

Why the climate crisis is a cultural rather than just technological problem

This chapter focuses on transportation.

Why single out transportation? Well, for many Americans, transportation is single the largest chunk of their climate footprints. This principally comes from two sources: cars and planes.

If you are an average American, 25% of your climate footprint comes from using an automobile. As we shall see, this is, in fact, a deceptively low number. This is because what is being tracked here is car use and not car ownership. Perhaps not surprisingly, vast quantities of greenhouse gases are emitted during the manufacture of automobiles. Hence, although we may think that cars add to our climate footprint only when we are driving down, just owning a car series of cars over your lifetime is enough to blow your entire carbon budget. In the next section, we will take this issue up in detail.

Air travel is a little trickier to assess, as some Americans rarely get on planes while others fly a great deal. Even if you don't travel by air a lot, when added to the 25% of your climate footprint that comes from using your car, it could be enough to make transportation the single largest part of your climate footprint. However, if you are a frequent flyer, transportation (that's air travel and car use) could together be responsible for emitting more greenhouse gases than everything else that you do in your life. That's right, transportation may be a doubling – or more - your personal climate footprint.

So, what's to be done?

Well, for years - decades really - we have put our hope in technology, as we have (from the 1960s and 70s onward) been looking forward to the day when electric cars finally became practical and affordable. Since that day is nearly here, it may seem that we were right to put pin hopes on technology.

The problem is that while these may be zero-emission vehicles when they are being driven, as I just noted (it will explain in detail in another section in the series), manufacturing a car releases tons of greenhouse gases, literally. When we take this “embedded carbon” into account, it becomes clear that electric cars are not the solution - and that for decades we have been backing the wrong horse.

Similarly, we are now being told that zero-emission airliners are on the horizon. For example, a few years ago Rolls-Royce confidently proclaimed that we are “entering the era of zero-emissions aviation.” They have even “produced a whole host of STEM-related activity packs for inquisitive young minds eager to learn more about cleaner sustainable aviation and have fun in the process.”

The problem is that this technology is in a nascent form, as the electric aircraft that have flown have generally been small planes that carry a single person - which is where we were back with the Wright brothers. Assuming that it is even possible (a very big “if”), we may be many decades

away from electric airliners that could carry hundreds of people over thousands of miles nonstop at over 500 mph.

This raises an important question: why did we put our hopes in technological solutions to the transportation problem when technology alone (as we shall see throughout the series) clearly cannot solve the issue? In order to answer this question, it's worth looking at who was touting these solutions.

For example, General Motors, which was for decades the largest automobile manufacturer on the planet, rolled out a concept car, the Electrovette in the 1970s. (Sounds a lot like GM's flagship sports car, the "Corvette," doesn't it?) In the 1990s, they actually put an electric car, the EV1, also known as the "Impact," into very limited production. GM only produced a little over 1000 of these electric cars. During the years that the EV1 was in production, GM produced tens of millions of gasoline powered cars.

Similarly, Rolls-Royce, which, as I noted, is now hyping "zero-emissions aviation," is the world's second-largest manufacturer of aircraft engines.

These companies have a huge vested interest in keeping us in the habit of driving cars and traveling by air. Indeed, if we got out of these habits, their businesses would likely cease to exist. Hence, they kept telling us that affordable zero-emission vehicles were just around the corner.

In other words, the message was clear: don't panic, and certainly don't get out of the habit of driving and flying, just stay with the course and we will take care of everything.

In promoting cars, automobile manufacturers have, in a variety of ways, directly attacked mass transit. A recent example would be Elon Musk, the CEO of Tesla: "I think public transport is painful. It sucks. Why do you want to get on something with a lot of other people...It's a pain in the ass...That's why everyone doesn't like it. And there's like a bunch of random strangers, one of who might be a serial killer, OK, great. And so that's why people like individualized transport, that goes where you want, when you want."

His messages clear: if you are afraid of serial killers, stay off of mass transit!

But seriously, it is worth pausing on the habits and promises of cars, planes, and other transportation options – which in fact is what this series on transportation will do.

Since, it is clear that technological solutions are not sufficient in themselves, we need to take a long hard look at how we get around. In order to travel short distances, like to school and work, we are in the habit of driving there by car. For longer distances, such as across the country, we are in the habit of using air travel.

But these are just habits.

For short distances, we could alternately use mass transit or personal mobility solutions, like a bicycle. For longer distances, like across the country, high speed rail would be an option.

Although changes in habits such as these may sound like solely personal choices, the situation is more complicated than that.

For example, although some people might like to use mass transit to get around, the bus systems in their town may be inadequate, with not enough buses, lines, or stops, or may simply not be safe. And few towns and cities in the US have truly adequate infrastructure for bicycles.

Similarly, although it would be possible to comfortably travel from Los Angeles to Chicago (a 2000-mile trip) in ten hours or less on a high-speed train, no such service exists.

Consequently, what is needed here is not just a change in our habits (i.e. personal action), but collective action in the form of government intervention. In other words, instead of being massive supporters of the automobile and aircraft industries (which the US. has been in the business of doing for many decades now), our government needs to instead support things like buses, high-speed trains, and bicycle infrastructure.

And then there is the fact that we are told on a daily basis (in subtle and not-so-subtle ways) that cars are cool, signaling that you are at least relatively wealthy if you own one. Conversely, getting around by bus or bicycle is often seen as either for people who cannot afford a car or are just plain dorkey.

None of this is directly related to technology, but rather has to do with government policies and cultural norms. In the US, the “normal” way - which is established by norms - of getting around is by car and plane (depending on whether you are traveling a short distance or far, respectively).

But, how do we establish these norms? This is a central question that needs to be taken up.

In some countries, such as Denmark (where the per capita income is just about the same as the US.), many people get around by bicycle. In Copenhagen, the capital, nearly two out of three people commute to work and to school by bike.

As we shall see in the series, Copenhagen’s transformation into a bicycle friendly city (which is still an ongoing process) did not happen overnight. Instead, it has taken nearly five decades. It was motivated by the same predicament that caused the American automobile industry to start promising us that zero-emission vehicles, like the Electrovette, were on the horizon: the energy crisis of the 1970s.

When it became clear in the 1960s and ‘70s that the global supply of fossil fuel could easily be interrupted and was ultimately finite, people, corporations, and countries set out to find alternatives and solutions.

With respect to ground transportation, some countries, like the US, largely put its hopes in technological innovations and change, like the promise of the Electrovette. Alternately, countries like Denmark and cities like Copenhagen came to see that cultural change would be a large part of the answer.

In general, this course will explore how we can address the climate crisis by way of cultural change. This is not to say that we should ignore or downplay the importance of technology. In fact, I am of the mind that electric vehicles have an important role to play in our sustainable future.

However, I do not think that 5000-pound vehicles carrying a lone person (three out of four cars on the road have a single occupant) are the answer. In dramatic contrast, one hundred e-bikes can be made from roughly the same resources, with the same amount of greenhouse gas emissions, and powered by the same amount of electricity - which would obviously carry, rather than just one, 100 or more people (some e-bikes have a second seat for a child or adult).

Similarly, as we shall see, buses and trains are already many, many times more efficient than the average automobile on the road. And mass transit powered by sustainable electricity is a particularly appealing option.

Moreover, it's also the case that the key to sustainable transportation may not much involve transportation at all. I know, this sounds like a paradox, but, in certain places, like Manhattan, a third of the population commutes to work by walking. Consequently, most households in Manhattan do not have a car. In contrast, 19 out of 20 households in the US have one or more cars.

In general, if we live in cities, which can be desirable for a host of reasons, then transportation becomes easier. Conversely, if we live in rural or suburban spaces, transportation becomes a far bigger problem.

I know, right about now I imagine that some people are wondering if I could possibly be serious: Do I honestly expect most Americans to ditch their cars and instead bicycle to work?

Well, two out of three people did just that in Copenhagen.

Some people may indeed voluntarily ditch their cars because they care about this planet and the future of our species on it. You may be among them. I hope that you are.

But what about everyone else? This is an important question, as I – sadly - suspect that this group may be the majority.

Although it may sound a little unbelievable, right now there is nothing to deter Americans or American corporations from contributing to the climate crisis by emitting greenhouse gases directly into the atmosphere in any amount that they like.

However, with respect to polluting the environment with toxic chemicals, the situation is very different. While there was a time, prior to the formation of the Environmental Protection Agency (EPA) in the early 1970s and a series of laws that preceded it, when people and companies could release toxic chemicals directly into the environment, such as waterways, the EPA changed all that. Now, if someone pollutes, they can face stiff fines and even imprisonment.

However, there's nothing to deter anyone in the US. from putting CO₂ and other greenhouse gases directly into the atmosphere. Hence, people and corporations are releasing these gases into the atmosphere in a wholesale way. Just look at busy freeways at rush-hour. Millions and millions of Americans are dumping many millions of pounds of CO₂ directly into the atmosphere, daily. Or look up at the sky at airliners, which release CO₂ and other gases directly into the stratosphere, which doubles their potency as greenhouse gases.

So, what's to be done about this? After all, we can't ask the EPA to fine or imprisoned everyone who drives a car. True. But, if we put a price on every pound of carbon dioxide released into the atmosphere (i.e. carbon pricing), then people might reconsider. Depending on the price, I think that they definitely would.

For every gallon of gasoline that we burn, 20 pounds of carbon dioxide are released into the atmosphere. So, if you drive an SUV that gets 20 miles per gallon, that's 1 pound of CO₂ for every mile that you travel. (Incidentally, this is just slightly under the efficiency of average car in the US, which is 25 miles per gallon.)

Pricing carbon would mean that the price of gasoline (as well as jet fuel and everything else produced out of and by way of fossil fuels) would rise. The idea here is to put a price on releasing a pound (or metric ton or some other unit of measurement) of CO₂ or equivalent greenhouse gases.

We know that when the price of gasoline goes up, people reconsider their driving habits. For example, in the Fall of 2005, right after Hurricane Katrina interrupted the supply of gasoline and hence caused gasoline prices to rise above three dollars per gallon for the first time in US history, the sale of SUVs dropped.

What would happen if we started pricing carbon and caused the cost of gasoline to rise permanently and significantly?

We can guess, as there was a similar situation a few decades ago with cigarettes. When the US government finally decided to step in and deter tobacco use, one of the things that was done was to impose a stiff tax on cigarettes. In particular, the goal was to stop young people from entering into a disastrous lifelong habit. In this regard in particular, pricing tobacco works surprisingly well. "For every ten percent increase in the price of a pack of cigarettes, youth smoking rates overall drop about seven percent."

Hence, if we priced carbon, the hope is that we would release less of it in the form of greenhouse gases. There is every reason to believe that this would happen. After all, if gasoline were \$10, \$15, or \$20 per gallon, people would likely drive more efficient vehicles, drive less, and look for more economic alternatives, like mass transit and personal mobility options (i.e bikes). The same goes for flying.

Incidentally, we also know that a carbon tax would work because other countries have already levied them. For example, Denmark first started taxing carbon in 1992. (Incidentally, even back

then it wasn't the first country to do so, which gives you some indication just how far behind the US. is when it comes to climate legislation and action.) Although there were a range of other factors in play, it is not coincidental that in Denmark's capital, Copenhagen, bicycle use has more than tripled since 1992. Because the city addressed the climate crisis early on, Copenhagen now hopes to be carbon neutral by 2025.

So, whether it is through personal action (i.e., people reconsidering how they get around), government action (such as pricing carbon), or some combination of the two (municipalities building more bike lanes so that more people bike), it is possible to dramatically reduce the climate footprint of transporting people around.

Generally speaking, we also need to reconsider transportation all together. As I noted, if we live in certain densely populated locales, like cities, it may be possible and convenient to simply walk in order to get to work, to buy groceries, to visit friends, and so forth. However, it is also now possible to visit and meet with people without even getting up out of our chairs.

A few years ago, if you brought up the notion of us being transported via telepresence, many people would have conjured up an image of the transporters from Star Trek. However, COVID-19 Zoomed us into a new telepresence era (sorry, I couldn't help myself!).

If COVID-19 had struck two decades earlier, our response would have been entirely different, as the Internet infrastructure, as well as the computers on our desks and the software that they were running, was simply not capable of handling high-definition video in the year 2000. However, as Netflix, YouTube, and a range of other video services proved in the second decade of the 21st, many people can now watch high-def video online.

How many? In 2020, YouTube hit 2.3 billion (with a "B") users worldwide, which is a little under a third of all people on the planet.

In a future section in the series, I want to recount my personal experience with telepresence, which dates back to 2015.