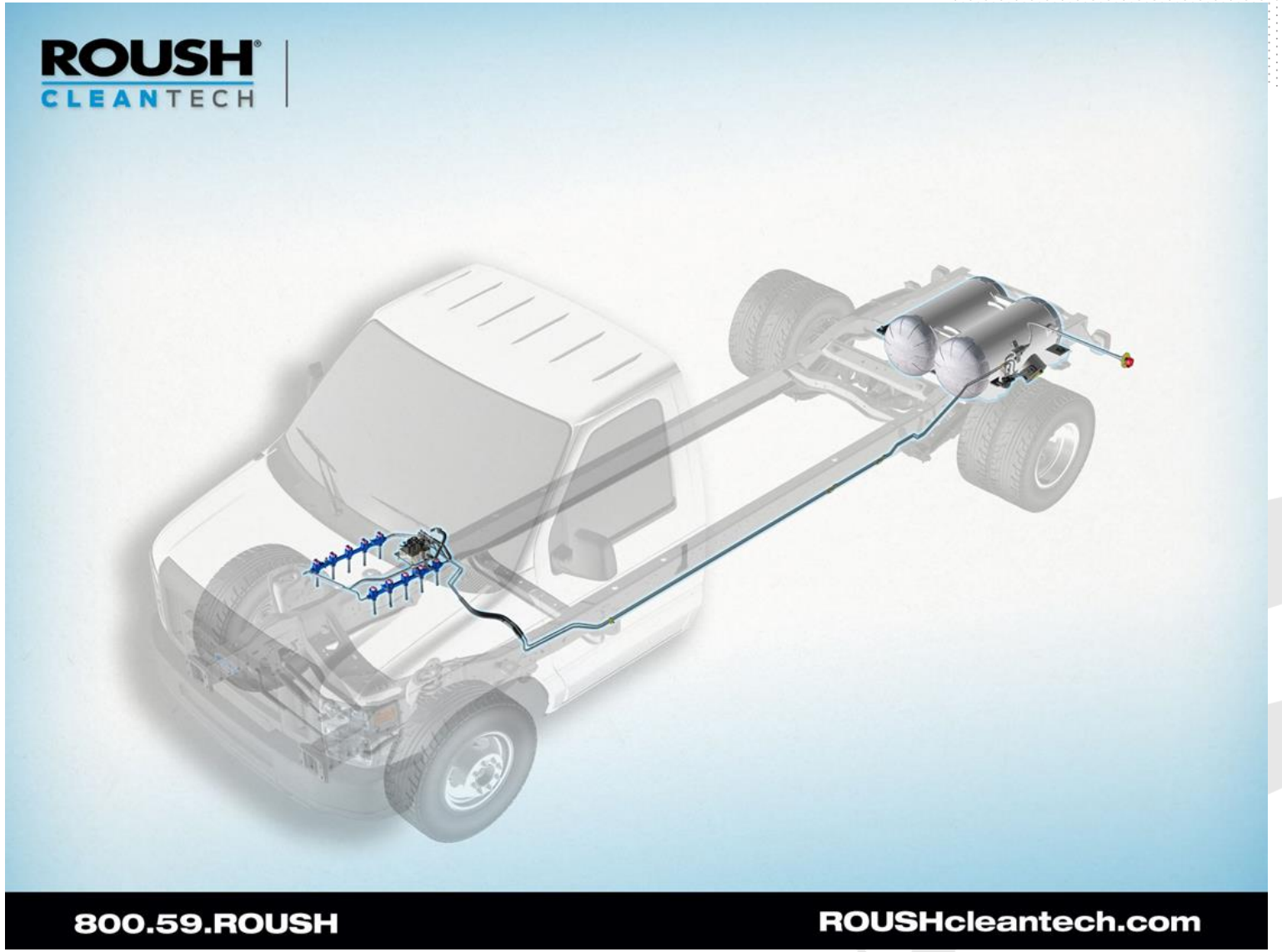

Ford F-450/550


Ford F-650/750

Blue Bird Vision

Micro Bird G5

Small Profile System Compared to Electric



OEM Propane Options

- Updated and improved to increase reliability.
- The entire powertrain is sold, warranted, and supported by Freightliner Custom Chassis.

Greenkraft Inc
The Green Automotive Future

Long Awaited Alternative Fuel Trucks Are Now Available!

CHOOSE YOUR FUEL!

Greenkraft offers trucks in Classes 4 to 7

14,500, 16,500, 17,950, 19,500, 26,000 & 33,000 GVW

BIG SAVINGS ON FUEL

NO DIESEL NO DPF NO DOC NO SCR NO UREA

FEATURES

- Panoramic view
- Heavy duty chassis
- Increased turning radius
- Air brakes
- Available in CNG, LPG & gasoline
- More hauling
- Less servicing
- Warranty 100,000 miles
- GM 8.0 liter engine with Allison 2300 RDS transmission
- Roomy interior
- High tech dashboard
- Near zero emissions certified
- Qualifies for government incentives

Please contact us for more details: sales@greenkraftinc.com | 714-545-7777

Greenkraft Inc a publicly traded company: GKIT | Now accepting dealership applications

MADE IN USA

Agility®
fuel solutions

GM 8.0L Propane Engine Powered by Agility

Innovation

The only dedicated propane genuine GM 8.0L engine available in the market

Improved fuel efficiency with patented Agility Liquid Propane Injection (LPI)® fuel system

Improved durability and reduced friction with roller rockers

Improved positive crankcase ventilation baffle reduces oil consumption

NEW reverse torque calibration ensures power is available even when backing up a slope

Redesigned lower intake manifold for improved gasket seal

Rugged tall deck cast iron long-block engine for improved durability

Full-length water jackets (non-siamesed cylinders) for improved cooling

Twelve unique front-end accessory drives able to accommodate your needs: three air conditioning options, air/hydraulic brakes, optional block heater

Industry standard J1939 engine controller compatible with existing diagnostic tools

2020 Model Year Products

F150
- 3.3 PFDI
- 5.0 PFDI
- 2.7/3.5 PFDI (SUMMER 20)

F250-F350
- 6.2 PFI

F450-F750
- 7.3 PFI (2021 MY)

E450
- 6.2 PFI
- 7.3 PFI (2021 MY)

TRANSIT
- 3.5 PFDI
- 3.5 ECOBOOST (FALL 20)

EXPLORER
- 3.3 PFDI

SILVERADO 1500
- 5.3 DI

SILVERADO 2500/3500
- 6.6 DI

EXPRESS/SAVANA
- 6.0 PFI

DURANGO
- 5.7 PFI

CHARGER
- 3.6 PFI

RAM
- 5.7 PFI
- 3.6 PFI (SUMMER 20)

Icom's certified Medium Duty Platforms

The Icom JTG II system is EPA Certified & CARB approved for over 1,200 2009-2019 vehicle platforms including many Ford and GM models.

The Total Solution for any Type of Fleet!

E450 - CARB approved

2016-2017

F350 F450 F550

F750

***FORD NEW 7.3L engine available Spring 2020!**

Taking orders now!

F53 F59 (BAKERY, LINEN, FEDEX TYPE BOX TRUCKS)

6.0L HD

Please confirm with Icom engine family

Chevy Cutaway

Coming soon!

ICOM Alternative Fuel Systems

CAMPBELL PARNELL AND ISUZU NPR

- Bi-Fuel conversions Pre or Post delivery
- 5 year warranty and maintenance packages available
- Plug and Play for ease of installation and service
- CP works directly with the OEM for product development
- EPA and Carb Certification

CAMPBELL-PARNELL

www.UseAltFuels.com

Off Road Applications

Propane Mowers

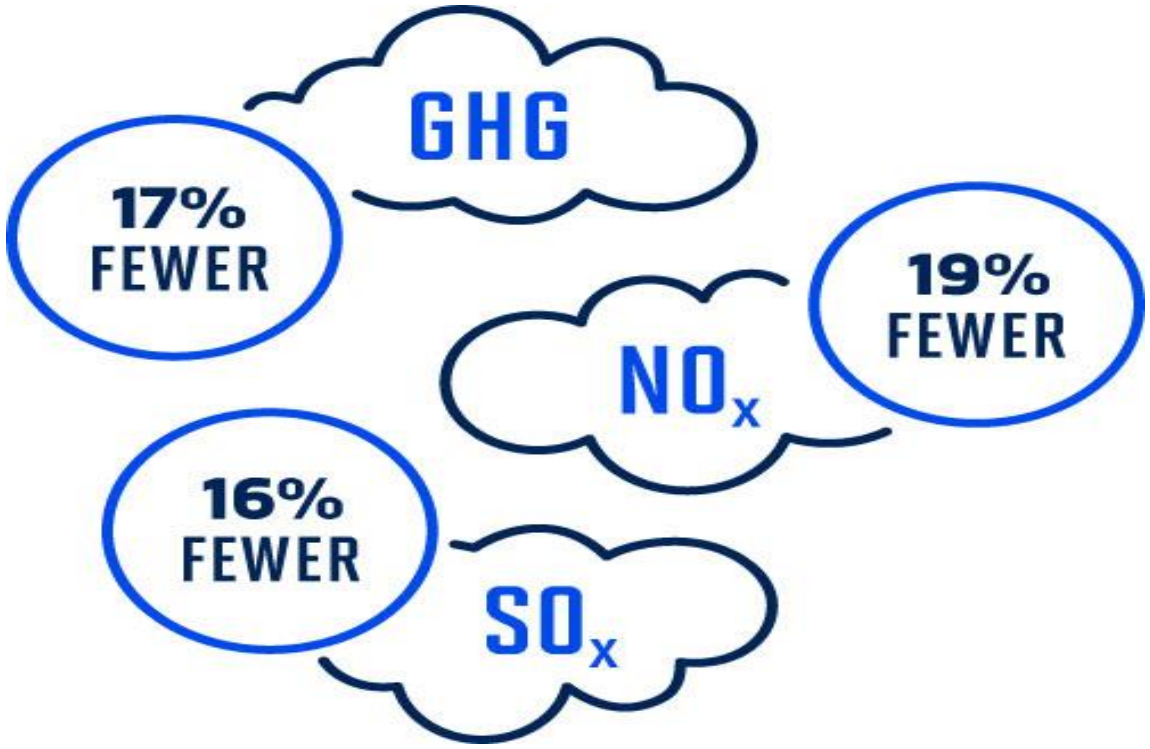
- Professional or Commercial-grade mowers
  - Zero-turn rider (ztr)
  - Walk behind
  - Stand-on
- 800 to 1,000 gallons per mower annually.
- Average of 30% fuel savings compared to gasoline.
  - 50% compared to diesel.

The Brands Farmers Know and Trust

OEM's

Aftermarket Conversions

Reduced Emissions



COMPARED WITH GASOLINE

Propane Mower Calculator

- Input variables specific to your fleet to determine the amount of savings propane equipment can provide your business.
- Available in tablet, smartphone and desktop applications.

www.propane.com/mower-calculator

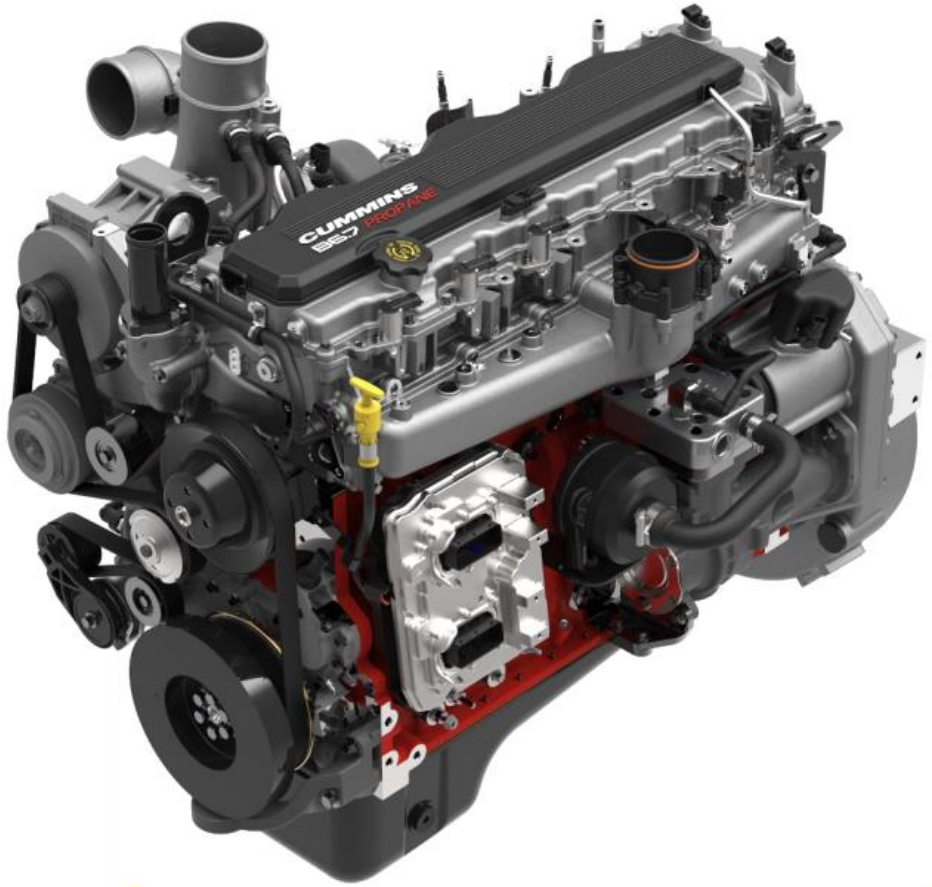
More Than Mowers

Propane is highly versatile and works hard in the field in a variety of applications:

- Utility Vehicles.
- Ride-on Blowers.
- Material Buggies.
- In-field Portable Power.

Technological Innovations

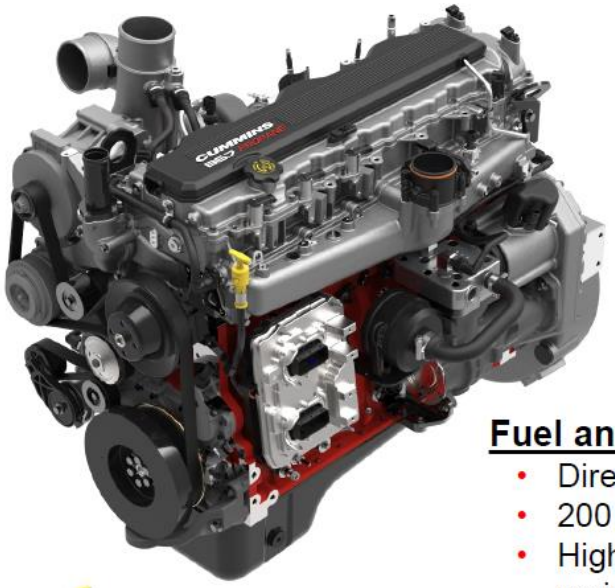
CUMMINS 6.7L PROPANE DEMONSTRATION ENGINE



B6.7 PROPANE DEMONSTRATION ENGINE ARCHITECTURE

Base Engine

- 6.7L Displacement
- 107 mm Bore x 124 mm Stroke
- 12:1 CR
- Late Intake Valve Closing cam
- 4 Head Bolt Gray Iron Block
- Dual Overhead Camshaft Valve Train
- 4 Valve Aluminum Cylinder Head
- 174 bar PCP Limit
- High Efficiency Pent Roof Combustion Chamber
- High Tumble Charge Motion Intake Ports
- Leverages B6.7 Diesel Components Where Applicable for Increased Reliability and Durability



Fuel and Ignition System

- Direct Propane Injection
- 200 bar Rail Pressure Capability
- High Pressure pump w/ recirculation
- M14 Spark Plug w/ single coil on plug inductive ignition system

Air Handling System

- Twin Entry, Dual Scroll, Wastegate Turbocharger with Command WG

Cummins Aftertreatment System

- On-Engine Close Coupled Three Way Catalyst

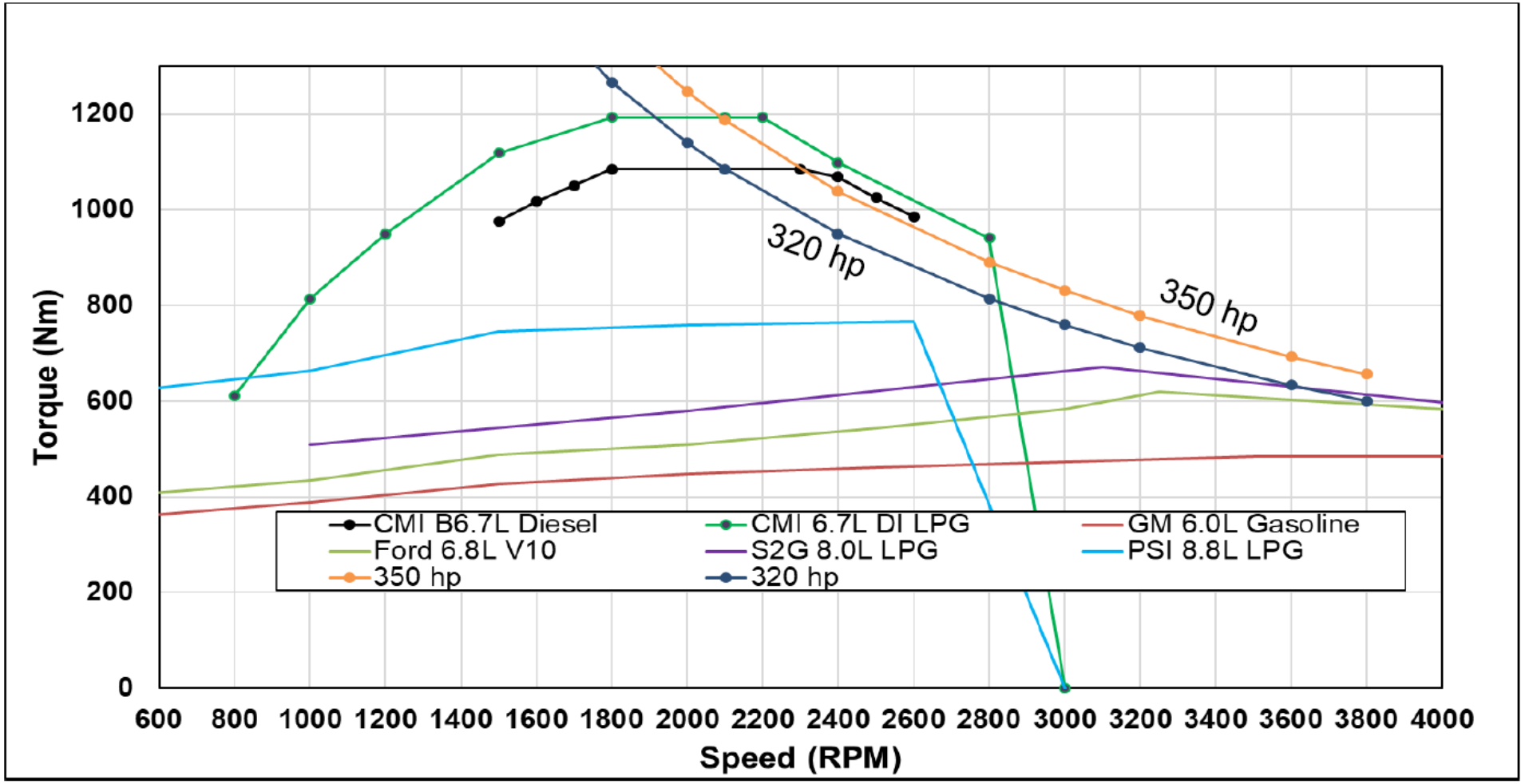
Electronics/Controls

- SI Specific ECM

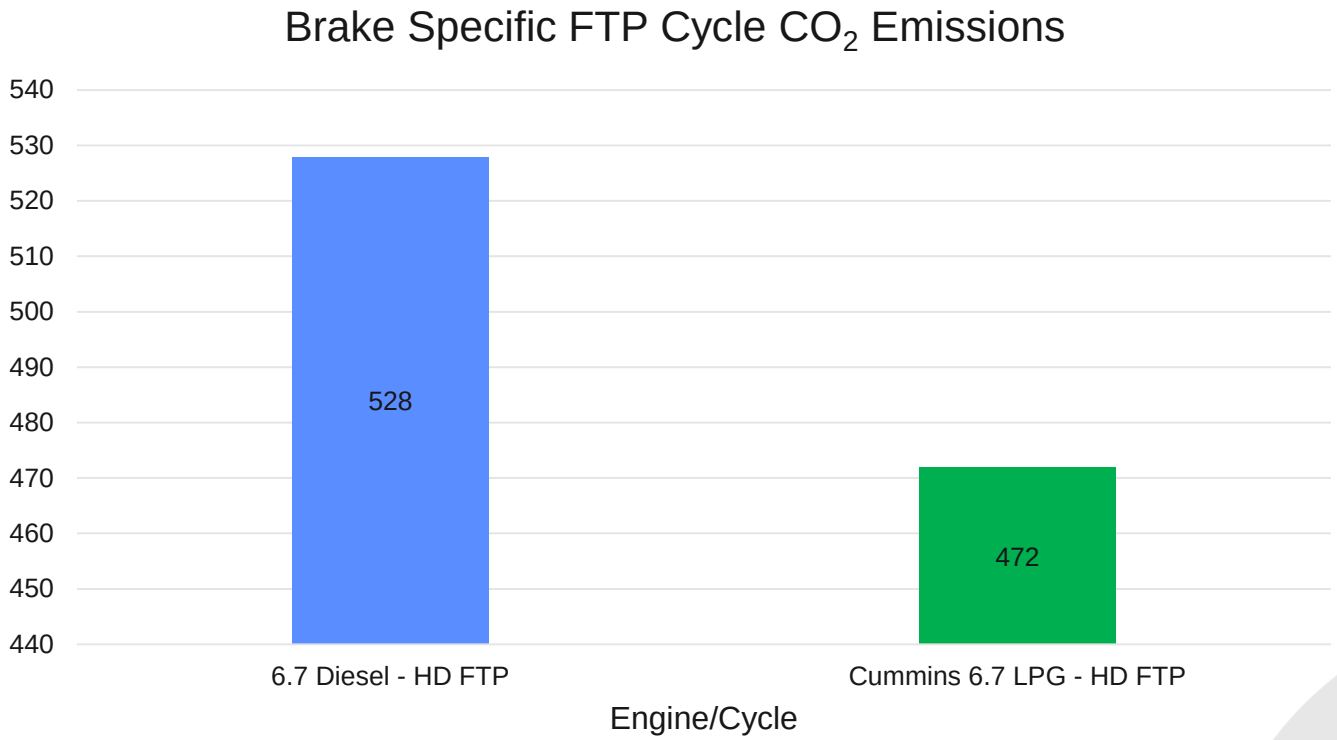
Vehicle Integration

- System Weight Improved Over B6.7 Diesel
- Customer Interfaces Similar to B6.7 Diesel

TORQUE CURVE COMPARISON



GREENHOUSE GAS EMISSIONS



- 11.4% lower CO_2 emissions than diesel engine with similar displacement and torque curve. Similar BTE, favorable H/C ratio results in lower CO_2.

Renewable Propane

The Future of Propane Autogas

2010

Comprehensive Carbon Goals

2020

>50% U.S. population.
>50% U.S. GDP.
>40% of on-road fuel.
>90% of heating oil.

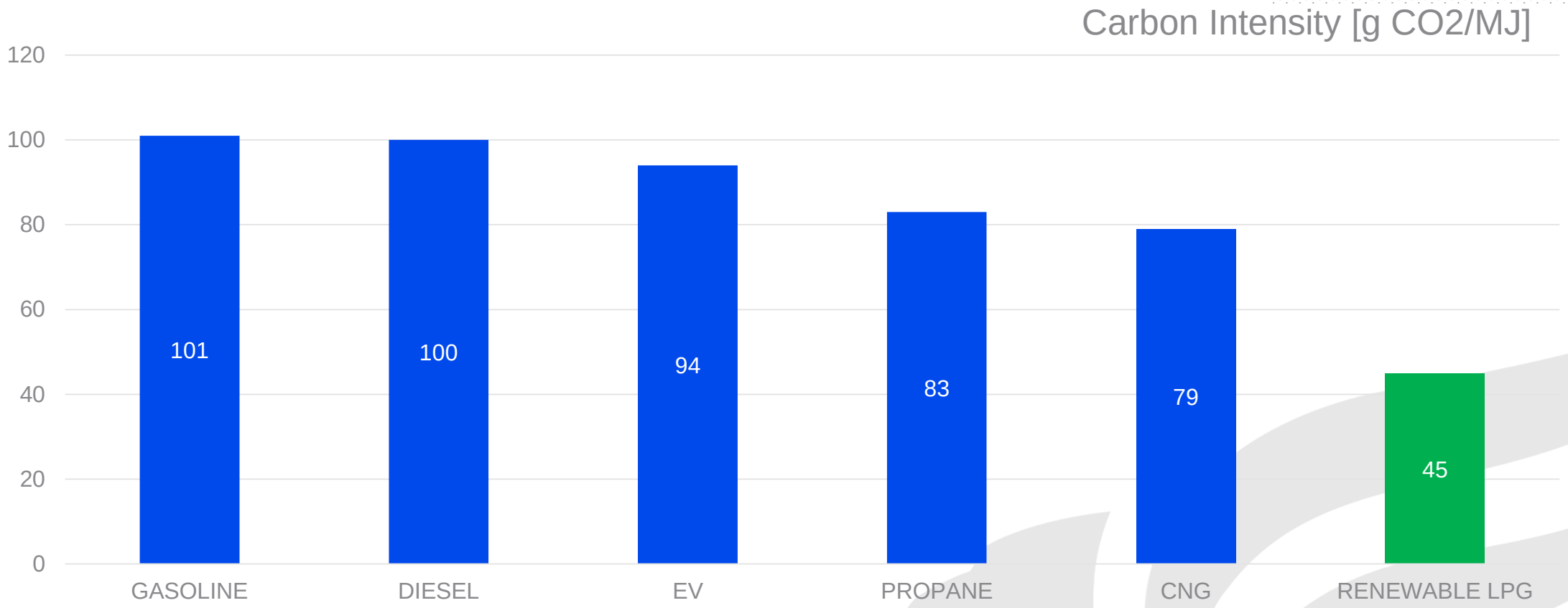
PROPANE EDX

Comprehensive Carbon Goals

Renewable Propane

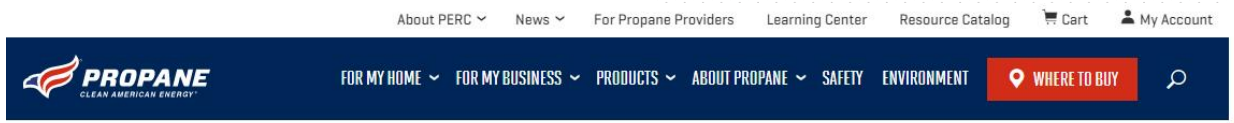
- Low carbon intensity.
- Inexpensive feedstock.
- Abundant feedstock.
- Low energy conversion.
- Final product competitively priced.

CARBON INTENSITY SCORES

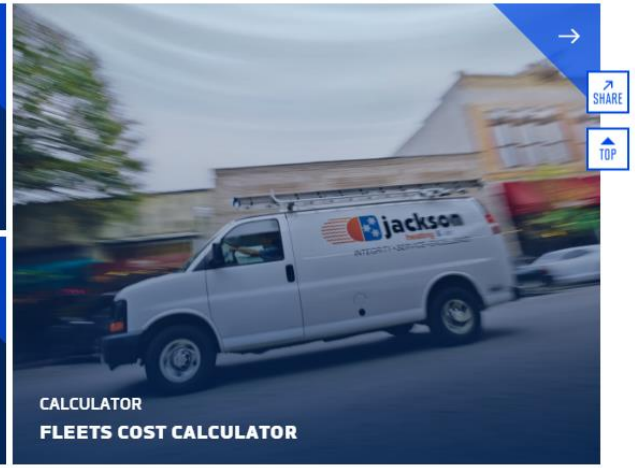


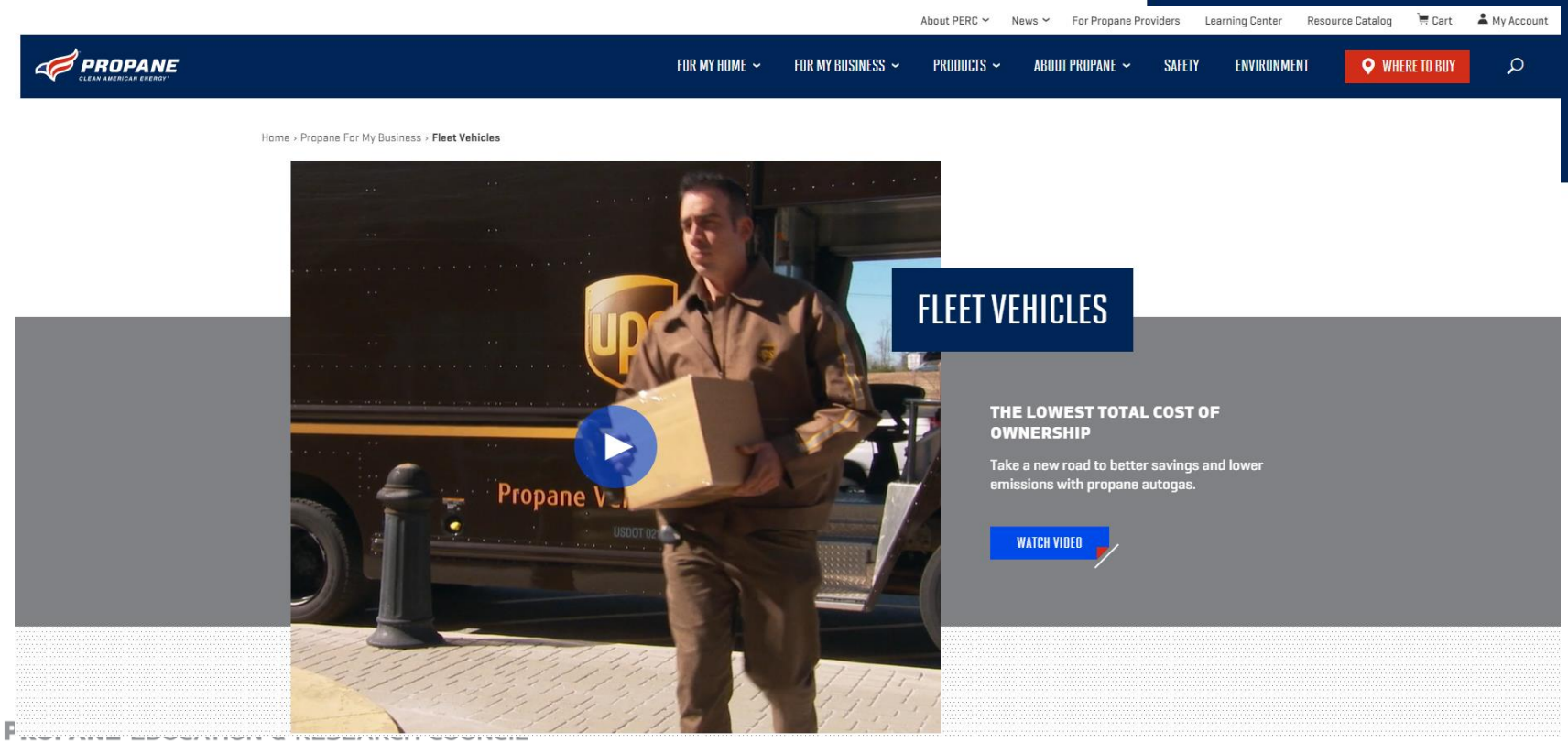
Renewable Propane – Drive The Future Now

www.propane.com/for-my-business/fleet-vehicles/



EXPLORE PROPANE FOR FLEET VEHICLES





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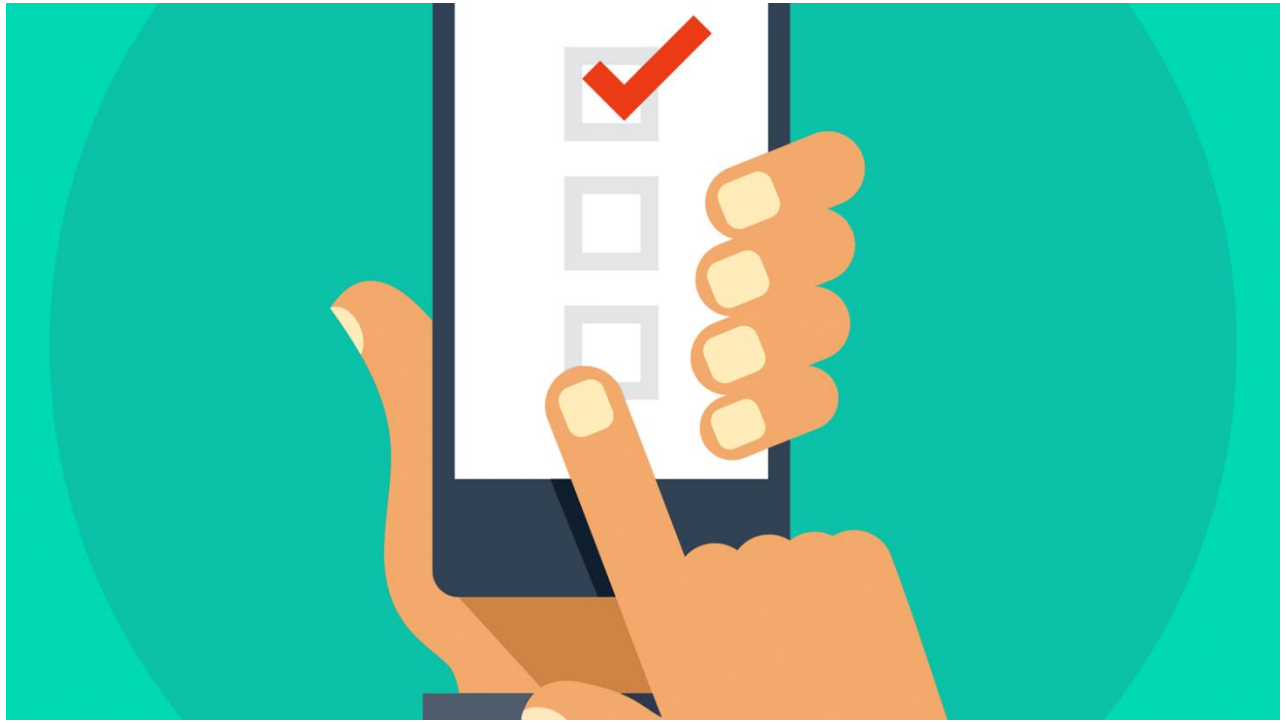
South Shore Clean Cities, Inc.
NORTHERN INDIANA

Quick Poll!



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WELCOME

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Global Locations

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Markets We Serve

Mobility

Ford
FCA
GM
GAC
Google
Toyota
Honda
Hyundai
Isuzu
Volkswagen
EcoMotors
Nissan
Blue Bird

Defense

Navistar Defense
BAE Systems
AM General
SAIC
Textron
FAAC
US Army/TARDEC
Oskosh Defense
Hardwire
Astradyne

Entertainment

Disney
Universal Studios
The Henry Ford

Aerospace

Bell Helicopter
Boeing
Pratt & Whitney
Sikorsky
United Launch Alliance

Gas & Oil

Aramco
Oceaneering
Conoco Phillips
Afton
ProSource
Weatherford

Motorsports

Ford
3M
Aflac
Crown Royal
UPS
Scotts
Kellogg
Vavoline
Coca-Cola
Fastenal

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Pioneer in Advanced Clean Technology

Gaseous Fuels

Electric

Charging

Hydrogen

Autonomy

ROUSH CLEANTECH

Transportation Solutions

School Buses

Blue Bird Vision
Propane, CNG

Micro Bird G5
Propane

Chassis Cabs

F-650 / F-750
Propane, Electric

F-450 / F-550
Propane

Stripped Chassis/Cutaways

F-59 / F-53
Propane

E-350 / E-450
Propane

ROUSH CLEANTECH

Our Progress

OVER

33,000

VEHICLES ON THE ROAD

ACCUMULATED OVER

500

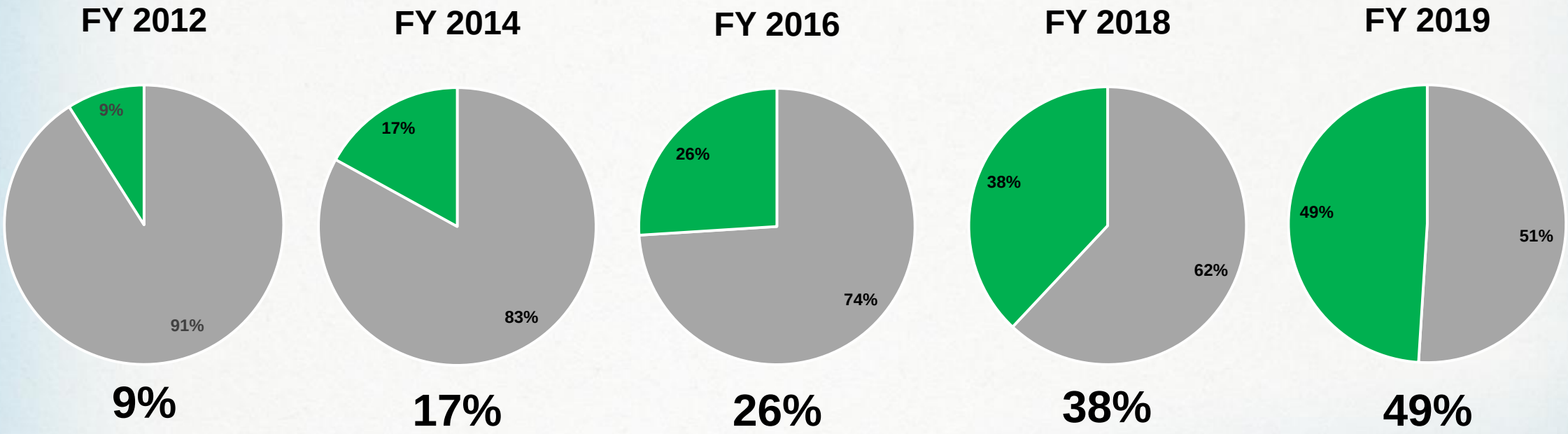
MILLION MILES

OVER

2,500

FLEETS

Disruptive Growth in Alt Fuels



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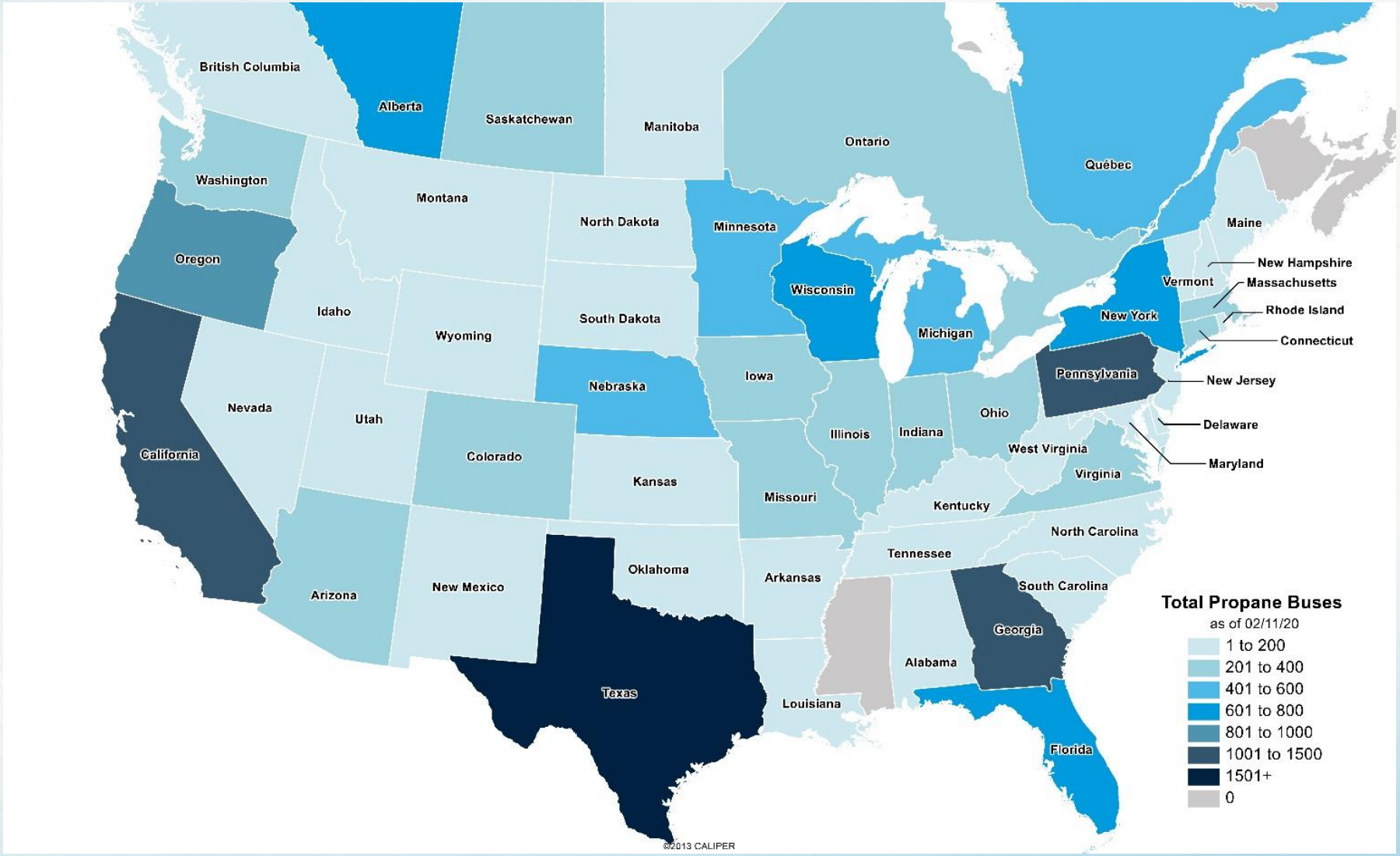
School Bus Propane Deployments



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Your Fuel Options

					
Ease of Adoption	✓	✓	✓		
Energy Independence			✓	✓	✓
NOx Emissions			✓	✓	✓
Fuel Infrastructure	✓	✓	✓		
Cost of Ownership			✓		
Range	✓	✓	✓		
Maintenance		✓	✓	✓	✓
Scalable	✓	✓	✓		
Cold Weather Operation		✓	✓		

ROUSH CLEANTECH

COST
&
COMPLEXITY

Preventative Maintenance

Ford V10
Gas and Propane
7 Quarts

Various Engines
Diesel
17 – 30 Quarts

Preventative Maintenance

Ford 6.8L V10

Part	Quantity	Price	Total
Element Air Cleaner	1	$15.75	$15.75
Oil Spin On Filter	1	$4.11	$4.11
Element, PSR, 510 Filter	1	$24.90	$24.90
Mobil Special 5W-20	7	$3.74	$26.18

Total $70.94

$200 Less than diesel PM vs. PM

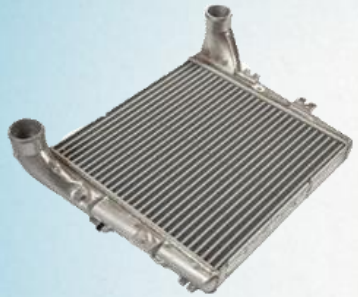
Cummins ISB 6.7L

Part	Quantity	Price	Total
Oil Filter	1	$13.75	$13.75
Fuel Spin-On Filter	1	$37.90	$37.90
Power Steering Spin Filter	1	$9.86	$9.86
Fuel Filter	1	$20.53	$20.53
Allison Control Filter	1	$8.49	$8.49
Mobil Fleet 15W-40	18	$2.59	$46.62
Cleaner, Air Element	1	$140.00	$140.00

Total $277.15

ROUSH CLEANTECH

The Diesel We Know Today
















Engine Components: Diesel

Cummins ISB 6.7L

Part	Quantity	Price	Total
NOx Sensor	1	$480.00	$480.00
NOx Sensor	1	$560.00	$560.00
Pressure Sensor	1	$140.00	$140.00
Doser Injector	1	$290.00	$290.00
Catalyst Assembly w/ DPF	1	$10,554.11	$10,554.11
Temperature Sensor	1	$78.90	$78.90
Temperature Sensor	2	$84.90	$169.80
Turbo	1	$2,731.20	$2,731.20
Injector	6	$755.56	$4,533.36
EGR Valve	1	$590.15	$590.15
EGR Cooler	1	$923.72	$923.72

Total
$21,051.24

You will not find any of these on the Ford / Roush powered Blue Bird Vision

Engine Components: Ford Roush

Ford 6.8L V10

Part	Quantity	Price	Total
PCV Hoses (2)	1	$43.68	$43.68
Vapor Management Valve	1	$65.00	$65.00
Gasket	1	$5.99	$5.99
Injector Assembly	10	$215.00	$2,150.00
Converter Assembly	1	$910.00	$910.00
Spark Plugs	10	$7.08	$70.80
O2 Sensors (all 3)	1	102.57	$102.57

Total
$3,348.04

A fraction the cost of diesel emissions parts

Full Engine Replacement

Ford 6.8L V10

Part	Price	Labor	Total
Ford 6.8L Engine	$5,728.91	$3,640.00	$9,368.91

Half the cost of the competition

Cummins ISB 6.7L

Part	Price	Shipping	Total
Cummins ISB 6.7L	$18,521.98	$400.00	$18,921.98

PSI 8.8L

Part	Price	Core	Total
PSI 8.8L	$17,014.29	$3,850.00	$20,864.29

ROUSH CLEANTECH

TCO - Calculator

ROUSH CLEANTECH	PROPANE	Rebates	GAS		
FUEL					
Annual Miles per Bus	15,500		15,500	15,500	15,500
Years Operated	18		18	18	18
Total Miles Lifetime Miles per Bus	279,000		279,000	279,000	279,000
Fuel Economy (mpg)	4.50		6.00	8.00	1.40
Gallons Used Annually per Bus	3,444		2,583	1,937.00	576
Gallons Used Total per Bus	62,000		46,500	34,875.00	10,373
Fuel Price / Gallon	$1.17	$0.81	$1.85	$2.47	$4.90
PREVENTATIVE MAINTENANCE					
Oil Interval	5,000		5,000	7,000	10,000
Oil Capacity (Quarts)	7		7	21	3
Oil Filter Cost	$5.00		$5.00	$15.12	
Cost per Oil Change	$22.50		$22.50	$67.62	$7.50
Lifetime Oil Change Total Cost	$1,255.50		$1,255.50	$2,695.14	$209
DEF Lifetime Cost				$2,637	
Fuel Filters Change Interval	50,000			15,000	
Fuel Filters Cost	$160			$12.99	
Total Filters Changes	5			18	
Fuel Fiter Cost Lifetime	$800			$233.82	
Total Cost	**Propane**	**Propane**	**Gasoline**	**Diesel**	**EV**
Lifetime Cost	$174,596	$152,276	$176,281	$183,706.76	$375,987.25
Lifetime Savings	$9,111	$31,431	$7,426		($192,280)
Cost per Mile	$0.63	$0.55	$0.63	$0.66	$1.35
		Grants			Grants

Fuel

Propane Fuel Price	Diesel Fuel Price
$1.17	$2.47
Gasoline Fuel Price	**Electricity kWh**
$1.85	$0.13

MPG

Propane MPG	Gasoline MPG
4.50	6.00
56%	
Diesel MPG	**EV Efficiency kWh/Mile**
8.00	1.40

Vehicle

Years Operated	Gasoline Bus Price
18	$89,000
Annual Miles per Bus	**Diesel Bus Price**
15,500	$92,000
Propane Bus Price	**EV Bus Price**
$100,000.00	$325,000.00

Grants

LPG Fuel Rebate	EV Bus Grant
$0.36	$0.00
LPG Bus Grant	**Diesel Bus Grant**
$0.00	$0.00

Alternative Fuel Tax Excise Credit

Annual tax credit included in federal budget to promote alternative fuel adoption

- Currently approved for 2018, 2019, and 2020 calendar years
- Propane is funded at $.36 per gallon
- Included in federal budget since 2008

Credit for infrastructure also included, propane and natural gas are eligible for 30% of the cost, not to exceed $30k per property.

More information available

https://afdc.energy.gov/laws/319

ROUSH CLEANTECH

ENVIRONMENT

ROUSH Propane – Emissions

Emission Constituent	ROUSH Propane Certification Level	% Lower than EPA / CARB Standard
NOx (Nitrogen Oxides)	0.01	90%↓
HCHO (Formaldehyde)	0.001	90% ↓
PM (Particulate Matter)	0.002	80%↓
NMHC (Non-Methane Hydrocarbons)	0.06	57%↓
CO (Carbon Monoxide)	5.0	65%↓
Greenhouse Gas Emissions		
GHG Carbon Dioxide (CO_2)	612	<1%↓
GHG Methane (CH_4)	0.03	70%↓
GHG Nitrous Oxide (N_20)	0.02	80%↓

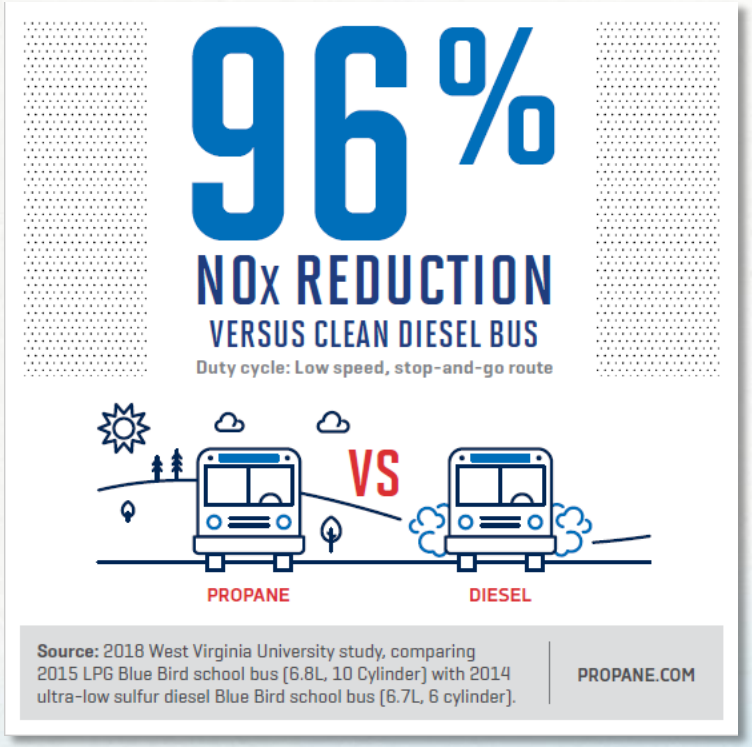
- Approximate Avg. Nearly 70% cleaner than current standards

Recent Studies

Fuel	Propane (LPG)	Ultra-Low Sulfur Diesel
Vehicle	Blue Bird School Bus (6.8L, 10 Cylinder)	Blue Bird School Bus (6.7L, 6 Cylinder)
Model Year	2015	2014
Exhaust Aftertreatment	Three-Way Catalyst	Diesel Oxidation Catalyst, Diesel Particulate Filter, Selective Catalytic Reduction System

Noteworthy Results:

- 96% NOx reduction
- >13% CO2 reduction

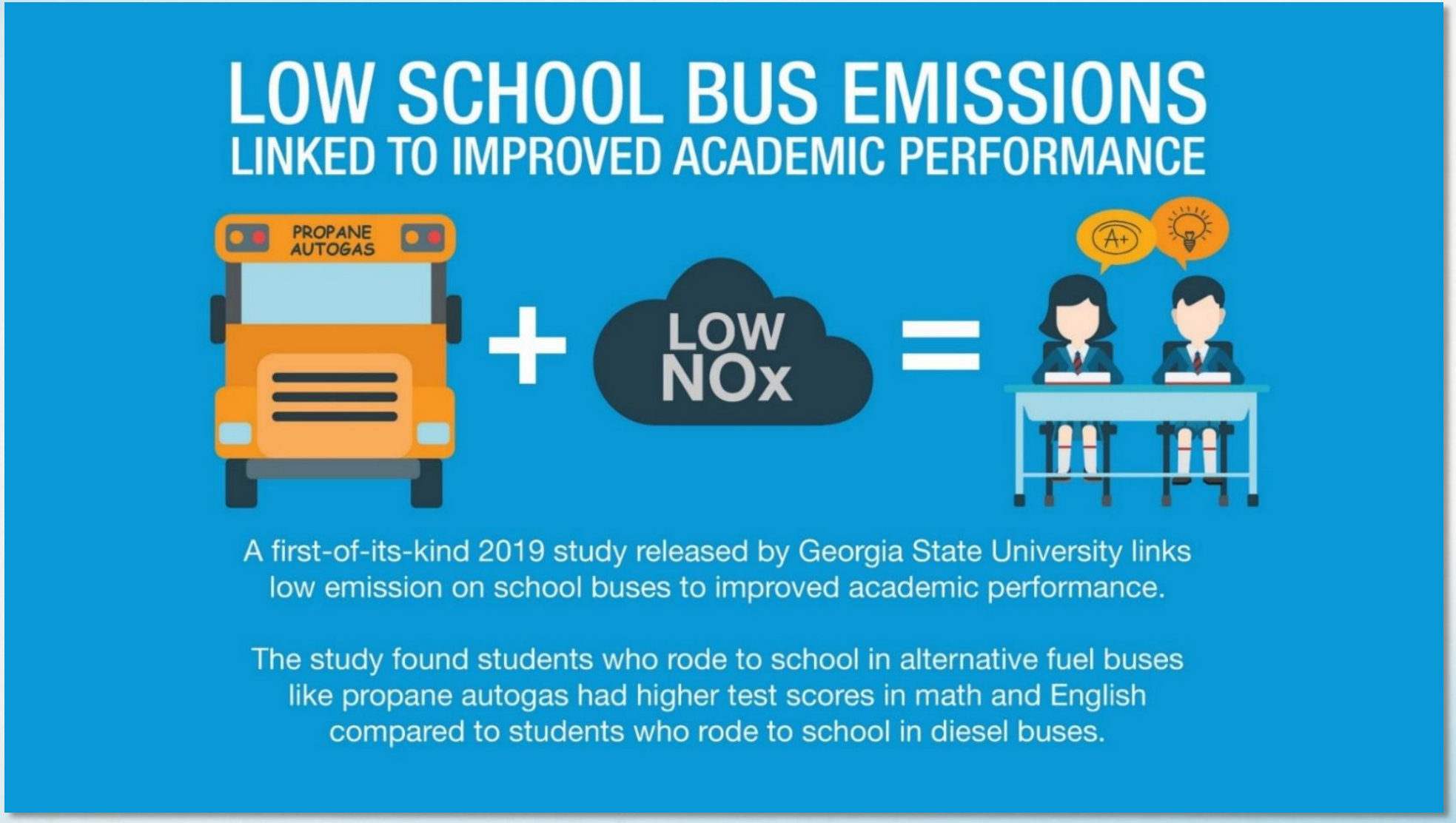


Noteworthy Results:

- New diesels produced ultra-fine particulate that isn't regulated
- During DPF regen, particulate emissions spiked 32%-115% above legal limits

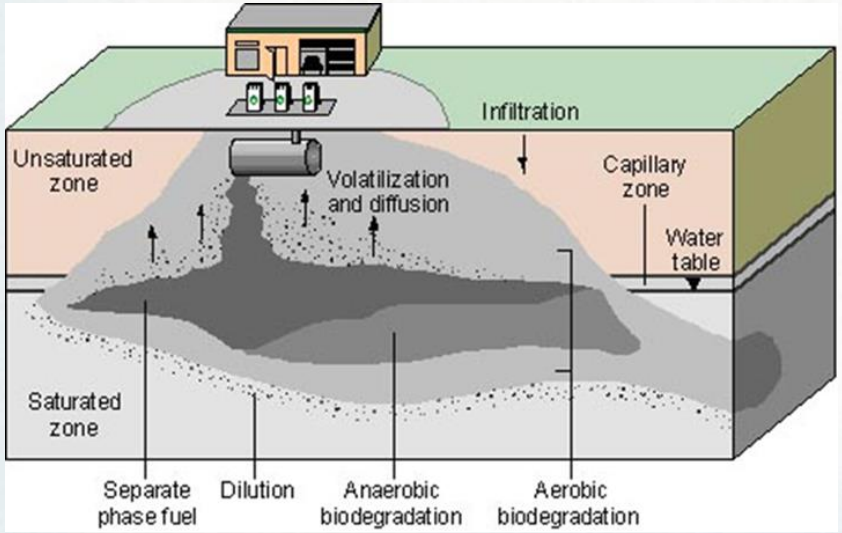
Source: 2020 European Federation for Transport and Environment AISBL: Study "New Diesels, New Problems"

Georgia State University Study



Environmental Benefits - Infrastructure

- Non-toxic
- Non-contaminant
- Non-carcinogenic
- Can’t contaminate ground water



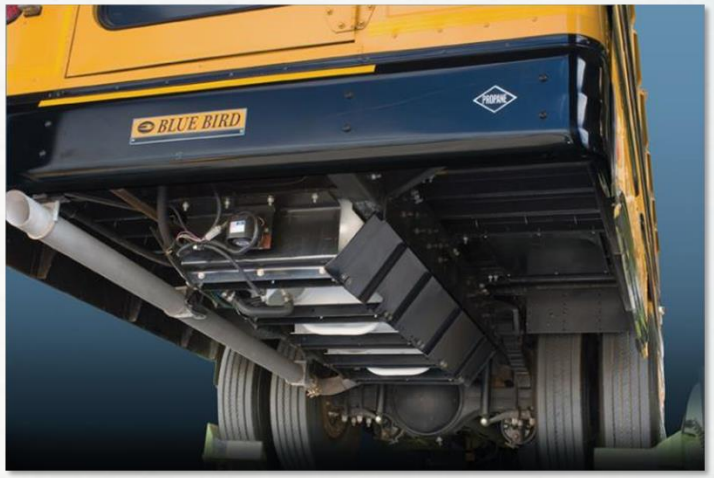
- K15 0.4 cc release, ½ the volume of a green pea

ROUSH CLEANTECH

SAFETY

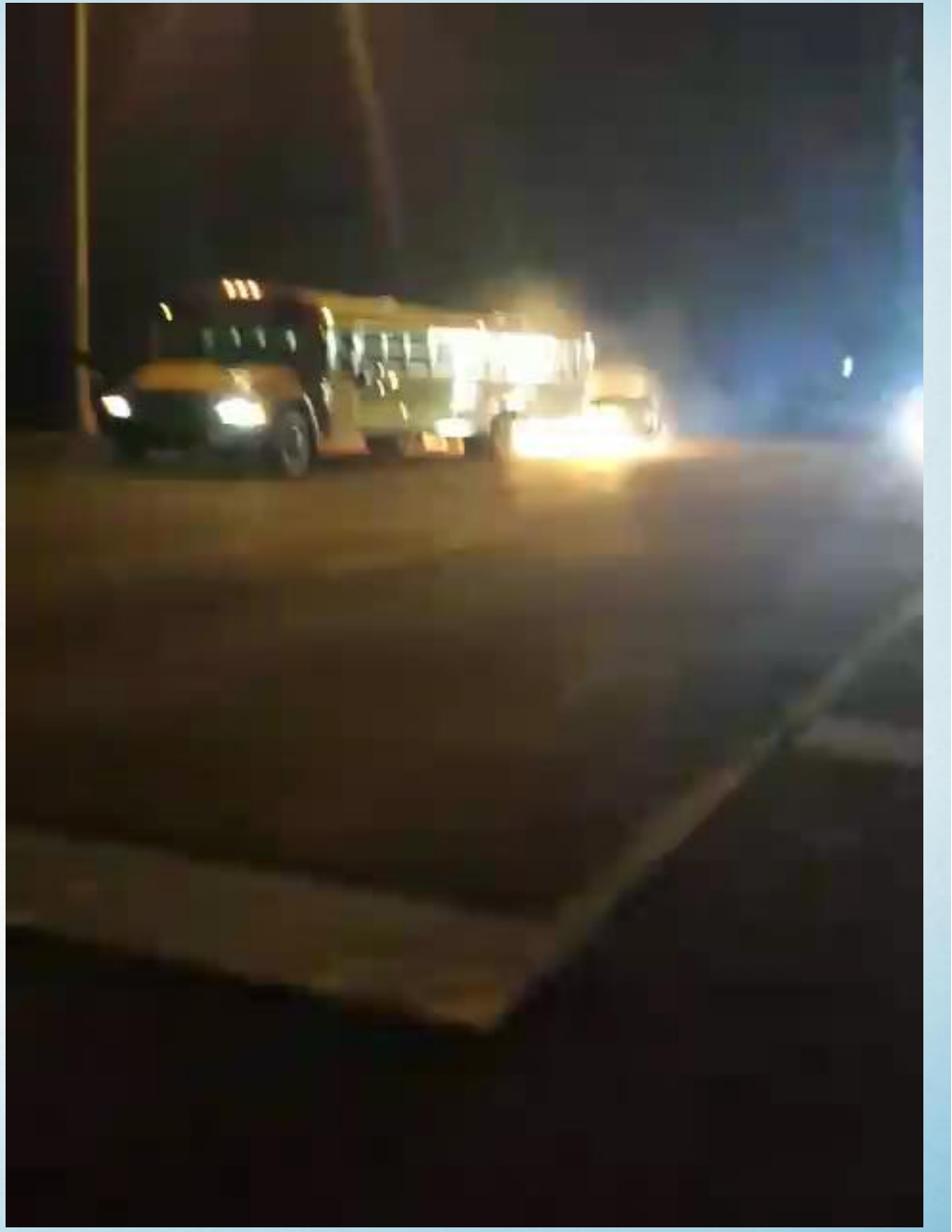
Tank Protection & Crash Testing

- Followed CMVSS 301.1 protocol
- 4,000 lbs @ 40 MPH
- Angled side and rear impact
- 220 PSI tank pressure
- No leakage or no pressure drop in 30 minute test



LPG Safety

- Solenoid Shut-offs
- Mechanical Back-ups
- Pressure Relief Device



Consideration Summary

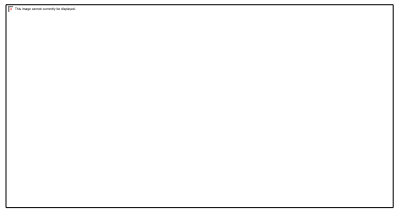
- ☑ Simple and Robust Design
- ☑ No Duty Cycle Compromise
- ☑ Economical Operation
- ☑ Safe by Composition and Design
- ☑ Environmentally Responsible from Well to Wheels

CO-ALLIANCE®

Agricultural Cooperative

Started in business in 1937 as single county Farm Bureau Co-op's

Now serving 83 counties in Indiana, Ohio, Michigan and Illinois



PROPANE AUTOGAS™
CLEAN AMERICAN ENERGY™

CO-ALLIANCE®

Four unique divisions

Energy – Agronomy – Swine - Grain

This diversification gives us stability in todays markets

CO-ALLIANCE®

PROPANE AUTOGAS™ CLEAN AMERICAN ENERGY™

Energy Division

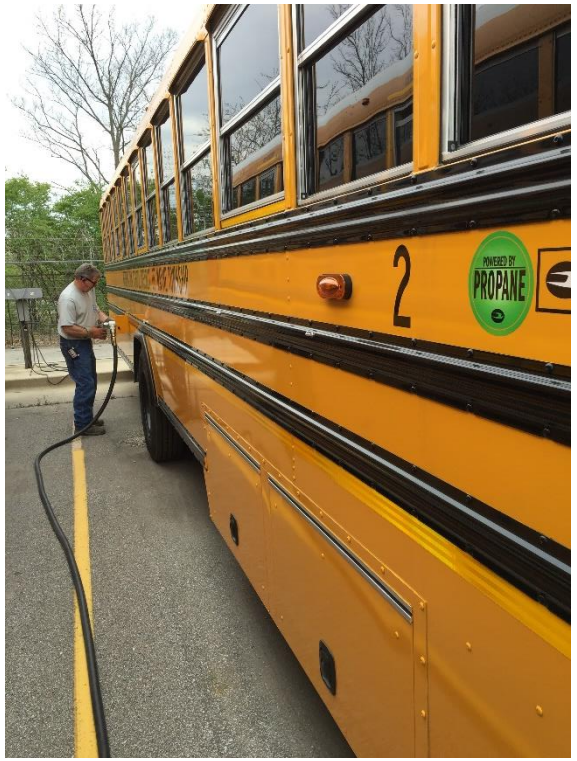
Propane – Liquid Fuels

Propane sales of around 30 million gallons

Farm – Commercial – Home heat - Autogas

Propane Autogas Fueling Options & Installations

- Cash posted price, OPIS pricing, fixed price contract
- Onsite fueling vs. wet-hosing of buses on site



CO-ALLIANCE®

PROPANE AUTOGAS
CLEAN AMERICAN ENERGY™

On-site Propane Autogas Fueling Infrastructure

Many options

- Tank size
- Aboveground / Underground
- Single hose vs. dual hose dispenser
- Skid mount vs. components
- Crash protection
- Electrical supply
- Lighting

CO-ALLIANCE®

PROPANE AUTOGAS
CLEAN AMERICAN ENERGY™

CO-ALLIANCE®

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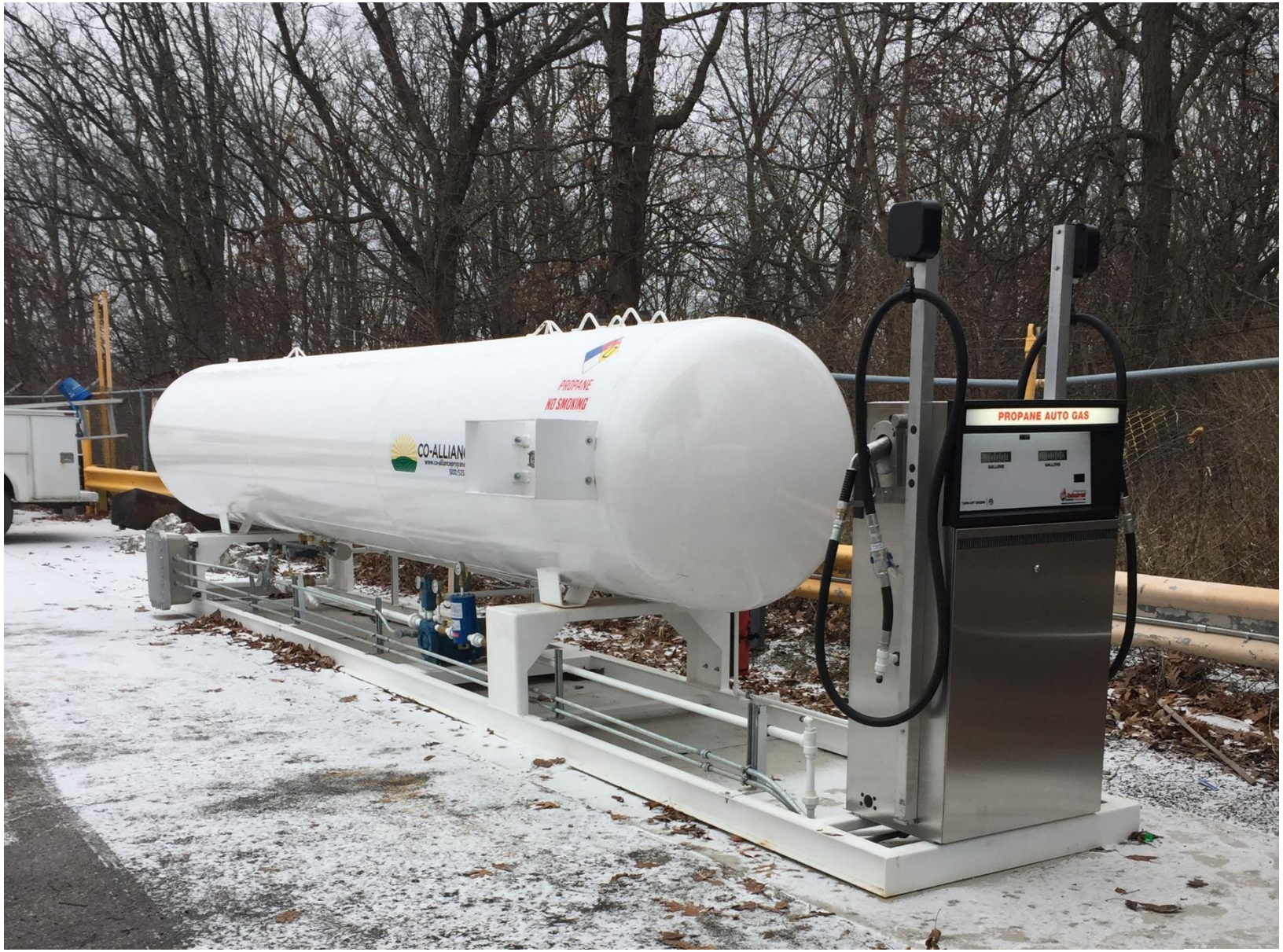

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PROPANE AUTOGAS™
CLEAN AMERICAN ENERGY™

Fleet Success

Avon Community School Corporation

- analyzed the cost effectiveness of Propane buses
- did not count on any rebates or incentives in calculations
- evaluated their pre-purchase analysis and continue to add Propane Autogas buses

CO-ALLIANCE

PROPANE AUTOGAS CLEAN AMERICAN ENERGY

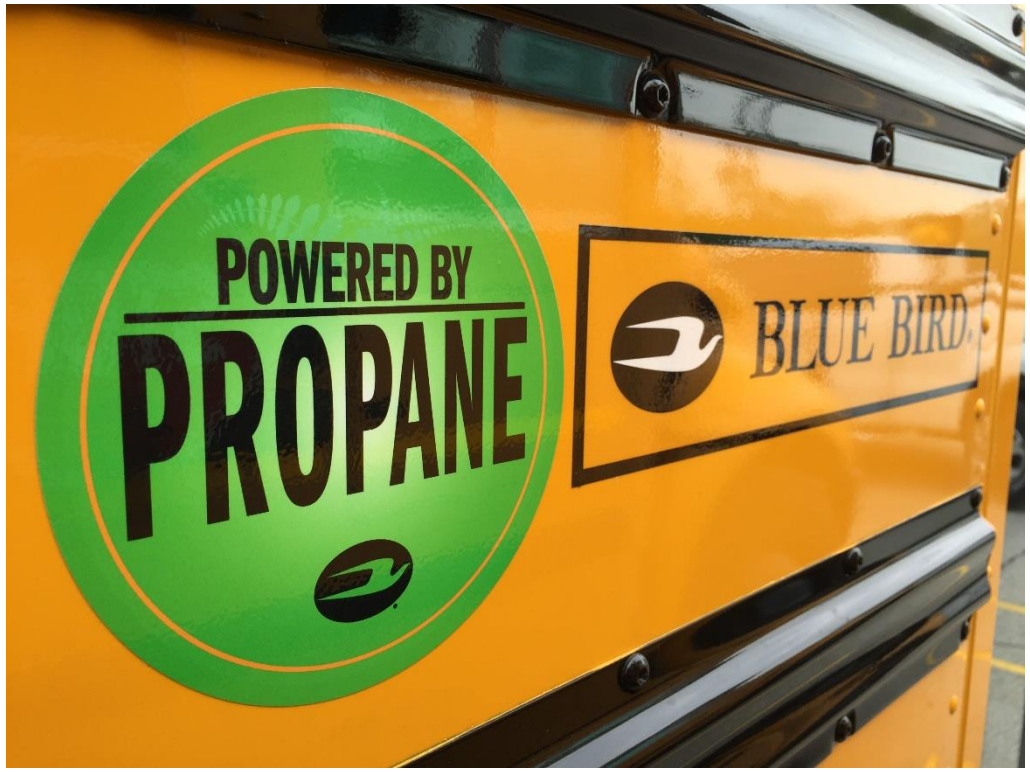
Fleet Success

- Every fleet that we partner with that has added additional new vehicles have added Propane Autogas vehicles.
- Schools still feel the need to keep a few gasoline or diesel buses for out of town trips but most plan to be 90% Propane.
- Police/Sheriff have really liked the bi-fuel option. They can choose which fuel is most cost-effective at the time but more often they really appreciate the increased range with two full fuel tanks.

CO-ALLIANCE®

PROPANE AUTOGAS™ CLEAN AMERICAN ENERGY™

Thank you



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CO-ALLIANCE®

PROPANE AUTOGAS™ CLEAN AMERICAN ENERGY™

SUE HARRISON

Director of Transportation

Michigan City Area Schools

Michigan City, Indiana

BACKGROUND OF MICHIGAN CITY AREA SCHOOLS

- Northwest Indiana
- Tourist Community
- 5500 Students
- Transport 4400 Students

- 12 Schools
  - 1 High School
  - 1 Career Center (Trade School)
  - 2 Middle Schools
  - 8 Elementary Schools
- 120 Square Miles
- LaPorte and Porter Counties
- 42 Secondary Routes and 39 Elementary Routes
- Over 2400 Miles per Day

ENVIRONMENTAL

Michigan City Area Schools Food Service

- Thermal Densification System
- Transform Styrofoam Trays to Pavers
- Reduces Waste by 95%

- Numerous State and National Recognitions
- Environmental Education
- Community Service Projects


PRAIRIE
RESTORATION


KRUEGER MIDDLE SCHOOL
OUTDOOR ENVIRONMENTAL
SCIENCE CENTER
LIVING HISTORY
Funding for this project
was provided in part by the
National Oceanic and
Atmospheric Administration and
the Indiana Department of
Natural Resources,
Lake Michigan Coastal Program.


KRUEGER
OUTDOOR
ENVIRONMENTAL


KRUEGER MIDDLE SCHOOL
OUTDOOR ENVIRONMENTAL
SCIENCE CENTER
BIRD HABITAT
HANSEN HUCKLEBERRY TRAIL

MICHIGAN CITY AREA SCHOOLS COMMITMENT TO SOLAR ENERGY

On March 28th, 2018 the Michigan City Area Schools initiated the largest renewable energy project by a school district. With the installation of Solar Arrays and LED lighting across 7 school facilities, the district is projected to save 23 million dollars over 30 years.

MY BACKGROUND AND FLEET EXPERIENCE

CO-ALLIANCE®

South Shore Clean Cities, Inc.

NORTHERN INDIANA

What made me research alternate fuels and why propane?

HOW DID WE GET TO WHERE WE ARE NOW?

- Attended the South Shore Clean Cities Annual Conference
- Northwestern Indiana Regional Planning Commission Meetings- Learning about the VW Grant
- Partnered with South Shore Clean Cities in April 2019
- Worked with Ryan Lisek to apply for the VW Settlement Grant
- Awarded the Grant on August 12, 2019 for the amount of $207,699.00 to replace 8 Diesel School Buses.
- Working with Shawn Seals, IDEM VW Grant Administrator

ORDERING, RECEIVING & DESTROYING

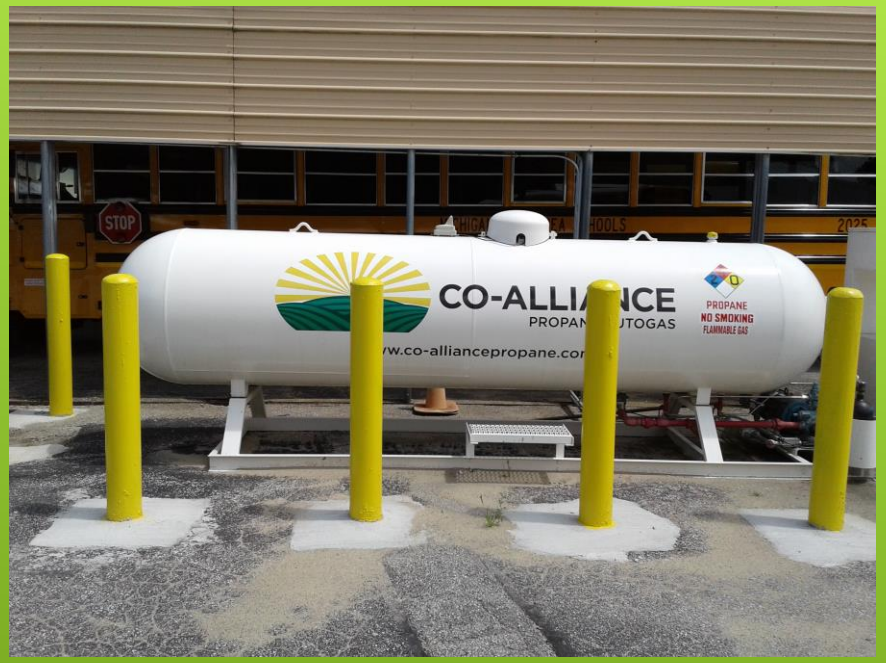
- **Once the VW Grant was awarded, bids were obtained for the buses, propane and infrastructure.**
- **Blue Bird was awarded the bid for the buses, Co-Alliance as the propane supplier and Oscar Larsen was hired to install the infrastructure.**
- **5 Propane Buses were initially ordered and then 3 additional shortly thereafter.**
- **Received the initial 5 buses in January of 2020 and were put into service the following month.**
- **The main stipulation of the grant was to destroy the diesel engines from the buses being replaced by propane. GMI Services handled the destruction of the buses.**

SCHOOL DISTRICT & COMMUNITY SUPPORT

Michigan City Area Schools
Opportunity ★ Excellence ★ Pride


SCHOOL BUS
SCHOOL BUS
2021


STOP


CO-ALLIANCE
PROPANE
NO SMOKING
FLAMMABLE GAS


CO-ALLIANCE
PROPANE AUTOGAS


CO-ALLIANCE
PROPANE AUTOGAS

Blue Bird Color Coordinates Buses:
Propane-Green
Gasoline-Blue
Diesel-Black

COST SAVINGS

- **COVID-19 Pandemic**
- **No Sufficient Data**
- **Cost Savings Estimate**

IS PROPANE IN THE MICHIGAN CITY AREA SCHOOLS TRANSPORTATION DEPARTMENT'S FUTURE PLANS?

ADVICE?

Do Your Research!

Any additional questions, feel free to contact me.

Sue Harrison
sharrison@mcas.k12.in.us
219-873-2127 ext. 8607

About South Shore Clean Cities

Northern Indiana Green Fleet Program

- SSCC manages the Northern Indiana Green Fleet Program including fleets within the MACOG and NIRPC territories.

- **Goal of the program:** To improve the environmental performance of public, private and nonprofit vehicle fleets in Northern Indiana.

- SSCC currently guides over **170 municipal, county, school & university member fleets** to help mitigate barriers associated with sustainable transportation adoption while creating policies supporting vehicle emission & petroleum use reductions.

South Shore Clean Cities, Inc.
NORTHERN INDIANA

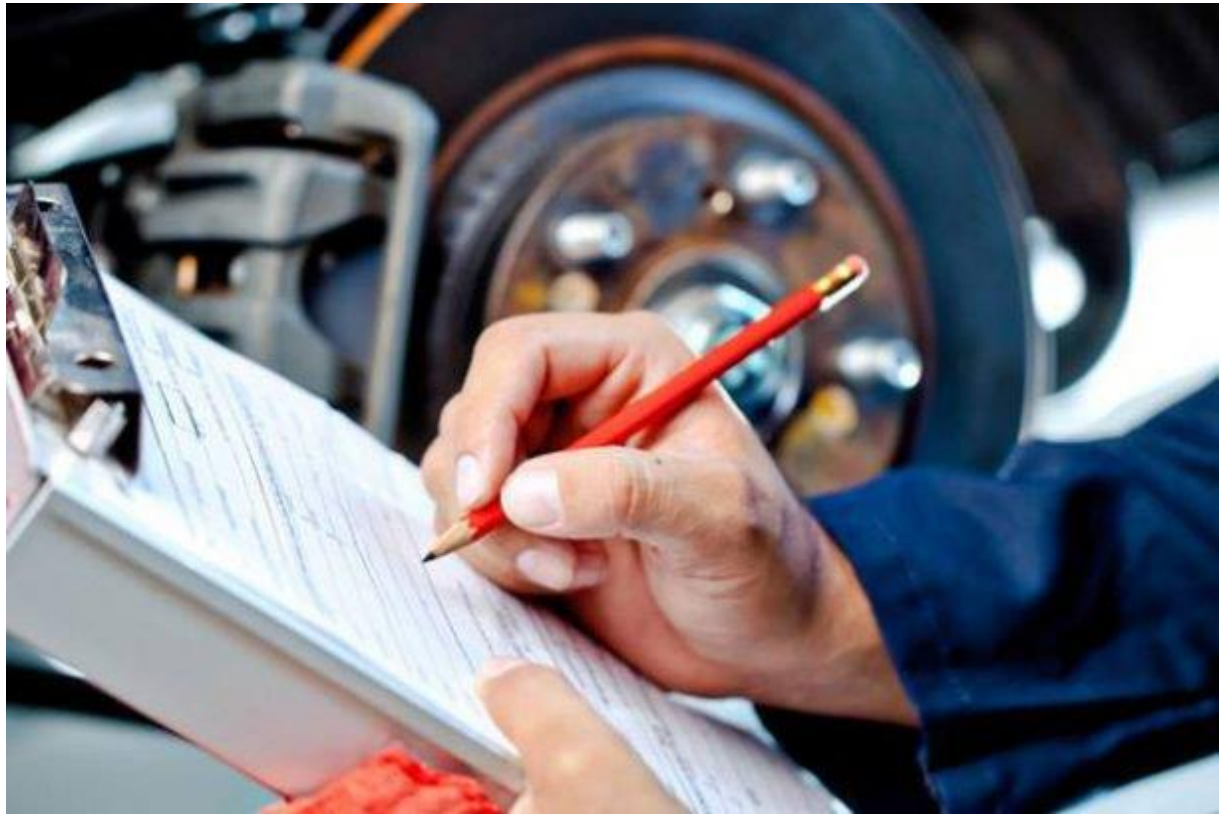
How does the Green Fleet program work?

- Educational opportunities including fuel & technology workshops, trainings & seminars
- Recognition & certification for fleet leaders taking steps to improve environmental performance & efficiency
- Branding & promotional tools to help fleets leverage earned certification status
- Informational resources including current technology options, market conditions, laws & incentives
- Connections with vendors offering sustainable transportation options
- Funding assistance with grant opportunities and other state and federal incentive programs
- **Professional consultation including a Green Fleet audit and emissions quantification.**

Green Fleet Audits

Step 1: South Shore Clean Cities staff will conduct a complete fleet analysis, including:

- Annual fuel usage
- Annual miles traveled & hours used
- Total number of vehicles & equipment
- Vehicle & equipment type, make & model
- Fuel type
- Average vehicle and equipment life
- Down time for fueling and maintenance
- Fuel cost



Green Fleet Audits

Step 2: South Shore Clean Cities staff then provides a complete fleet analysis in a written Green Fleet audit report, including:

- Cost comparisons for various sustainable fuel and vehicle types
- Availability and location of fueling options
- Personalized recommendations for short- and long-term fleet purchase plans
- Provide total cost of ownership and return on investment analysis
- Suggestions for implementing cost-saving programs & training such as idle reduction
- Information on potential funding opportunities to best leverage sustainable transportation investments

South Shore Clean Cities, Inc.
NORTHERN INDIANA

Partnerships & Grant Acquisitions

Thank You!

South Shore Clean Cities
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Project Manager
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www.southshorecleancities.org
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St. John, IN 46373

Type your questions in the question box!

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