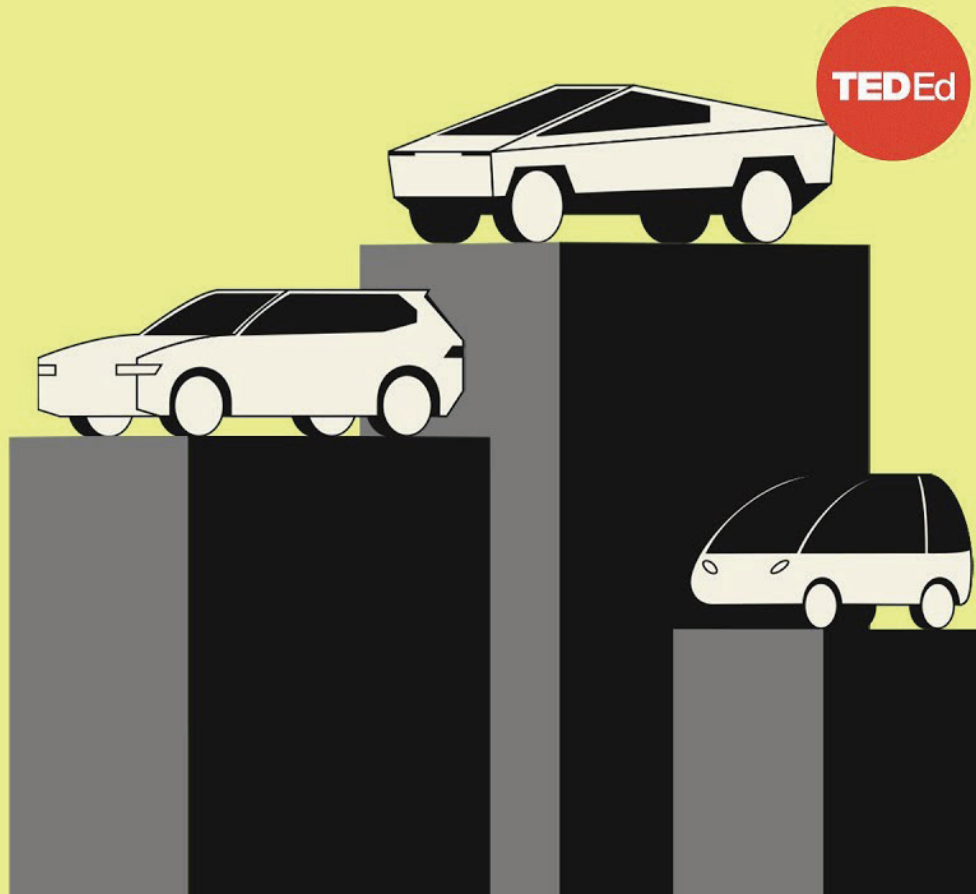


WHAT'S THE BEST FUEL?



What's the best fuel for your car?

Transportation accounts for 16% of all greenhouse gas emissions, and passenger cars using fossil fuels are responsible for around 8%. Gasoline is cheap and efficient—it packs a lot of bang for the buck. Using fossil fuels has serious drawbacks, however, including its contribution to the warming of the planet, which causes more extreme weather; oil spills, which cause great harm to our environment and cost millions to clean up; and increased air pollution. The burning of fossil fuels also contributes to millions of deaths every year. The video explains the costs of continuing to use fossil fuels in our cars, presents alternatives, and identifies the way we can determine which fuel is best.

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Animation of car fuel sources.

Historically, most cars have run on gasoline, but that doesn't have to be the case in the future: other liquid fuels and electricity can also power cars. So what are the differences between these options? And which one's best?

Animation of gasoline production.

Gasoline is refined from crude oil, a fossil fuel extracted from deep underground. The energy in gasoline comes from a class of molecules called hydrocarbons. There are hundreds of different hydrocarbons in crude oil, and different ones are used to make gasoline and diesel —which is why you can't use them interchangeably. Fuels derived from crude oil are extremely energy dense, bringing a lot of bang for your buck.

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Animation of environmental impacts of gasoline.

Unfortunately, they have many drawbacks. Oil spills cause environmental damage and cost billions of dollars to clean up. Air pollution from burning fossil fuels like these kills 4.5 million people each year. And transportation accounts for 16% of global greenhouse gas emissions, almost half of which comes from passenger cars burning fossil fuels. These emissions warm the planet and make weather more extreme. In the U.S. alone, storms caused by climate change caused \$500 billion of damage in the last five years. So while gas is efficient, something so destructive can't be the best fuel.

Animation of an electric car.

The most common alternative is electricity. Electric cars use a battery pack and electric motor instead of the internal combustion engine found in gas-powered cars, and must be charged at charging stations. With the right power infrastructure, they can be as efficient as gas-powered cars. If powered by electricity generated without fossil fuels, they can avoid greenhouse gas emissions entirely.

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Animation of cost of electric cars.

They're more expensive than gas-powered cars, but the cost difference has been shrinking rapidly since 2010.

Animation of alternative fuels.

The other alternatives to gasoline are other liquid fuels. Many of these can be shipped and stored using the same infrastructure as gasoline, and used in the same cars. They can also be carbon-neutral if they're made using carbon dioxide from the atmosphere—meaning when we burn them, we release that same carbon dioxide back into the air, and don't add to overall emissions. One approach to carbon-neutral fuel is to capture carbon dioxide from the atmosphere and combine its carbon with the hydrogen in water. This creates hydrocarbons, the source of energy in fossil fuels—but without any emissions if the fuels are made using clean electricity. These fuels take up more space than an energetically equivalent amount of gasoline —an obstacle to using them in cars.

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Another approach is to make carbon-neutral fuels from plants, which sequester carbon from the air through photosynthesis. But growing the plants also has to be carbon neutral—which rules out many crops that require fertilizer, a big contributor to greenhouse gas emissions. So the next generation of these fuels must be made from either plant waste or plants that don't require fertilizer to grow. Biofuels can be about as efficient as gasoline, though not all are.

Animation of cost of alternative fuels.

For a fuel to be the best option, people have to be able to afford it. Unfortunately, the high upfront costs of implementing new technologies and heavy subsidies for the producers of fossil fuels, mean that almost every green technology is more expensive than its fossil-fuel-based cousin. This cost difference is known as a green premium. Governments have already started subsidizing electric vehicles to help make up the difference. In some places, depending on the costs of electricity and gas, electric cars can already be cheaper overall, despite the higher cost of the car.

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The other alternatives are trickier, for now—zero-carbon liquid fuels can be double the price of gasoline or more. Innovators are doing everything they can to bring green premiums down, because in the end, the best fuel will be both affordable for consumers and sustainable for our planet.



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