



## Grand Challenge 4: How We Get Around | Climate Project

Our lives revolve around transportation. From the objects in your classroom to the furniture, food, and clothes in your house, everything relies on planes, trains, and cars to get around—including you.

Unfortunately, most transportation relies on fossil fuels that only worsen the effects of climate change. We need to find and utilize cleaner forms of energy if we want to get to net zero.

**0:08***Narrator speaking**2 photos showing different modes of transportation**Photo of students on a school bus; photo of cars in traffic**Clips of the different modes of transportation sliding across the screen**Grand Challenges infographic (zooms in on "How we get around")*

Look around the room you're in.

Unless you're taking this class in the middle of some wilderness, most of the stuff in your room was transported there from somewhere else. And, I'm willing to bet that a lot of it, like food, clothes, and furniture, was carried by a vehicle that ran on fossil fuels.

The same goes for you, and any other people in your room: you probably got to school in a vehicle that burned fossil fuels. In the world today, there are more than 1 billion passenger cars in operation, and we make more each year.

Of course, it's not a bad thing that more people have access to transportation. Our planes, trains, and automobiles (not to mention our trucks and cargo ships) get us and the products we depend on from place to place.

But the increasing number of vehicles is a huge problem for climate change, and that's a good description of Grand Challenge Number 4: How We Get Around.

**1:00***Text description**Time lapses of cars driving on freeway**Pie chart showing how different types of vehicles create emissions*

The ways in which we move people, and things, contribute about 16 percent of the 51 billion tons of greenhouse gases that humans produce around the world each year.

That's a pretty hefty chunk.

And here in the United States, transportation emits more greenhouse gases than any other Grand Challenge.

This should serve as a warning. As nations get richer, transportation expands. So, any increase in global wealth will just lead to more transportation emissions and make climate change much worse. That is, unless we make some changes.

What are these changes? Well, right now, lots of different kinds of vehicles create emissions. Personal vehicles like cars, SUVs, and motorcycles account for almost half the carbon produced by transportation.

Commercial vehicles, everything from garbage trucks to buses, make up another 30 percent. Then, big ships, cargo, and cruise ships, and airplanes each make up another 10 percent.

Finally, there's about three percent from miscellaneous vehicles, mostly trains.

**1:57***Narrator speaking**Photo of a hand pumping gas; text: Why do we use fossil fuels to move people and stuff around?; transition music**Text: Attributes of fossil fuels*

What do these vehicles all have in common? They all use some sort of fossil fuel.

Okay, so the first question we have to ask is, "Why do we use fossil fuels to get around?" The answer is simple: fossil fuels contain a lot of energy—and I mean a lot.

*Photo of a can of gas and illustration of a pile of dynamite separated by equal sign; gas photo reappears along with photo of juice and milk*

*Text: Can we move transportation away from fossil fuels?; transition music*

**2:53**

*Text description*

*Photo of electric cars and designated EV parking spaces; text: Electric Vehicles (EVs)*

*Bar graph showing growth in EV stock based on countries*

*Photo of a battery*

*Text: We can do this; transition music*

*Text: How We Get Around;*

**3:52**

*Narrator speaking*

*Photos of heavy duty vehicles*

*Clips of alternatives to electrifying certain vehicles*

A single gallon of gasoline holds as much energy as 130 sticks of dynamite—and it's cheap! We might complain about gasoline prices, but a gallon of gas is still comparable to a gallon of milk or orange juice. So we get a lot of energy from gasoline for very little money.

But, there's a hidden cost: burning fossil fuels like gasoline releases carbon into the air each time you step on the gas pedal.

The next question you may be asking yourself is, "Can we move our transportation away from these fuels?"

Absolutely. And here's the good news: we've already started!

For one example, just look around the next big parking lot you visit. I bet you'll see at least one electric or hybrid car. Just a few decades ago, electric cars were a dream. Just a few years ago, they were luxury vehicles only the very wealthy could afford.

Today, more and more are sold each year, and new models include pickup trucks and SUVs.

Part of that growth has to do with the availability of batteries, which determine the range of electric vehicles. Batteries have gotten cheaper by about 87 percent in the last decade.

Because of this price drop, electric cars are getting cheaper and driving farther.

In the rest of this video, we're going to focus on electric vehicles. But they represent just one of the pathways you can explore as you seek solutions to the Grand Challenge of How We Get Around.

And we're going to need other solutions because electric vehicles alone won't solve all our transportation problems.

They're great for passenger vehicles like cars, vans, and SUVs. But a lot of greenhouse gasses produced by the transportation sector come from heavy duty vehicles, like 18 wheelers, airplanes, and cargo ships.

These vehicles move lots of heavy items and often travel over very long distances. Electrifying them would probably never be cost effective because the batteries needed would weigh too much.

So, we're going to need to pursue other pathways.

*Text: Alternative Fuels;  
photo of a gas station; text  
box defining biofuels*

*Clip of tractors digging for  
fossil fuels*

**4:48**

*Text: Alternative Fuels;  
photo of a gas pump; text:  
Electrofuel*

*Narrator speaking*

*Text: To what extent is  
electric car technology...;  
transition music*

*Photo of an electric car*

**5:44**

*Photo of a car being  
repaired and a car being  
charged*

*Photos of a gas price sign*

*Photo of a person charging  
an electric bus*

*Photo of electric buses in  
Shenzhen*

The first of these is alternative fuels, such as biofuels and electrofuels. Biofuels work much the same way as fossil fuels, but they're generally cleaner in terms of greenhouse gases.

Unlike fossil fuels, biofuels emit carbon that has been recently captured by plants. This is a small but important difference.

Fossil fuels release carbon that's been stored underground for millions of years, so burning them adds carbon that hasn't been in our atmosphere for ages.

But by using biofuels, we capture carbon already in our atmosphere by growing plants and then return it when the biofuels are burned.

Electrofuels are produced when electricity is used to bond different elements together. Later, they're separated in an engine, producing only water and other clean wastes. Most electrofuels are based on hydrogen.

But biofuel and electrofuels have downsides, and you're going to learn about those in this course.

Electrofuels and biofuels are a bit obscure right now.

But there's one technology most people think of when they think about innovation pathways to combat climate change: the electric vehicle.

Electric vehicles are actually pretty common, and they're getting more popular every year. They're also getting cheaper. In fact, they may represent a cost savings for many people.

Why? Because while electric cars still cost more to purchase than cars that run on gasoline, they cost less to own; you don't have to pay for gas, and they generally need less maintenance.

And, the green premium will go down even more if the price of gas goes up.

In many parts of Europe, where gas is much more expensive, the green premium for electric cars is already zero.

Electric vehicles could also offer some hope to communities overburdened by traffic because the technology has proven very effective for city buses.

Buses travel the same, relatively short routes all day and can easily return to their charging stations each night. Many cities around the world are in the process of converting their public transport to electric buses.

The city of Shenzhen, China has already converted its fleet of 16,000 buses to electric.

**6:41**

*Text: Obstacles; transition music*

*Photo of an electric battery; text: Infrastructure; photo of EV charging station*

*Photo of windmills and solar panels producing clean energy; text: Action Opportunities; transition music*

As the number of electric buses grows, their green premium may reach zero by 2030.

But, if we're going to get more people and cities to choose electric vehicles, we still need plenty of innovations. For example, cars that burn fossil fuels have essentially limitless range; they can go for many miles and quickly refuel at any corner gas station.

Electric vehicles are a bit different. They run on electric batteries, which tend to have a shorter range than fossil fuel engines. And, right now, there just aren't as many charging stations as gas stations, and charging an electric car can take up to an hour.

Finally, if we're going to see the full benefit of electric vehicles, we need to be sure the electricity we use to charge them isn't coming from burning fossil fuels.

If you're getting a bit gassed at the scale of this challenge, tap the brakes. There's plenty you can do in your community to help us get to zero.

**7:41**

*Text: Action Opportunities; photo of EV charging station; text box describing the action opportunity*

*Text box: educate about electric vehicles*

*Photo of two people city-planning; text box: Advocate...; photo of bikers cycling in a city*

For example, you can help lobby for your community or state to build the infrastructure, like public charging stations, that would make it easier for people to own electric cars.

Or, you might educate your friends about how much better electric cars have gotten, and how many choices there are these days.

In the long term, you could study to be a city planner and design spaces that make it possible for people to get around your community in healthy ways that are also cleaner for the environment.

But the first questions you have to answer are about where you live. What sorts of projects are feasible in your community? Do you live in a small town where everyone drives miles to work? Do you live in an urban area with lots of public transportation? Where do most people live in your community?

The answers to all these questions can help guide you towards the most effective action opportunities. What will you do to help your community and help us get to zero?

*Outro music; OER Project logo appears*



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