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## Alternative Fuel Vehicles



Automobiles that utilize alternative fuels come in all shapes and sizes and run on a variety of fuel types. A few examples of common alternative fuels are electricity, ethanol and biodiesel, often combined with traditional gasoline or diesel fuels. Alternative fuels are often produced with renewable resources, which makes them more sustainable than non-renewable fossil fuels. The introduction of alternative fuels can be traced to the 1970s when 10% ethanol was mixed with gasoline to provide cost relief during the gasoline shortage.<sup>1</sup> This trend continued even after the gasoline shortage ended and is now the standard for commercial gasoline.<sup>2</sup> Federal regulations like the Energy Policy Act of 2005 (EPA) and the Energy Independence and Security Act of 2007 (EISA) have continued the growth of alternative fuels over the past decade.<sup>1</sup> There are now more choices than ever for alternative fuels, including niche fuels like natural gas, hydrogen and propane.<sup>3</sup>

Most gasoline contains some amount of ethanol. For example, 87 to 93 octane gasoline most often contains 10% ethanol.<sup>2</sup> This commercial gasoline (E10) can be used in all gasoline vehicle models from 1980 and newer, while E15 (15% ethanol) can be used in all gasoline models from 2001 and newer.<sup>2</sup> A flex-fuel vehicle (FFV) can utilize alternative fuels consisting of stronger ethanol blends, up to E85 (85% ethanol).<sup>2</sup> This typically provides reduced greenhouse gas emissions, along with similar driving performance.<sup>2</sup> There is also typically a reduction in fuel efficiency of about 20-30%, relative to gasoline.<sup>4</sup> The ethanol used to create these blends is largely produced from American-grown corn.<sup>4</sup> This helps reduce fossil fuel consumption, while also decreasing our dependence on imported oil and improving our national energy security.<sup>4</sup>

Another example of an alternative fuel is biodiesel, which is created through the esterification of vegetable oils like soybean oil, canola oil, sunflower oil and used cooking oils.<sup>5</sup> Similar to ethanol, biodiesel is mixed with traditional fossil fuels, in this case diesel fuel, to create a blended product. The most common mixtures are B5 (5% biodiesel) and B20 (20% biodiesel).<sup>5</sup> These fuels can be utilized by most diesel vehicles without any additional requirements or costs.<sup>5</sup> Benefits include slight boosts to performance and reductions in the emissions of greenhouse gases, carbon monoxide, particulate matter, sulfates and hydrocarbons.<sup>5</sup> Drawbacks are a slight decrease in fuel economy (2-8%).<sup>5</sup> The ability to fuel vehicles with renewable resources, or even recycled materials, is a major benefit to the environment.

One of the fastest-growing alternative fuel vehicle types is electric and hybrid-electric automobiles. These vehicles use a high-voltage battery to power the drivetrain, either by itself or in conjunction with gasoline in the case of hybrids. One of the great advantages to these vehicles is their fuel efficiency, with new hybrid and electric vehicles able to push 100 miles per gallon equivalent.<sup>6</sup> There is also ubiquitous access to 120V electricity for charging around American households and growing access to higher-voltage public charging stations. Disadvantages include limited battery range for electric vehicles (although this has improved to include multiple models with over 300 mile range) and a much longer time to re-fuel (charge) compared to most other fuel types.<sup>7</sup> Another negative is the greater initial cost for purchasing these vehicles, although the lower fuel cost helps recover this cost throughout the lifetime of the vehicle.<sup>7</sup> There is also added promise to the future of this fuel type as the sources for U.S. electricity generation become more and more green.

Gasoline vehicles accounted for approximately 92% of the light-duty vehicle market in 2019, but alternative fuel types are predicted to greatly increase in the coming decades.<sup>8</sup> By 2050, gasoline vehicles are estimated to account for roughly 80% of light-duty vehicles.<sup>8</sup> This decrease is largely spurred from an increase in electric vehicles, which are projected to increase around 6% each year.<sup>8</sup> As electric vehicles and other alternative fuel vehicles continue to grow, more and more options for protecting the environment will be available to all of us!

## TAKE ACTION



### How Practical Are Alternative Fuel Vehicles?

A common consideration for alternative fuel vehicles is their practicality. Is it easy to find the alternative fuel? Does it cost more or less than gasoline? We explore these questions and more in the full article.

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## SPOTLIGHT



### The NIH Fleet & Alternative Fuels

The NIH Fleet has been managed very carefully to maximize its potential to use alternative fuels. These efforts have led to a major shift in the fleet's fuel consumption profile over the past few years.

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## NEMS TRAINING

**Did you know?** The NIH Fleet consists of over 350 vehicles that must be managed according to federal, state and local regulations. To learn more about fleet management at the NIH, please visit the [NEMS Training webpage](#) to view a short (20 minute) NIH environmental awareness training video.