



**Session #8: Propane Transportation Applications
and Success Stories**

October 07, 2021



Sessions through December 09, 2021



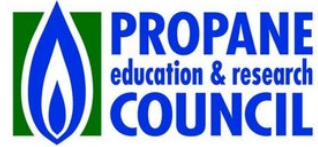
Sessions September 09, 2021 – October 19, 2021

<https://www.sustainablefleetexpo.com/>

SFT Conference Series Upcoming Sessions

- **10/09: Funding Sources & Creative Financing for Sustainable Fleet Deployment**
- **10/12: Funding Sources and Creative Financing for Sustainable Fleet Deployment**
- **10/14: Hydrogen as a Transportation Solution**
- **10/19: Future Proofing Electric Vehicle Charging Infrastructure**
- **10/21: Best Practices of the Top Green Fleet Winners 2021**

2021 SFT Conference Series Sponsors



Format

- Q&A at the end
- Submit questions and comments to “Panelists”
- Scheduled for 2:00p-3:30p
- Handout
- Recording

Propane Transportation Applications and Success Stories October 07, 2021

2:00-2:07 **Rick Sapienza NCCETC**--Introduction & Welcome

2:07-2:22 **Steve Whaley PERC**—Propane Autogas Overview and Applications

2:22-2:34 **Joe Lasek, Schwan's Home Delivery**—Schwan's Home Delivery Propane Story

2:34-2:44 **Trey Stow, Fulton County Schools**—Propane School Bus Deployment

2:44-2:56 **Charlie Megginson Delaware Transit, DART's Propane Program**

2:56-3:02 **John Barnett Suburban Propane**—Propane Fueling and Vehicle Conversion

3:02-3:30 Q&A





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Steve Whaley
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- Director of Autogas Business Development for the Propane Education & Research Council
- More 25 years experience working with both natural gas and propane solutions for public and private fleets
- Previous experience with Whaley Clean Transportations Consulting, Agility Fuel Systems, Roush Clean Tech and Blossman Propane

Propane Autogas: Applications & Success Stories

Stephen Whaley
Director of Autogas Business Development

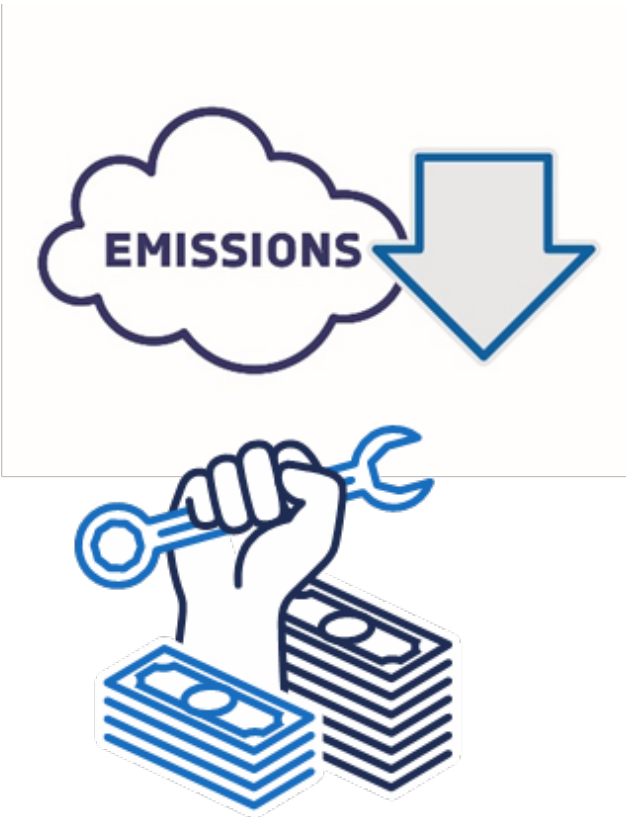
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What's the Criteria for Success?

What Makes an Alternative Energy Adoption Successful?



- Reduced emissions without increasing cost or losing efficiency.
- TCO reduction or ROI realized before the end of the lifecycle.
- Similar (or better) performance than the original fuel without compromising range.
- High-volume supply of energy domestically sourced.

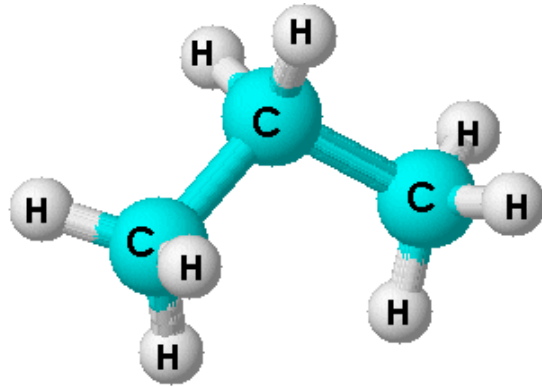
WHAT IS PROPANE?

- 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

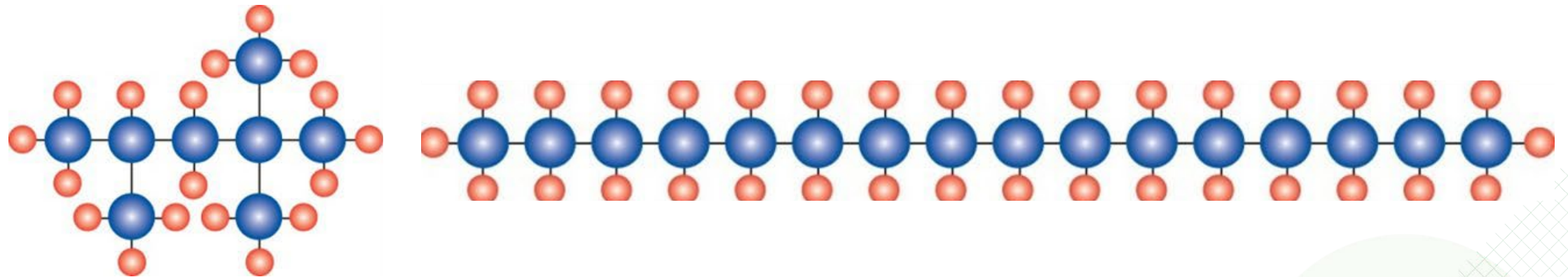
What is Propane?

- Liquid state below minus 42 degrees Fahrenheit
- 100 PSI at 60-degree ambient temperature
- Heavier than air
 - No expensive ventilation systems needed for maintenance facilities

What is Propane?



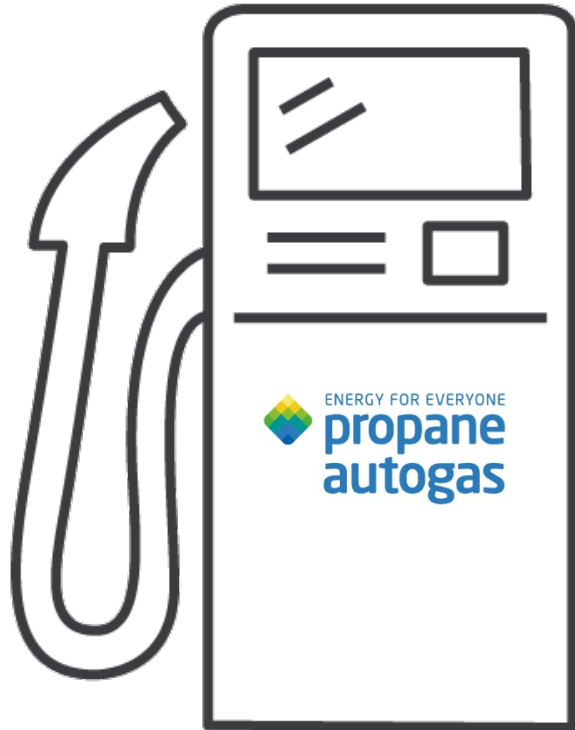
Low Carbon – Hydrogen Rich Energy



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



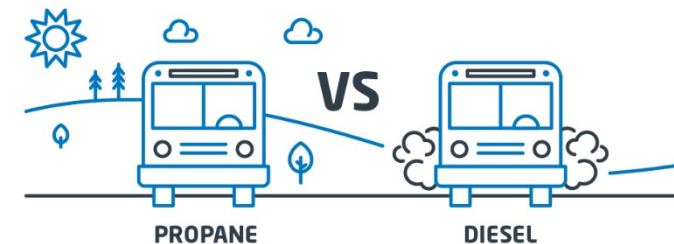
Path to Zero Emissions

- Particulate Matter
 - Virtually zero
- 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

96%

NOx REDUCTION VERSUS CLEAN DIESEL BUS

Duty cycle: Low speed, stop-and-go route



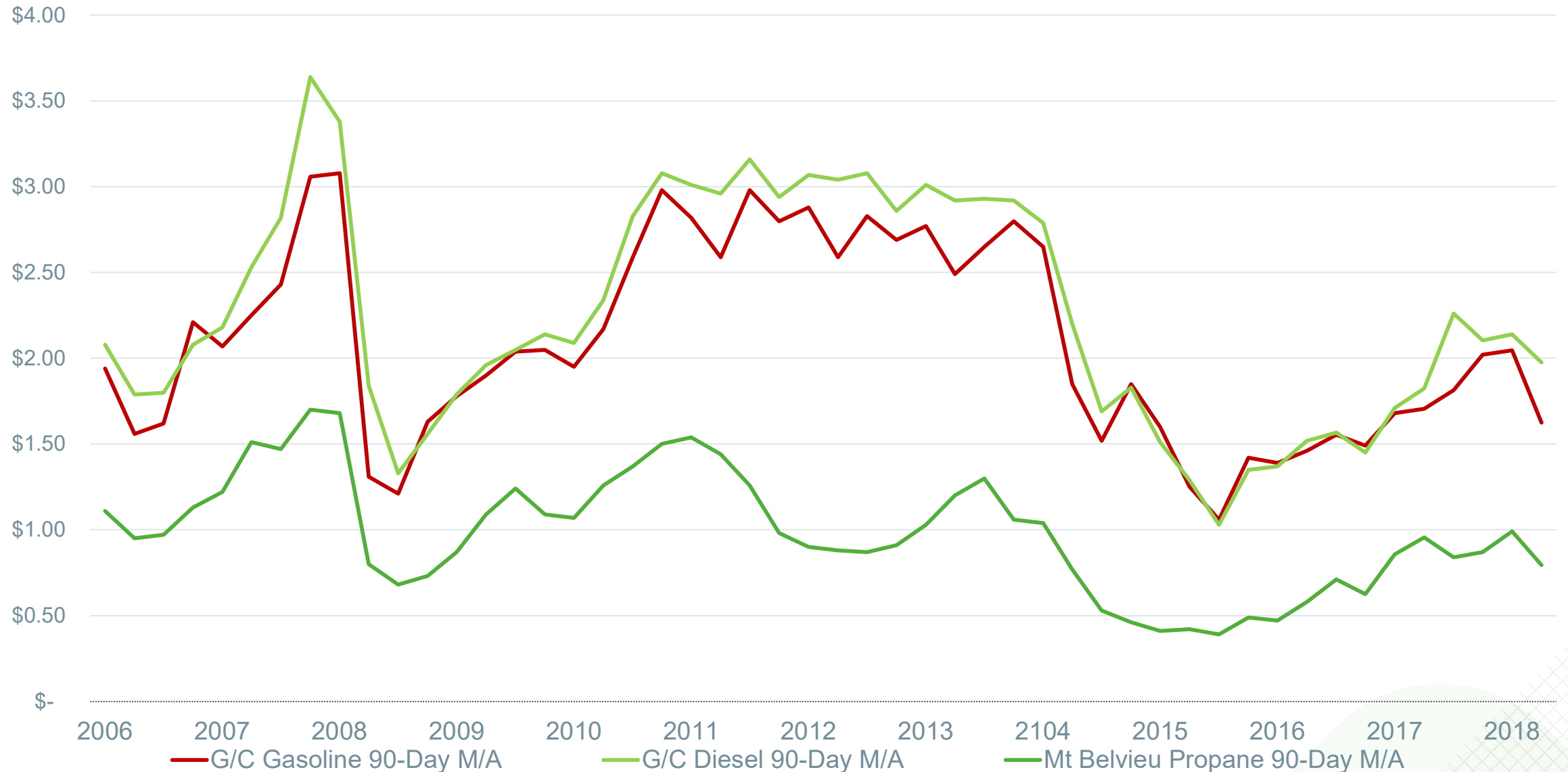
Source: 2018 West Virginia University study, comparing 2015 LPG Blue Bird school bus (6.8L, 10 Cylinder) with 2014 ultra-low sulfur diesel Blue Bird school bus (6.7L, 6 cylinder).

PROPANE.COM



Fuel & Maintenance Cost Reductions

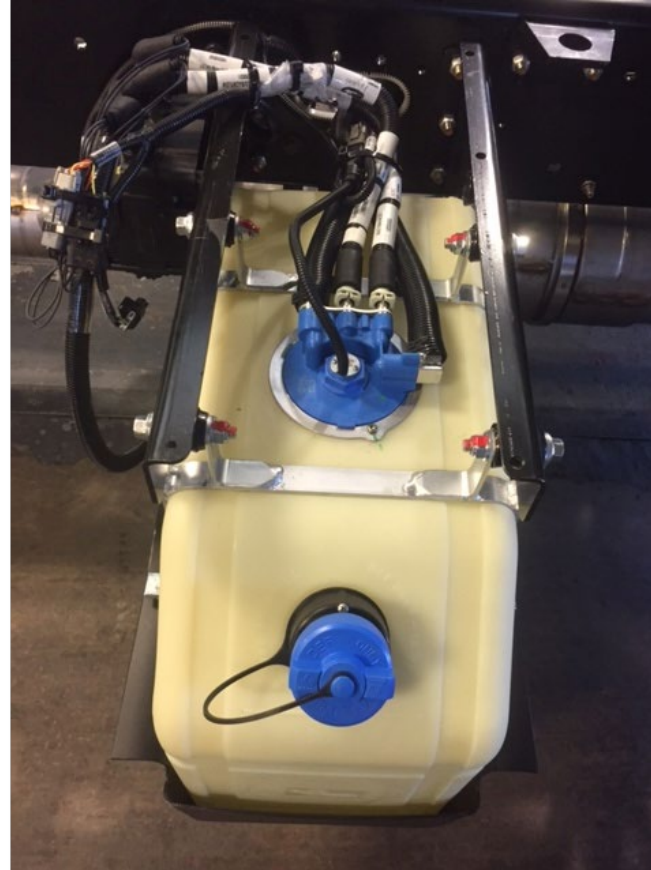
US ENERGY PRICE COMPARISON 2006-2018



Source: EIA.gov

Increased Inventory

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



The Diesel We Know Today



The Future of Diesel:

THE NEW PHASE II INTEGRATED SYSTEM CONCEPT

HOW IT WORKS

- The integrated Rotary Turbine Control enables exhaust gases to bypass the turbine stage and enter the Close Coupled Unit after the gas has been injected with urea by the new Cummins UL4 injector.
- When combined with the Single Module™ chassis mounted aftertreatment, the concept integrated System has the potential to improve emissions, particularly for cold start and urban driving operations.



Combining Engineering Expertise to Help Customers Address Future Emissions Control Standards

2010



Figure 1. EPA 2010 aftertreatment system layout.

.2 NOx

2024

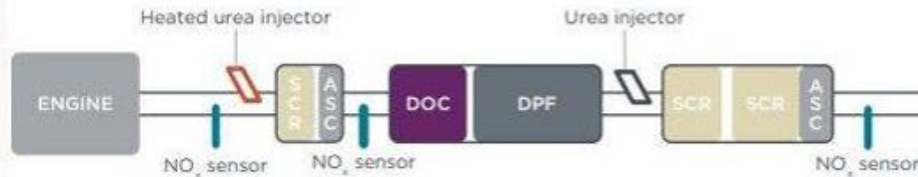


Figure 3. Potential aftertreatment configuration (No. 2) of a CARB 2024 compliant system.

.05 NOx

2027

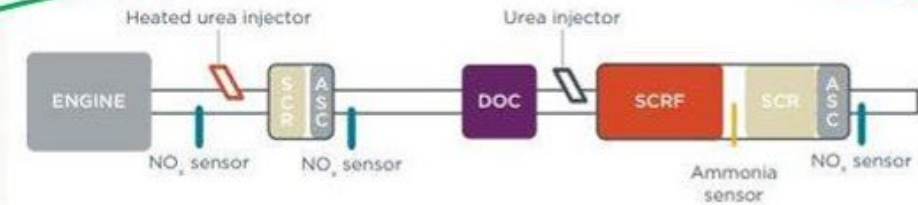


Figure 5. Aftertreatment configuration 2 to meet CARB 2027 standards under FTP and supplemental low-load cycle. Adapted from SwRI (Sharp, 2019).

.02 NOx

1

1

LPG Meets This Today

Source: "ESTIMATED COST OF DIESEL EMISSIONS-CONTROL TECHNOLOGY TO MEET FUTURE CALIFORNIA LOW NOX STANDARDS IN 2024 AND 2027"
<https://theicct.org/sites/default/files/publications/HDV-emissions-compliance-cost-may2020.pdf>



Current Autogas Vehicle Offerings





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

OEM Propane Options



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





2021 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)





SCHOOL BUS

STOP

R415

R389




SNAPSHOT OF PROPANE AUTOGAS SCHOOL BUS MARKET

1,250,000

STUDENTS TRANSPORTED

..... **DAILY**

STATES WITH
14 
500+ BUSES

.....
1,000

DISTRICTS &
CONTRACTORS
OPERATE PROPANE
AUTOGAS BUSES

.....

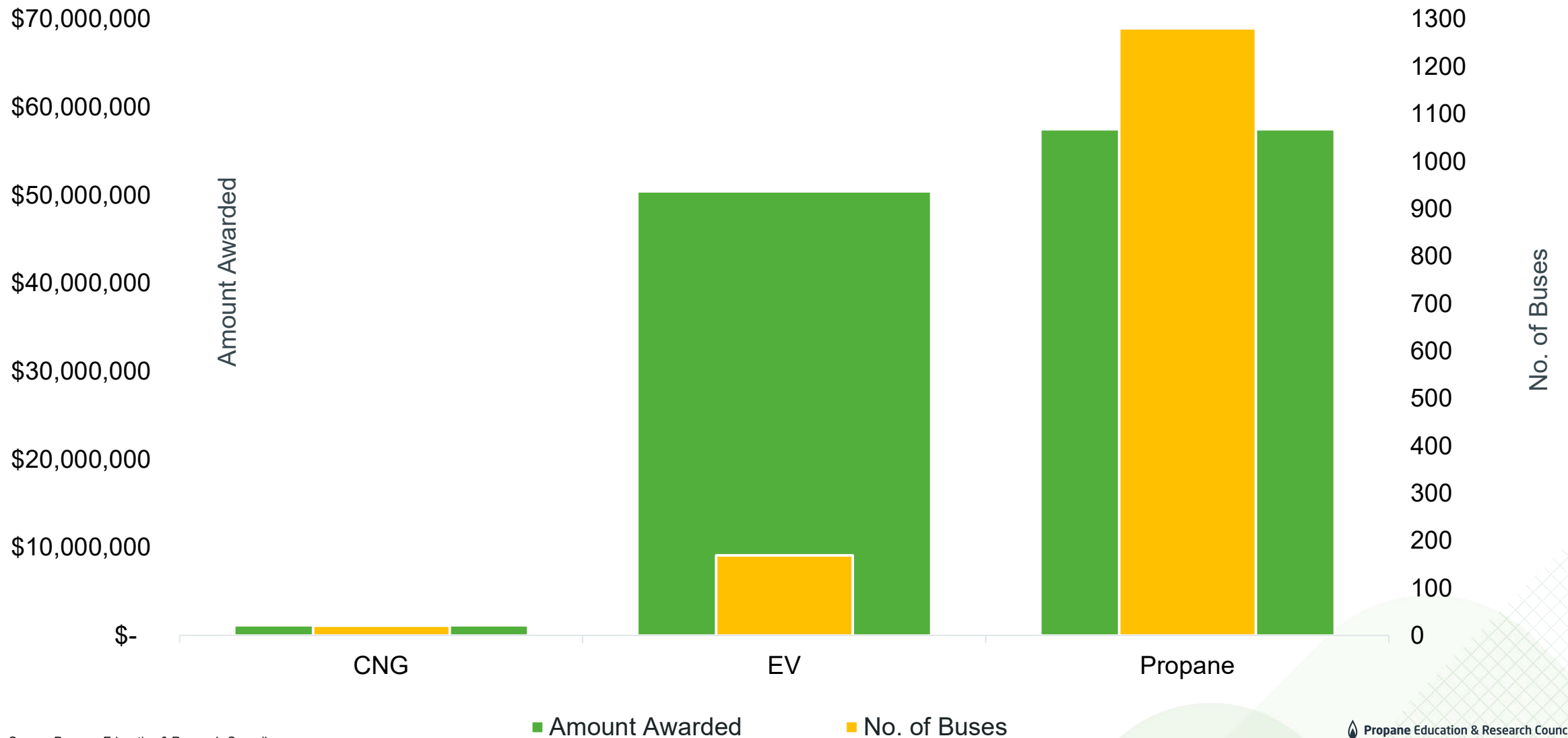
22,000+

PROPANE AUTOGAS BUSES
..... **ON THE ROAD**

Similarly Equipped Blue Bird Type C Bus

Diesel, Cummins, ISB, 6.7L	\$100,000.00
LPG, Ford/Roush, 6.8L	\$106,000.00
CNG, Ford/Roush, 6.8L	\$134,000.00
Electric, Cummins	\$350,000.00

VW: Alt Fuel School Bus Funding & No. of Buses Through January 31, 2021





High Growth Vehicle Markets

EMERGING MARKETS

Food/Beverage

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



EMERGING MARKETS

Paratransit

- 51,000 paratransit vehicles nationwide.
- 600 gallons per month average fuel consumption.
- ADA requires every county in the U.S. to provide service.



Same Equipped 14 Passenger Shuttle Bus

Gasoline, 7.3L Engine	\$71,569.00
Propane, Roush, 7.3L Engine	\$86,784.00
Electric 88kWh Battery (100 mi)	\$233,603.00

EMERGING MARKETS

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/month average fuel consumption.





Autogas Infrastructure

Fueling Infrastructure – Mobile Refueling

- **Best Option:** Fleet has limited space for on-site infrastructure.

Your fleet can take advantage of propane autogas even if your plans are uncertain about investing in infrastructure in the near future.

- Mobile refueling is arranged with your local propane retailer.
- At a scheduled time, your retailer will refuel your fleet vehicles on-site, one by one.

Costs and situations vary; talk to an area propane retailer for more details.



Temporary Refueling Set-up

- **Best Option:** Fleet is in the process of building permanent refueling infrastructure.
- **Includes:** Exact setup varies, but generally includes a dispenser and fuel tank mounted on a trailer.

This option keeps fleets fueled with a temporary, self-contained refueling setup.

- A propane retailer owns all the equipment, and your fleet refuels using the tank and dispenser for as long as necessary.

Costs and situations vary; talk to an area propane retailer for more details.



Standard Private Station

- **Best Option:** Fleet of 50 vehicles or fewer.
- **Includes:** A 1,000-3,000-gallon tank, plus a single autogas fuel dispenser.

Like an advanced private station, you or your propane provider own the infrastructure.

- If your propane provider owns the infrastructure, you're responsible for site preparation (crash protection and electrical).
 - Propane provider owns the infrastructure — Your cost: \$1,500-\$15,000 (site preparation)
- If you own the infrastructure, you purchase the propane tank, pump, motor, and dispenser for a convenient central refueling location.
 - Fleet owns the infrastructure — Your cost: \$1,500-\$15,000 (site preparation) + \$20,000-\$60,000 (infrastructure)





SHARP
AUTOGAS

1024

Ready Refresh

Ready Refresh

Advanced Private Station

- **Best Option:** Fleet of 50 vehicles or more.
- **Includes:** A high-capacity tank, a canopy, and multiple fuel dispensers.

With this setup, either you or your propane provider own the infrastructure:

- If your propane provider owns the infrastructure, you're responsible for site preparation (crash protection and electrical).
 - Propane provider owns the infrastructure — Your cost: \$5,000-\$75,000 (site preparation)
- If you own the infrastructure, you pay for the cost of a canopy, propane tank, pump, motor, and dispenser with card lock and vehicle tracking capability.
 - Fleet owns the infrastructure — Your cost: \$5,000-\$75,000 (site preparation) + \$60,000-\$225,000 (infrastructure)



Dispenser Options

- Credit card reader
- Transaction receipt printer
- Hose retractor
- Quick connect (Euro) nozzles
- Fully integrated, customizable fuel management system
- Third party fuel management system connections
- Telemetry

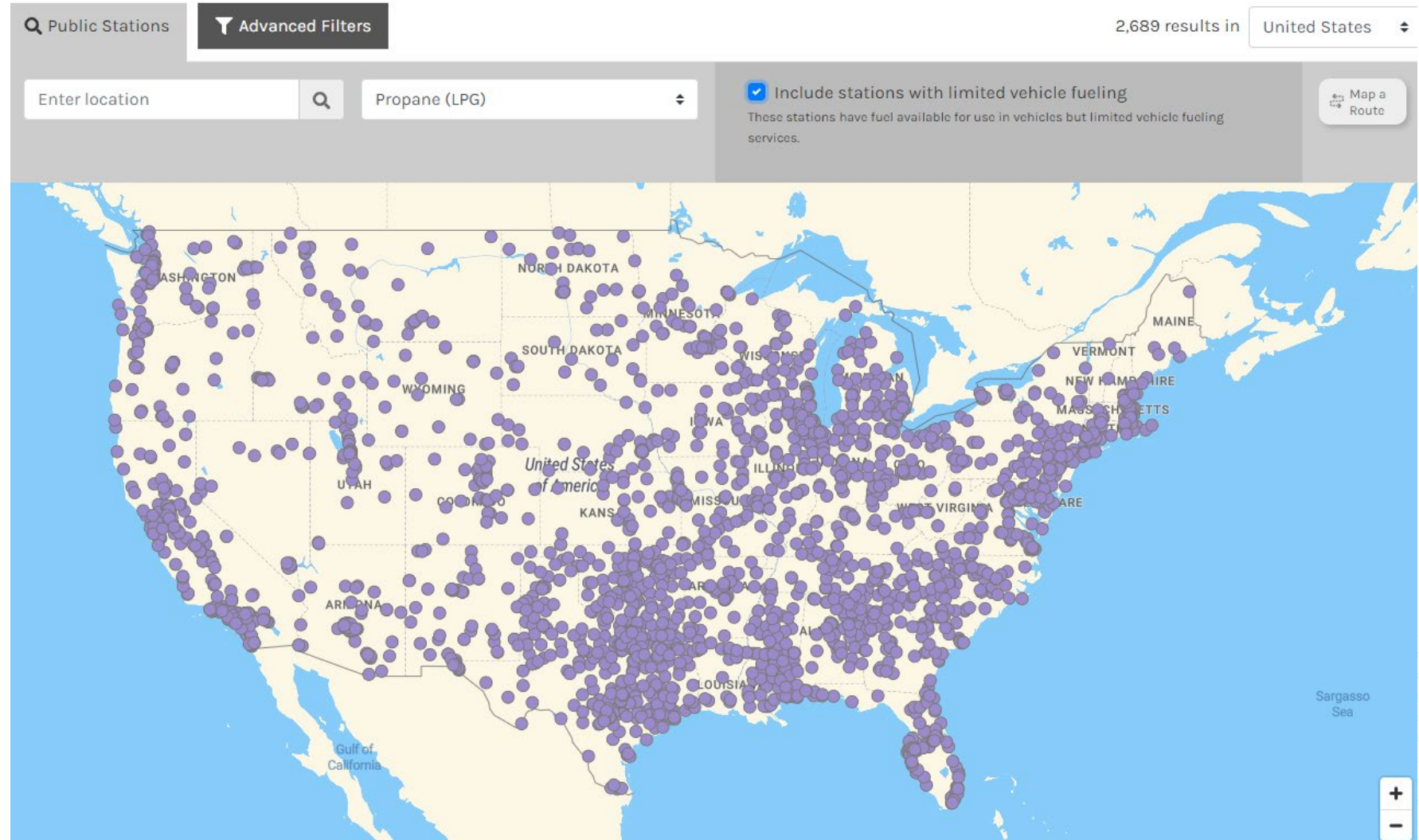
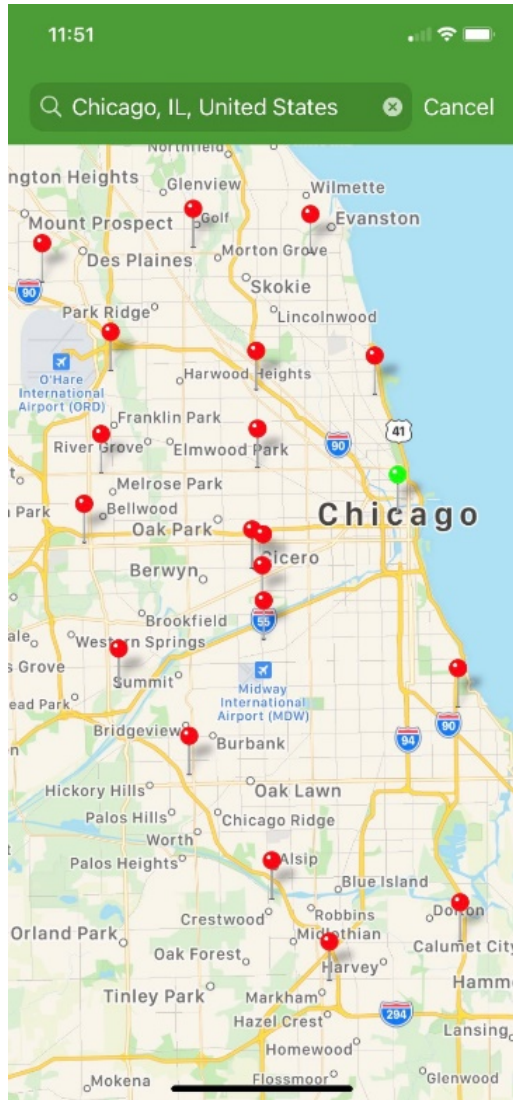




Fueling Infrastructure Cost for 10 Shuttles

- Propane = \$40k
- CNG = \$200k (ten fixed time fill hoses)
- Electric = \$250k (ten fixed plug in lines)

Dept of Energy Alt Fuel Station Locator



Resiliency



Resiliency - Everyday Distribution





Renewable Propane

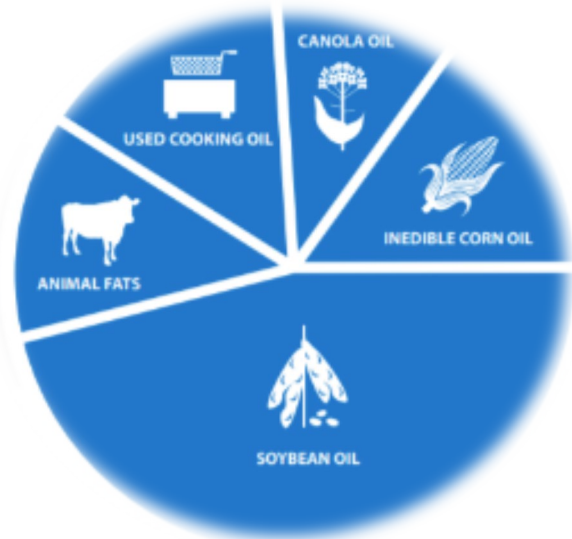
The Future of Propane Autogas

Renewable Propane

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



Current Renewable Propane Sources

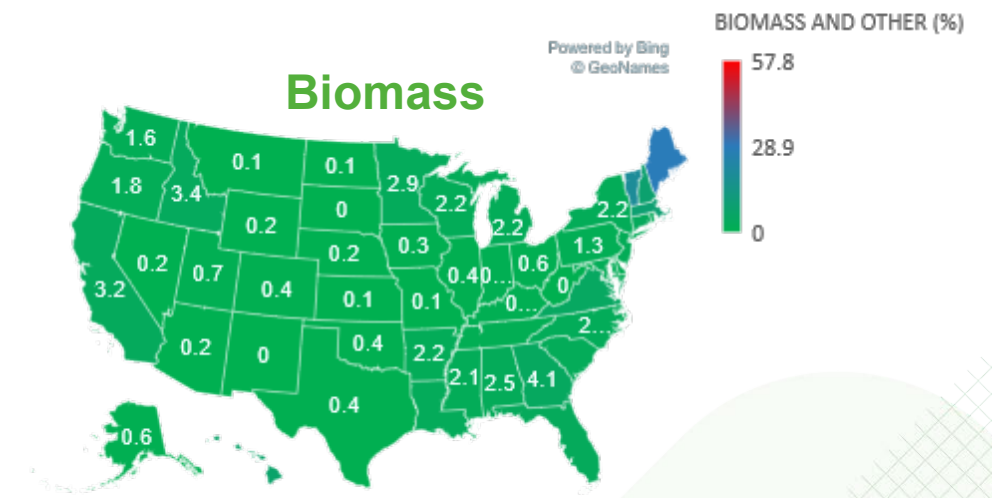
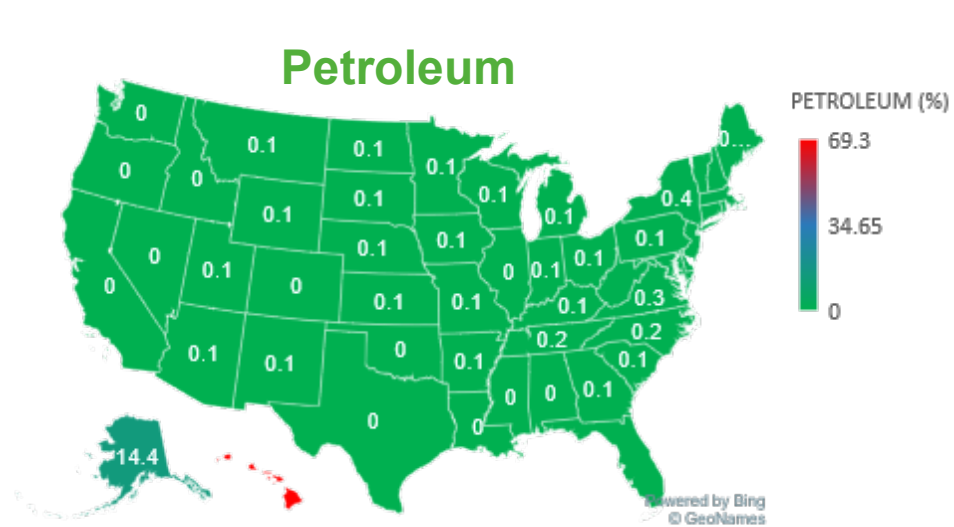
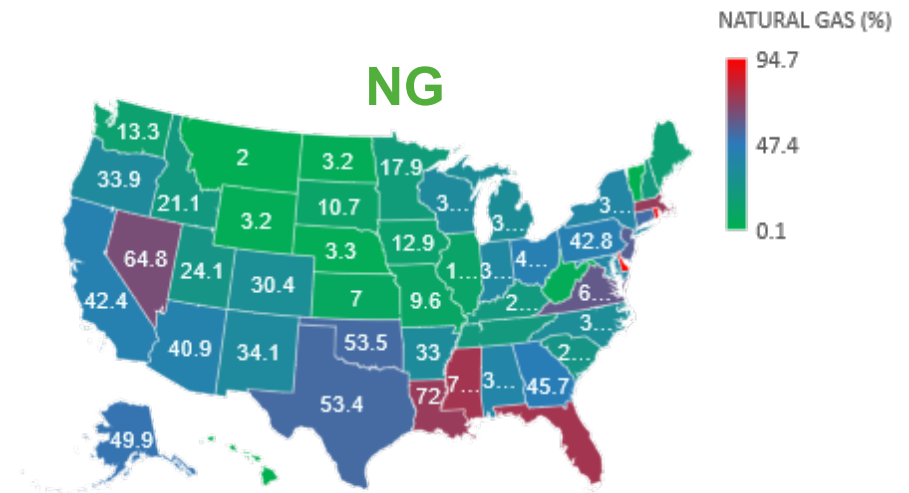
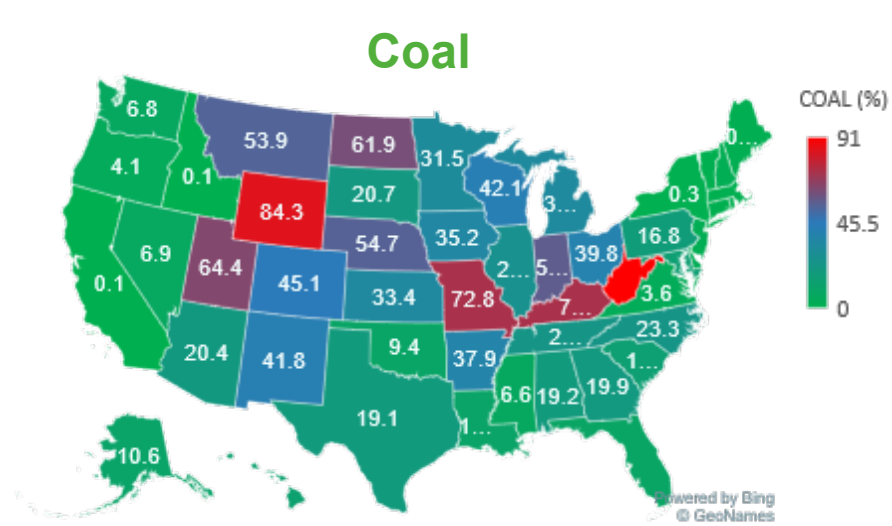


Source: Menecon Consulting/Atlantic Consulting

GHG LCA

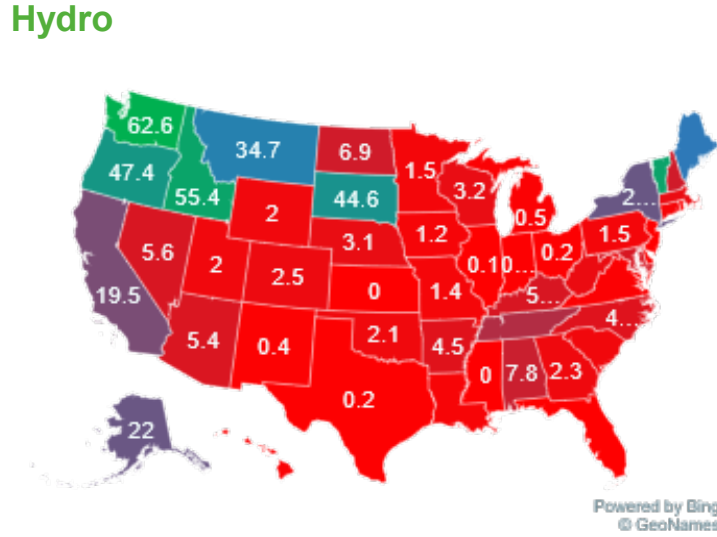
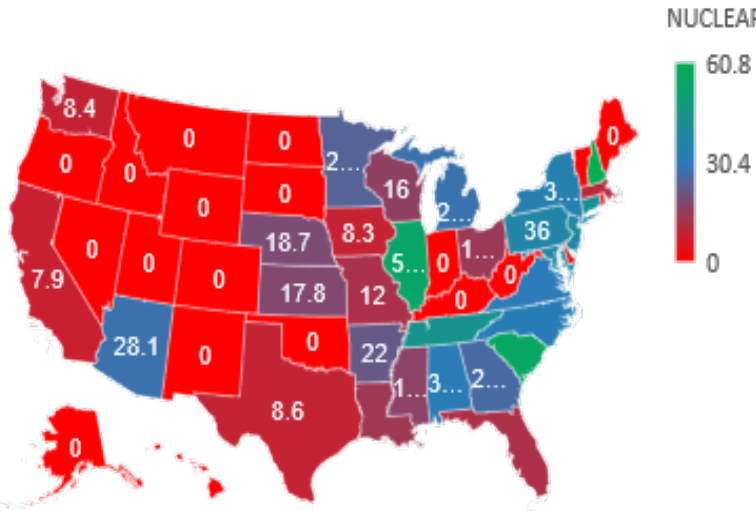
Comparisons between Propane and Electric Medium Duty Vehicles

2019 Electrical Grid Source Energy Mix – Fossil and Biomass



2019 Electrical Grid Source Energy Mix – Renewables and Nuclear

Nuclear



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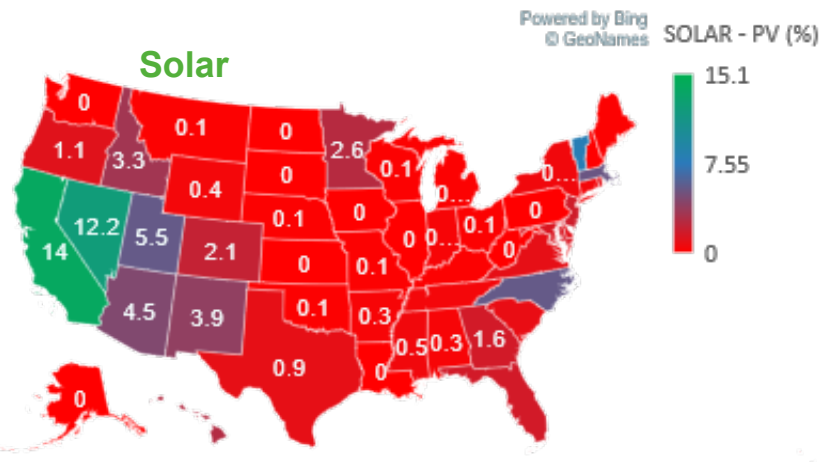
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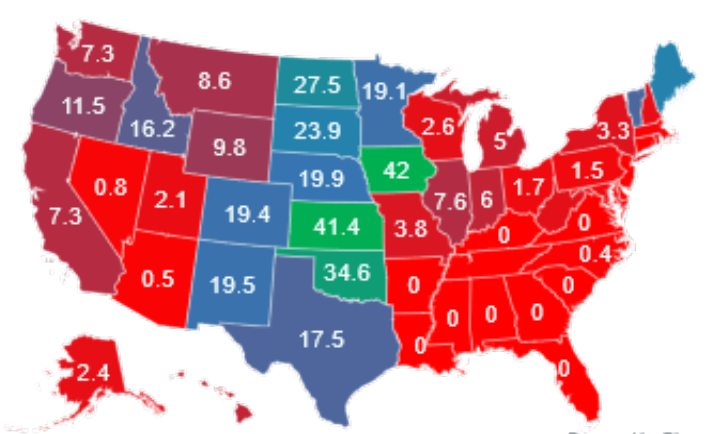
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Solar

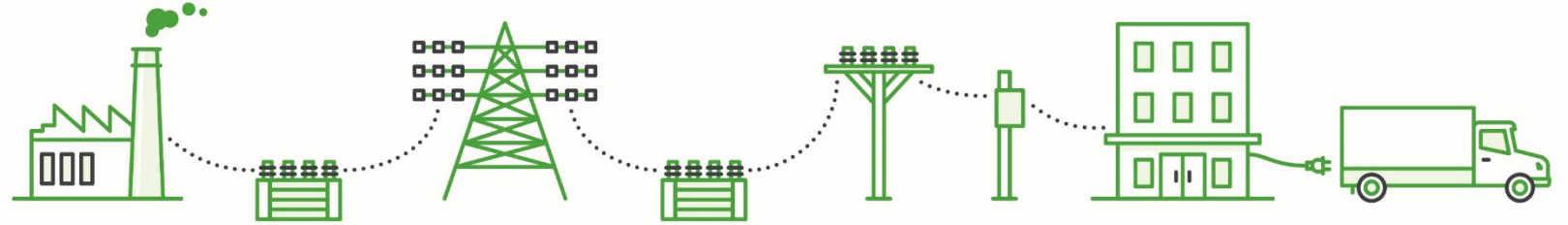


Wind



GHG FOOTPRINT OF ELECTRICITY

CONSIDER EVERY STEP OF THE PROCESS



1 EXTRACTION

Electricity is not naturally occurring, so it must be produced using other resources.

- Gas extraction
- Coal mining
- Nuclear fission
- Wind and solar component manufacturing
- Biomass cultivation and harvesting

approximately 9.9% CO₂ eq emissions

CARBON INTENSITY SCORE:

15.2 g/MJ

2 GENERATION

Power plant generates electricity.

Transformer steps up voltage for transmission.

approximately 75.6% CO₂ eq emissions

CARBON INTENSITY SCORE:

116.5 g/MJ

3 TRANSMISSION & DISTRIBUTION

The transmission lines carry electricity to transformers, which step down voltage. Electricity is delivered to the charging location.

approximately 4.5% CO₂ eq emissions

CARBON INTENSITY SCORE:

7 g/MJ

4 EV CHARGING

Losses occur from charging electric vehicle battery.

approximately 10% CO₂ eq emissions

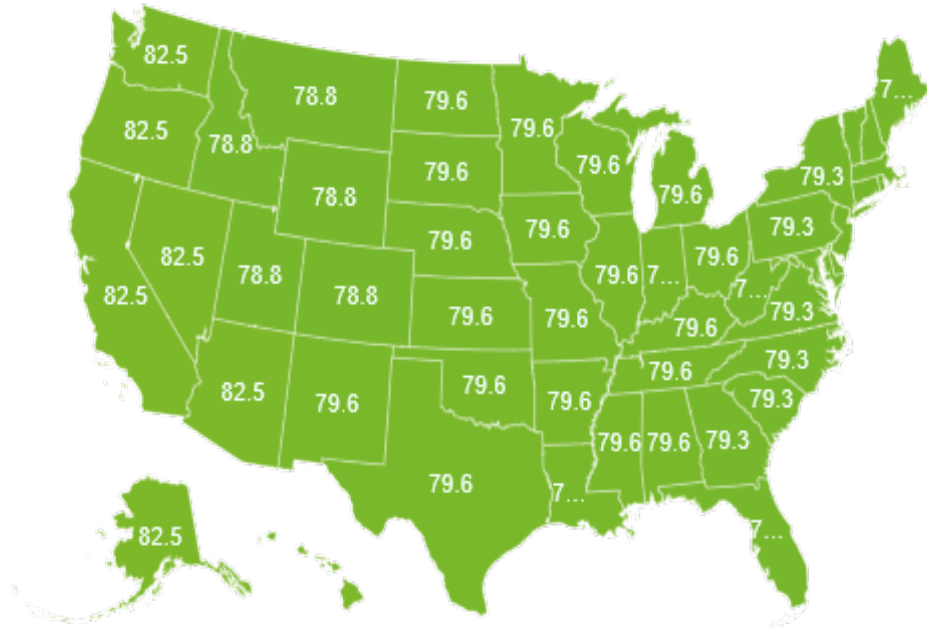
CARBON INTENSITY SCORE:

15.4 g/MJ

TOTAL GHG INTENSITY = 154 g/MJ

Well-to-Wheels Carbon Intensity Comparisons of “Fuel” (gCO₂_{eq}/MJ)

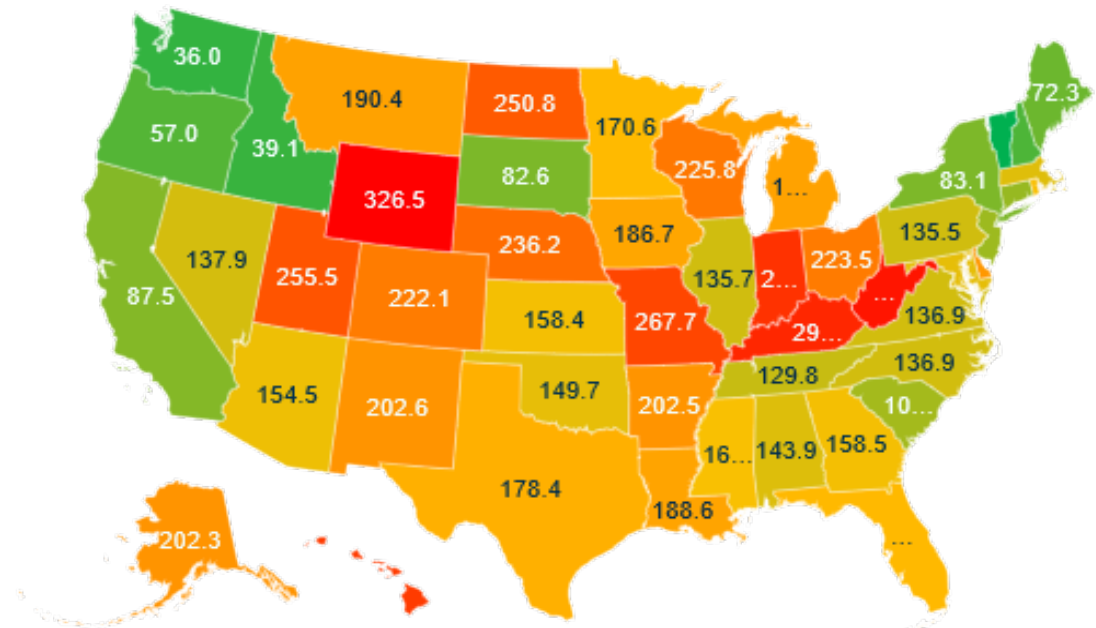
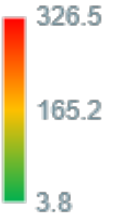
Conventional Propane



Propane – 79
(National Average)

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Electrical Grid



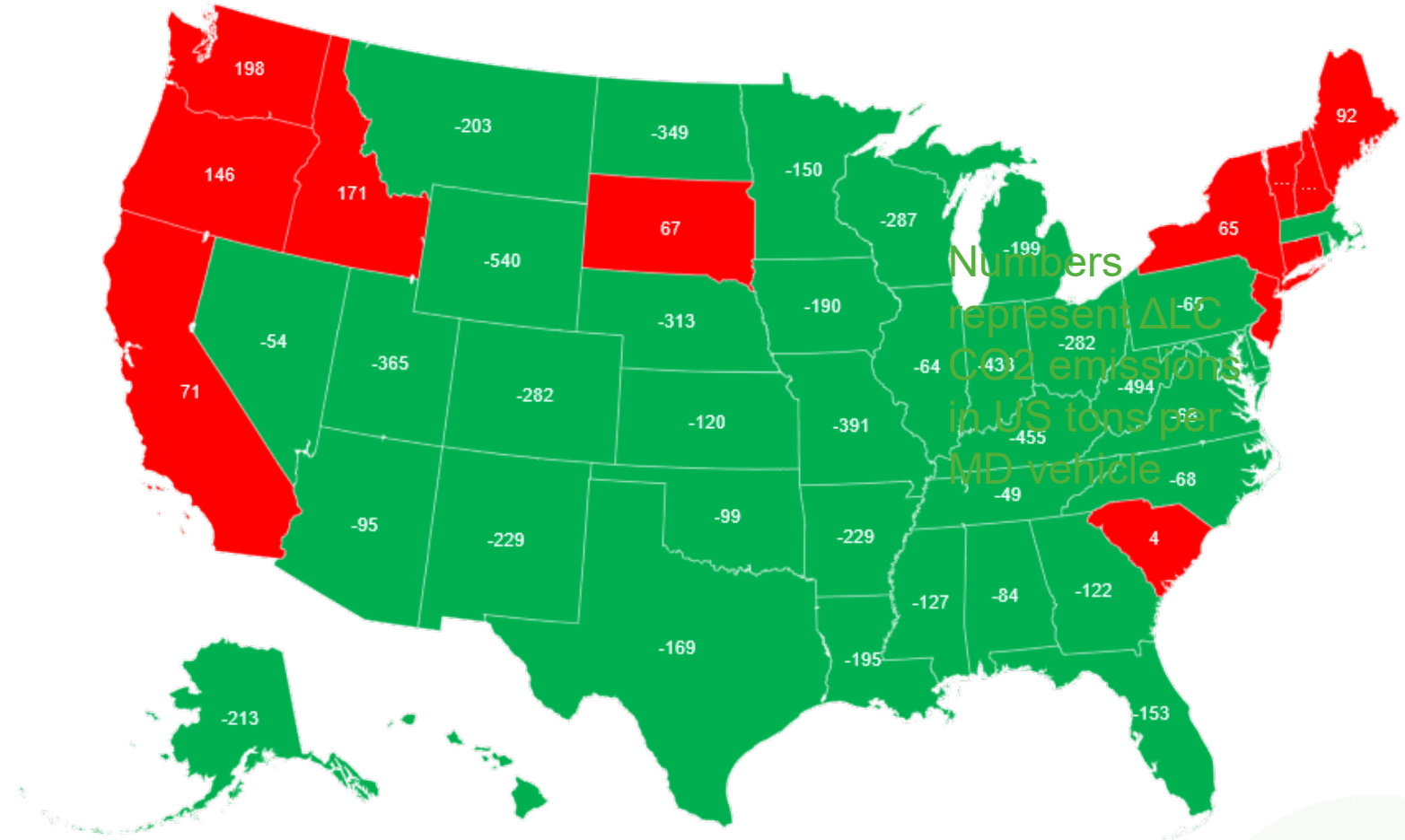
Grid Electricity – 154
(National Average)

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Case-I: $\Delta\text{CO}_2_{\text{eq}}$ for One Truck:

Today, Propane is a cleaner solution for 38 states and DC

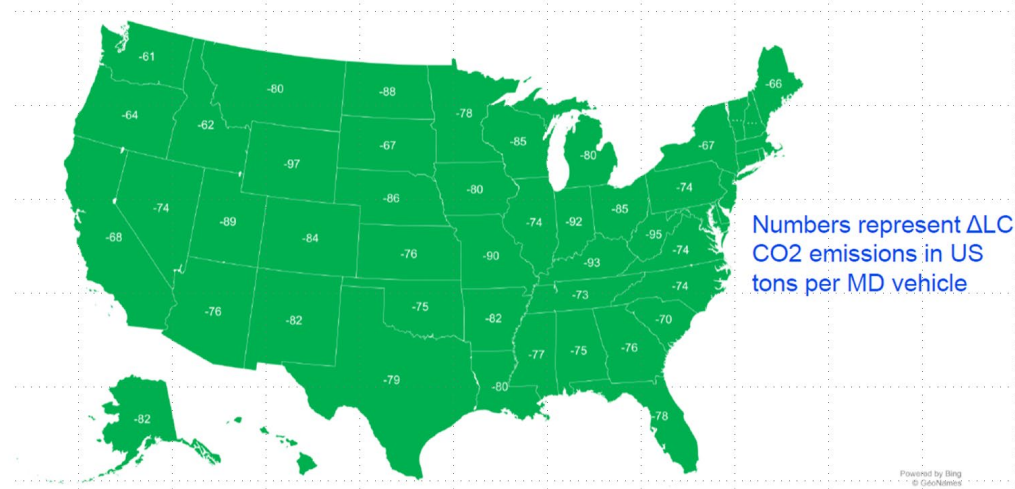
CO2 emissions depend on a number of factors in addition to carbon intensity; emissions from battery and feedstock production, electricity generation, transmission, and distribution.



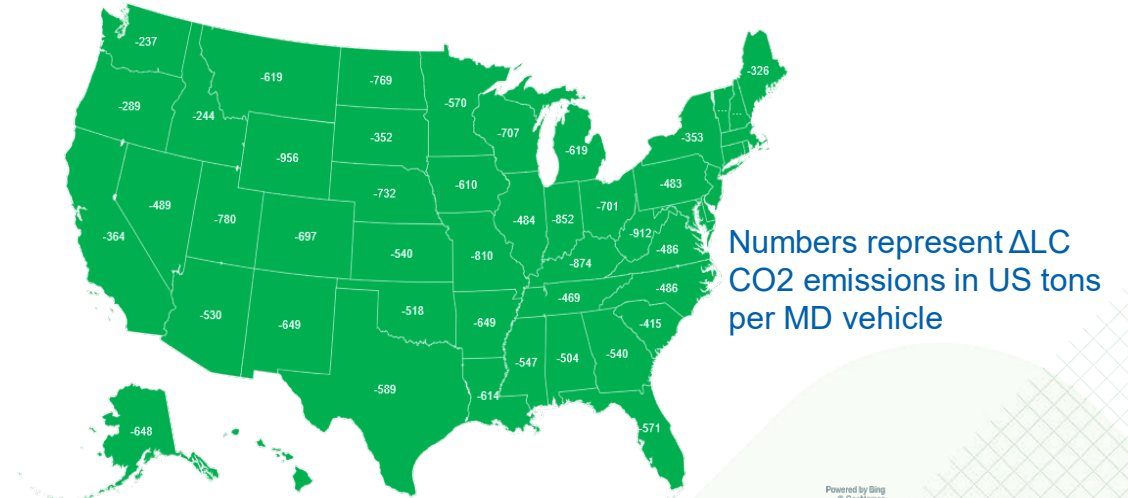
Green - Propane is Better, Red - MDEV is better

Case-V – Utopian Future: $\Delta\text{CO}_2_{\text{eq}}$ for One Truck:

Even with decarbonized electric grid, renewable propane/renewable DME blend vehicle is a cleaner solution than MDEV for all states and DC



OBERON + SUBURBAN: MOVING RDME TOWARDS COMMERCIALIZATION



Green – R-Propane/R-DME is Better

Benefits of Propane/Renewable Propane

- Cost Effectiveness
 - MD Propane averages 15% of vehicle cost
 - MD EV averages 200% of vehicle cost
- Payload/Range
 - MD Propane –no loss of payload/400+ miles in all weather
 - MD EV – heavy battery weight diminishes payload/100 miles weather dependent (no AC or heat)
- Emissions
 - MD Renewable Propane best blend produces less carbon in all states than EV's best grid in 2035
 - MD Propane including upstream NOx emissions = 0.44 g/mile (CA)
 - MD EV including upstream NOx emissions = 0.83 g/mile (CA)

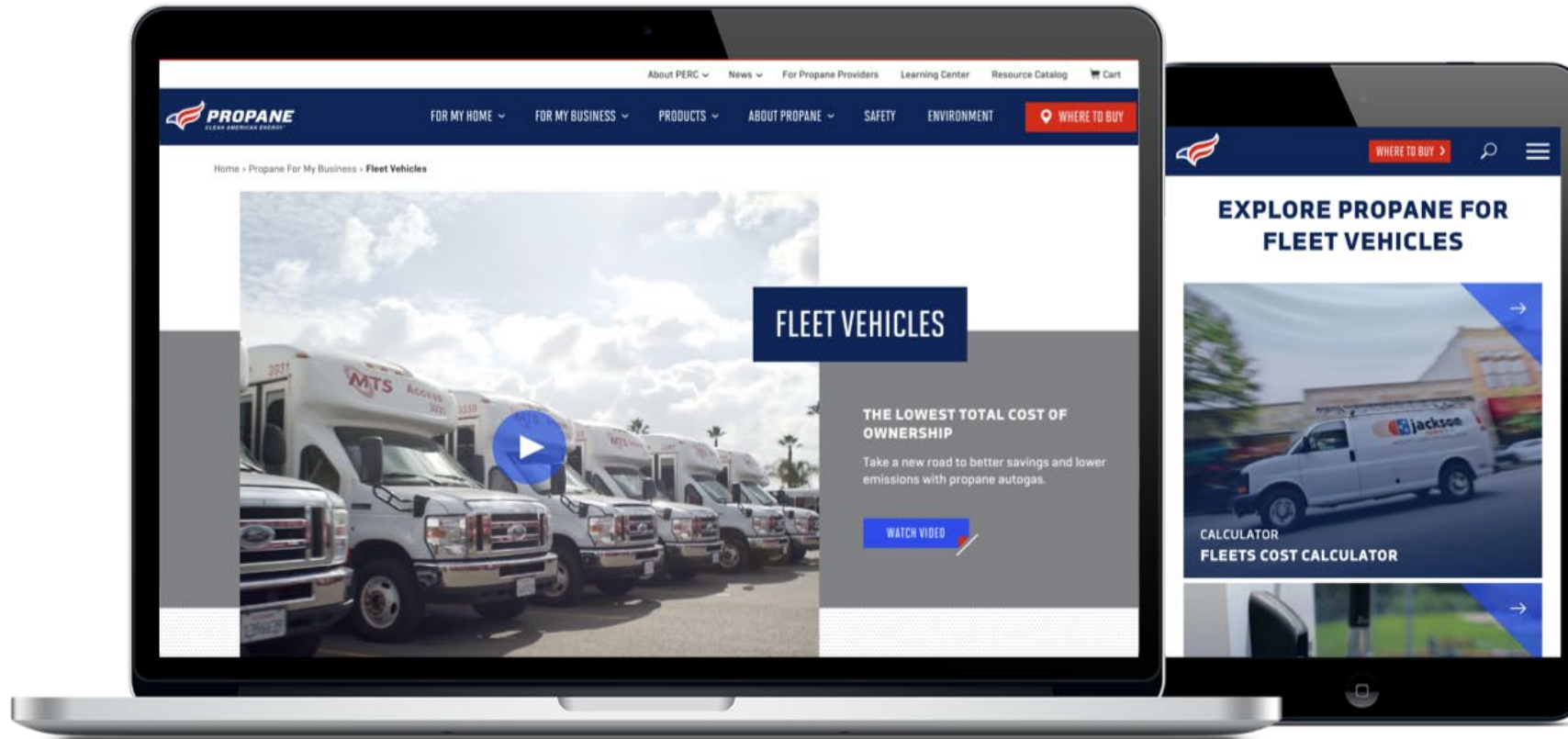


How Does Autogas Meet the Criteria for Success?

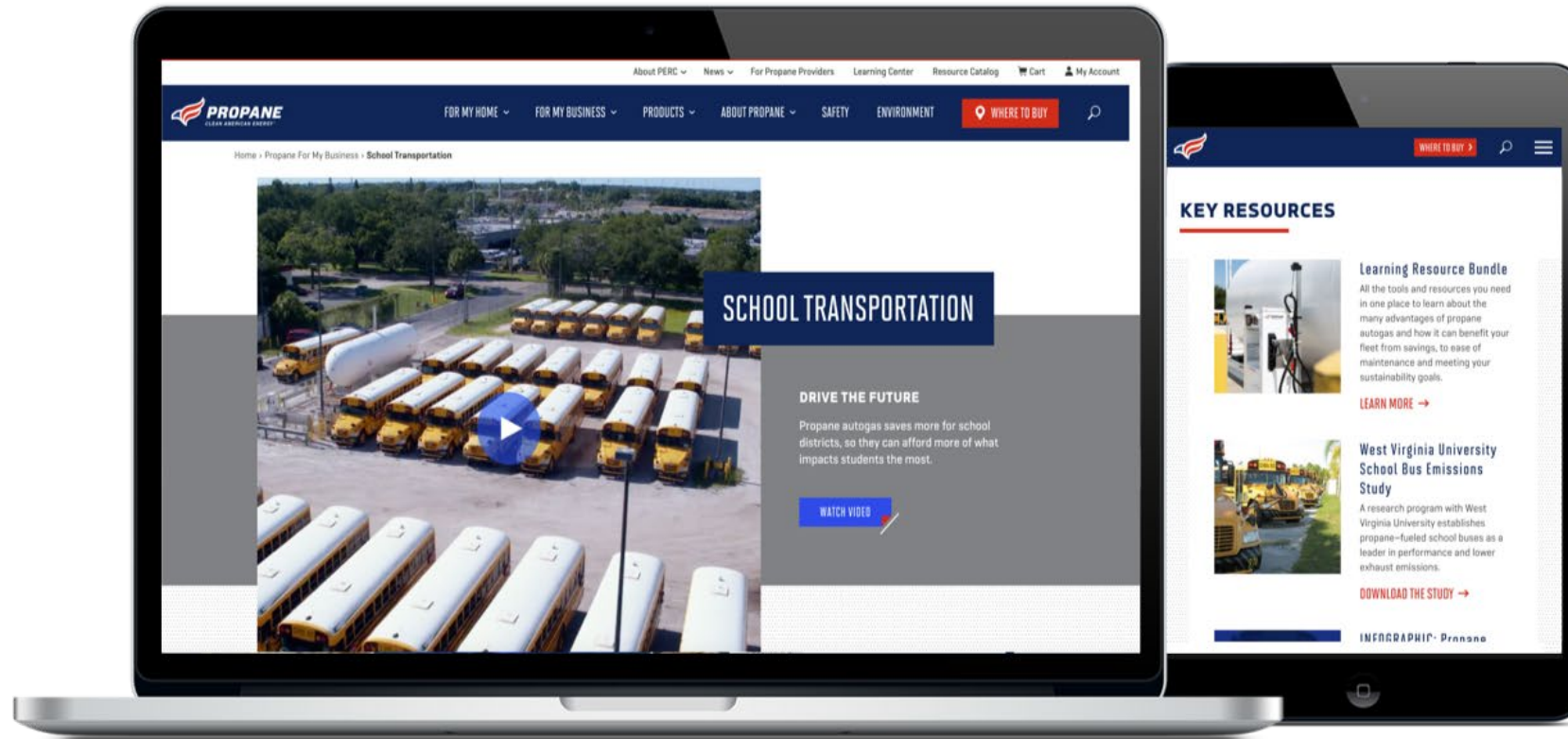


- Most cost-effective energy source to reduce NOx emissions.
- Lowest total cost-of-ownership of any fuel.
- Comparable or improved performance without compromising range.
- U.S. production = 28 billion gallons in 2019.
 - 9 billion used domestically.
 - 19 billion gallons exported.

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



<https://propane.com/for-my-business/school-transportation/>





STEVE WHALEY

*DIRECTOR OF AUTOGAS
BUSINESS DEVELOPMENT*

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Schwan's Home Delivery

Joe Lasek

Director of Facilities and Non-Food Contract

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- Private Fleet of Propane Autogas medium duty trucks
- Currently 2400 and growing Delivery trucks running Autogas
- Our Journey over the past 45 years



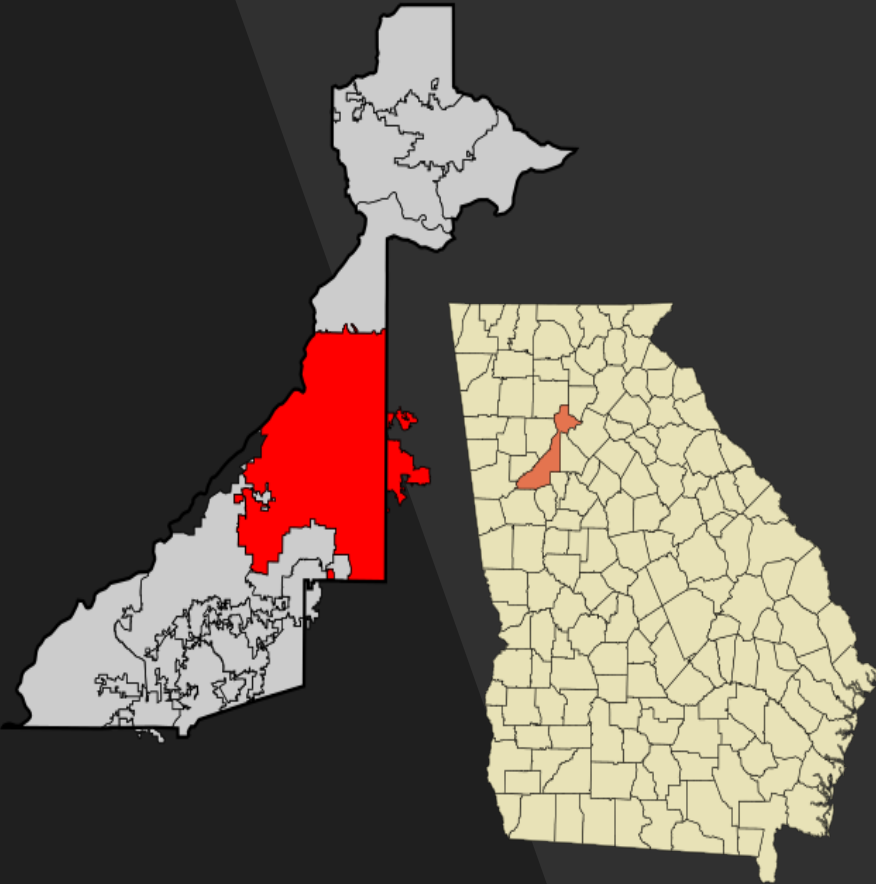
*F*ulton
County Schools

Where Students Come First



Trey Stow

Director of Transportation
Operations



Fulton County, GA

- 71 Miles top to bottom
- 15 Different Municipalities
- 108 Schools/94,400 enrolled students
- City of Atlanta is a separate school district
- 930 School Buses
- 443 Buses Propane Powered
- 238 Support Vehicles
- 48 new Propane buses to be delivered in January

- First Propane purchase in 2017
- 11 State and Federal Grants awarded
- Worth almost \$10 million in funding
- %59 of route buses are Propane powered



- 2 Fueling sites
- 30,000 gal. tanks
- 8 dispensers each location
- Third site in the planning phase
- Only expense to district was the canopy



- Blue Bird Propane Vision Buses
- 6.8 Ford Triton V10
- Roush CleanTech Fuel system
- Buses on order will be 7.3 Ford Godzilla V8
- Largest Propane Powered School District by Roush



Top 10 School Districts

1. **Fulton County Schools**
2. **Boston Public Schools**
3. **Broward County Public Schools**
4. **Northside ISD**
5. **Mobile County Schools**
6. **Pinellas County Schools**
7. **Arlington ISD**
8. **East Stroudsburg Area School District**
9. **El Paso ISD**
10. **Los Angeles Unified School District**

- Regular preventative maintenance ¼ the expense of our Diesel buses
- Recoup the expense of the propane system in 4 years
- Larger pool of prospective technicians with the propane platform





Charlie Megginson
Charlie.megginson@delaware.gov
302-576-6038

- Vehicle Maintenance Director at Delaware Transit Corporation - State of Delaware
- More than 30 years industry experience in transit
- US Army Veteran





DART's Propane Program



Who Is DART

- **Delaware Transit (DART) provides:**
 - **Fixed Route Service**
 - 250 Fixed Route buses
 - **Paratransit Service**
 - 309 Paratransit buses
- **1 million paratransit trips a year**
- **6 Operating Locations**

DTC Revenue Fleet Vehicle Profile

- **309 E-450 Ford Paratransit Cutaways**
 - 266 Roush Propane
- **209 Gilligs**
- **13 MCI Cruisers**
- **20 Battery Electric Buses**
- **8 E-450 Fixed Route Cutaways**

Propane Pilot Goal

- **Reduce Environmental Emissions**
- **Transparent to Customers and Operators**
- **Comparable Performance & Reliability**
- **Reduce Operating Costs**
- **Minimize Capital Program Costs for Transition**
- **12 Month Pilot Duration**

Why Propane (HD5)?



- **Cleaner Burning, Lower Emissions**
 - 20% Less Nitrogen Oxide
 - 60% Less Carbon Monoxide
 - 24% Fewer Greenhouse Gases
 - Fewer Particulate Emissions
- **Lower Operating Costs**
- **Lower Infrastructure Costs**
- **Readily Available Supply**
- **Extended Engine Life**
- **Higher Octane**

Why ROUSH CleanTech



- **Performance; No Horsepower or Torque Loss**
- **OEM Approved, Maintains Ford Factory 5 Year 60,000 Mile Warranty**
- **FTA Approved and Altoona Tested**
- **Service Available at Ford Dealerships Nationwide**
- **Reliable at any Altitude/Weather Condition**

Propane

- A partnership was established between Roush and DTC to install 2 propane fueling stations, at no cost to DTC, at the Mid County and Georgetown facilities.



Propane Fueling

- **Two additional propane fueling stations were built at our Dover and Wilmington facilities using 100% state funds.**
- **With fueling stations in place DTC was able to expand the number of propane fueled buses statewide.**



Annual Cost Savings

Year	Miles	# of buses	Savings v Gasoline
2016	1,040,394	50	\$85,975
2017	3,749,491	55	\$404,188
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* Gasoline prices dropped sharply

Summary

- **6.1 MPG**
- **Exceeded all program goals**
- **By 2022 100% fleet conversion**
- **Reduced emissions**
- **LTD fuel savings \$1,981,630**
- **Strong partnership with Roush & Sharp energy resulting in significant capital infrastructure savings.**



John Barnett

JBarnett@suburbanpropane.com

(480) 490-3077

- National Sales Rep. for Suburban Propane
- Responsible for Autogas sales and Autogas sales training
- 15 years in the propane industry, starting with U-Haul
- Actively involved in industry—Member of PERC Advisory Committee for Safety and Technical Training, Member NPGA Member and NFPA Member
- With his enthusiasm for renewable products, passion for Autogas and his past experience building Autogas infrastructure, leader driving the industry



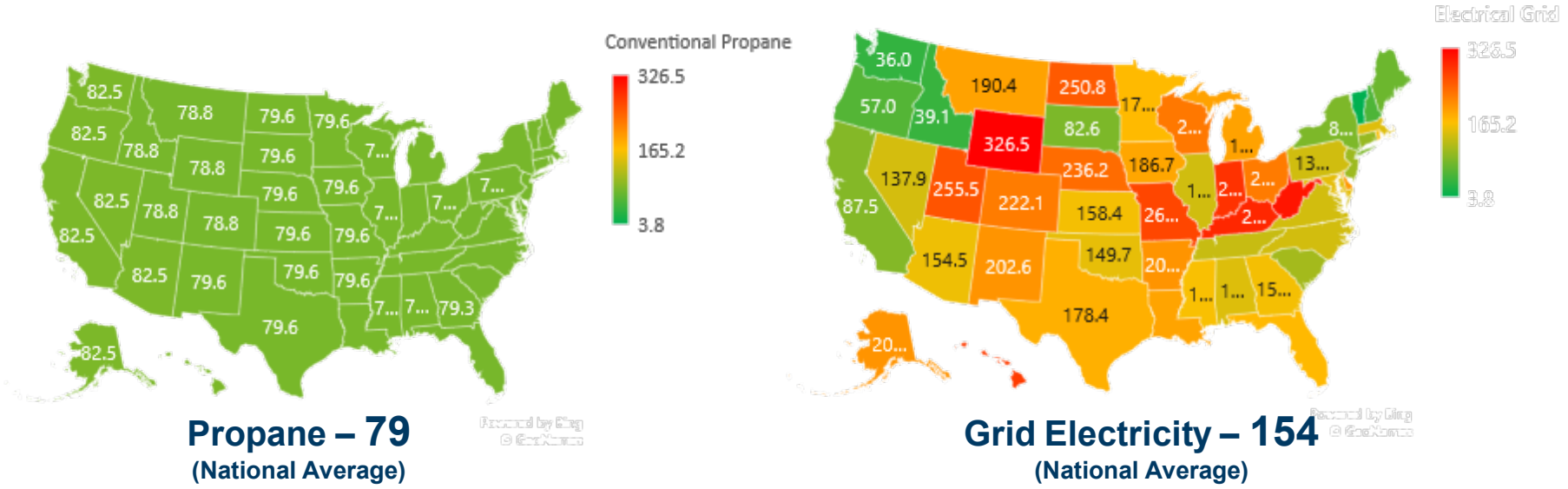
Suburban Propane Autogas

 PROPANE EDUCATION & RESEARCH COUNCIL

Reduced emissions without increasing cost or losing efficiency.

CI Comparison

- Well-to-Wheels Carbon Intensity Comparisons of "Fuel" (gCO₂_{eq}/MJ)



High-volume supply of energy
domestically sourced.



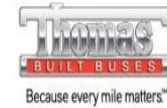
Suburban Propane will
install an Autogas
dispenser for a fleet of
any size



Similar (or better) performance than the original fuel without compromising range.



From OEM to third party, Suburban Propane works with the propane conversion manufacturers to find a system to meet most fleets needs.



Similar (or better) performance than the original fuel without compromising range.

**Suburban
Propane®**

Roush Clean Tech is a leader in OEM propane systems. This is a mono fuel liquid injection system. They have solutions from class 3 through class 7

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

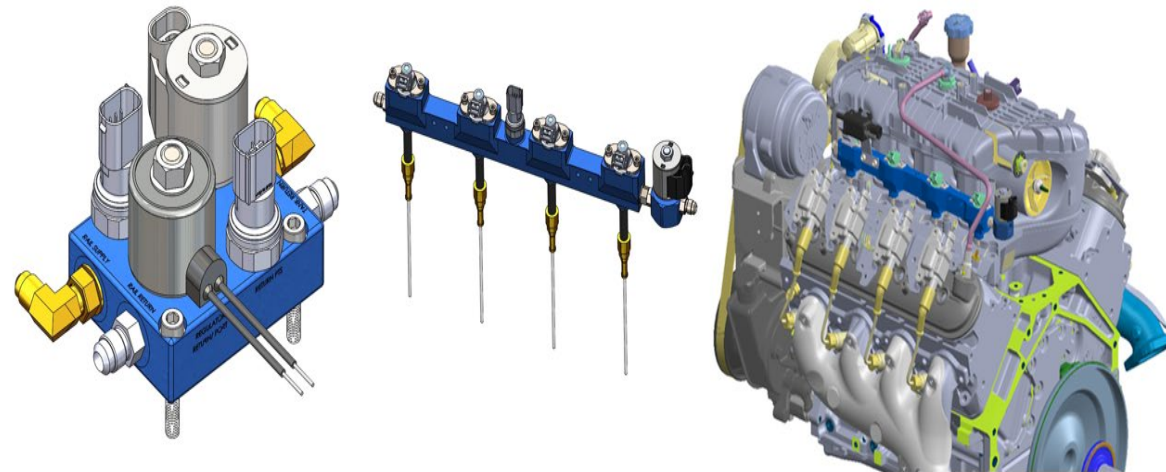
PROANE EDUCATION & RESEARCH COUNCIL

Similar (or better) performance than the original fuel without compromising range.

**Suburban
Propane®**

ICOM is an aftermarket system manufacture that has bi-fuel and mono fuel liquid injection systems.

ICOM BLUE 3.0 ENGINE SYSTEM



- ✓ *Anodized billet aluminum rails and distribution block.*
- ✓ *Simplified all in one distribution block - contains both the supply solenoid and regulator all in an all in one block.*
- ✓ *Increased passages for increased fuel flow.*
- ✓ *Mounting hardware designed with the OEM 3D Engine / Vehicle Models*
- ✓ *Engineered and built proudly in the United States.*
- ✓ *UPDATED ICOM ICU Module with user friendly interface and remote diagnostics*



Property of ICOM North America

**Suburban
Propane®**

Similar (or better) performance than the original fuel without compromising range.

**Suburban
Propane®**

STAG USA is an aftermarket propane system manufacturer that has bi-fuel vapor injection systems.

DI AND PFDI SYSTEMS FOR:

- 1.3L Ford Escape
- 3.3L Ford Interceptor
- 3.5L Ford Transit
- 5.0L Ford F150
- 5.3L and 6.6L GM Silverado
- 7.3L F600/650 F750 E-Series and F53/F59 stripped chassis
- 3.6L Dodge/ Chrysler V6
- Dodge Ram 5.7L Hemi
- Isuzu Truck 6.0/ 6.6L NRR



Drive Hard. Drive STAG.

STAG
Alternative Fuel Solutions USA

TCO reduction or ROI realized before the end of the lifecycle.



- Grants may be available in your area to help with the initial investment to make the switch to propane Autogas.
- Suburban propane has a program to help find funding to make the initial investment to convert to fleets to run on propane Autogas.



REDUCE EXPENSES

What Makes an Alternative Energy Adoption Successful



Propane Autogas:

- Most cost-effective energy source to reduce NOx emissions.
- Lowest total cost-of-ownership of any fuel.
- Comparable or improved performance without compromising range.
- U.S. production = 28 billion gallons in 2019.
 - 9 billion used domestically.
 - 19 billion gallons exported





For Local Service Call
1-800-PROPANE

Proud Sponsor of the
American Red Cross

Suburban Propane

SUBURBAN PROPANE, L.P.



PROPANE

Suburban Propane

216386

USDOT214695

John Barnett
Autogas Sales Rep
Jbarnett@Suburbanpropane.com
Tel/Cell: 480.490.3077





Charlie Megginson
Charlie.megginson@delaware.gov
302-576-6038

- Vehicle Maintenance Director at Delaware Transit Corporation - State of Delaware
- More than 30 years industry experience in transit
- US Army Veteran





DART's Propane Program



Who Is DART

- **Delaware Transit (DART) provides:**
 - **Fixed Route Service**
 - 250 Fixed Route buses
 - **Paratransit Service**
 - 309 Paratransit buses
- **1 million paratransit trips a year**
- **6 Operating Locations**



DTC Revenue Fleet Vehicle Profile

- **309 E-450 Ford Paratransit Cutaways**
 - 266 Roush Propane
- **209 Gilligs**
- **13 MCI Cruisers**
- **20 Battery Electric Buses**
- **8 E-450 Fixed Route Cutaways**

Propane Pilot Goal

- **Reduce Environmental Emissions**
- **Transparent to Customers and Operators**
- **Comparable Performance & Reliability**
- **Reduce Operating Costs**
- **Minimize Capital Program Costs for Transition**
- **12 Month Pilot Duration**



Why Propane (HD5)?



- **Cleaner Burning, Lower Emissions**
 - 20% Less Nitrogen Oxide
 - 60% Less Carbon Monoxide
 - 24% Fewer Greenhouse Gases
 - Fewer Particulate Emissions
- **Lower Operating Costs**
- **Lower Infrastructure Costs**
- **Readily Available Supply**
- **Extended Engine Life**
- **Higher Octane**

Why ROUSH CleanTech



- **Performance; No Horsepower or Torque Loss**
- **OEM Approved, Maintains Ford Factory 5 Year 60,000 Mile Warranty**
- **FTA Approved and Altoona Tested**
- **Service Available at Ford Dealerships Nationwide**
- **Reliable at any Altitude/Weather Condition**

Propane

- A partnership was established between Roush and DTC to install 2 propane fueling stations, at no cost to DTC, at the Mid County and Georgetown facilities.



Propane Fueling

- **Two additional propane fueling stations were built at our Dover and Wilmington facilities using 100% state funds.**
- **With fueling stations in place DTC was able to expand the number of propane fueled buses statewide.**



Annual Cost Savings

Year	Miles	# of buses	Savings v Gasoline
2016	1,040,394	50	\$85,975
2017	3,749,491	55	\$404,188
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Sessions through December 09, 2021



Sessions September 09, 2021 – October 19, 2021

<https://www.sustainablefleetexpo.com/>