U.S. VEHICLE FUEL MATRIX

A BALANCED FUEL PORTFOLIO

At Clean Fuels Michigan, we've always embraced a "big tent" approach that welcomes any fuel that moves us beyond the status quo. Rather than seeing fuels as being in opposition, we recognize that innovation thrives through competition, and each fuel has an opportunity to demonstrate its best use case.

By supporting a range of clean fuels, we don't just hedge our bets; we create a system where different solutions can work in harmony, strengthening Michigan's transportation by driving innovation and investment across the state. Now is the time to build on our progress and ensure that cleaner, more innovative fuels continue to gain ground.

PASSENGER VEHICLE FUELS

FUEL TYPE	Fuel Cost	Fueling Infrastructure Availability	Best Geography	Maintenance	Human & / or Environmental Impact	Fuel Source	Performance
Electric Vehicle (EV)	**Best:** $1.25 / gallon equivalent	• Easy access to overnight charging • The public charging network is growing	Densely-populated	• 8-year / 100,000-mile battery warranty • Fewer parts, no oil changes	• No emissions • Battery/energy storage recycling in development • Very quiet	Electricity is generated locally	Instant torque
Plug-in Hybrid (PHEV)	**Good:** Much lower than ICE	• Widely available petroleum fueling • Growing electric network	All	• Higher maintenance costs • 8-year / 100,000-mile battery warranty	• Lower than traditional ICE vehicles • Noise level = mid	Electricity is generated locally	Prioritizes efficiency over performance
Ethanol	**Better:** Lower per-gallon cost than gas	E15 (~15% ethanol and 85% gasoline) is widely available at gas stations	Anywhere, with particular advantages in agricultural areas	• Similar to gas vehicles	• Emissions =higher VOCs, lower NOX • Noise level = high	Domestic, primarily from corn crops	In high performance engines, can exceed the performance of traditional gas-powered vehicles
As compared to gasoline	Variable	Widely available	Long distance and heavy daily mileage	• 100+ years of development and readily available replacement parts	• Carbon heavy • Parts – close to closed cycle • Noise level = high	Domestic and foreign	Variable depending on vehicle build and cost

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CLEAN FUELS MICHIGAN

MEDIUM- & HEAVY-DUTY FLEET VEHICLE FUELS

FUEL TYPE	Fuel Cost	Fueling Infrastructure Availability	Best User	Maintenance	Human & / or Environmental Impact	Fuel Source	Performance
Biodiesel	**Good:** B20 (20% biodiesel) is usually 10-15 cents cheaper per gallon than diesel • Higher blends may be more expensive, though	• B5 is widely available as the typical blend for conventional diesel • Higher blends like B20 and B100 are available at certain retailers	Heavy-duty trucks, marine	• Nearly all diesel engines can use B20 • More routine filter changes may be needed	Up to 74% fewer emissions than diesel	Domestic, Primarily from soy crops	Virtually the same as diesel
Propane Autogas	**Better:** 50% cheaper than diesel	Widely available at designated fleet fueling stations	School buses, transit buses, and other fleets	Lower maintenance costs than traditional fossil fuel vehicles	Fewer emissions than gasoline or diesel.	90% of propane fuel is produced domestically	Higher performance
Natural Gas (CNG, LNG, RNG)	**Good:** Typically lower cost, but can vary, like gasoline	Average availability in densely populated geographies	Medium- and heavy-duty buses and trucks	Less maintenance than diesel	Cleaner emissions than gasoline or diesel, especially for RNG	Most natural gas is produced domestically.	Similar to gasoline or diesel engines
Electric Vehicle (EV)	**Best:** $1.25 / gallon equivalent	Fleets likely install their own chargers for overnight charging	School buses, transit buses, medium-duty trucks	• 8-year / 100,000-mile battery warranty • Fewer parts, no oil changes	• No emissions • Battery/energy storage recycling in development	Electricity is generated locally	Instant torque
Hydrogen	More expensive due to lack of scaled production	Low fueling network availability	Heavy-duty trucks, rail, bus, marine	Generally, less maintenance due to having fewer parts	No emissions from the vehicle; producing the fuel varies based on the production method	Domestic	Instant torque
As compared to diesel	Variable	Widely available	Long distance and heavy daily mileage	100+ years of development and readily available replacement parts	Prevalent noise and odor	Most diesel is refined in the U.S. or imported from Canada	Variable depending on vehicle build and cost

Sources

Alternative Fuels Data Center: Alternative Fuels and Advanced Vehicles

Pros and Cons of Electric Cars | U.S. News

Homepage - U.S. Energy Information Administration (EIA)

QUESTIONS? Learn more at cleanfuelsmi.org or reach out to us at info@cleanfuelsmi.org.

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