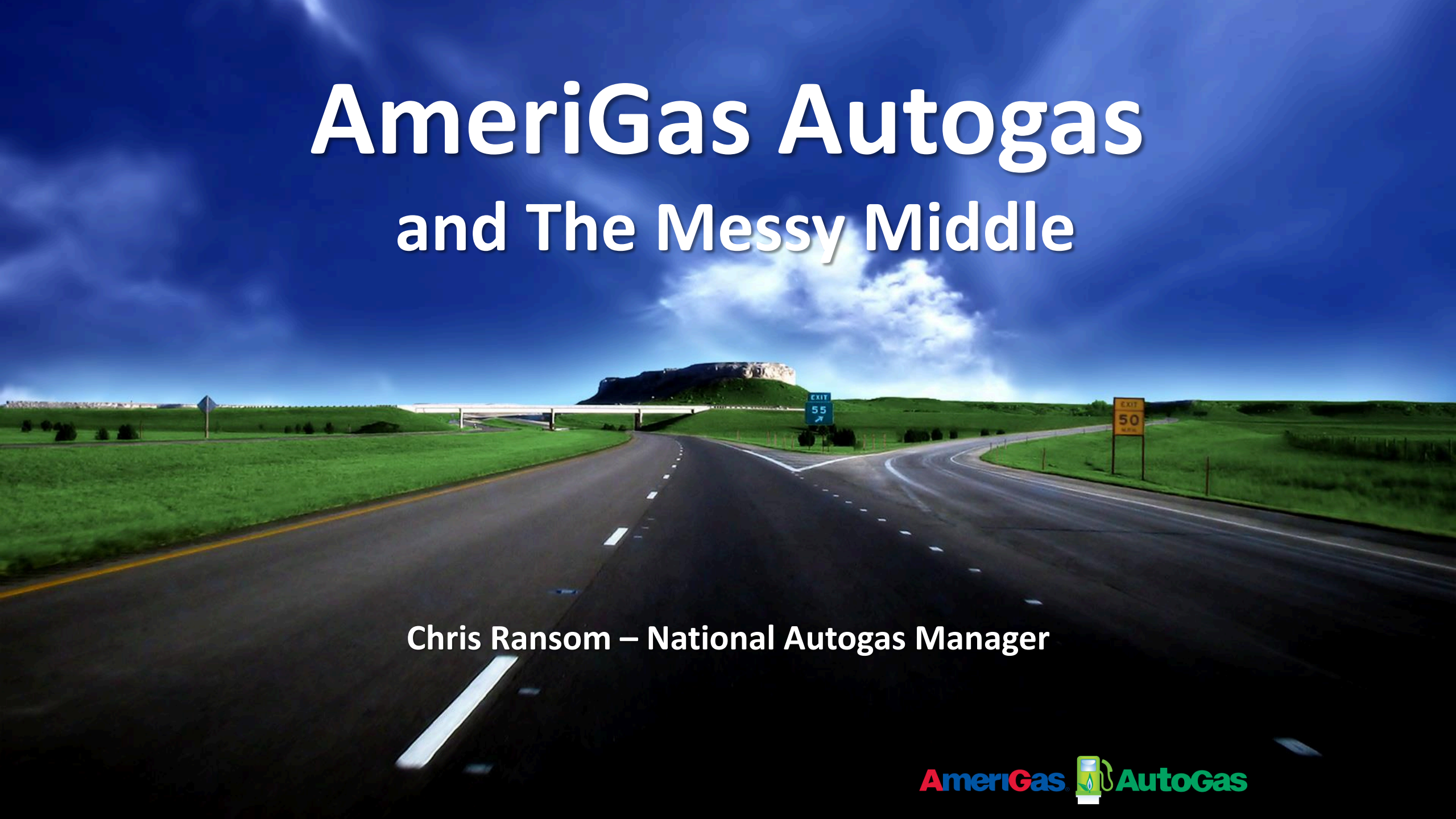
2020 Webinar Series

Hosted by South Shore Clean Cities

AmeriGas Autogas

and The Messy Middle



Chris Ransom – National Autogas Manager

AmeriGas AutoGas

AutoGas = Propane

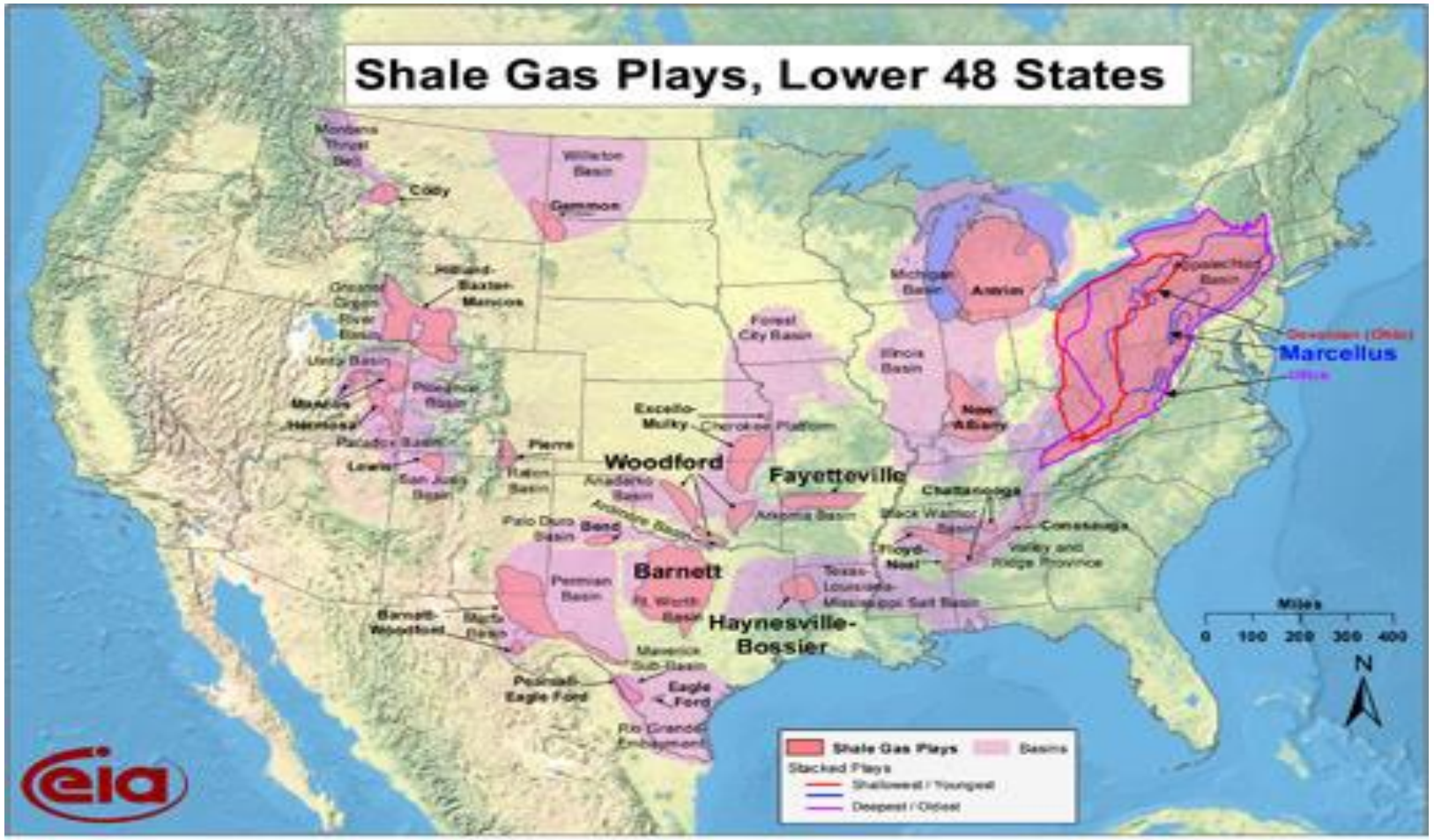
- American Made
- Readily available
- Best TCO of any Alt Fuel
- Environmentally Friendly
- Powers >500,000 vehicles in the US and growing

WSJ 6 December 2018

- **U.S. Becomes Net Exporter of Oil, Fuels for First Time since 1973**

  Boom propels U.S. to symbolic milestone of ‘energy independence’

American Made!

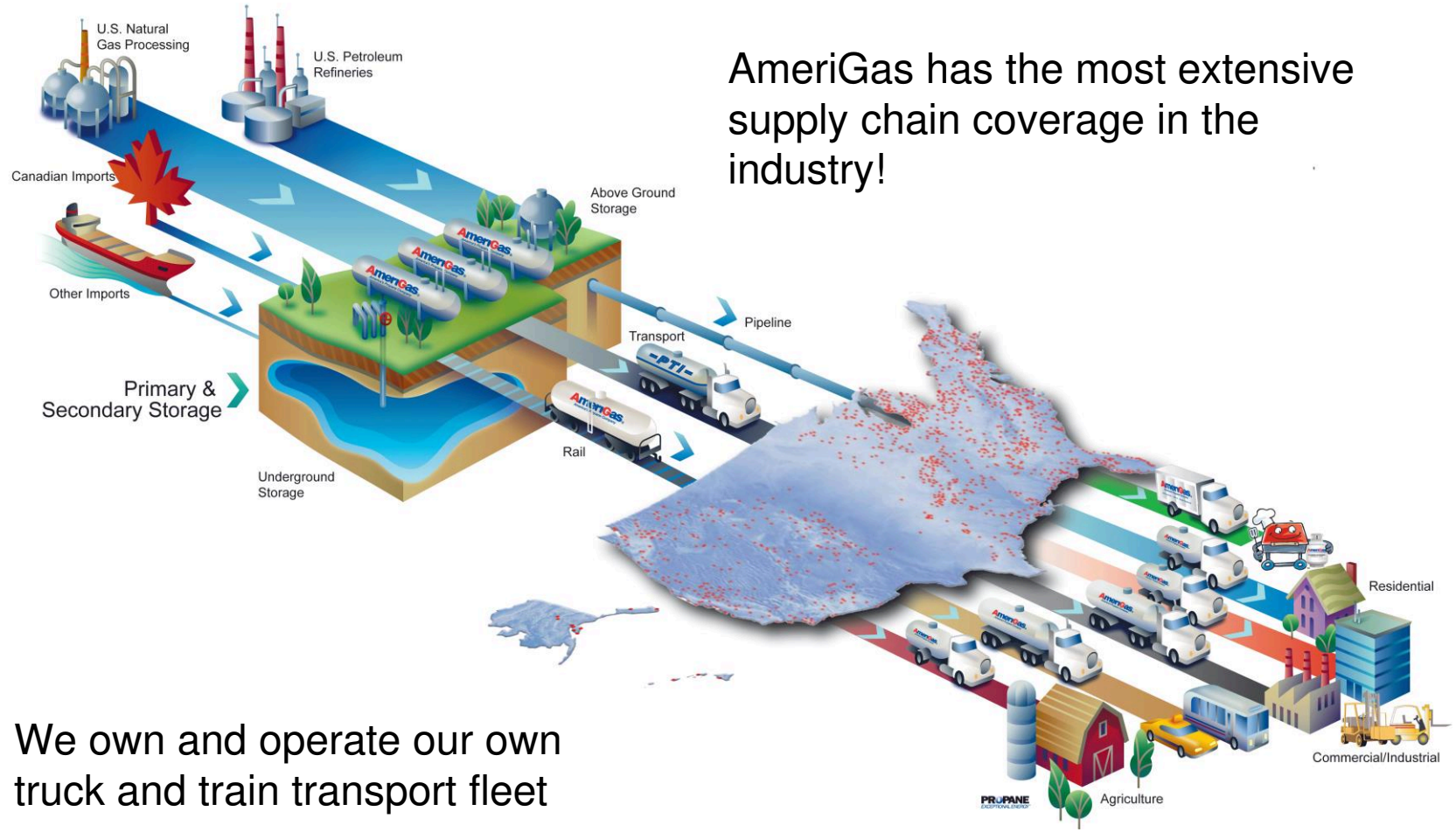


Source: Energy Information Administration based on data from various published studies
Updated: March 10, 2010

Always Reliable Safe Responsive there.
amerigas.com

AmeriGas AutoGas

Unmatched Supply Chain



AmeriGas has the most extensive supply chain coverage in the industry!

We own and operate our own truck and train transport fleet

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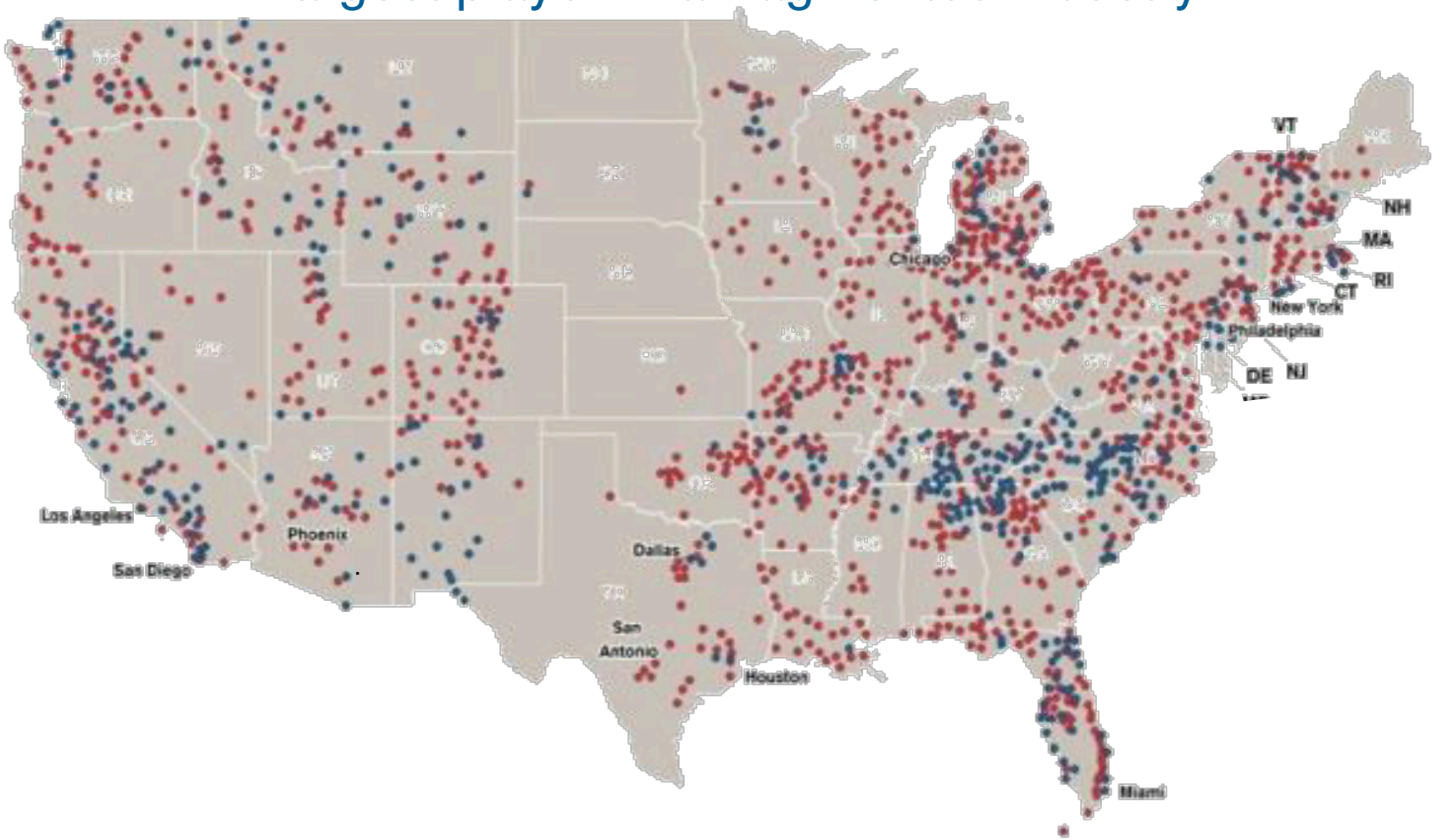
AmeriGas AutoGas

Unmatched Nationwide Footprint

Largest player in a fragmented industry



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AmeriGas AutoGas

TCO: Winner!

FUEL				
Annual Miles per Bus	15,000	15,000	15,000	15,000
Years Operated	15	15	15	15
Total Miles Lifetime Miles per Bus	225,000	225,000	225,000	225,000
Fuel Economy (mpg)	7.00	4.50	5.75	5.75
Gallons Used Annually per Bus	2,142.00	3,333	2,608	2,608
Gallons Used Total per Bus	32,142.00	50,000	39,130	39,130
Fuel Price / Gallon	$2.95	$1.25	$2.35	$2.05
PREVENTATIVE MAINTENANCE				
Oil Interval	7,000	5,000	5,000	5,000
Oil Capacity (Quarts)	21	7	7	7
Oil Filter Cost	$9.36	$4.00	$4.00	$4.00
Oil Cost Per Quart	$2.55	$2.55	$2.55	$2.55
Cost Per Oil Change	$62.91	$22	$22	$22
Lifetime Oil Change Total Cost	$2,022.11	$983.25	$983.25	$983.25
Lifetime DEF Gallons	1,124.97	0	0	0
DEF Cost per Gallon	$1.89			
DEF Total Cost Over Lifetime	$2,126.19			
Fuel Filter Change Interval	15,000	50,000	15,000	5,000
Fuel Filter Cost	$12.99	$43	$15	$150
Total Filter Changes	15	4	15	45
Fuel Fiter Cost Lifetime	$194.85	$172	$225	$6,750
ACQUISITION COST				
Incremental Acquisition Cost	$0.00	$7,000	-$2,500	$25,000
Vehicle Rebate per Unit			$0.00	$0.00

TOTAL COST OF OWNERSHIP	Diesel	Blue Bird Propane	Blue Bird Gasoline	Blue Bird C-CNG
Lifetime Operational Cost/Bus	$99,162.05	$70,655.25	$90,663.75	$112,949.75
Lifetime Savings/Bus		$28,506.80	$8,498.30	-$13,787.70
Cost per Mile to Operate	$0.44	$0.28	$0.41	$0.39

Propane Fuel Price
$1.25

Diesel Fuel Price
$2.95

Gasoline Fuel Price
$2.35

GGE Fuel Price CNG
$2.05

Propane MPG
4.50 64%

Diesel MPG
7.00

Gasoline MPG
5.75 82%

CNG MP GGE
5.75 82%

Years Operated
15

Annual Miles per Year per Bus
15,000

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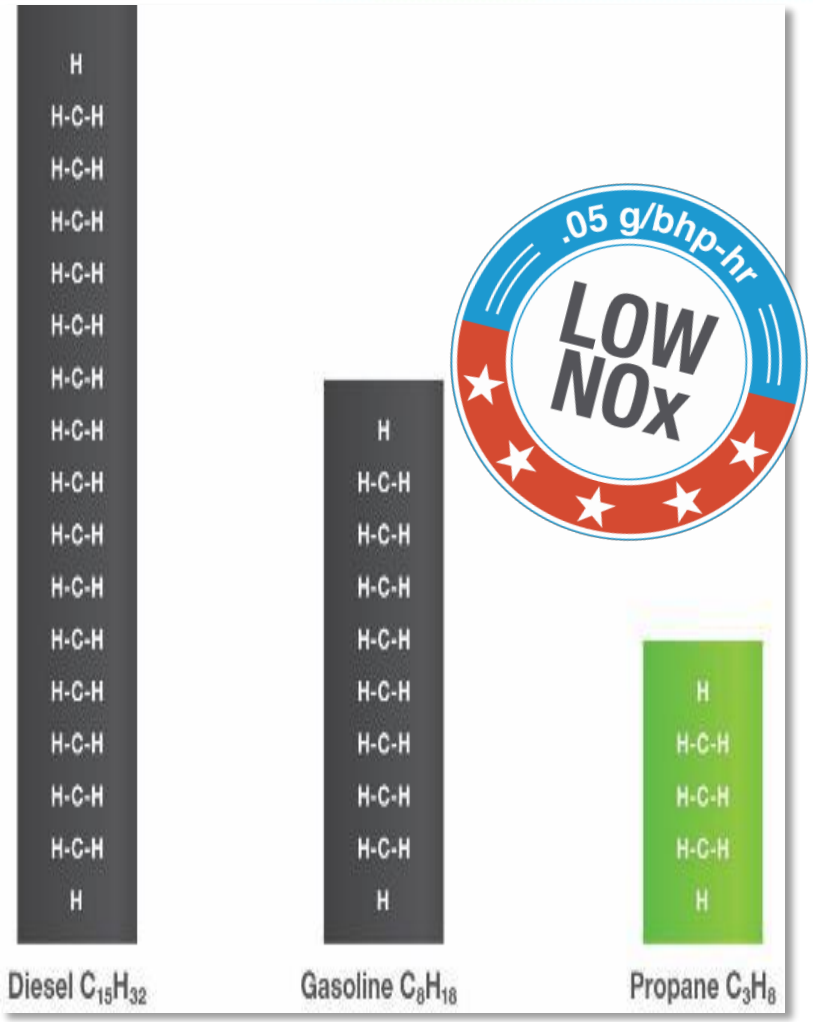
AmeriGas AutoGas

Environmental Benefits

- Propane poses no harm to groundwater, surface water, or soil
- Propane autogas is a nontoxic, non-carcinogenic, and non-corrosive fuel
- 75% less NOx emissions
- Low Carbon Intensity



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Autogas Equipment

- Autogas station installed on-site at fleet base
- Spill-free dispenser
- Fully scalable to serve fleets of all sizes
- Works well with fuel management systems
- All necessary training for fleet personnel

Dispensing Options

Alternative Fuels – Best Fit

Fuel Type	Vehicle Cost	OEM Class 7 Availability	OEM Class 5 Availability	Fuel CPG	Infrastructure	PM & NOx
Diesel	✓	✓	✓	✗	✓	✗
Electric	✗	✗	✓	✗	✗	✓
CNG	✗	✓	✓	✓	✗	✓
Propane	✓	✓	✓	✓	✓	✓

Chris Ransom – National AutoGas Manager

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THANK YOU!

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AmeriGas AutoGas

MacAllister Transportation

ROUSH CLEANTECH

BUILT Ford TOUGH

BLUE BIRD
A heritage of looking ahead.

Your Fuel Options

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

Blue Bird Propane History

- ✓ **Propane is a by-product of natural gas and petroleum, occurring naturally during domestic oil refining and natural gas processing.**
- ✓ **97% Produced in North America**

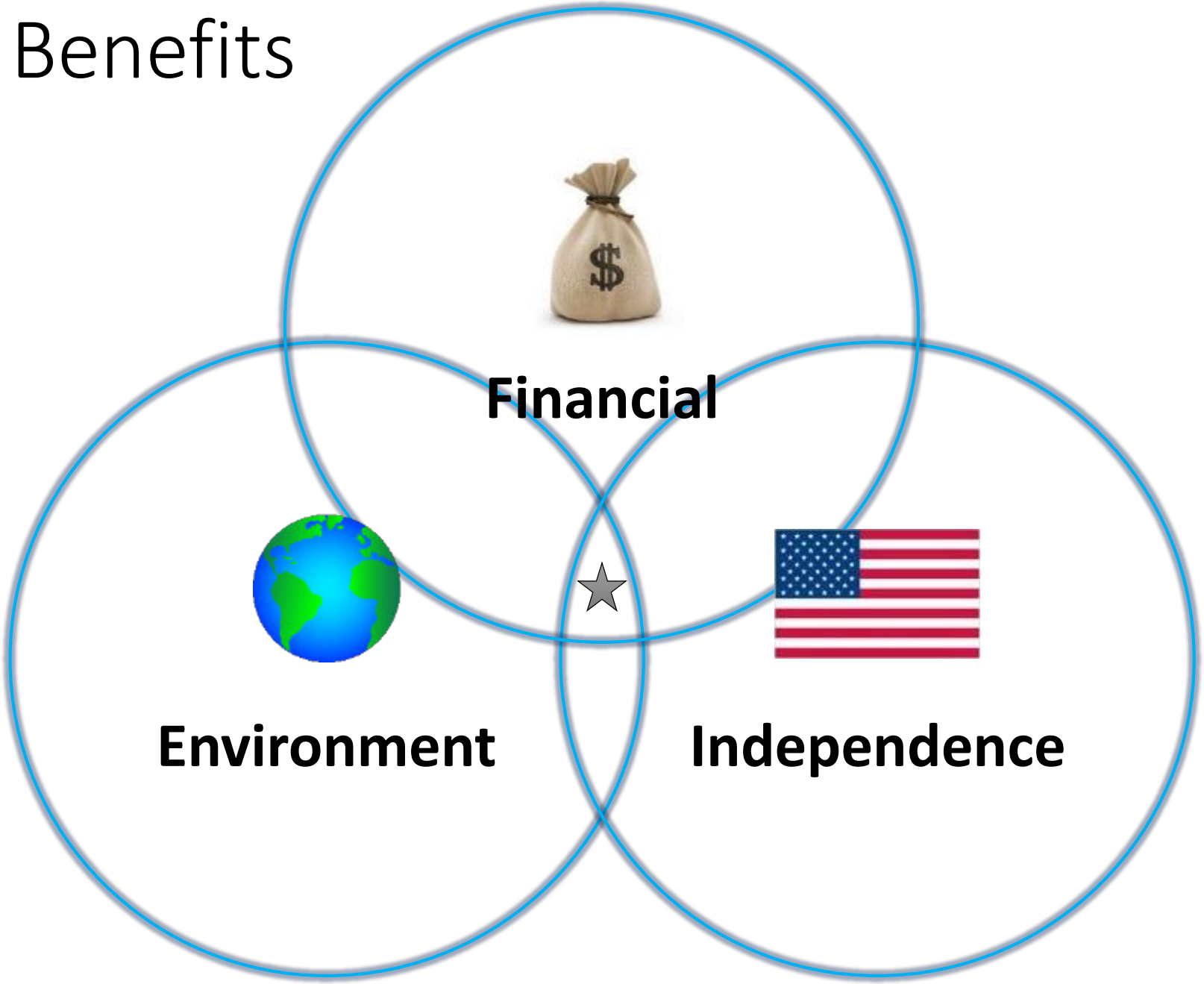
- **GEN 1** – Launched in 1992 - Vapor System
- G**EN 2** – Launched in 2007 - First liquid injection system with the GM8.1L / PTI /CleanFuel
- **GEN 3** – Launched in 2011 - Ford / ROUSH CleanTech
- **GEN 4** – Launched in 2016 - Our current Ford / ROUSH CleanTech system

Exclusive Partnership till 2025

We listened to the customers and made considerable improvements regarding maintenance accessibility, performance and emissions

ROUSH CLEANTECH

Propane Benefits



Emissions – Optional Low NOX Advantage

	NMHC	NOX	CO	PM	HCHO
Standard	0.14	0.2	14.4	0.01	0.01
LPG - Blue Bird	0.07	0.05	2.2	0	0
LPG - Thomas	0.1406	0.1599	5.392	0.0013	0.00154
LPG - IC	0.08	0.1	5.6		0.004
CNG - IC	0.027	0.102	5.6	0	0.00106
CNG/LNG	0.1	0.1	7.8	0	
Diesel - ISB	0.02	0.19	0.1	0	
Diesel - ISL	0.01	0.2	0.1	0	
Diesel - MF7	0.085	0.495	3.247	0.006	
Diesel - DTE	0.016	0.386	6.069	0.0016	

Definitions:

- NMHC – Non Methane Hydrocarbons
- NO_X – Nitrogen Oxide
- CO – Carbon Monoxide
- PM – Particulate Matter
- HCHO - Formaldehyde

Ford, as OEM, meets or exceeds gov't emission requirements

Why Propane?

COST SAVINGS

DISTRICTS REPORT SAVINGS OF UP TO

.37¢ PER MILE

NOISE REDUCTION

UP TO

40% QUIETER

COLD STARTS

STARTS IN TEMPERATURES AS LOW AS

-40°F

LOWEST EMISSIONS

100% less Particulate Matter

60% less Nitrogen Oxide

80% less Hydrocarbons

INCREDIBLY REDUCED EMISSIONS

BUILT Ford TOUGH

ROUSH CLEANTECH

*than a typical fuel tank

Ease of Converting Fleet

ROUSH CLEANTECH

BUILT Ford TOUGH

BLUE BIRD
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Blue Bird – The Alternative Fuel Experts Since 1992

OVER
22,000
ALT FUEL SCHOOL BUSES

OVER
900
SCHOOL DISTRICTS

POWERED BY PROPANE

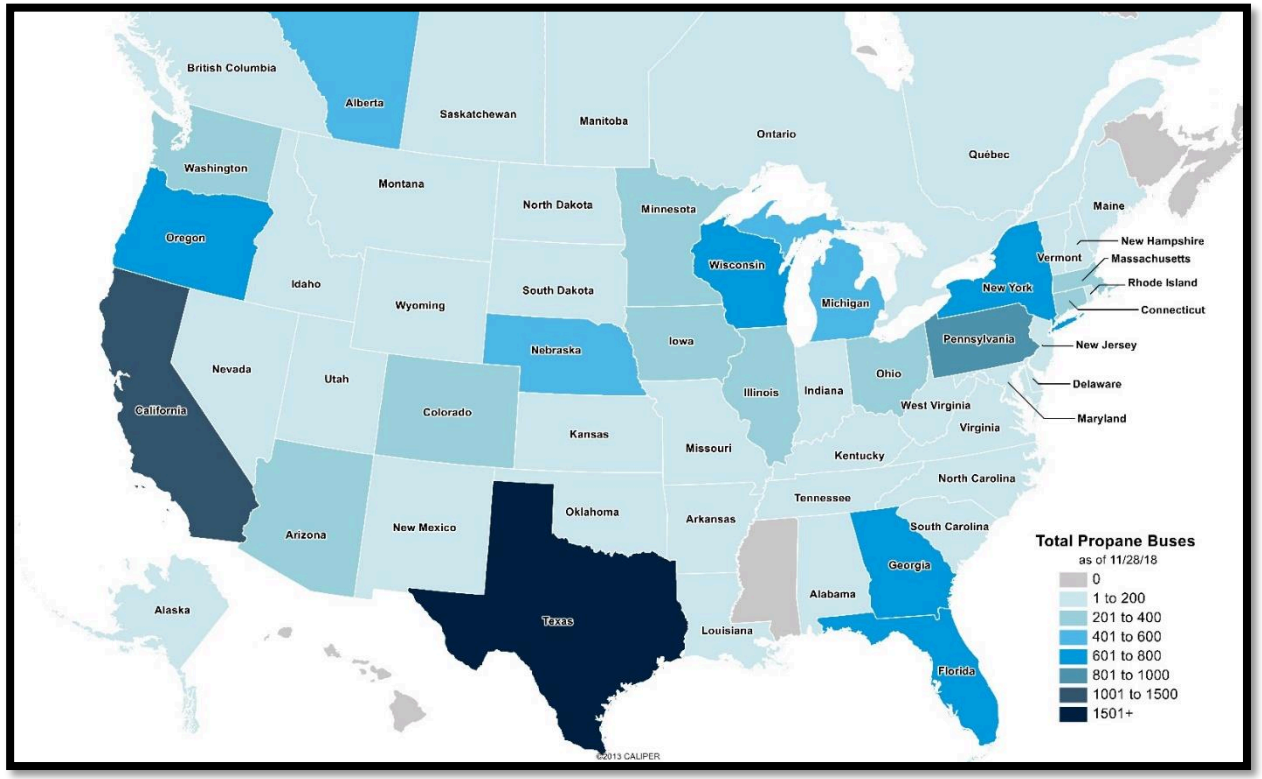
POWERED BY GASOLINE

POWERED BY CNG

POWERED BY ELECTRICITY

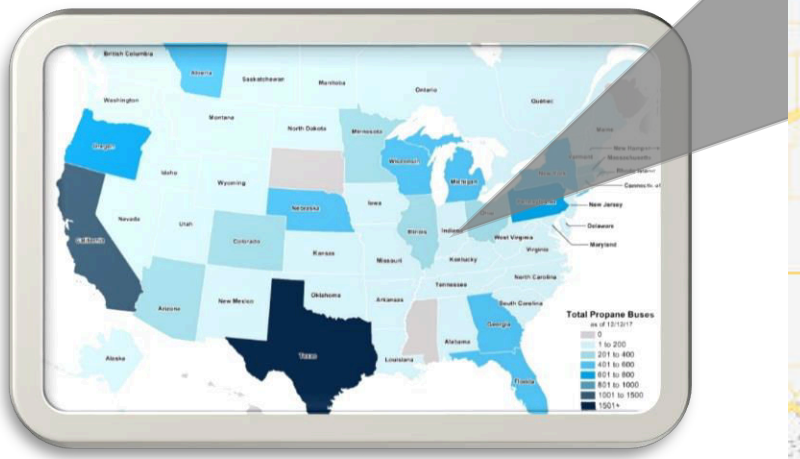
Blue Bird Propane

- Over 18,300 propane school buses are on the road
- Carrying approximately 1,118,700 students/day
- In the fleets of approximately 930 school districts, private schools, and bus contractors



Based on IHS-Polk data for new vehicle registrations through June 2019 and Vehicles in Operation registrations through Dec. 2018. There are no registered Type D propane school buses from January 2012 through June 2019 in IHS's new vehicle registration database. Additional buses based on manufacturer information and other publicly available information, which includes buses ordered and/or delivered but not yet registered and buses sold before 2012 which did not include propane fuel type in their Vehicle Identification Number (VIN) and sales data from other public sources. Ridership based on approximately 62 students per Type C bus and 14 students per Type A bus. Double routing and use for extracurricular activities can increase ridership.

Ford/ROUSH Indiana Deployments



Indiana Propane School Bus Deployments

272
SCHOOL BUSES as of 6/29

OVER
20
SCHOOL DISTRICTS

ROUSH CLEANTECH

BLUE BIRD

BUILT Ford TOUGH

Why Convert?

ROUSH CLEANTECH

BUILT Ford TOUGH

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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	

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	**Total $3,348.04**
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	

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	**Total $21,051.24**
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	

Cost per Mile to Operate and Total Cost

TCO Inputs (Fuel and Preventative Maintenance Only)		
Fuel	Price / Gallon	MPG
Diesel	$2.75	7.5
Gasoline	$2.25	5.85
Propane	$1.10	4.5
CNG	2.15 (GGE)	5.85
Electric	12.3¢ / kWh	1.4 kWh / mile

ACQUISITION COST					
Acquisition Cost	$80,000.00	$85,000	$78,000	$115,000	$300,000
Vehicle Rebate per Unit			$0.00	$0.00	$0
TOTAL COST OF OWNERSHIP	**Diesel**	**Propane**	**Gasoline**	**CNG**	**Electric**
Lifetime Operational Cost/Bus	**$166,701.46**	**$142,039.25**	**$165,745.50**	**$210,374.40**	**$338,745.00**
Cost per Mile to Operate	$0.39	$0.25	$0.39	$0.42	$0.17

Electric $0.17

Propane $0.25

Gasoline $0.39

Diesel $0.39

CNG $0.42

Questions?

Tyler Nohe

MacAllister Transportation

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Franklin Community Schools

- Located 20 miles south of Indianapolis
- Our district Covers 112 square miles
- 65% of students live within a 3 mile radius
- About 5200 students total, transport approx 3500
- Approx 70 buses and 60 routes
- $2.7 million transportation budget including wages and benefits
- Put our first 3 propane buses online last school year

Why the interest in propane ?

- Began looking at all possible money saving alternatives to help with major funding losses brought about by tax caps.
- If propane made sense budgetarily, then it would help with our bus idling policy
- Due to the logistical layout of half of our buildings, vehicle fumes are easily brought into the buildings through fresh air make up units.

How did we start the journey?

- Started looking at propane buses about 4 years ago
- Asked questions and listened to other corporations in our region that are using propane buses.
- Glean information from their personal experiences, both pro and con with propane.
- Use bus vendors as a resource for information.

Information to consider

- Fleet size?
- Average miles put on buses over the lifespan of the bus?
- Rural or urban area?
- Does your city have a clean air initiative?
- Infrastructure considerations?

Cost Analysis

- Do a cost analysis spreadsheet!
- Use your own, current dollar amounts
- Include everything
- Propane bus vendors can assist with providing the document.
- Be realistic about numbers and projections.
- In your presentation, don’t base projections off of “best case scenario” figures. Give yourself cushion to meet expected goals.
- Don’t use any funding or grants that you haven’t secured as this could play into your future plans.

Actual fuel usage

- Track real propane usage
- Mileage fluctuates due to route makeup, trips and driver habits
- Driver awareness for propane vs diesel
- Utilize your propane buses everywhere you can to maximize savings. Field trips, etc.. If you have a bus on the road, use the propane if possible.

Where we go from here

- For us, it’s easy to show, and now prove, how propane is our best direction given what we currently see.
- Our real world figures are very close to our projections.
- 5 more propane buses will come online in late September
- Utilizing 8 propane buses vs our diesel buses will save us at least two loads of diesel per year ($25-30k)
- In our given situation, we currently see no reason to go back to diesel powered buses.

FCS Propane Fueling Station

About South Shore Clean Cities

Northern Indiana Green Fleet Program

- SSCC manages the Green Fleet Program
- **Goal of the program:** To improve the environmental performance of public, private and nonprofit vehicle fleets throughout Indiana.
- SSCC currently guides over **150+ member fleets**

South Shore Clean Cities, Inc.
NORTHERN INDIANA

Why Become a Green Fleet Member?

- Educational opportunities
- Recognition & certification
- Branding & promotional tools
- Informational resources
- Connections with vendors
- Funding assistance
- Professional consultation

South Shore Clean Cities, Inc.
NORTHERN INDIANA

Partnerships & Grant Acquisitions

Questions? Contact Us!

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Coming Up…

Visit www.southshorecleancities.org/event/ for details