

The Home Forum®

Driving toward a more livable planet

KIDS, THE WORLD IS counting on you to change America's driving habits.

Scientists say that Earth's climate is slowly, slowly heating up. Exhaust from cars and trucks is seen to be a major cause for this. Meanwhile, most American adults are still comfortable driving big honking sport-utility vehicles that guzzle gasoline.

Not me – at least not today. I'm test-driving a Toyota Prius hybrid car. As I whiz along the freeway, keeping up with 70 mile-per-hour traffic, I'm getting 52 miles per gallon – twice what the typical new car gets.

I pull off the highway. Arrows on a computer screen in the center of the dashboard begin switching back and forth. The computer is telling me that my car is using more battery power and less gas.

At a stoplight, the gasoline engine, spookily, abruptly stops. My car is silent. But I can still hear the throbbing engines of the cars around me. (Hmph. Old technology.)

When the light turns green, I step on the accelerator. The gas-powered engine starts up instantly. Had I started more slowly, the gas engine would not have come on at all. Instead, the car would have moved forward with a high-pitched whine, sounding like a loud electric train set. That's the sound of battery power.

Hybrid cars have four driving "modes": electric power only, gas power primarily, battery charging, and braking. A computer under the hood switches among modes automatically. Hybrid-carmakers figure that trend-setting drivers who buy hybrids will want to see what mode the car is in – thus the dashboard display.

A different kind of driving fun

Critics say driving a hybrid car is no fun. They're slower than gas cars. But hybrid owners like Courtney Cole of Illinois say they are fun to drive – but in a different way. Her husband, Casey Hayward, likes to play fuel-economy games. How high can he get the gas-mileage readout to go while he's driving?

An electric motor linked to the gas engine in a hybrid not only can run the car, but also can provide extra power for climbing hills or acceleration. It restarts the gas engine quickly when traffic lights turn green.

The motor has another function, too: When electricity is flowing through it, it can drive the car. But when the electric motor is being turned by the momentum of the car, it generates electricity. This electricity is used to recharge the hybrid's batteries.

That is the key to hybrids' high gas mileage. When you step on the brake in a conventional car, your forward motion is turned into friction (heat energy) by your brakes. You're throwing away energy! Hybrids, on the other hand, can recapture

some of that forward momentum by using it to generate electricity and storing the electricity in batteries.

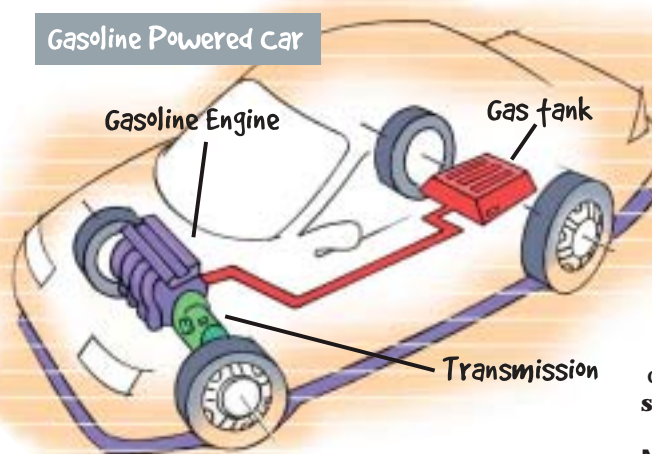
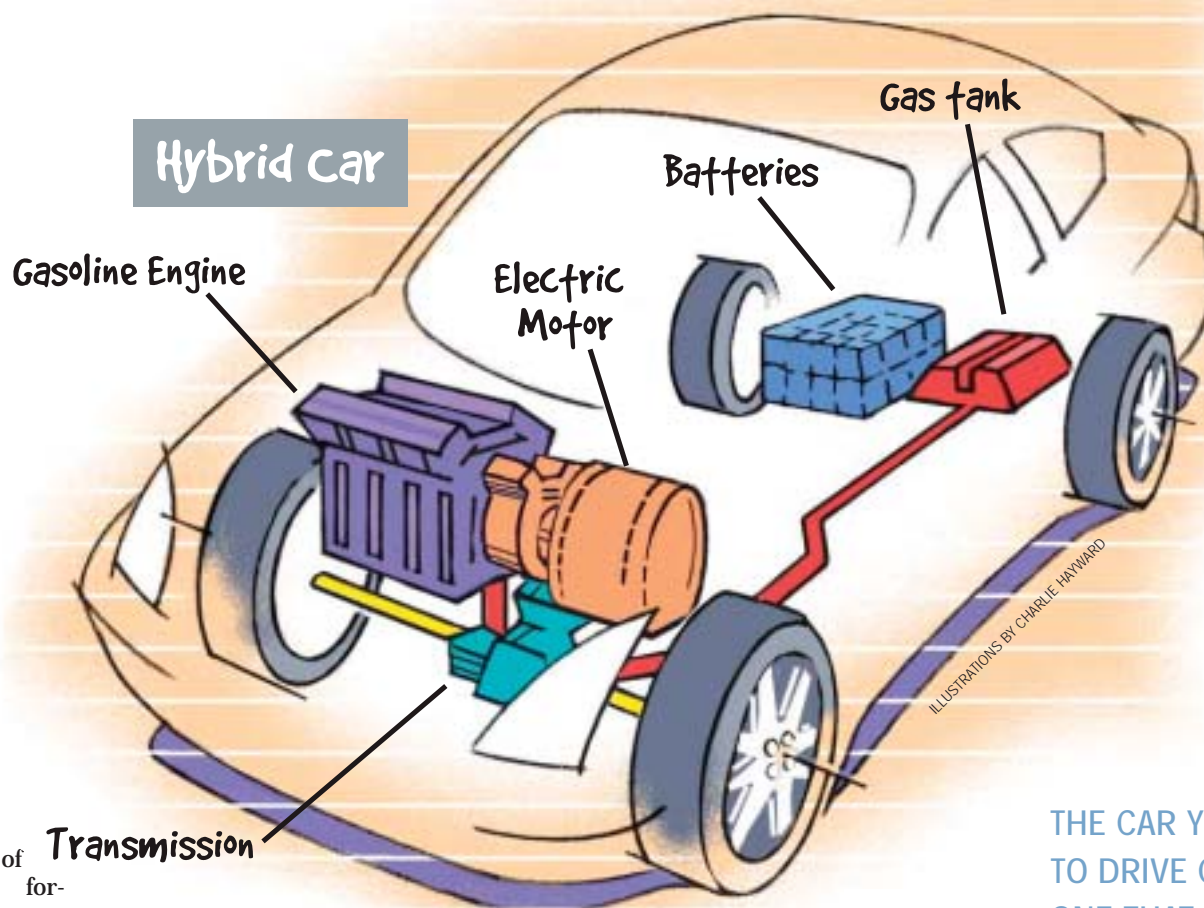
Hybrids also use less gas because they have smaller gasoline engines. The electric motor provides the added power needed.

But not all hybrids have to be small or slow. Next year, Ford will introduce an SUV hybrid. A few years later, Honda (which builds the other two hybrid cars being sold today) wants to market an expensive sports car and a luxury sedan that would use the extra electric power not for fuel economy but in order to go fast.

By powering the rear wheels with a gas engine and the front wheels with an electric motor, such a car could also have four-wheel drive.

Combining the best of both worlds

Hybrids were designed as a way to combine the best of both worlds: the advantages of battery power without its disadvantages. Battery-powered cars produce no air pollution (though generating electricity to recharge the batteries often does). Batteries are heavy, they take a long time to charge (overnight), and they can't store very much energy. Battery-only cars can't go very fast or very far. By including a small gas engine in the car to generate electricity, hybrids can go at least as far as regular gas cars on a tank of gas. And they use a much smaller, lighter battery pack



THE CAR YOU LEARN TO DRIVE COULD BE ONE THAT SHUTS ITSELF OFF AT EVERY RED LIGHT – OR ONE WHOSE EXHAUST IS PURE WATER VAPOR.

SUVs next year. Meanwhile, some 40,000 hybrids are already on the road in the US. But hybrids are not the last word in clean cars. Most experts predict the hybrid "wave" will last about 10 years. After that, look for even cleaner fuel cells to drive many cars. (See story on next page.)

New notion for mainstream motion

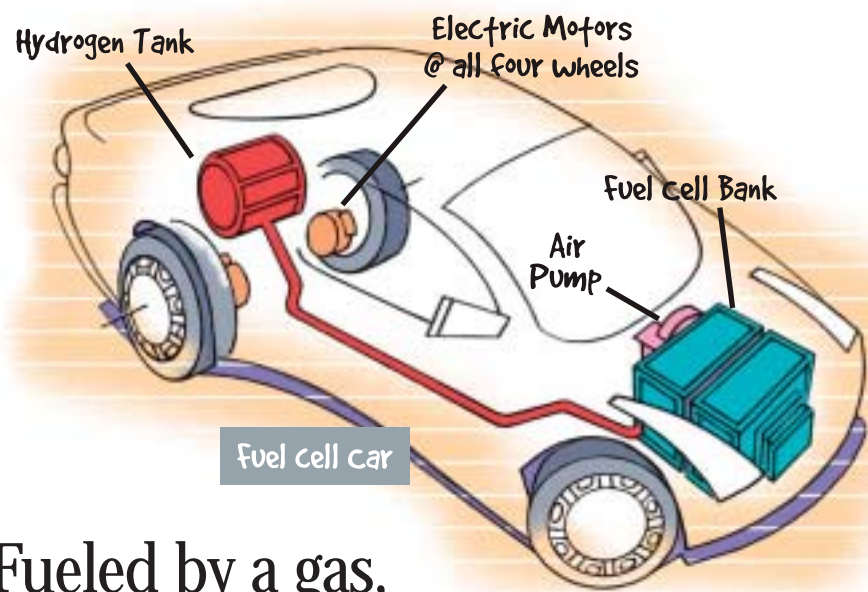
In the meantime, as hybrids become more than just economy cars, they will become more popular and mainstream. People won't even notice they're driving something different. They'll just stick the key in the ignition and turn it. If the engine doesn't start, they won't worry. The engine will start later when it needs to.

If you're a kid who loves cars, high technology, and the environment, soon you won't have to worry about adding to global warming so much just to drive a car. Plenty of even cleaner vehicles are coming down the road, so you won't have to decide between caring for the planet and driving a car. Young adults who are interested in the environment and technology are one of the most popular markets for these high-tech cars so far.

than battery cars do. The gas engine also powers such energy-draining things as heat and air-conditioning. When the Prius comes to a stop on a hot, muggy day with its air-conditioning on, the gas engine keeps running in order to power the A/C. The engine will also keep going if the batteries need charging. If the engine is cold, it will run until it warms up.

Naysayers still point to the fact that hybrids are expensive and heavy. They are expensive cars filled with expensive technology that is expensive to repair. In fact, a Toyota Corolla, with just as much interior room as the Prius, gets more than 40 miles per gallon and costs more than \$4,000 less.

So far, only Japanese automakers are selling hybrids, but automakers in the United States will start selling hybrid



Fueled by a gas, it gives off water

WE'RE LIVING OFF THE PAST. Way past. Gasoline, diesel, natural gas, and coal all began as vast ancient forests and other biomass that decomposed and were buried over millions of years.

These "fossil fuels" power our homes. They provide heat and light, and fuel our cars, boats, trains, and planes. But once humans have used up all the fossil fuel, there won't be any more.

Burning fossil fuels also creates pollution. Pollution-control technology has cut down on this problem. But burning also produces carbon dioxide, or CO_2 . People long thought CO_2 was harmless. It's what plants breathe in and what we breathe out.

Now scientists say that CO_2 is a "greenhouse gas." It traps heat energy from the sun in our atmosphere, warming up the Earth. Many scientists say CO_2 and other such emissions are changing our climate.

Imagine a world that could get its energy needs from water. And that the only byproduct produced was ... water.

That's how fuel cells work. They don't actually run on water. They run on hydrogen, which is easily made from water.

NASA, the United States space agency, developed fuel cells to make electricity aboard space ships. The first place you're likely to see fuel cells on Earth is in cars.

Many carmakers are building experimental fuel-cell vehicles. Some buses in Chicago and Vancouver, British Columbia, already are powered by fuel cells.

Driving one of these experimental fuel-cell

cars doesn't feel much different from driving a regular car. The one I drove, a Mercedes NECAR 4, was small and slow, especially with five large men as passengers. A key unlocks the ignition and turns on the fuel cell. It takes a few moments to warm up.

The whir of an air pump rose and fell as I stepped on the accelerator and released it. The noise reminded me of a roar of a gasoline-powered car. The electric car didn't have a transmission, just a switch for forward and reverse.

Toyota plans to sell a fuel-cell car starting in 2004. But it will only be for businesses, because regular consumers would have no way to get hydrogen to fill up the tank. Industry experts say we can expect fuel-cell cars to be commonplace by 2010.

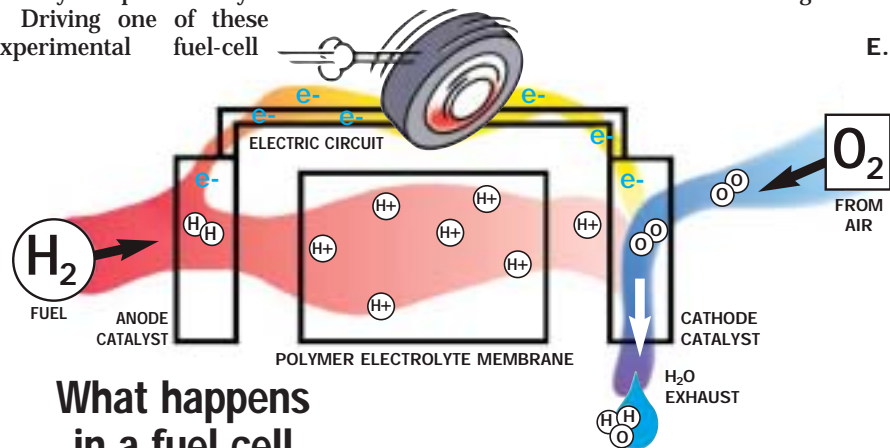
Fuel cells could also provide electricity and heat for buildings and factories. Someday you might have a hydrogen gas line come to your house to run your home fuel cell for electricity. You'd fill up your car at the hydrogen pipe.

Fuel cells have two major drawbacks:

1. Hydrogen is hard to store, and you need a lot of it to run a car. You can liquefy it by freezing, but that takes energy, too. And it must be kept at -273 degrees C.

2. You need electricity to make hydrogen from water. If the United States were to power all its vehicles with hydrogen, it would need twice the electrical-generating capacity it has today. Most power plants use polluting fossil fuels. Building or converting power plants to cleaner fuels is a massive undertaking.

E.C.E.



What happens in a fuel cell

Internal-combustion engines burn gasoline to release energy, but fuel cells don't burn the hydrogen gas that fuels them. Hydrogen gas atoms are naturally stuck together in pairs (H_2). These molecules of hydrogen release electricity (electrons) when the pairs of atoms are split apart by the anode catalyst. (The atoms aren't 'split,' as in a nuclear chain reaction, they're just pried apart.) The electricity generated can run an electric motor in a car. The hydrogen ions then travel through a thin plastic membrane to combine with electrons and oxygen (air) to make H_2O - water vapor.

TODAY'S ARTICLE ON CHRISTIAN SCIENCE

Helping children learn about God's care

Can we tell the future?

HAVE YOU EVER THOUGHT about what it would be like if we could see into the future?

For one thing, we'd be able to prevent mistakes before we made them. Maybe we wouldn't step in the sticky bubble gum someone left on the sidewalk. Or maybe we'd get a cup with our ice-cream cone just because we knew that the scoop of ice cream was going to fall off the cone after only a few licks.

Lots of TV shows and movies have played with the idea of seeing into the future. We've watched people prevent disasters, save a friend, and perform other heroic deeds - all because they knew something was going to happen long before it actually did.

Even though seeing into the future is a feat we'll never be able to perform, maybe it's better that way. After all, what's the point of a surprise party if you already know it's going to happen?

But what about when it comes to feeling safe and protected? Wouldn't it be better to know the future so we could stay out of trouble?

It's a good thing that God is always guiding and protecting us. Just as your parents take care of you and make sure you feel safe and loved, so God takes care of everyone. He does this by being infinite Love, infinite good. And because He is infinite good, that means good is present everywhere.

Even when things seem scary, God is there. His goodness is what's true and real no matter what circumstances we're in. And when we trust God's goodness and love, we're protected. This trust shows us that there's no room for the things that would make us feel scared, since every little bit of space is filled with God. We can't be separated from that goodness.

I learned about the way God protects us when I was at camp one summer. For two weeks I'd been learning and thinking a lot about God. I'd always known that God was right with me at all times. But during those two weeks, I was feeling that closeness more than I ever had before.

One morning, I was out on the porch of our cabin sweeping. We had a neat cabin that was built into a hill; the back part of the porch was actually about two stories off the ground. So, as I swept, I had a great view of the forest

that lay all around and behind us.

The porch was cool, because part of it was built around the trees that had already been growing when the cabin was built. There were big holes in the side portion of the porch with trees growing right up through them. I liked living among the trees like that.

That particular morning, I'd been sweeping and thinking about other things. Suddenly, I heard "Stop!" I didn't hear it out loud. I heard it in my thoughts. But it was such a forceful "Stop!" that that was exactly what I did. I stopped right where I was.

It was only after I stopped that I realized I was standing just a few inches from one of those big holes where a tree was growing through the porch. I was small, and the hole had been made a bit larger than the trunk so the tree still had room to grow. One more step backward, and I would have fallen right through.

I know that the "Stop!" that protected me came from God. It's what I like to think of as an angel message. In "Science and Health with Key to the Scriptures," Mary Baker Eddy calls angels "God's thoughts passing to man; spiritual intuitions, pure and perfect" (pg. 581).

These angels make me feel sure that I'll be safe in the future, even when I don't know what the circumstances and events might be. They remind us of God's presence and goodness, of His love for us. In my case, that reminder came in a way that kept me safe.

Intuition is a quality everyone has, because God's thoughts are with us all the time. They speak to us in ways we can understand. They bring us messages of God's guiding ever-presence. And when we listen to and obey these messages, we can't help being protected. After all, what those messages tell us about is God's loving promise for everyone: Ours is a future filled with good.

Thou, Lord, only makest me dwell in safety.

Psalm 4:8

God's thoughts speak to us in ways we can understand.

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