

# **Clear the Air: Reducing Costs and Emissions with Propane Autogas**

**A Look At Transitioning  
Fleets To Propane Autogas**

# The Big Push to Lower Emissions



- ▶ **How does the push to reduce emissions impact your fleet?**
- ▶ **How does Propane Autogas achieve the goal of reducing emissions?**

# What Goals Do You Want To Achieve?

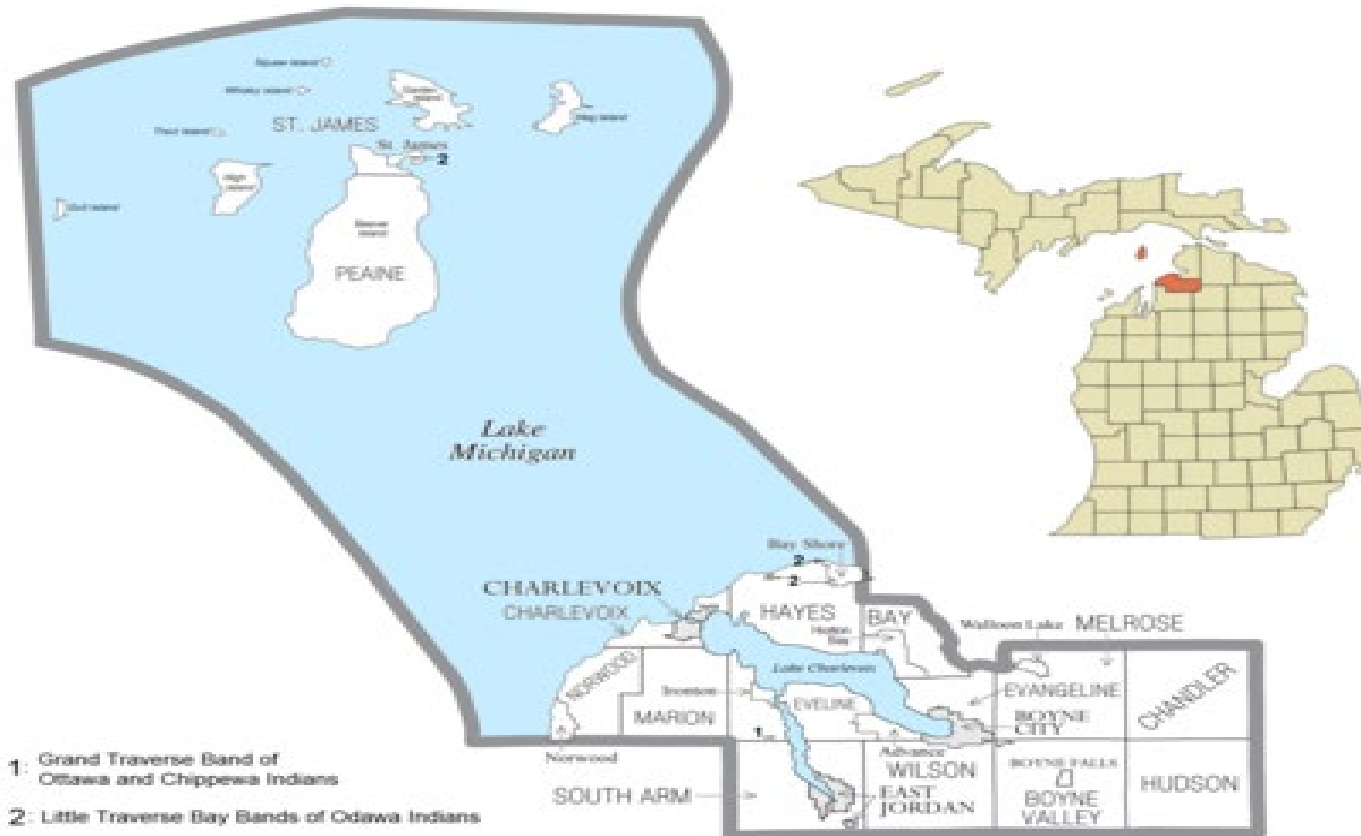


- **Similar (or better) performance than the original fuel without compromising range.**
- **Reduced emissions without increasing cost or losing efficiency.**
- **Reduce maintenance costs**
- **An infrastructure solution that could be expanded as the fleet grows**
- **TCO reduction or ROI realized before the end of the lifecycle.**

# Charlevoix County TRANSIT

WE HAVE THE POWER TO MOVE PEOPLE.

► 2021 CTA Rural Transit System of the Year







# What You Need To Know About Propane Autogas



# WHAT IS PROPANE?

- Affordable, Clean, American-Made Energy for Everyone
  - C<sub>3</sub>H<sub>8</sub>
  - Byproduct of natural gas processing
  - 100% Domestic
  - Commonly used for space and water heating, cooking, and as engine fuel
  - 28 billion gal/year produced in US with 19 billion exported
  
- 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



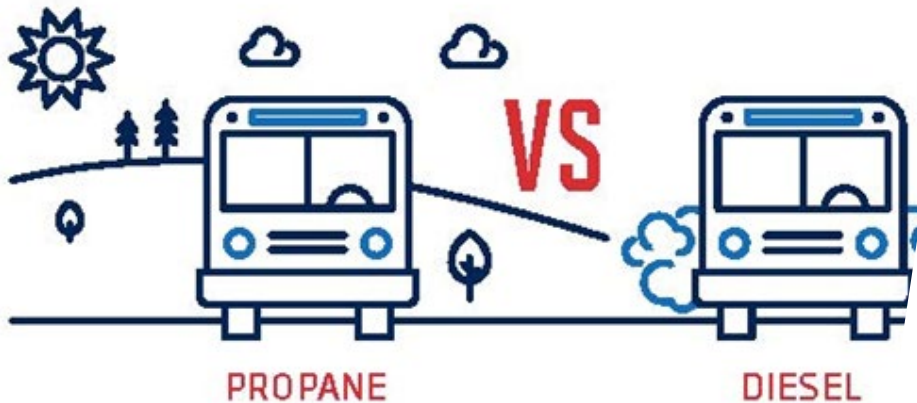
**Propane comes from organic as well as renewable sources.**

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

# 96%

## NO<sub>x</sub> REDUCTION VERSUS CLEAN DIESEL BUS

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



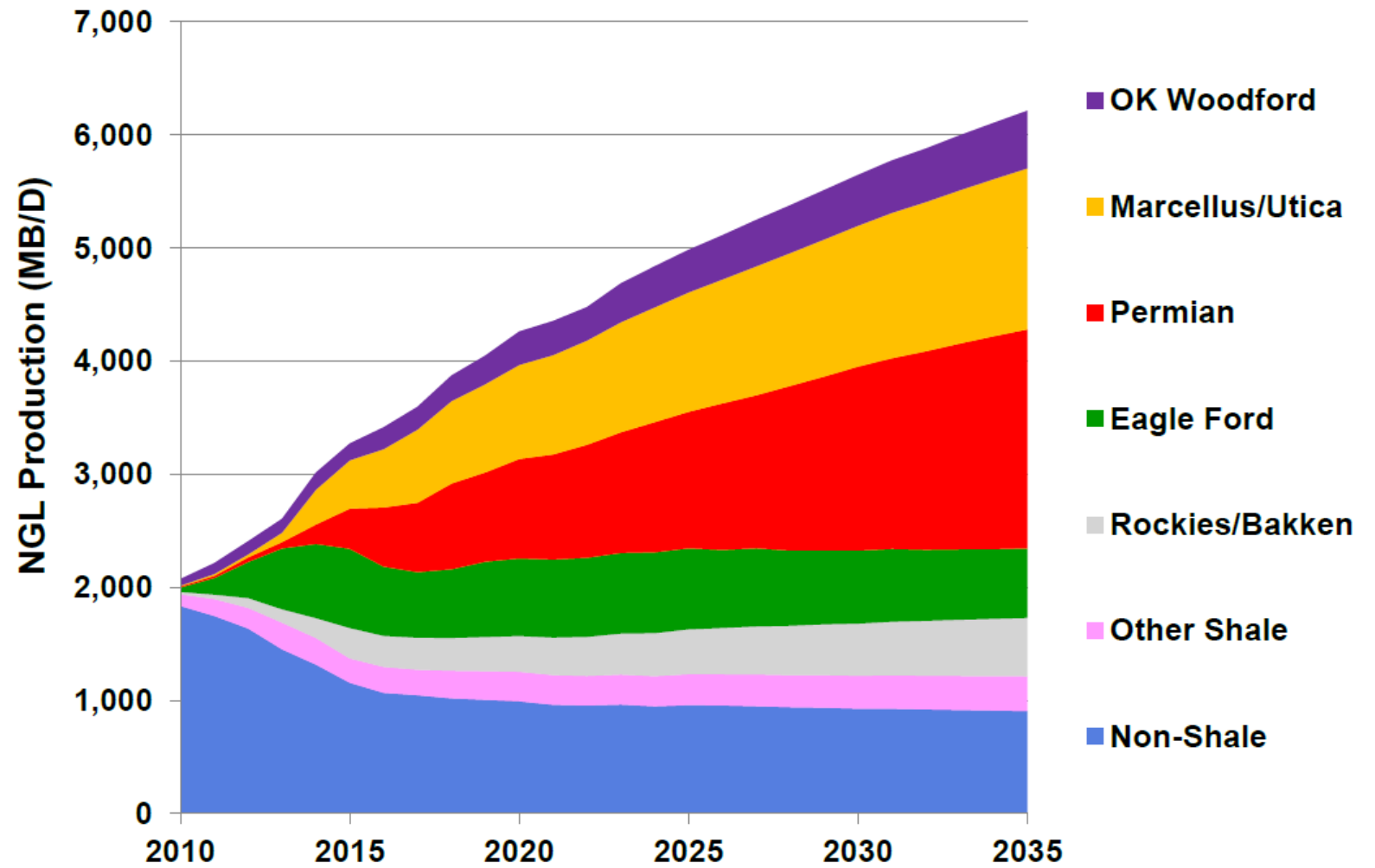
## Path to Zero Emissions

- ▶ **Particulate Matter**
  - ▶ Virtually zero
- ▶ **NO<sub>x</sub>**
  - ▶ 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

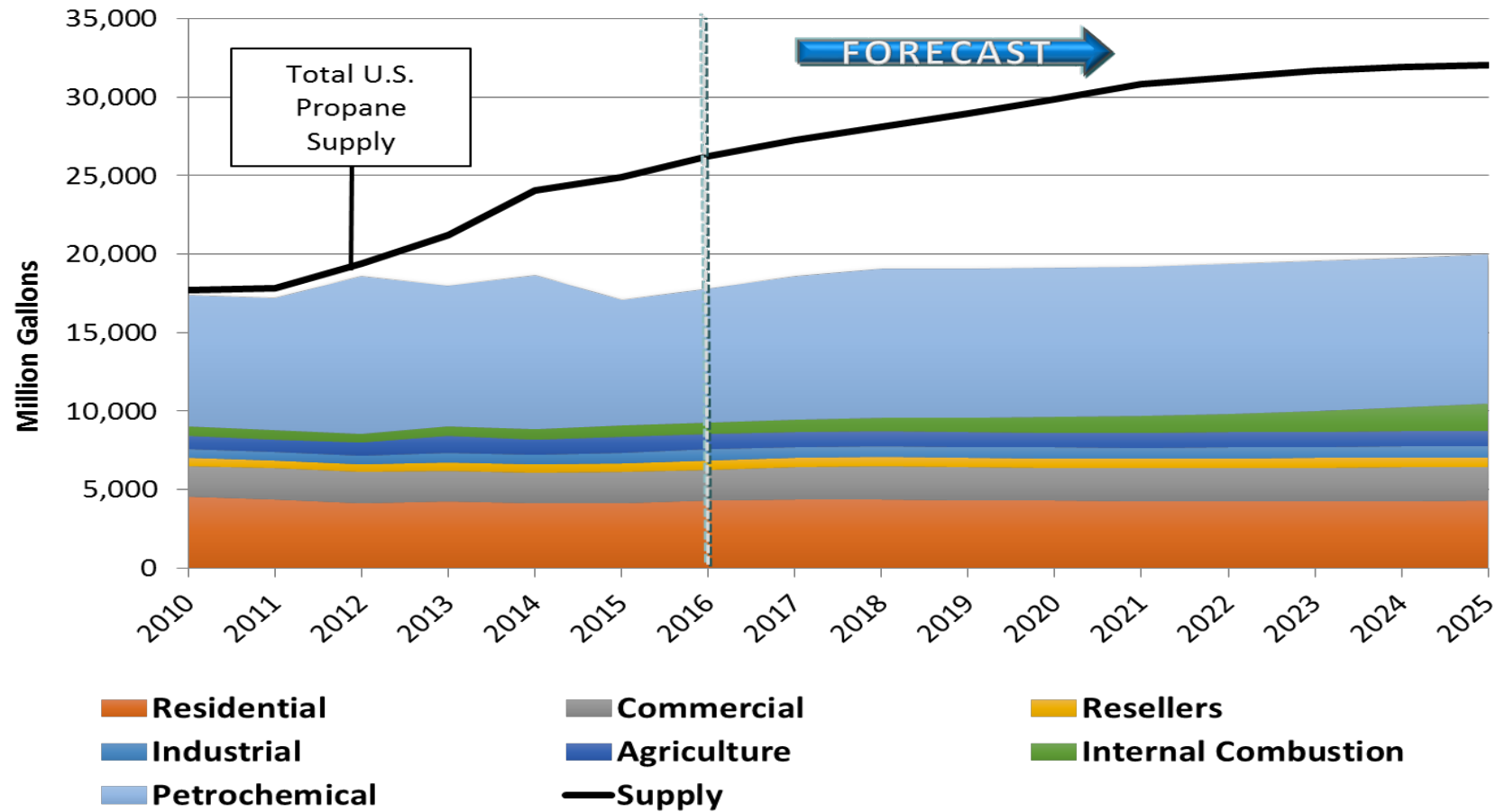
**Source:** 2018 West Virginia University study, comparing 2015 LPG Blue Bird school bus [6.8L, 10 Cylinder] with 2014 ultra-low sulfur diesel Blue Bird school bus [6.7L, 6 cylinder].

# U.S. NGL Production (Natural Gas Liquids)

Ethane  
Propane  
Butane  
Isobutanes  
Pentanes



# U.S. Propane Supply vs. Demand



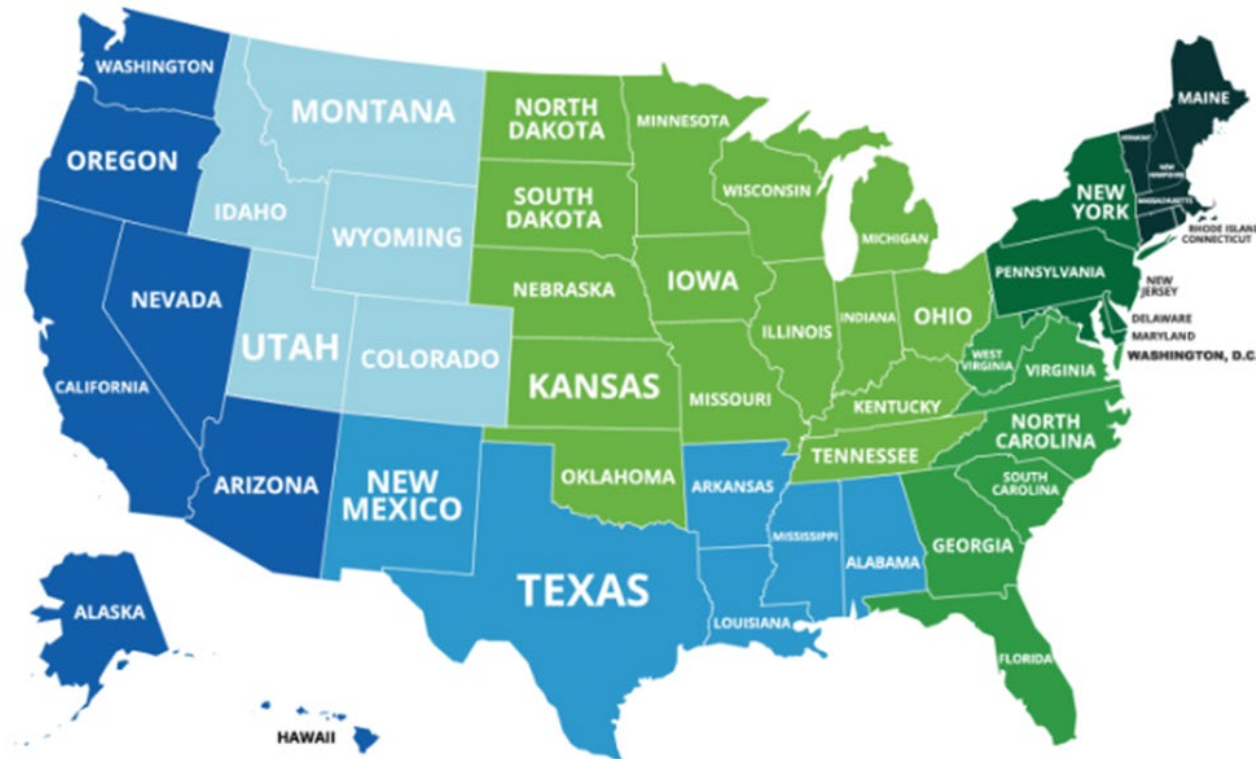
# Today's Propane Autogas

## Average Price Per Gallon for the week of August 4, 2022

These prices are based on National averages. To receive a custom quote with your local autogas pricing, contact us today.

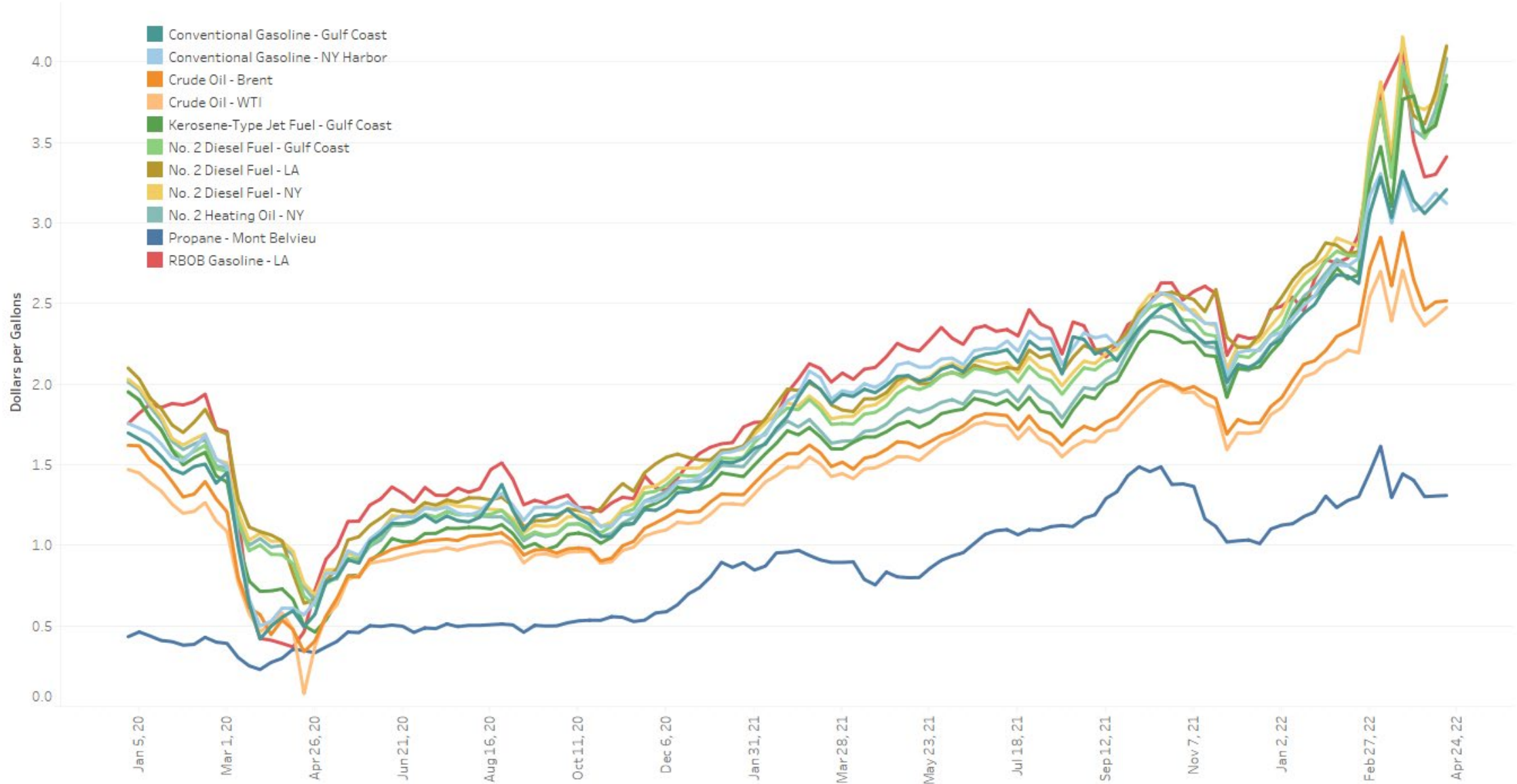
Learn more about the savings and stability of autogas.

\*Autogas price estimates do not reflect the current federal tax credit.



# US ENERGY PRICE COMPARISON

Average Weekly Energy Prices





# Dept of Energy Alt Fuel Station Locator

Public Stations

Advanced Filters

2,689 results in United States

Enter location



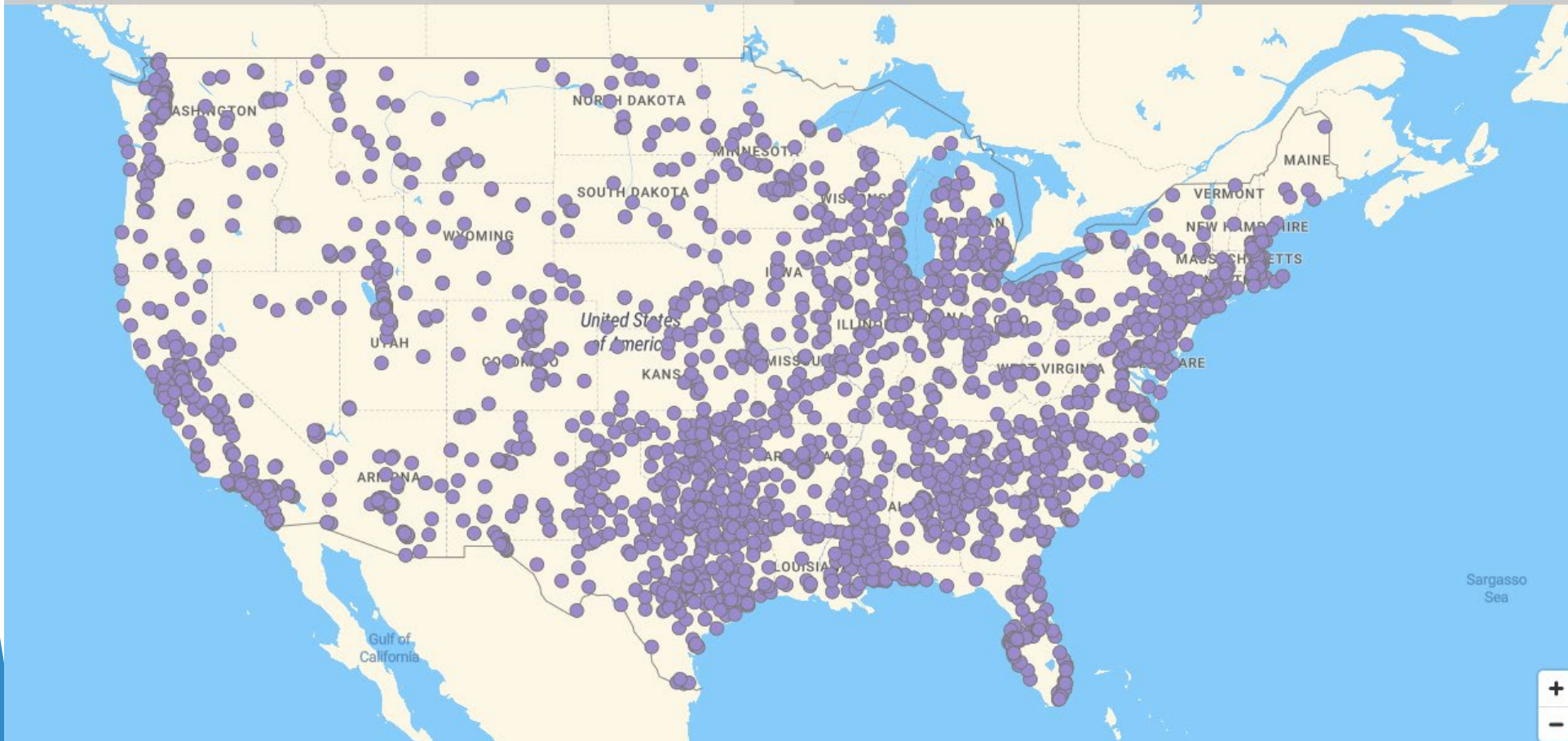
Propane (LPG)



Include stations with limited vehicle fueling

These stations have fuel available for use in vehicles but limited vehicle fueling services.

Map a Route





**Continual growing production  
equals stable prices now and  
into the future**

# You may have seen us...

# ROUSH<sup>®</sup> CLEANTECH



ROUSHcleantech.com | 800.59.ROUSH



# ...rolling around your community

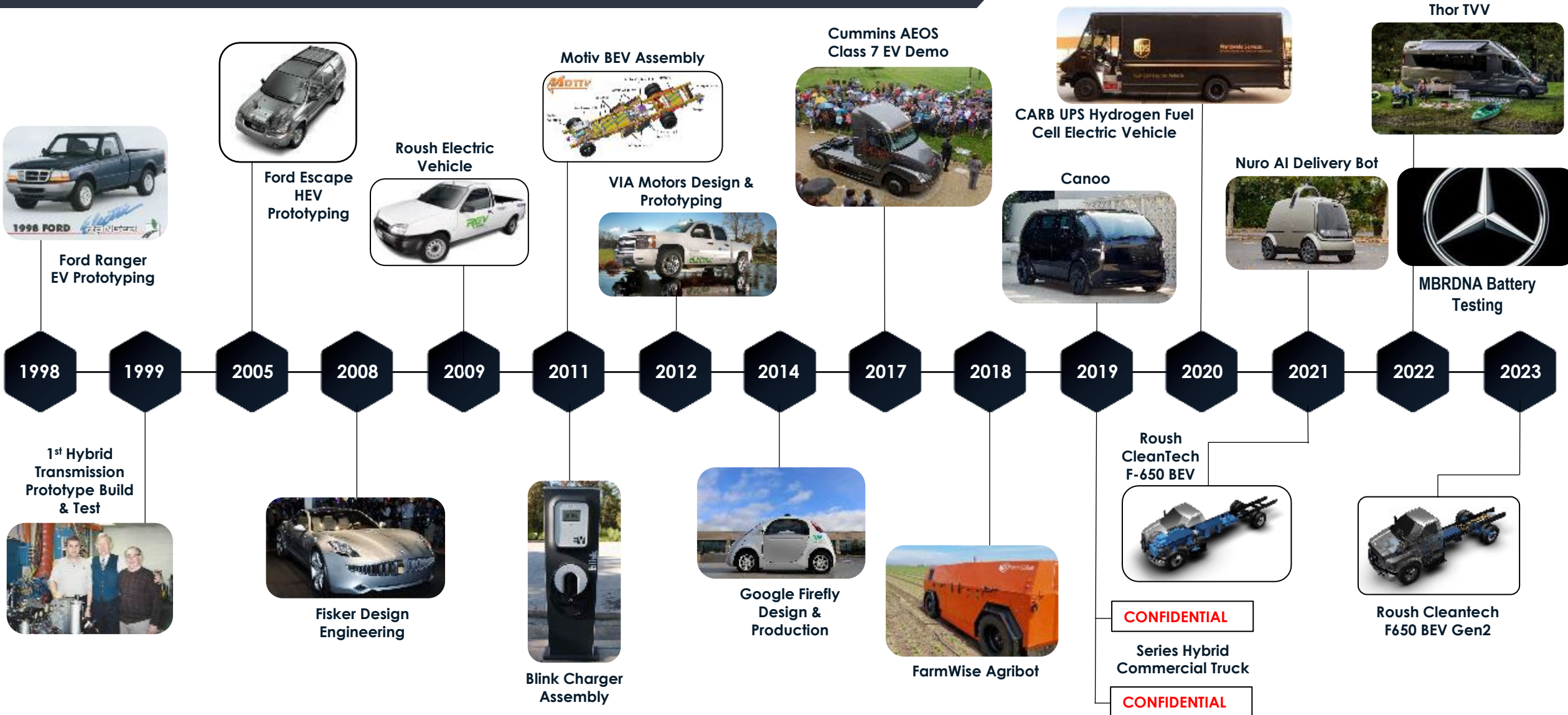
**ROUSH**<sup>®</sup>  
CLEANTECH



ROUSHcleantech.com | 800.59.ROUSH

# Roush Experience

# ROUSH®





# Our Progress

**ROUSH**<sup>®</sup>  
CLEANTECH

OVER

**40,000**

VEHICLES ON  
THE ROAD

OVER

**1 Billion**

MILES  
ACCUMULATED

OVER

**3,000**

FLEETS



# Propane Autogas Product Lineup

**ROUSH**<sup>®</sup>  
CLEANTECH

- Medium duty Ford trucks, chassis cabs, cutaways, and stripped chassis
- Purpose Built Engine
- OEM Ordering Options
- Ship-Thru / Drop-Ship Arrangements
- Factory Ford warranty maintained
- No loss of HP / torque / towing capacity
- Serviceable with existing diagnostic equipment



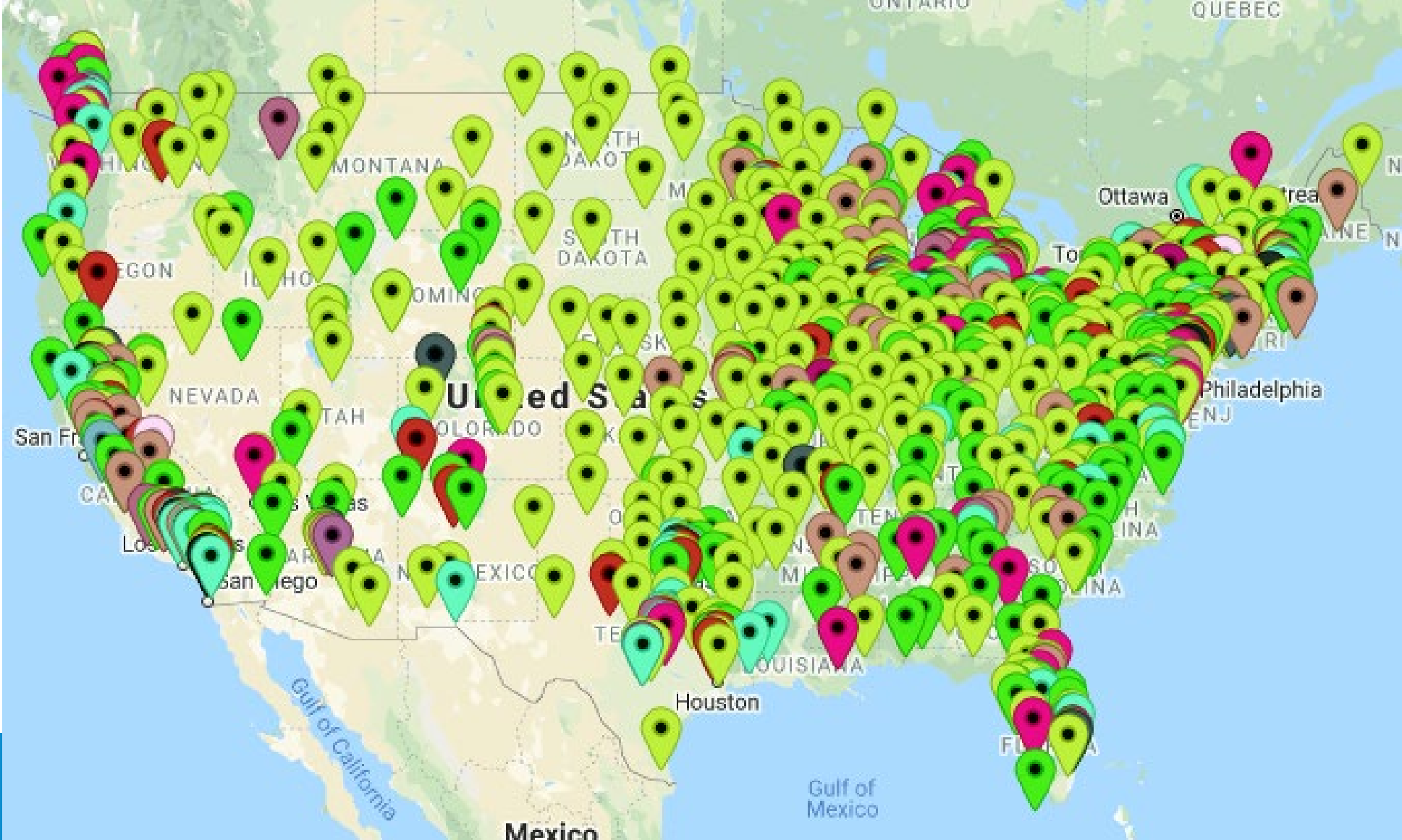


# Shuttle Buses





# Non-School Bus Deployments

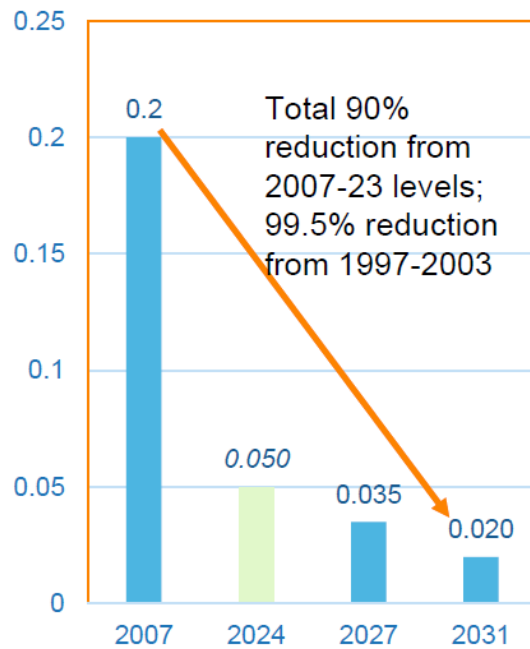


# What is Next for Diesel?

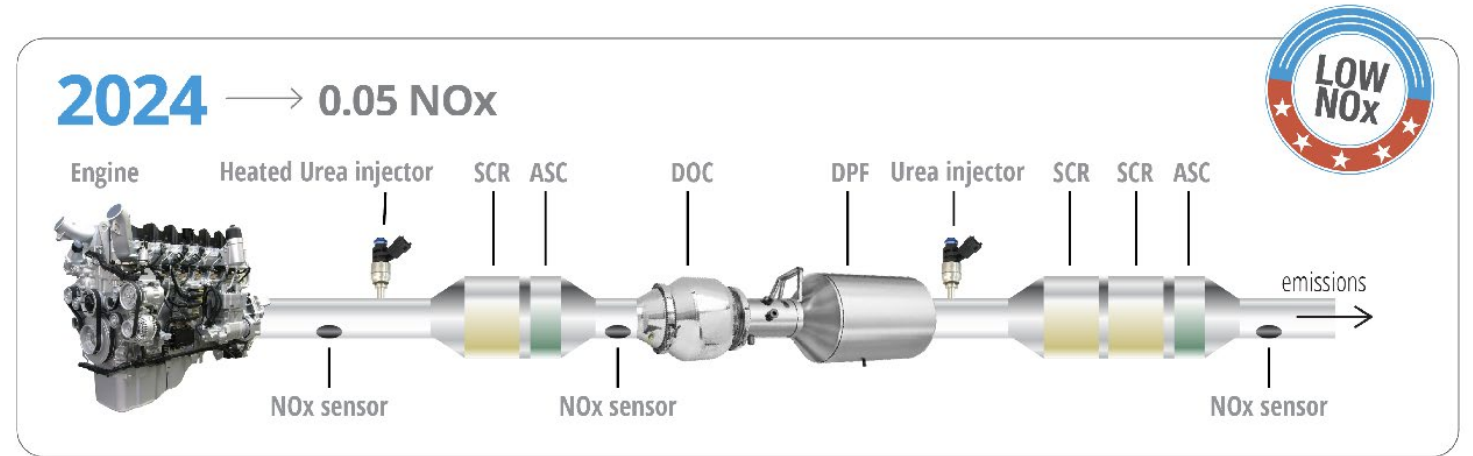


## California Air Resource Board Heavy Duty Engine and Vehicle Omnibus Regulations passed into law in 2021

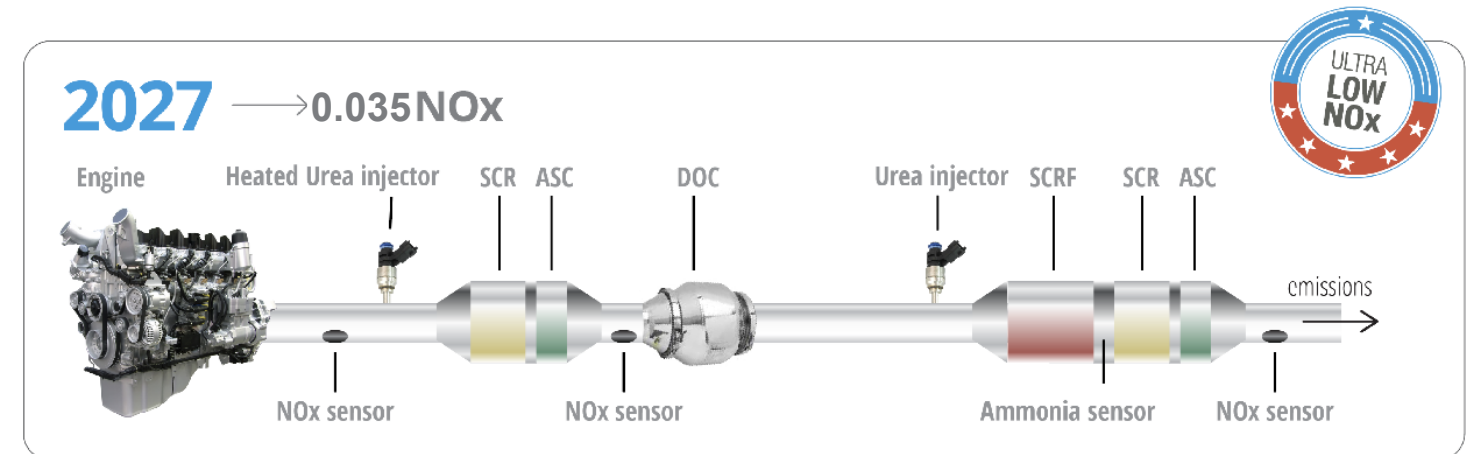
Projected NOx Standards



Source: "ESTIMATED COST OF DIESEL EMISSIONS-CONTROL TECHNOLOGY TO MEET FUTURE CALIFORNIA LOW NOx STANDARDS IN 2024 AND 2027"  
[https://www.roushcleantech.com/The\\_Future\\_of\\_Emissions\\_February\\_2022.pdf](https://www.roushcleantech.com/The_Future_of_Emissions_February_2022.pdf)



✓ ROUSH CleanTech's propane autogas vehicles meet CARB's 2024 standard.



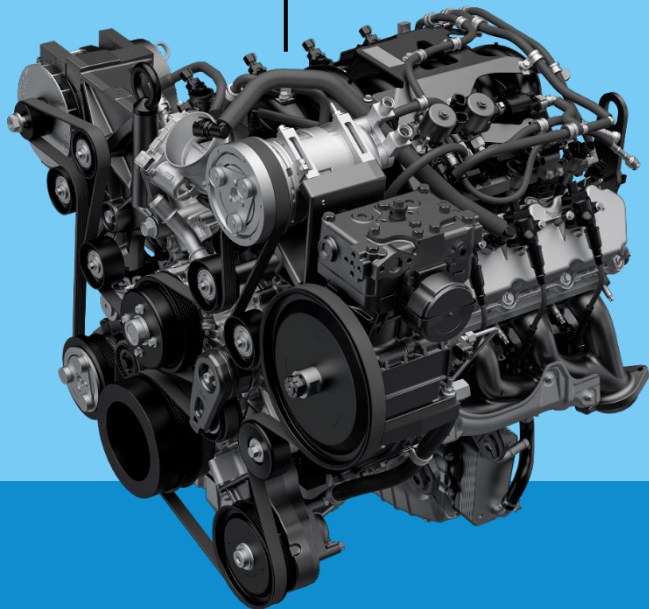
✓ ROUSH CleanTech's propane autogas vehicles meet CARB's 2027 standard.

# 7.3L V8 Engine Stats

LEANER

CLEANER

MEANER



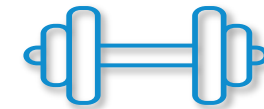
**7.3**

**Engine RPM**



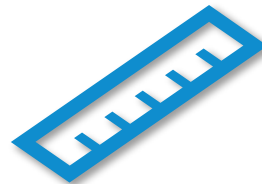
Idle: 680 / Max: 4,050

**Power**



HP: 335 / Torque:  
468 ft-lbs. @ 3,900 RPM

**Design**



90° V8 / 445 CI / Pushrod 2V

**Compression**

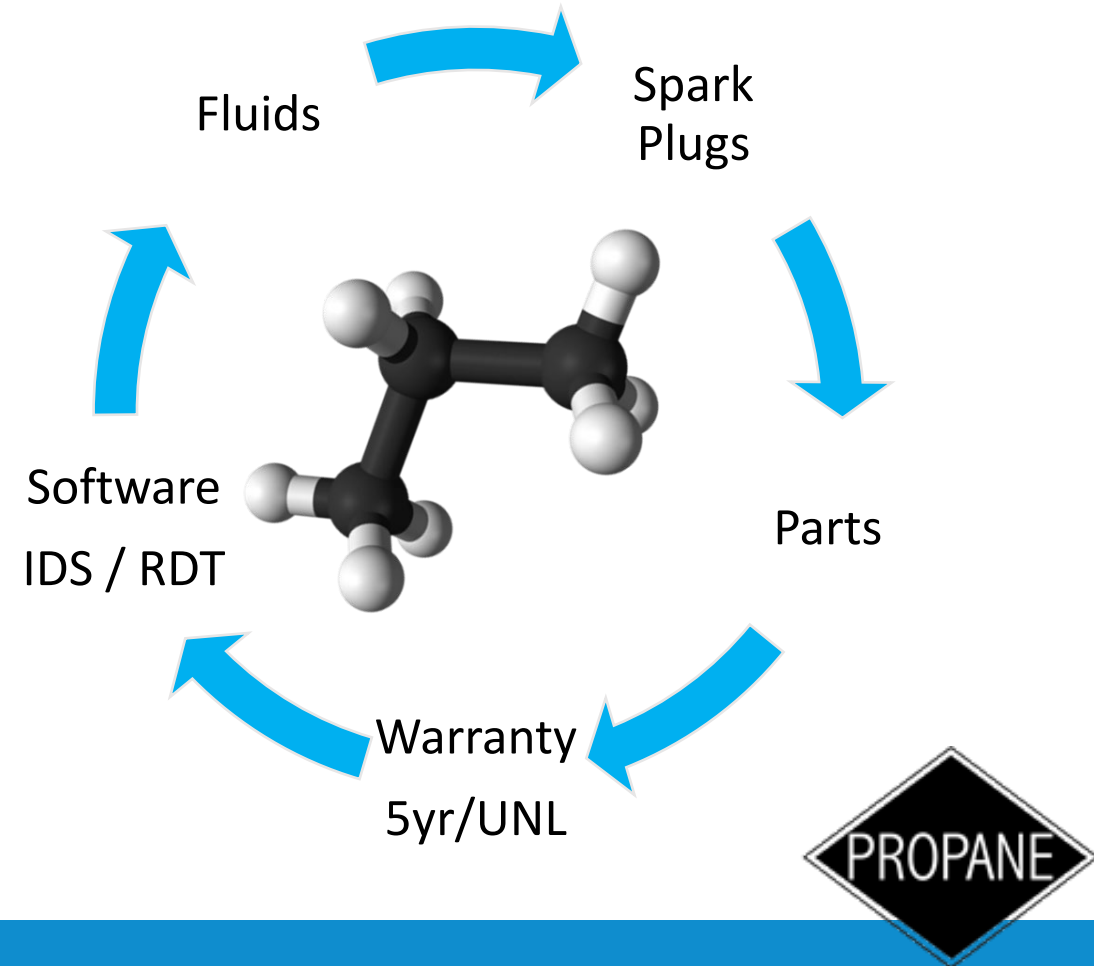
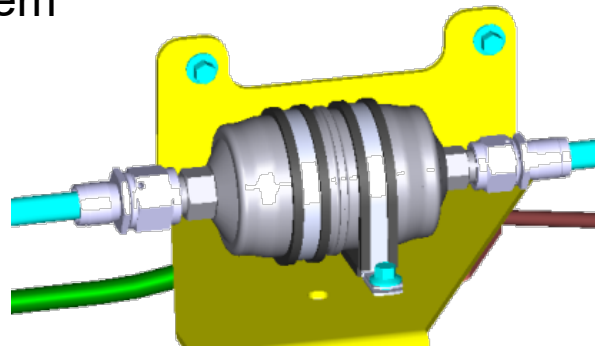


10.5 to 1

# Propane Maintenance: COMMON



- Fuel filtration is the only unique maintenance item
- PM Compatibility
- Cold Weather Resilience
- Reduced Carbon in Oil
- Passive Emissions System



# E-450

**ROUSH**<sup>®</sup>  
CLEANTECH

## Engine

7.3L V8 Ford Engine with ROUSH CleanTech propane fuel system

## Applications

158" / 176" / 186" / 190" wheelbase configurations  
Chiller required for vehicles operating in temps  $\geq 110^{\circ}\text{F}$   
6-speed automatic transmission

## Fuel Tank Capacity

Aft-Axle: 41 gallons (usable)

## Technical Specifications

- EPA and CARB approved
- GVWR: 14,500 lbs.
- Up to 30 passengers





# Ford F-53 / F-59 (Class 5/6)

**ROUSH**<sup>®</sup>  
CLEANTECH

## Engine

7.3L V8 Ford Engine with ROUSH CleanTech propane fuel system

## Propane Fuel Tank

Aft-Axle: 65 or 93 gallons (usable)

## Technical Specifications

- EPA and CARB approved
- GVWR: 16,000 – 26,000 lbs.
- Up to 225 miles of range
- 6-speed automatic transmission
- Requires “91G” gaseous fuels prep. package



# Commercial Vision (Type C)

**ROUSH**<sup>®</sup>  
CLEANTECH

## Engine

7.3L V8 Ford Engine with ROUSH CleanTech propane fuel system

## Applications

169" / 189" / 217" / 238" / 252" / 273" / 280" wheelbase configurations

6-speed automatic transmission

## Fuel Tank Capacity

- **Short:** 47 gallons (usable)
- **Standard:** 67 gallons (usable)
- **Extended:** 93 gallons (usable)

## Technical Specifications

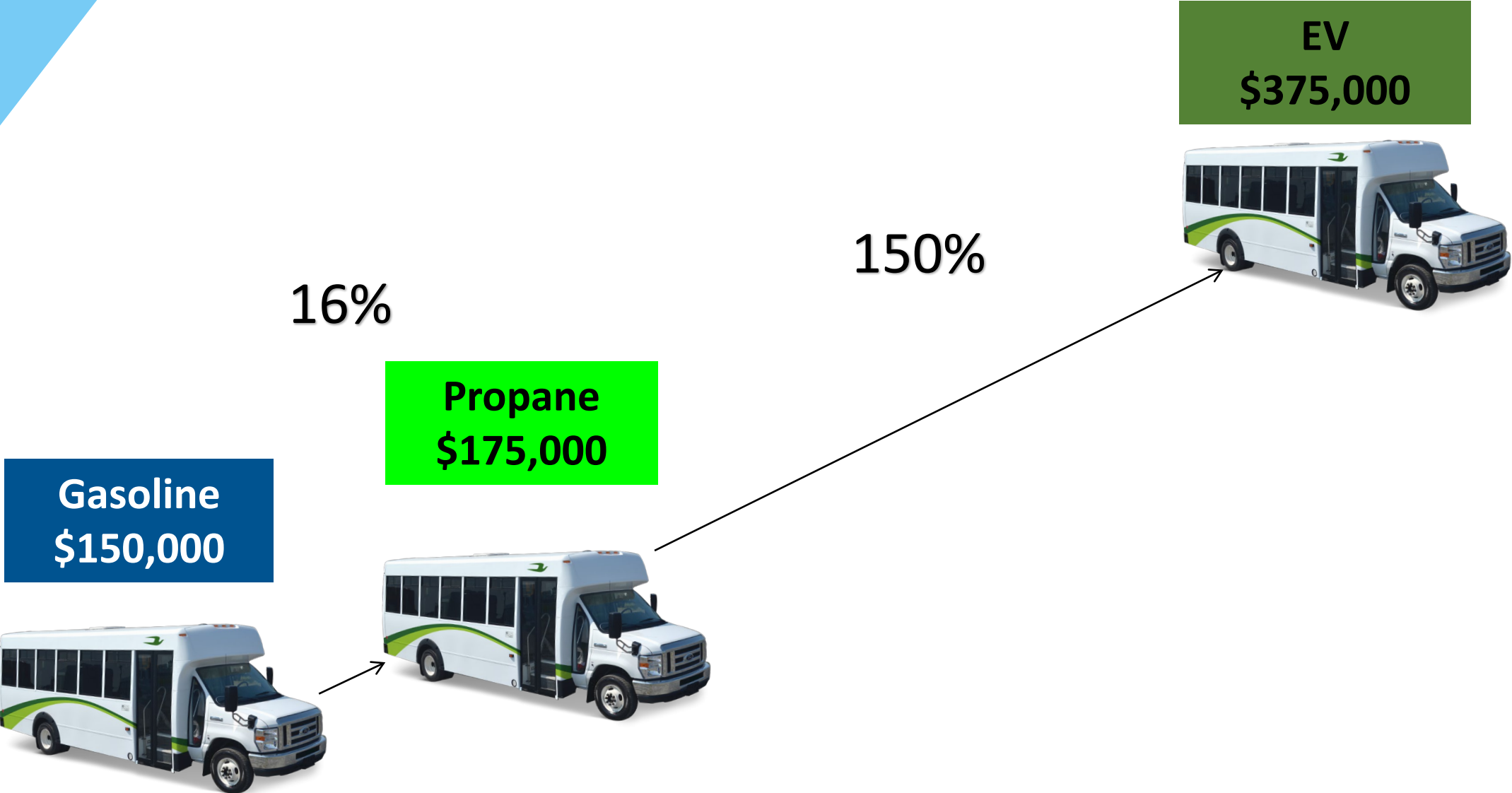
- EPA and CARB approved
- GVWR: 33,000 lbs.
- Up to 81 passengers



**BLUE BIRD**<sup>®</sup>



# Capital Expense





▶ **Autogas  
Infrastructure &  
Dispensers**



# Onsite Planning

- ▶ What are the site dimensions?
- ▶ Where will the dispenser be placed?
- ▶ Who owns the property?
- ▶ Who is the local authority that has jurisdiction? Fire Marshal?
- ▶ What are the required distances from buildings, property lines and sources of ignition?
- ▶ What will be the traffic patterns?
- ▶ What type of surface area and thickness is required to place the dispenser?
- ▶ What local contractors will be necessary? Concrete, bollards, electric, etc.
- ▶ What are the electrical needs? (Three phase preferred)



# Temporary Refueling Set-up



# Mobile Refueling





# Standard Private Station



# Standard Private Station





# Custom Advanced Private Station



# NEW: Off-Grid Fueling Option

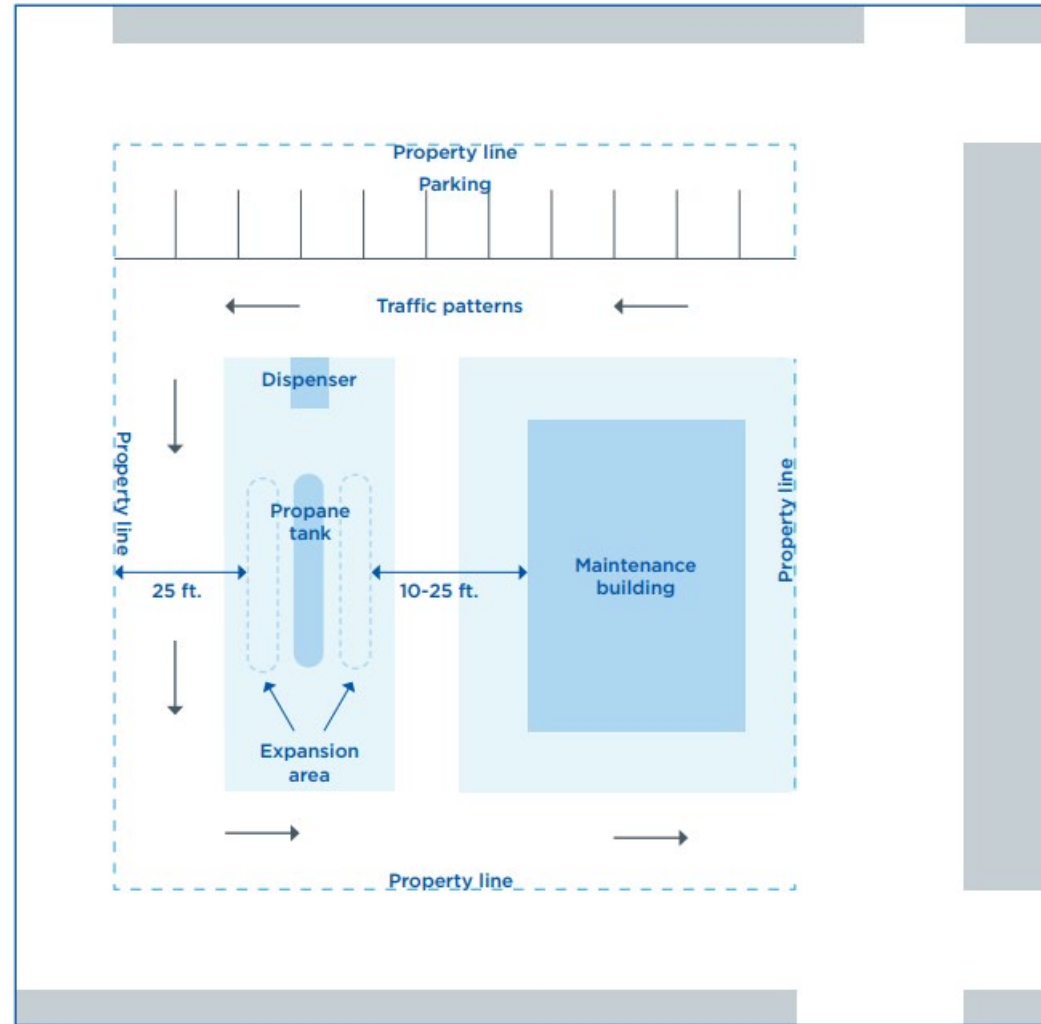
**ROUSH**<sup>®</sup>  
CLEANTECH




[ROUSHcleantech.com](http://ROUSHcleantech.com) | 800.59.ROUSH

# ► Preparation

- Gather solutions for permits and placements specifications
- Timeline?







**Case Studies Show  
Substantial Fuel Cost  
Savings and a Reduction  
In Maintenance Cost; All  
While Reducing  
Emissions**

# What Can You Learn From Other Systems?



# San Diego Metropolitan Transit System

**ROUSH**<sup>®</sup>  
CLEANTECH

**Industry:** Paratransit

**Location:** San Diego, CA

**Vehicles:** 101 Ford F-550 / E-450 Buses

## By The Numbers:

- Reduce emissions by **2 million pounds** per year.
- Will save **\$5.8 million** over lifecycle of vehicles.
- Reported **\$9,740** in savings annually per bus
- Reduce carbon intensity by **71%**.





# Cherokee County Area Transit, GA



- **Received 85% funding** from Federal Transit Administration for a propane bus
  - Propane meets FTA's green initiatives
- **Obtained 90% funding** from the Federal Transit Administration for a propane fueling station
  - Propane meets FTA's green initiatives
- **Saved \$10,000 per propane vehicle** compared to same model gasoline vehicle
  - Higher FTA funding and propane supplier funding
- Locked in 3-year fuel price agreement with propane provider at a **50% saving per gallon** over gasoline





# Kitsap Transit - Bremerton, WA

- 3.5 million riders each year
- Started adopting propane autogas 2015
- 47 propane autogas buses
  - 11 remaining diesel buses to be replaced with current order of propane buses
- Fuel Costs per mile
  - Diesel \$.48/mile
  - Gasoline \$.50/mile
  - Propane \$.20/mile
- GHG Emissions for 8-hour route period
  - Diesel bus – 2.4 metric tons
  - Propane bus - .014 metric tons



# Charlevoix County Transit



**Service:** Countywide Demand-Response

**Location:** Boyne City, MI

**Propane Vehicles:** 13 Ford E-450 Buses / 4 Bi-Fuel Ford Transit Vans Buses

**Gasoline Vehicles:** 2 Ford Transit Vans

## FY-22 By The Numbers:


• 53,035 Gallons Propane \$108,191 \$161,386 Gas Equivalent

• 1,094 Gallons Gasoline \$ 3,915

**FY22 Fuel Cost \$112,106 \$165,301**

**Fuel Cost Savings \$53,194**

**Alt Fuel Tax Credit \$16,229 = \$69,423**



- ▶ **Rebate, Incentives,  
Funding and  
Technical  
Assistance**

# CHS Propane is a wholesaler

(Working w/ 100's of retailers in SD & ND)

# Chicken or the Egg

# Committed to the rural communities

# Rebates Through August 31, 2024





## ▶ Grant Writing

- VW settlement, DERA, state and local grant dollars available
- Low-No Program
- Partnership with Fisher Consulting

## Authorized Funding: Buses and Bus Facilities Formula, Competitive, and Low-No Program (Section 5339)

Program Component	FY 2022 (in millions)	FY 2023 (in millions)	FY 2024 (in millions)	FY 2025 (in millions)	FY 2026 (in millions)
Formula	\$603.99	\$616.61	\$632.71	\$645.78	\$662.20
Buses and Bus Facilities Competitive	\$375.70	\$383.54	\$393.56	\$401.69	\$411.90
Low or No Emissions Competitive	\$1,121.56	\$1,123.06	\$1,124.96	\$1,126.51	\$1,128.46
<b>5339 Program TOTAL</b>	<b>\$2,101.25</b>	<b>\$2,123.21</b>	<b>\$2,151.23</b>	<b>\$2,173.98</b>	<b>\$2,202.56</b>

*Please Note: Funding amounts before subtracting administrative and oversight takedown.*



# 2023 Low-No & Buses and Bus Facilities Competition

## Available Funding: Approximately **\$1.7 billion**

- Buses and Bus Facilities Competitive: Approximately \$469 million
- Low or No Emissions: \$1.22 billion (**\$357 million for low emission projects\***)

Important Dates	
Notice of Funding Opportunity	January 27, 2023
Applications Due	11:59pm EST April 13, 2023
Project Evaluations	April – May 2023
Award Announcement	No Later than June 28, 2023
Pre-Award Authority	Starts on date of project announcement
Available for Obligation	The year of award plus 3 years – September 30, 2026

*\*Please note: Due to less funding being requested than was available for low-emission projects in 2022, this amount includes approximately \$69 million in FY22 funds reserved for low-emission projects as required by statute.*



## Competitive Program Descriptions

### Low-No Program

“The **Low-No Program (5339(c))** provides funding for the purchase or lease of zero-emission and low-emission transit buses, as well as for the acquisition, construction, or leasing of supporting facilities and equipment.”

### Buses and Bus Facilities Competitive Program

“The **Grants for Buses and Bus Facilities Program (5339(b))** authorizes FTA to award grants to assist in the financing of buses and bus facilities capital projects including:

- 1) Replacing, rehabilitating, purchasing, or leasing buses or related equipment
- 2) Rehabilitating, purchasing, constructing, or leasing bus-related facilities”





# Alternative Fuel Excise Tax Credit

A tax incentive is available for alternative fuel that is sold for use or used as a fuel to operate a motor vehicle. A tax credit in the amount of \$0.37 per gallon\* is available for propane. For more information about claiming the credit, see IRS Form 4136, which is available on the [IRS Forms and Publications](#) website.

NOTE: This incentive was originally set to expire on December 31, 2021, but has been extended through December 31, 2024, by Public Law 117-169.

## Rebates & Incentives































Many State Propane Associations and Fuel Vendors provide incentives and rebates when purchases or retrofitting vehicles.

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

\*Gas Per Gallon Equivalent is used for calculating credit.

# Will Your Fuel Choice Meet The Expectations and Needs of Your Agency



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



# Thank You

**Jill Drury, PERC**

**Andrew Ernst, CHS Propane**

**Derek Whaley, Roush CleanTech**