

Future-Proofing Infrastructure Investments Planning Your Path to Polyfuel

Polyfuel – The What & Why

Polyfuel: a fueling strategy, comprised of multiple alternative fuels, that enables you to tailor your fuel selection to meet the diverse applications within your fleet.

Driving Forces of Polyfuel

Varied applications

Policy/Incentives

Technology

Sustainability

Agenda

Polyfuel – The What & Why

- Overview
- Driving Factors

Company Overview

- U.S. Venture
- U.S. Gain

Polyfuel – Understand Your Options

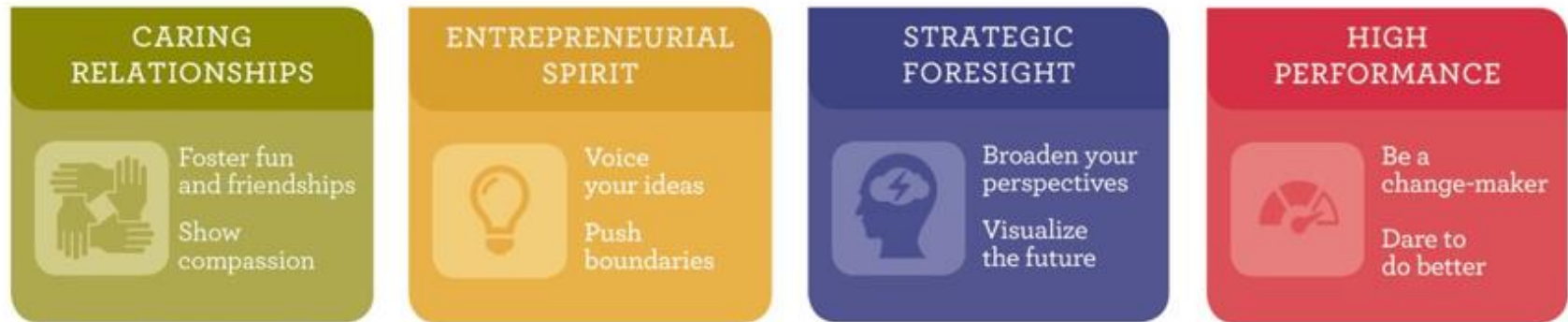
- Renewable Natural Gas
- Electric
- Hydrogen
- Other Biofuels
 - Ethanol
 - Renewable Diesel
 - Renewable Propane

Next Steps to a Polyfuel Future



Our Differentiating Values

Our success is our people. We live for the pursuit of bold ideas, making a positive impact, and achieving our full potential. Our work inspires us to find a better way to change the world.



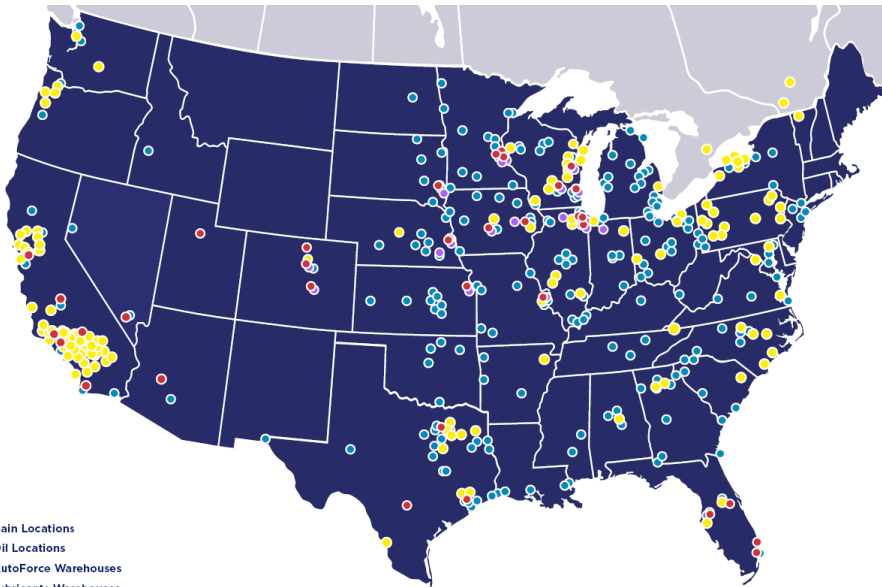
At U.S. Venture our purpose is to **Find a Better Way.**

Company Overview – Our Roots



Leading provider of transportation products and insight driving the world forward.

- Headquartered in Appleton, WI
- Ranked #5 on Deloitte's Wisconsin Distinguished 75 list
- Operations in 33 states with 2,100 team members

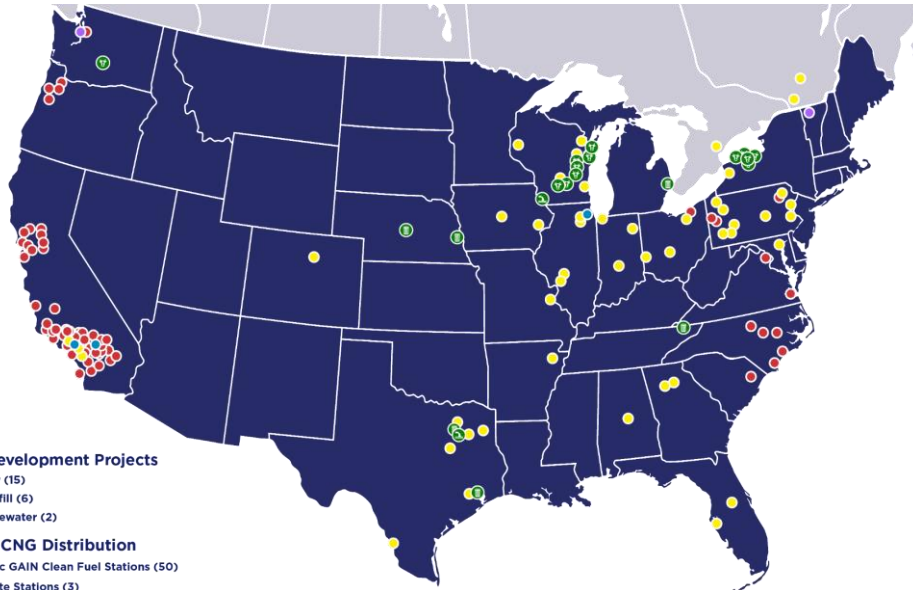


Company Overview – Our Division



Leading provider of sustainable energy solutions that reduce emissions for a cleaner world.

- Representation across the United States and into Canada
- Vertical integration offers the cleanest alternative fuel & renewable thermal energy, at the best value



Renewable Natural Gas Development

- Agricultural
- Landfill
- Wastewater
- Food / Industrial

Alternative Fuel Supply

- Renewable & Compressed Natural Gas
- Electric
- Hydrogen
- Renewable Diesel, Ethanol, Biodiesel, Propane

Fueling Infrastructure

- Public 
- Private

Thermal Energy Supply

- Renewable Natural Gas

Polyfuel – Understand Your Options

Infrastructure Considerations for Selecting the Right Fuels:

How fleets are used?

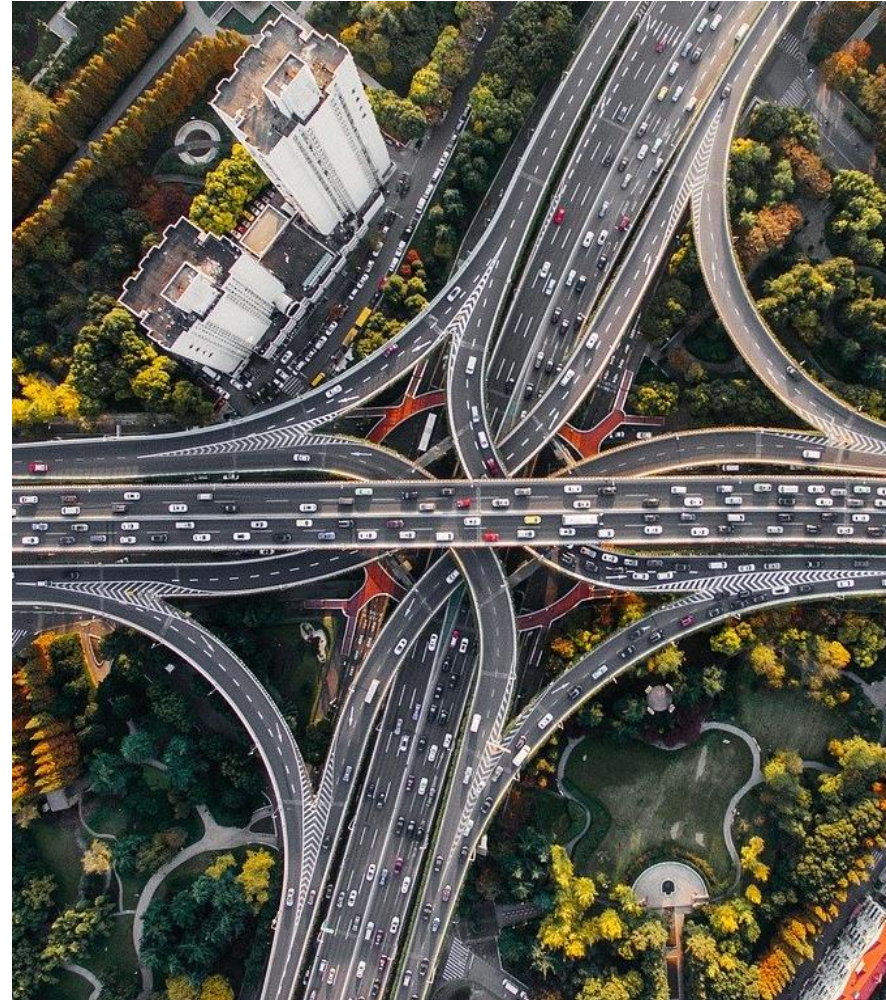
- Duty cycles
- Concurrent fueling & dwell time
- Route details (mileage, environmental factors, return to base, etc...)

Fleet Goals? How will they be used?

- Financial
- Sustainability
- Station model

Understand utility details and pricing

- Available electric capacity
- Pressure of pipeline natural gas
- Water pricing and quality
- Land availability

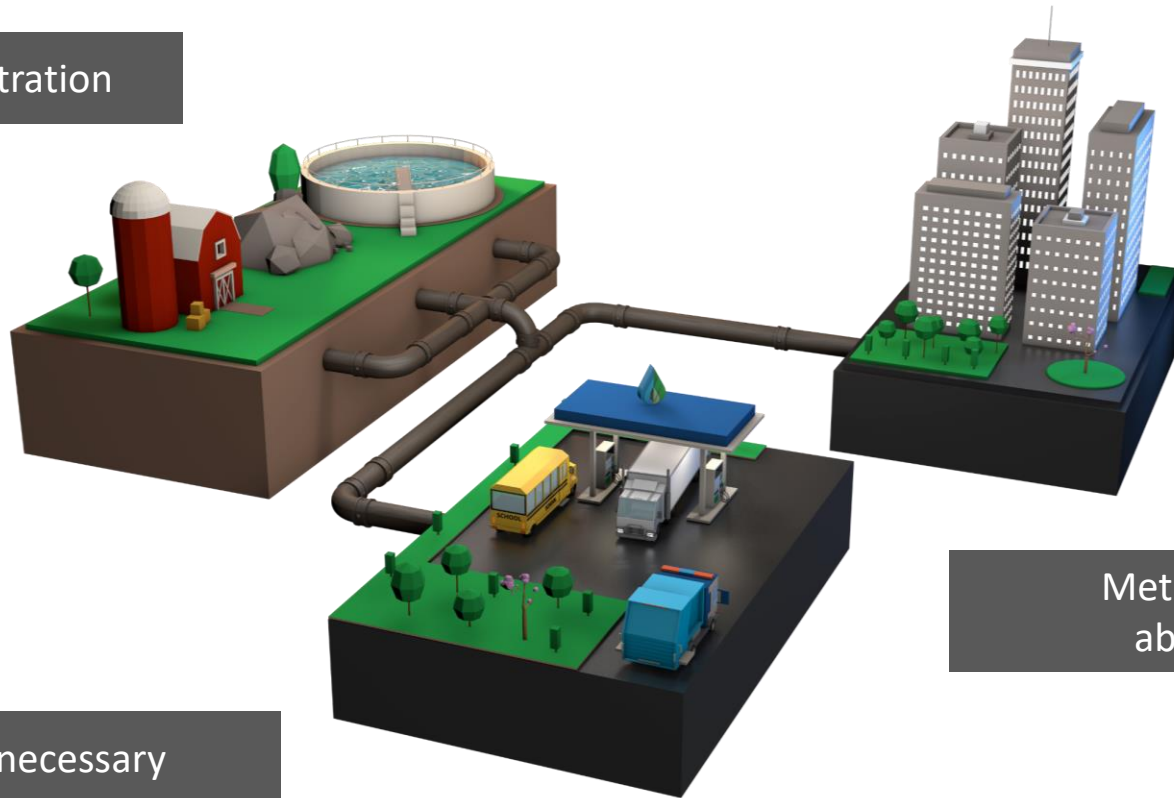


Polyfuel – Understand Your Options

Option #1: Renewable Natural Gas (RNG)

The now and ready solution

Methane sequestration



Methane sourced
above ground

No fracking is necessary

Polyfuel – Understand Your Options

Option #1: Renewable Natural Gas (RNG)

Benefits

Clean

- Organic Feedstocks: agricultural, landfills, wastewater treatment facilities
- Lowest carbon intensity (CI) scores (especially with *dairy gas*)
- Immediate emission reductions

Established

- Growing supply (140+ development projects)
- Extensive public fueling network; private sites widely used and affordable
- Proven Cummins near-zero natural gas engine technology
 - New Hybrid CNG/EV (Hyllion) technology coming

Affordable

- Incentives for adoption
 - Grant funding and RFS/LCFS/CFP credits



Polyfuel – Understand Your Options

Option #1: Renewable Natural Gas (RNG)

Ideal Applications

Widely adopted among commercial vehicle segments

- Multiple fleet types: transit, school, refuse, trucking
 - High mileage / duty cycle applications
- Return to base or dedicated routes
 - Can leverage onsite fueling
 - Fast-fill vs. time-fill

RNG - A fuel that grows with you, future-proofing your infrastructure investments

- Accelerated adoption of natural gas vehicles
- Feedstock: hydrogen production and electricity generation
 - SMR produces +95% of hydrogen



Polyfuel – Understand Your Options

Option #1: Renewable Natural Gas (RNG)

Infrastructure: Time Fill

Less Overhead Cost

- Simplified metering & no POS
- Less compression
- Less storage

Total Fleet Fueling

- Multiple vehicle fueling
- Ideal for overnight fueling



Polyfuel – Understand Your Options

Option #1: Renewable Natural Gas (RNG)

Infrastructure: Fast Fill

Public Fueling Options

- Advanced metering & POS option
- Fast filling along dedicated routes

Versatility

- Slip seat applications
- Time critical carrier needs

Temperature Compensation

- Temp. Compensated Fill ($PV=nRT$)
 - Higher pressure on hot days
 - Lower pressure on cold days

Added Cost Compared to Time Fill

- Fast fill requires added compression and storage.



Polyfuel – Understand Your Options

Option #2: Electric

Benefits

Economic

- Low maintenance cost
- Low vehicle and fuel costs

Clean

- Zero tailpipe emissions
- Potential for carbon-neutral
- Sourced from renewables
 - Onsite solar/wind
 - RECs
 - Sourcing RNG for NG Fuel cells

Ideal Applications

- Shorter routes / light-duty cycles
- Return to base applications
- High dwell time
- Fair weather climate



Polyfuel – Understand Your Options

Option #2: Electric

Vehicles: Technology Readiness

Vehicle Technology Readiness for Electric Models

Class 8 33,000 lbs and over	 Drayage Truck	 Long-Haul Freight
Class 7 26,001 to 33,000lbs	 City Transit Bus	 Refuse Truck
Class 6 19,501 to 26,000 lbs	 School Bus	
Class 5 16,001 to 19,500 lbs	 Walk-In Van	
Class 4 14,001 to 16,000 lbs	 Delivery Truck	
Class 3 10,001 to 14,000 lbs	 Shuttle Bus	
Class 2 6,001 to 10,000 lbs		 Full Size Pickup
Class 1 6,000 lbs or less	 Light Duty	
	Commercially Available	Limited Commercial Availability
		Demonstration/Prototype

Polyfuel – Understand Your Options

Option #2: Electric

Infrastructure Considerations

Fleet Details

- Mid to Small Fleet Size
- Route details (fair climate, short mileages, return to base, concurrent refueling, time of charging, high dwell time)

Charging Equipment

- Charger Types (Level 1 (120VAC), Level 2 (240VAC), Level 3 DC Fast)
- Interfaces (Plug-in, overhead, wireless)
- Charge control

Space Availability

- Station type (Depot, Opportunity, Public / Private)
- Solar and/or wind considerations

Utility Requirements

- Have you engaged with your utility
- Ample grid and transformer capacity

Polyfuel – Understand Your Options

Option #2: Electric

Infrastructure Cost Comparison

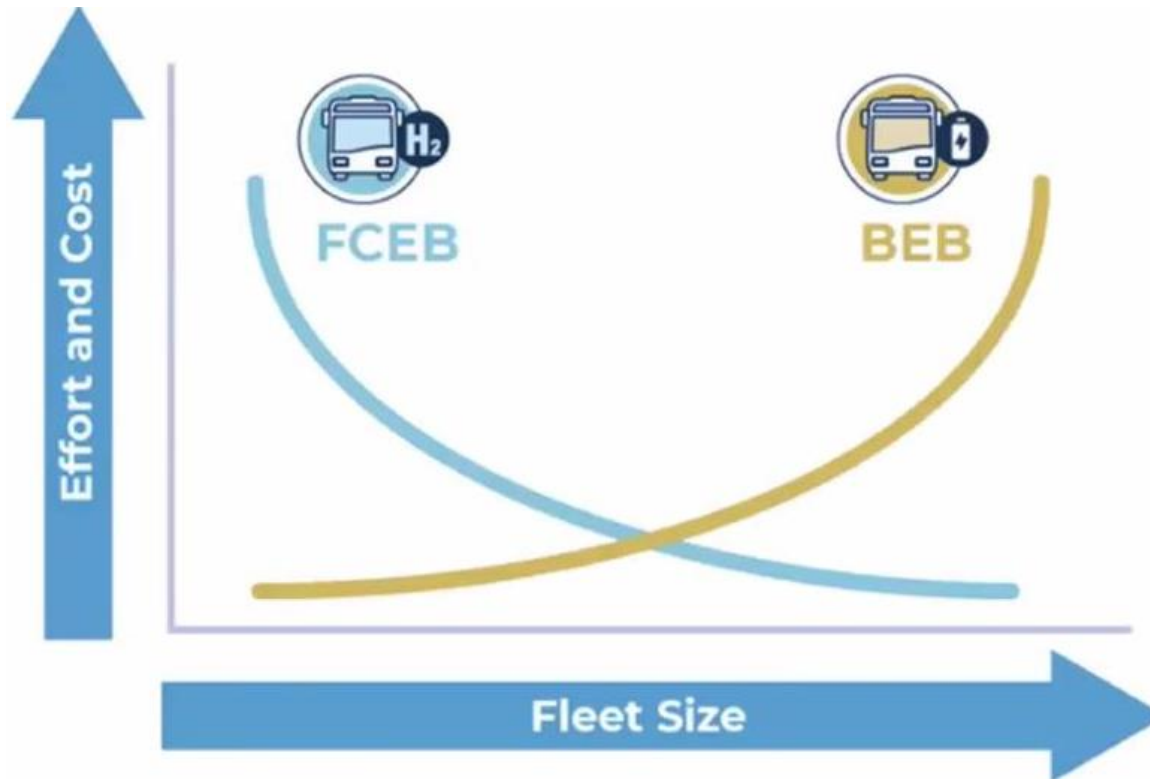


Image taken from the CTE, 9/16/20

Polyfuel – Understand Your Options

Option #3: Hydrogen

Benefits

Ease of Use

- Longer range than electric
- Avoid over burdening electric grid

Clean

- Zero tailpipe emissions
- Better than carbon-neutral
- Potential for net-negative
 - RNG for methane reform
- Green Hydrogen

Ideal Applications

- Large ZEV fleets / heavy duty cycles
- Any climate (including extreme)
- Slip seat applications
- Return to base / dedicated routes (CA)
 - Short or long routes



Polyfuel – Understand Your Options

Option #3: Hydrogen

Infrastructure Considerations

Fleet Details

- Smaller / larger fleet size
- Route details (any climate, mileages, return to base / dedicated routes, concurrent refueling, dwell time)

Fueling Equipment

- Fueling types – H70, H35
- Storage and compression (refueling rate)

Space Availability

- Station type (public / private)
- H2 source (delivered GH2 / LH2, onsite SMR / electrolysis)
 - Solar and/or wind considerations

Utility Requirements

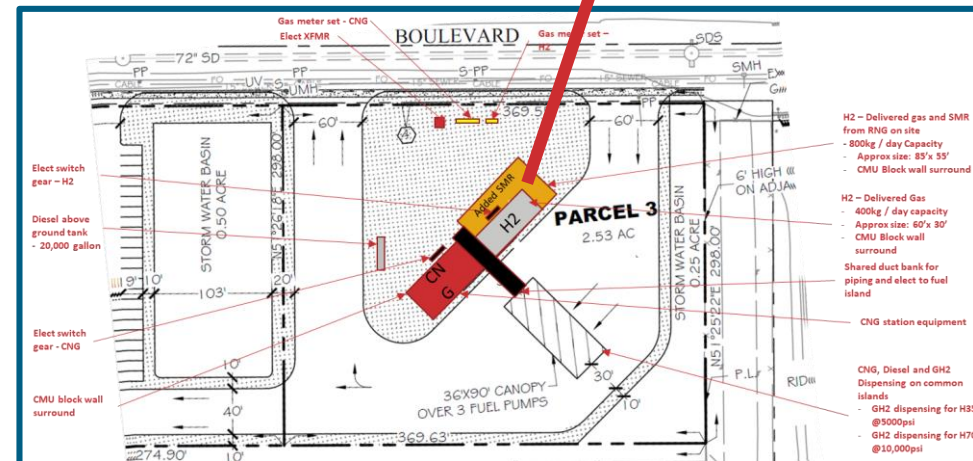
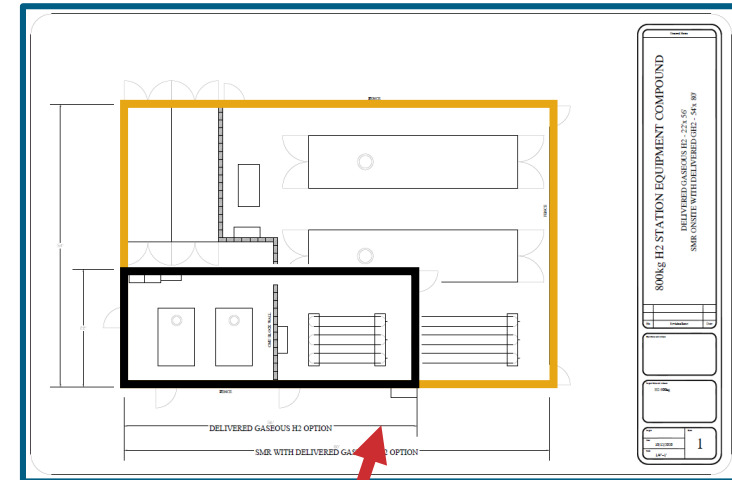
- Have you engaged with your utility
- Ample grid and transformer capacity
- Water price and quality
- Pressure of pipeline natural gas



Polyfuel – Understand Your Options

Option #3: Hydrogen Infrastructure Considerations

- **Delivered H2**
 - Less space requirement (GH2 vs. LH2)
 - Lower equipment costs (~50% less)
 - Avoids power outage issues
 - Lower utility consumption
 - Less credit potential
- **Onsite Generation**
 - Electrolysis vs. SMR
 - Future-proofing existing NG supply
 - Larger space requirement
 - More expense
 - Higher utility consumption
 - Larger credit potential



Polyfuel – Understand Your Options

Option #3: Hydrogen

Vehicles: Technology Readiness

Vehicle Technology Readiness for Hydrogen Models

Class 8 33,000 lbs and over	 Drayage Truck  Long-Haul Freight		
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Polyfuel – Understand Your Options

ZEV Options: Hydrogen / Electric

Infrastructure Economic Comparison – Foothill Transit Example

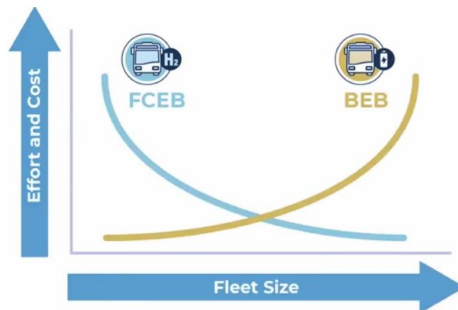
Fuel cell buses offer an attractive TCO

- When deployed at scale

Foothill Transit's (CA) study compares the cost of deploying 20 ZE buses on a 42-mile roundtrip route.

Result:

- Will need 34 BEBs vs 23 FCEBs because of BEBs limited range



Capital Cost

Fuel cell electric bus	\$1,100,000
Battery electric bus	\$890,000

Fuel Cost/Mile/Bus

Fuel cell	\$1.00
BEB/kW	\$0.76

Scheduled Maintenance per Mile

Fuel cell	\$0.12
BEB	\$0.04

Mid-Life Replacement Cost/Bus

Fuel cell	\$30,000
BEB	\$200,000

Fueling Infrastructure

Fuel cell - up to 30 buses	\$4 million
BEB - chargers for 34 buses	\$11 million

Data taken from the Foothill Transit Executive Board Meeting (7/24/20)

Polyfuel – Understand Your Options

ZEV Options: Hydrogen / Electric

Infrastructure Economic Comparison – Foothill Transit Example

12-year Lifecycle Cost Comparison		
	34 BEBs	20 FCEBs
Capital cost - buses	\$30,260,000	\$25,300,000
Capital cost - fueling infrastructure	\$10,948,000	\$4,000,000
12-year fuel cost	\$11,839,973	\$15,661,340
12-year PMI cost	\$626,454	\$1,879,361
Mid-life maintenance cost	\$6,800,000	\$690,000
Total	\$60,474,427	\$47,530,700

Cost Savings with FCEB: \$12,943,726

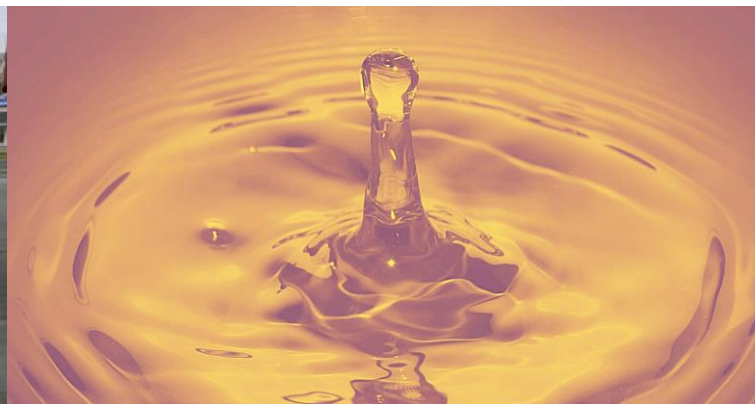
Shows the total cost of ownership of BEBs is **higher** than FCEBs

Polyfuel – Understand Your Options

Other Alternative Fuels

While we see RNG, electric and hydrogen as the three largest players in the renewable fuel space, there are many other alternative fuel solutions that can aid fleets in their decarbonization strategy:

Ethanol | Renewable Diesel | Biodiesel | Renewable Propane



Next Steps & Conclusion

A polyfuel strategy requires **advanced planning** and can **build upon existing infrastructure**; however, it can be simplified with the right partnerships. We can help to secure **grant funding**, monetize **clean fuel credits**, understand your **fueling infrastructure needs** and provide **continuous support**!



 <https://www.usgain.com/blog/>



We look forward to hearing from you.

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