



## How Can We Respond to Climate Change?

Now that we know how complex and interwoven climate change is with society globally, we can begin to see it everywhere. But that heightened awareness also means we can begin to see solutions everywhere. In this episode of Crash Course Climate & Energy, we break down what needs to happen in our governments, corporations, and communities to slow the increase of Earth's average temperature.

0:00

*Narrator M Jackson appears on screen; clips of tropical storm, hurricane aftermath, flash flood; image of researchers at a glacier; Crash Course Climate + Energy intro clip plays*

Scientists have been studying our climate for decades, and together, we've reached a single, inescapable conclusion: greenhouse gases are driving up Earth's average temperature and, unchecked, that's going to make our planet a lot harder to live on.

Climate change has brought — and will continue to bring — extreme environmental events that will be hard to prepare for, experience, and recover from — with effects that will continue to layer upon our world's existing inequalities.

But there are things we can do — each of us can do — to help protect our planet, ourselves, and each other. We can't change the past, but together, we can change the future — and slow down and stop climate change in meaningful ways.

Hi hi! I'm M Jackson, and this is the final episode of Crash Course Climate and Energy. [THEME MUSIC]

1:03

*Photos of attendees at Paris Climate Change Conference, Natisono River, dried wetlands in Panama, farmhouse with sign reading "Farmers Need Climate Action"*

In 2015, countries around the world forged the historic Paris Agreement. In it, they committed to taking decisive action to reduce greenhouse gas emissions and keep climate change in check.

For many countries, that action became a pledge — a pledge to reach net-zero carbon emissions by 2050. That means they've agreed to reduce emissions by as much as possible, and make up for whatever they can't eliminate by removing greenhouse gases from the atmosphere.

The goal of these pledges is to limit how much the average global temperature goes up. Specifically: to limit warming by the end of the century to less than two degrees Celsius above pre-Industrial Revolution levels.

And ideally, to stop at 1.5 degrees. That half a degree might not sound like much, but science has shown that it makes a world of difference.

For instance, in parts of southern Europe, Central America, and Australia, which are already suffering occasional water shortages, two degrees of warming would create intense and long-lasting droughts. But when warming is kept to 1.5 degrees, the situation is a lot less severe, with some places experiencing half as many water shortages as in the worst-case scenario.

**2:25**

*Clips of coral reefs, busy markets, machinery at work in a textile factory; graph showing global greenhouse gas emissions and warming scenarios*

And that's just one example. Everything from the vegetables you eat, to the coral reefs you want to visit someday would have a better chance at survival with just 1.5 degrees of warming.

Ultimately, it translates to better food security and higher quality of life for millions of people — and for all life here on planet Earth. That said, staying under 1.5 degrees of warming will be really, really tough.

As a society, we're super invested in burning fossil fuels for energy. — to the point where even an industry that seems unrelated on the surface, like textile production, releases roughly a billion tons of greenhouse gases every year.

So, if we're going to keep our warming planet in check, we're going to need to overhaul our ways of doing...just about everything. And soon.

As of the time we're posting this in 2023, we're on track for temperature rises between two and three degrees Celsius, unless we make a big and rapid change. So, limiting ourselves to 1.5 degrees is nothing short of a monumental challenge.

Still, if we take immediate steps to transform every major industry, it is possible to get to net-zero carbon emissions by 2050 and, in so doing, keep warming in check.

**3:43**

*Graphic of roadmap highlighting milestones at: 2025, 2035, 2040, 2045, 2050; clips of air pollution from a coal plant, SUV driving on a dirt road*

A policy-making organization called the International Energy Agency has even given us a roadmap full of possible milestones. It involves things like stopping the sale of fossil fuel boilers to heat our water and homes by 2025, and stopping the sale of gasoline-powered cars by 2035.

By 2040, the whole world would be running on electricity with net-zero emissions, and half of all buildings would have systems in place to operate without releasing greenhouse gases. By 2045, we would be getting half our heat from efficient, low-carbon heat pumps.

And finally, by 2050, even manufacturing would be transformed, with more than 90% of heavy industry, like machinery production and ship-building, being considered low-emission.

Manufacturing processes are often especially hard to decarbonize, so in addition to technological breakthroughs on the materials we use, we would likely also rely on technologies to capture the emissions released rather than letting them escape in the atmosphere.

So, say you're 15 years old, watching this in 2023. If we stuck to a plan like this, then by your 42nd birthday party, you'd be living in a very different world.

Imagine it: there'd be no more coal-fueled power plants, belching smoke over cities. The phrase "gas guzzler" would also be a thing of the past, because there'd be no more gasoline pumps. Instead, you'd be rocking an electric hotrod Camry, or hopping on public transit powered by carbon-free electricity.

## 5:22

*Robot in shirt and bowtie rolls in, hands M Jackson a mug; photos of carbon neutral technologies and innovations;*

And in your home? That same electricity would power all your devices, from your phone charger to your robot butler! [JohnGreenBot] Greetings! [M] Oh, hey, JohnGreenBot. Thanks! The incredible thing is, this future? It's not some sci-fi pipe dream. Well, maybe /you/ are, JohnGreenBot.

We've learned throughout this series that there are many carbon-neutral technologies that exist right now in every sector. They just need to be made affordable to take off. But to make this net-zero future a reality, we'll also need some serious technological advances.

For example, we already have options for generating carbon-neutral electricity — wind, solar, nuclear, hydroelectricity, and more. But to use them to power the whole world, we'll need big improvements in electricity storage and transmission, so we can get power whenever we need it and wherever we need it.

And technology won't be the only hurdle to overcome. There are still a bunch of government policies, subsidies, and initiatives in effect, that are designed to keep fossil fuels cheap.

They make various carbon-free options artificially expensive by comparison — creating something called a Green Premium. But if governments can thoughtfully reduce, and eventually eliminate fossil fuel subsidies, they can help make carbon-free energy more affordable, and make technologies that emit greenhouse gases look less appealing.

## 6:49

*Images of woman hiking, man shopping, pair preparing vegetables, woman holding a "Save Our Planet" sign; graphic of table listing 20 company logos*

The money governments are currently spending to make fossil fuels cheap could also be used to make carbon-neutral energy cheaper — or to research new, emissions-free technologies.

Ultimately, though, when it comes to getting to net-zero, every emissions sector and every area of the world will need a different approach. There's no one-size-fits-all strategy.

Meanwhile, the stakes keep getting higher. So, if you're feeling like all of this is overwhelming...you're not alone. Government subsidies, emerging technologies — many of the solutions to climate change might seem like they're happening on a level way above your head.

And the things you can do, like walk or cycle, make thoughtful purchasing decisions, eat less meat, vote — all of these are awesome, by the way — but they can feel discouraging, or maybe, small. It's hard to be just one person trying to make a difference.

Especially when you consider the impacts of what you can do versus the impacts of major corporations. From 1965 to 2017, just 20 companies were responsible for a whopping 35% of all greenhouse gas emissions globally.



**8:04**

*Images of Greta Thunberg, young people marching, clip of Ghislain Irakoze explaining his app, images of Kehkashan Basu receiving a Peace Prize, mangrove trees, a seawall collapse*

So, where do people like you and me fit into that part of the story? Well, companies, governments, and research centers developing new technologies — they all have one thing in common. They're made by people, supported by people, and can be changed by people. And in a lot of big ways, young people are leading this charge.

You've probably heard of Greta Thunberg, a Swedish environmental activist who has led school strikes and spoken at global climate conferences. And while she might be the most famous, she's far from the only young person to stand up for the climate.

At 18 years old, Rwandan student Ghislain Irakoze noticed piles of electronics thrown away in a local landfill. So, he invented an app that helps people figure out where they can recycle them locally.

At 12 years old, Emirati-Canadian student Kehkashan Basu started a company to get young people involved in local sustainability efforts. And today, she leads people in planting mangrove trees in tidal habitats that have suffered deforestation.

At 16 years old, Delaney Reynolds founded a program in Florida to educate youth in her community about the dangers of sea level rise.

And that's just to name a few examples of young people. Entrepreneurs, educators, and activists have inspired people of all ages, all over the globe to take action against climate change.

**9:28**

*Animation of an orange Earth in space and erupting volcano, with textbox: 4.2-3.8 billion years ago; animation of a girl amongst a clear blue sky who is then shown decades later, the environment is murky, polluted and hot*

Getting involved in climate change doesn't only mean making speeches, staging strikes, or going to marches. Whether you're into storytelling or gardening, engineering or educating, there's something there for all of us. Because whatever you're into, and whatever you're up to, climate change intersects with it.

Way back in the first episode of this series, we learned how climate change normally happens over centuries and millennia. Throughout Earth's long history, it's been a drawn-out process driven by things like volcanoes and splitting continents.

But now, driven by burning fossil fuels and greenhouse gases, climate change is happening over decades, over individual human lifetimes.

Since climate is all about long-term patterns in things like rainfall and temperature, climate change can be hard to point to. It's everywhere, all around us, all the time.

And once you learn how the climate is changing and what's fueling it, you can start to connect the dots — see how it intersects with everything in your life.

**10:33**

*Clips of severe storms, high-rise buildings in construction, fossil fuel plant, tractor plowing, electric SUV charging, buildings with solar panels, activism in action*

Climate change is the storm made more powerful by a warmer ocean, that wiped out lettuce crops and made your favorite salad more expensive. It's the apartment complex being built down the street, from cement and steel made by burning fossil fuels.

It's the late-season snowfall that knocked out your power, the fumes from a diesel-powered tractor, and the lack of accessible public transportation in your town.

On the flip side, climate change is also the electric pickup truck your neighbor just bought, and the solar panels sparkling on those new apartment roofs, and the falling cost of batteries, and activists pitching their governments on policies that make heat pumps more affordable.

It's people and organizations coming together to try and slow the damage that's already been done to the climate, and prevent things from getting worse. So, engineers, storytellers, artists, farmers, business owners, students, you name it — we're all a part of the story of Earth's changing climate.

And once you learn what to look for, you can see how climate change weaves throughout your entire life. When you hear stories about people fighting against climate change, it can sometimes sound like it's just one person standing up on their own, facing down a whole government.

But almost always, change happens because a group of people, often from different backgrounds and walks of life, team up for something they care about.

And there's a lot of people to team up with. Surveys have shown that the majority of people on Earth are concerned about climate change, and are willing to do something about it.

At the end of the day, if human creativity can put a plane in the sky — an unthinkable magic trick at the time — then human creativity, like yours and mine, can — when joined together — see us out of this mess.

I like to think of it like this: we have 8 billion people on this planet... that's 8 billion people coming up with 8 billion possible solutions forward.

Climate change is everywhere, and so too are the ways to solve and stop it. This involves talking to community members, designing new technologies, passing new laws, protecting natural spaces, and caring for people and landscapes most affected by our shifting world. And, of course, there's a lot of learning involved too — so, hey, thanks for being here for this series.

Ultimately, reducing emissions by 2050 will take a huge effort on the part of scientists, governments, corporations, and individuals — especially individuals banding together as groups and communities.

Sometimes, that effort just looks like talking to each other about climate change, helping one another see how it impacts our lives, who we are, our futures. This can be enough to tip the first domino to start a cascade of hope that changes this generation, the next one, and all the ones to come.

**11:48**

*Fast moving clip of crowds of people marching; image of activists in Africa holding signs; bar chart showing 72% of the surveyed are concerned about climate change, 80% are willing to make changes; images depicting examples of climate change solutions; graphic of domino toppling; video credits displayed*



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