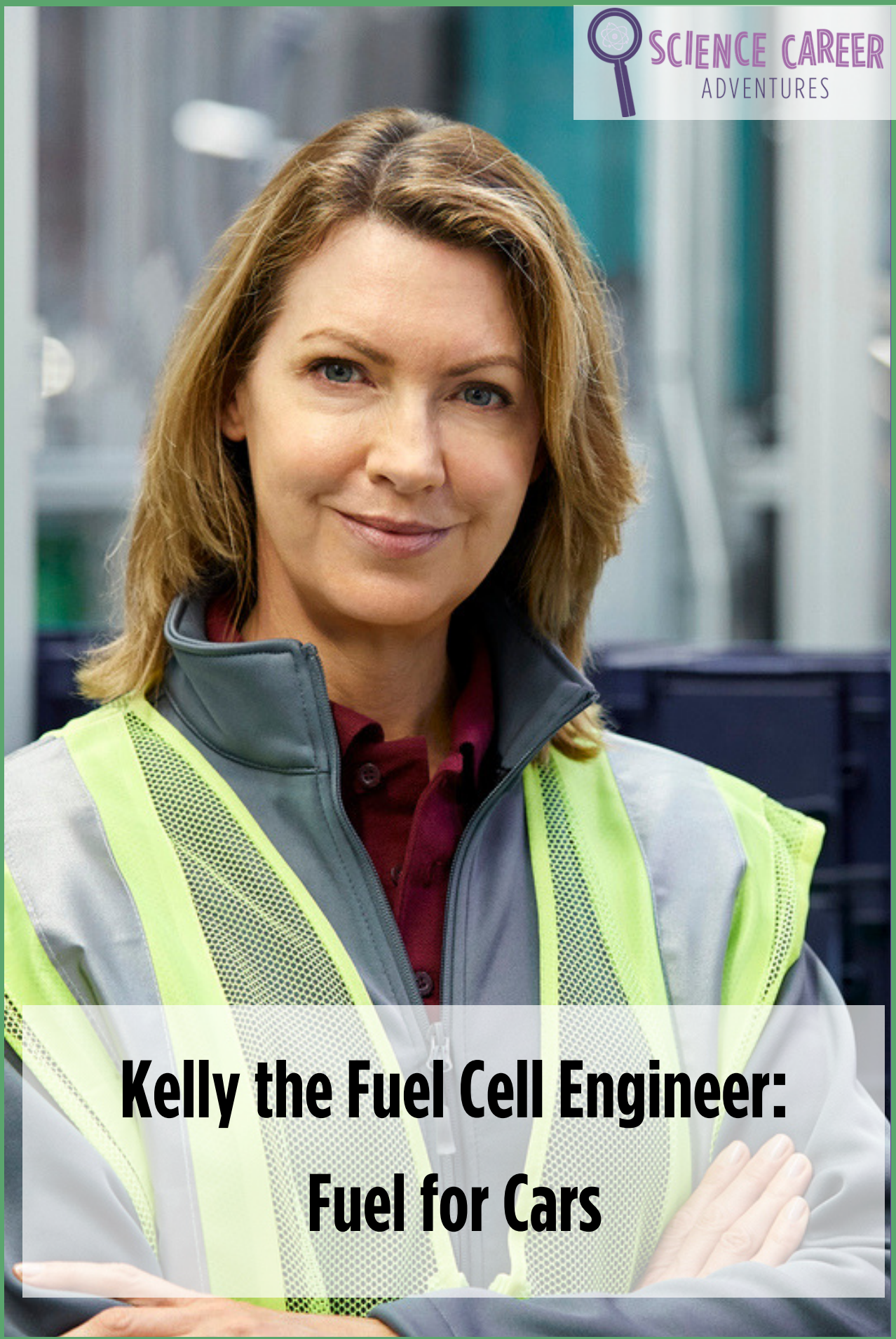


Kelly the Fuel Cell Engineer: Fuel for Cars

Meet Kelly!

Hi! I am Kelly. I am a fuel cell engineer. A fuel cell engineer designs and builds fuel cells. Fuel cells are used to power vehicles, like cars and trains.

Currently, most cars run on gas. But, over the next 20 years, the majority of cars will run on different types of power, like electricity, alternative oils, and even water!

Right now, I am developing hydrogen fuel cells that will be used to power cars. Hydrogen fuel cells are devices that produce electricity to power cars by combining hydrogen and oxygen.

Did you know that engineers are brainstorming and researching crazy ways to power vehicles? Here are a few examples:

Buses that run on poop

The biobus is a bus that runs on human waste. Five adult humans in one year can fill a tank to run 186 miles!

Cars that run on algae

This car is a hybrid Prius that runs on algae. Algae can produce 60 times more fuel than land-based fuel sources like corn.

Cars that run on vegetable oil

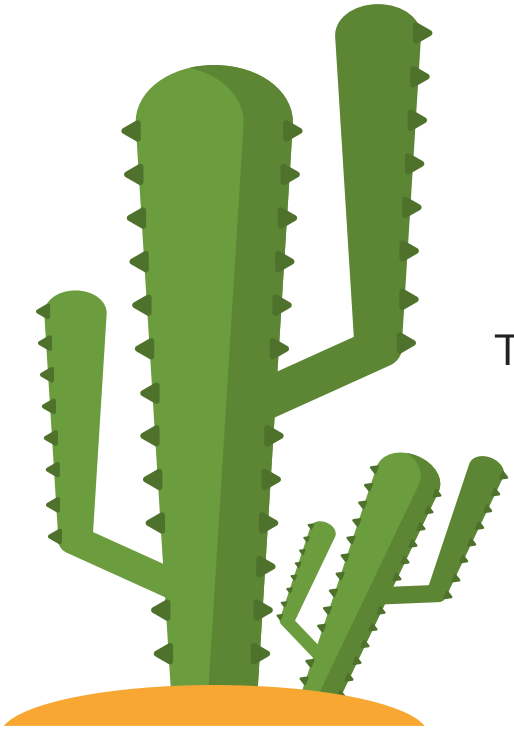
People are starting to convert their cars to run on vegetable oil. It is much cheaper than gas!

Top 5 Reasons I Love My Job

#1 Test Driving New Vehicles

The best part of my job is that I get to test drive hydrogen fuel cell vehicles. This one to the right just came off the shop floor! I even get to drive one home from work once and a while.

Testing Out Different Ideas #2



I love coming up with new ideas and testing them out. Right now, I am testing which types of hydrogen fuel cells work best in different environments. Fuel cells work best when a part of the fuel cell, called the membrane, is a little wet. The moisture level of the surrounding air can affect how wet or dry the membrane is.

My guess is that different types of fuel cells will work best in different environments. For example, one type of fuel cell might work best in a humid environment, like Florida. Another fuel cell might work best in a dry environment, like Arizona.

Top 5 Reasons I Love My Job (Cont'd.)

#3 Traveling Around the World

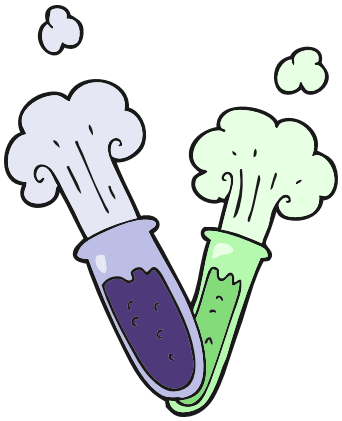
I travel around the world to attend conferences where scientists and engineers talk about fuel cells. A conference is an event where professionals meet to discuss their research. I have gone to conferences around the world! Last year I attended a conference in Sweden to talk about how hydrogen fuel cells won't cause as much air pollution as cars that use gasoline.

Designing Fueling Stations #4

A fueling station is a place where people can stop to fill up their vehicles with fuel, like a gas station. Today, the only hydrogen-fueling stations in the United States are in California. I hope to bring these fueling stations to other states so everyone can drive a hydrogen fuel cell vehicle! But, we have to figure out how to make these fueling stations affordable.

Top 5 Reasons I Love My Job (Cont'd.)

#5 Using Chemistry



I love using chemistry in my job. As a fuel cell engineer, I have to understand how chemical reactions work! By understanding chemical reactions, I can know exactly how hydrogen and oxygen react inside the fuel cell to create electricity that will be used to create fuel.

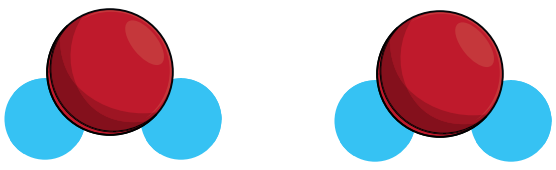
A chemical reaction occurs when one or more substances combine to form a new substance. Hydrogen and oxygen always come in pairs, but when they are combined, they rearrange and link together to form water and electrical energy. Then, the electrical energy fuels the car!

The chemical reaction that takes place inside a fuel cell looks like this:

REACTANTS

$2\,H_2$ (HYDROGEN) + O_2 (OXYGEN)

PRODUCTS



$2\,H_2O$ (WATER) + ENERGY

More On Chemistry

Do you notice anything about the number of hydrogen atoms and oxygen atoms before the reaction compared to after the reaction?

You may notice that the reaction starts with four hydrogen atoms and two oxygen atoms. After the reaction, there are still four hydrogen atoms and two oxygen atoms. But, they now form a different combination!

The fact that the amount of hydrogen atoms and oxygen atoms is the same both before and after the reaction can be explained by the **law of conservation of matter**. This law states that matter cannot be created or destroyed. That means that the mass of the starting materials of a chemical reaction will equal the mass of the products after the reaction.

I can use this information to predict how much energy will be produced each time a chemical reaction occurs inside fuel cells. How cool is that?

Do you want to be an engineer too? My advice is to pay attention in math and science classes! They may be challenging sometimes, but you will need that knowledge in the future!