Why Don’t Hydrogen Cars Fly Away?
Questions & Answers on Being Greener With Your Car
“How could I make a little book, when I have seen enough to make a dozen large books?”

John James Audubon (1785-1851)
Naturalist/Artist
Why don’t hydrogen cars fly away?

While it is true that hydrogen is a lighter than air element, you would need a blimp-sized amount of it to lift your car. This isn’t science fiction either. Until the Hindenberg disaster of 1937, hydrogen was the filler of choice for zeppelins (airships). And even though it proved too combustible for the unfortunate Hindenberg, it’s an excellent fuel for today’s cars.

Hydrogen-fueled cars are just one of many changes we will see in the automobile industry in the near future. These changes have come from an emerging realization in our society that becoming greener is important to the health of our environment. While there’s a wealth of facts, figures and technical information available, our goal in creating this book is to give you some ideas about how to be greener with your car, and in a fun and novel way.

This book was designed for the whole family: to be discussed at the dinner table or read at bedtime. You can also use it as a jumping off point for further exploration of the topics covered.

We hope your family enjoys Why Don’t Hydrogen Cars Fly Away?
What is a cold start?
Well, it’s not the onset of the flu or the beginning of an arctic day. A car is said to get a “cold start” when it’s been sitting around (meaning not running) for an hour or more before the ignition is turned on. The problem is that the engine’s air pollution control device,
the catalytic converter, takes several minutes to warm up and work efficiently. When the car is cold it can pollute up to \textit{five times} more than a warm car. That’s a lot.

How does the catalytic converter prevent this from happening? It’s designed to burn away unburned fuel vapor and convert nasty pollutants like carbon monoxide into cleaner compounds like water. But to work best, it has to be warm, so remember: To reduce pollution, reduce cold starts.

Source: San Francisco Bay Area Air Quality Management District
Should I run my errands together, or alone?
Running errands together is definitely the way to go. Although it may seem like a better idea to limit driving time by doing a single errand today, one tomorrow, etc., it’s actually much better to do them all at once. By trip linking your daily activities, you can save money and time, as well as reduce cold starts.
How do you trip link? Make a list of your errands and decide how much time you’ll need to complete them. Then consider the route and figure out the most efficient order to do them in.

This may seem like a lot of work, but it pays off. Cutting 20 miles of driving out of your schedule each week can reduce your global warming pollution by more than 1,200 pounds a year and save you over $100 in gas expenses. That’s more than half a ton of pollution and the cost of a nice dinner for your family (and it gets nicer the higher gas prices go).

Source: Environmental Defense Fund
Should I let my car idle while I wait for my burger?
Unfortunately no. When sitting in a fast food line, you probably never consider turning off your car, but think again. Idling for only 30 seconds uses up more fuel than restarting the engine. This wasn’t always the case, but with today’s modern engines it takes very little
fuel to start a car.

Think of all the times you sit waiting in your car: When you pick up your kids at school, when you’re in line at the bank, when you wait for your food at the burger joint, when someone runs into the store.... If you’re going to be idling for more than 30 seconds, turn off the engine and restart later (except in traffic, of course). So kids, the next time you’re with your parents waiting for french fries, tell them to turn off the motor!

Source: Environmental Protection Agency
How does my car melt the ice caps?
Even though we live far away from the north and south poles, the pollution we create with our cars travels far and wide. How does this happen? The combustion engine of an automobile is powered by fossil fuels (gas and oil). When burned, fossil fuels produce
heat-trapping greenhouse gases which enter the atmosphere, cover the earth and prevent heat from escaping into space. The resulting rise in temperature melts the ice caps and is called *global warming*.

Of course it's not just cars that melt the ice caps. Factories, cows (they produce methane), diesel trucks, buses, airplanes, all contribute to global warming. Want to help stop the ice melting? Park your car and walk, or cycle around town whenever possible.

Source: Environmental Defense Fund
1 ounce  2 ounces  4 ounces  8 ounces
Weights
How is a pound of CO$_2$ measured... it’s a gas isn’t it?
Yes, \(\text{CO}_2\) (carbon dioxide) is a gas. But it can also be weighed. A volume of \(\text{CO}_2\) is first measured by a device that collects a sample of air and determines the amounts of each of its separate parts, listing them like the ingredients on a soda can. The exact weight of the \(\text{CO}_2\) in the sample can then be
calculated using the known weight of a single CO₂ molecule.

But what exactly is CO₂ and why is measuring its weight important? CO₂ is a colorless and odorless gas that is all around us. It is produced naturally (we ourselves produce CO₂ when we exhale) and is a by-product of burning fossil fuels such as oil and gasoline. One gallon of gas in your car produces 20 pounds of CO₂! Motor vehicles alone are responsible for almost a quarter of annual U.S. emissions of CO₂. This ultimately affects the climate because CO₂ is the primary global-warming gas. And you now know what that does!

Source: Union of Concerned Scientists
Two-stroke, four-stroke, or backstroke?
Well the backstroke is great if you’re in a pool, but when you’re talking about engines, the two- and four-stroke varieties are what cause pollution.

Like the human body, engines need to “breathe” to work—they inhale (intake) and exhale (exhaust) just like we do. Specifically, two-
stroke engines “breathe” in two steps, and four-stroke engines “breathe” in four. The four-stroke engine, with its two extra steps, is better at burning fuel and “exhaling” cleaner exhaust gases.

What about two-stroke engines? There are many of them out there, including lawn mowers, weed eaters, leaf blowers and gas-powered scooters. How bad are they? The hydrocarbon emissions from 30 minutes of leaf blowing equals the emissions from driving 2,200 miles. This is comparable to a round trip from San Francisco to Amarillo, Texas.

Source: California EPA
Why is my exhaust a funny color?
Typically, today’s cars don’t produce a visible exhaust under most conditions. You might see white steam on cold mornings, but by and large, modern cars, with their efficiency and pollution controls, keep things invisible.

Visible exhaust, on the other hand, is a very bad thing. Exhaust
is a source of ground level ozone pollution when combined with heat and sunlight, and it comes in four main colors. White smoke usually means that antifreeze is being burned. Black smoke indicates that there is too much fuel and not enough air in the engine. Grey and blue smoke are both caused by a car burning oil (although sometimes grey smoke can mean burning brake fluid).

All of these things add up to more pollution in the air and indicate that it’s time for a tune up.

Short and slow... the tortoise should be my commute role model, right?
Wrong! Contrary to popular myth, the tortoise does not beat the hare in this race. Congested traffic means more greenhouse gas emissions due to idling cars. After all, a stopped car gets zero miles per gallon! And driving
in stop-and-go traffic releases as much as *three times* the pollution of free-flowing traffic. In fact, you can drive farther and faster while polluting less and using less fuel if you can avoid congestion.

Sometimes you have no choice in your travel times, but whenever possible, choose routes that bypass traffic jams, and limit voluntary errands during peak travel hours. *Remember the hare!*
Can I really get to Hawaii by car?
Yes, you can use your car to get to Hawaii. How? The cost of operating a car for a year is approximately $5,170. This is about the cost of a family vacation in Hawaii. If you didn’t drive for a year, you could use this money for the trip. It’s as simple as that.
Not interested in going to the tropics? Well, that same $5,170 can pay for your child’s orthodontia, a couple of month’s mortgage or rent, or a sizable contribution to a retirement or college fund. All thanks to your car!

To look at it another way, the average family has to work more than six weeks to pay a year’s car expenses. By comparison, it takes less than one day to pay for a year’s bicycle expenses, leaving you five weeks and six days to relax!

Source: AAA Mid-Atlantic and U.S. Census, 1998 median family income figures
Will gas stations still be gas stations in the future?
The answer is probably yes and no. Scientists are currently developing all kinds of clean fuel options to power cars. These include biofuels, electricity, natural gas and propane, hydrogen fuel, solar, methane, and more. Cars of the future will probably run on all kinds of fuel, and drivers will need to “fill up” some-
where. It’s certainly possible that gas stations might be electric stations, biofuel stations or perhaps even fuel cell stations, but the need for them will continue.

What will change is the automobile as we know it. We’re already seeing hybrid, electric and biodiesel cars on the road. Producing cleaner vehicles has become a priority since cars and trucks make up most of the CO₂ emissions in our country, and it has become increasingly important to slow climate change. Who knows? Maybe cars will run on brain power!
How green is this book?

Well, to begin with, this book is printed on 100% recycled stock with soy inks. You could practically plant it to grow a tree! The printing facility where this book is produced is a certified Wind Powered business.

In addition, 511 Contra Costa is itself a Bay Area Certified Green Business. Our facilities conform to the high standards of the Bay Area Green Business Certification.

We believe that the production of this book actually replenishes the ozone layer. We can’t be sure, but maybe...

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