# U.S. VEHICLE FUEL MATRIX

CLEAN FUELS MICHIGAN

## 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 | Best User | Maintenance | Human & / or Environmental Impact | Fuel Source | Performance |
|---|---|---|---|---|---|---|---|---|
| **Electric Vehicle (EV)** | EVs cost less to fuel than gas cars | Easy access to overnight charging. The public charging network is growing. | Densely-populated | • Passenger<br>• Medium-duty<br>• Bus | • 8-year / 100,000-mile battery warranty.<br>• Fewer parts, no oil changes | • No emissions<br>• Battery/energy storage recycling in development<br>• Very quiet | Electricity is generated locally. | Instant torque and a great driving experience. Available at a range of price points and vehicle types. |
| **Plug-in Hybrid (PHEV)** | Much lower than ICE | • Widely available petroleum fueling<br>• Growing electric network | All | Passenger | • Higher maintenance costs<br>• 8-year / 100,000-mile battery warranty | • Better than traditional ICE vehicles<br>• Mid-quiet | Electricity is generated locally. | Prioritizes efficiency over performance. |
| **Gas** | Variable | Widely available | Long distance and heavy daily mileage | • Passenger<br>• Medium-duty (for now) | • 100+ years of development and readily available replacement parts | • Carbon heavy<br>• Parts – close to closed cycle<br>• Noise level = high | Foreign | Variable depending on vehicle build and cost |
| **Ethanol** | Lower per-gallon cost than gas | E10 (~10% ethanol) is common gasoline. E15 and higher blends are widely available at gas stations. | Anywhere, with particular advantages in agricultural areas | Gasoline vehicles | • Similar to gas vehicles. | • Higher vaporization rate than petroleum. Higher VOCs, lower NOX | Domestic, primarily from corn crops. | Similar to gas, but a higher octane gives more power. |

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## MEDIUM- & HEAVY-DUTY FLEET VEHICLE FUELS

| FUEL TYPE | Fuel Cost | Fueling Infrastructure Availability | Best Geography | Best User | Maintenance | Human & / or Environmental Impact | Fuel Source | Performance |
|---|---|---|---|---|---|---|---|---|
| **Biodiesel** | • Lower blends are comparable to diesel.<br>• Higher blends are more expensive. | Typical diesel is B5 (~5% biodiesel). Higher blends are available at certain retailers. | Anywhere, with particular advantages in agricultural areas. | • Heavy-duty<br>• Marine | More maintenance for hoses, filters, fueling systems, and power systems. | 15% cleaner burn than fossil fuels. | Domestic, Primarily from soy crops | Easier to start in cold weather. Better ignition value = less time to ignite = easier to start |
| **Propane Autogas** | 50% less than diesel and 40% less than gasoline. | Widely available at designated fleet fueling stations. | Rural geographies | Currently used in light-, medium-, and heavy-duty | 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)** | Typically lower cost, but can vary like gasoline. | Average availability in densely populated geographies. | Any | • Medium- and heavy-duty<br>• Bus | 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 |
| **Hydrogen** | High | Low fueling network availability | Any | • Heavy-duty<br>• Rail<br>• Bus<br>• 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 |

**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.