

# THE REAL SCIENCE OF CLIMATE CHANGE

## PROF. KATHARINE HAYHOE



DEFIANCE #029  
WITH PETER MCCORMACK

## DEF029 - PROF. KATHARINE HAYHOE INTERVIEW TRANSCRIPTION

### THE REAL SCIENCE OF CLIMATE CHANGE

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**Peter McCormack 00:03:54:**

I wanted was to speak to somebody whose job is to know this stuff, to really rather than when getting into a debate, some people throw me all these charts and "have you seen this" and "it's the solar sun cycles". I just want somebody who's an expert I can put in and say, "Look, I'm not going to debate this." Katharine is the expert, speak to her.

**Katharine Hayhoe 00:04:17:**

Thank you.

**Peter McCormack 00:04:17:**

I'll tell you something funny. The first ever college football game I watched was with the Texas Tech game.

**Katharine Hayhoe 00:04:21:**

What?

**Peter McCormack 00:04:22:**

Yeah. Are you a local long time here? Right, so you know the game? I was at my 30th birthday. I was in Las Vegas, so which was 11 years ago. Texas Tech v. Texas, do you remember the game?

**Katharine Hayhoe 00:04:38:**

Yes.

**Peter McCormack 00:04:38:**

Crabtree?

**Katharine Hayhoe 00:04:39:**

Yes, Crabtree last second-

**Peter McCormack 00:04:40:**

Last second touchdown.

**Katharine Hayhoe 00:04:41:**

Absolutely.

**Peter McCormack 00:04:42:**

I was in the state restaurant on my birthday and the game was on. And I didn't recognise the team names. So I said to somebody. So he said, "No, this is college football. This is much better."

**Katharine Hayhoe 00:04:50:**

Yes, all right.

**Peter McCormack 00:04:50:**

But how can it be? And this game, I can't remember. It was something like at 45, 43.

**Katharine Hayhoe 00:04:58:**

Yes, something like that.

**Peter McCormack 00:04:59:**

It was back and forth and then Crabtree got that last second touchdown and it just went crazy. So when anyone ever says who's your college team? I always say Texas Tech. Now, I'm here.

**Katharine Hayhoe 00:05:11:**

All right, so you obviously need to visit the bookstore and get a T-shirt or something like that?

**Peter McCormack 00:05:16:**

Yes, I do. Where is it?

**Katharine Hayhoe 00:05:17:**

Yes, I can show you where afterwards, no worries.

**Peter McCormack 00:05:19:**

Well, I would get a hoodie for my son and I want to maybe get a shirt for me or something.

**Katharine Hayhoe 00:05:24:**

Yes, you can get lots of-

**Peter McCormack 00:05:26:**

How funny is that?

**Katharine Hayhoe 00:05:27:**

That is amazing. Yeah, I love that.

**Peter McCormack 00:05:31:**

Yeah. I didn't know. I flew into Lubbock and I was like ... And then my Uber driver picked me up. I was like, "Is that the Texas Tech Stadium?" He's like, "Yeah." And I was like, "Oh, my god." And so I was telling him the same story. He didn't know the game, but what an ... I still think to this day it's the best game of football I've ever seen.

**Katharine Hayhoe 00:05:49:**

See, I'm Canadian. So for me, it's hockey, I'm sorry.

**Peter McCormack 00:05:53:**

I don't mind a bit of hockey although whenever I talk to Canadians about hockey, they always say, "Yeah, but if you're watching the American stuff, it's not the proper hockey. You got to come to Canada. You got to go to Montreal or Toronto. That's where they really fight. That's where they really lose teeth."

**Katharine Hayhoe 00:06:11:**

There literally is blood and teeth on the ice. You can see it, yes.

**Peter McCormack 00:06:15:**

Well, anyway, we should really talk about climate stuff because this is what I'm here for. And so thank you for giving me up your time. I'd give a bit of context. I can't remember exactly how but we ended up in a thread together on Twitter. And I just interviewed Nathaniel Rich about his book which is about the origins of climate change denialism, which itself is an inflammatory term that upsets people.

**Peter McCormack 00:06:43:**

But I ended up in a thread with you and then every time someone was arguing me, I kept copying your name in and say, Katharine will answer. So just to give people the context, I think it would be good to start by you explaining what your role is, what your background is, what your experience is so they understand why you are one of the experts we came to, to talk about this.

**Katharine Hayhoe 00:07:06:**

So my name is Katharine Hayhoe and I am a legit climate scientist. My undergraduate degree is in physics and astronomy and my master's and PhD is in atmospheric science. So climate scientists can be many different things. They can come from an earth science perspective or oceanography, ecology. My particular area is atmospheric science and I specifically study what climate change means in the places where we live.

**Katharine Hayhoe 00:07:31:**

So often we think of it as this big global issue that affects polar bears or people who live far away, but what does it actually mean for us? And the answer is it depends on what we are already vulnerable to in the places where we live. If we're already vulnerable to heavy rain

or flood, to hurricanes or cyclones or storms, to wild fire or heat waves, climate change is often exacerbating those things making them worse.

**Katharine Hayhoe 00:07:54:**

But to understand how that's happening, we have to understand the physics of the climate system. So that's what I do.

**Peter McCormack 00:07:59:**

Right, okay. So it must be very frustrating for you as somebody, it's not even that you're convinced. My expectation of your answer is that you know that climate change is real and it's caused by humans. So it must be frustrating that there is this constant debate about it.

**Katharine Hayhoe 00:08:18:**

Well, what most people don't realise is we have been kicking the tires of this thing for almost 200 years. We have known that digging up and burning coal and then later oil and natural gas is wrapping an extra blanket around our planet. And that is the reason why the planet is heating up.

**Katharine Hayhoe 00:08:37:**

The basic science that tells us that was done in the 1850s and it's the same basic science that explains how refrigerators cool food and how stoves heat food and even how airplanes fly. So when people say, "Oh, that can't be real," if they really want to be consistent, they would have to throw pretty much every piece of modern technology with that.

**Katharine Hayhoe 00:08:59:**

But they don't actually have a problem with the climate science, because again if they did, they would also have a problem with stoves and fridges and airplanes. What they have a problem with are the perceived solutions, because they've been told that the only solutions are so antithetical to their ideology and their values that we can't possibly do them.

**Katharine Hayhoe 00:09:20:**

But our defense mechanism as humans is we can't say, "Oh, it's a real problem but I don't want to fix it," because that would make us the bad guy. And none of us wants to be the bad person. We want to be the good person. So our psychological defense mechanism is to say it can't be real because if it was real, I'd want to fix it. But it isn't real. So that means that we don't have to endorse any of those horrible solutions I've heard about that include socialism, communism, destroying the economy and letting China or the United Nations or the Antichrist take over the world.

**Peter McCormack 00:09:51:**

Well, the solutions topic is quite complicated itself. So I think we should build ourselves up to that. And you said people don't deny that the science is real but actually, they do and I've experienced that.

**Katharine Hayhoe 00:10:04:**

Oh, no, that's not what I said.

**Peter McCormack 00:10:04:**

All right.

**Katharine Hayhoe 00:10:11:**

I said they don't actually have a problem with the basic physics.

**Peter McCormack 00:10:12:**

Because of the fact that they use stoves-

**Katharine Hayhoe 00:10:13:**

And fridges and airplanes and things like that. But what they do have and this relates to the psychological mechanism, they have sciencey-sounding objections to say the problem can't be real. Because our defense mechanism is we have to say it's not a real problem because otherwise, if it was real, we have to fix it. But if we don't agree with any of the solutions, we have to reject the reality of the problem itself.

**Katharine Hayhoe 00:10:34:**

So we use sciencey-sounding objections as smokescreens to cover the real problem which is solution aversion.

**Peter McCormack 00:10:43:**

Okay, when you're dealing with people who deny this or argue or object, do you notice any consistency in the type of person, the demographic, maybe we can throw the Bitcoin people in there because a lot of them just don't believe it. But do you notice a specific type of person who wants to argue this, who wants to debate it?

**Katharine Hayhoe 00:11:04:**

Absolutely. I have a sample of thousands of people, many of them collected on social media, some in person, many via letter or email or even phone call. And what I can tell you is that the number one predictor of whether we agree with the science or not is where we fall on the political spectrum.

**Katharine Hayhoe 00:11:24:**

So if somebody on social media is attacking me and they're from the US, chances are they'll have Mega in their profile. If they're from the UK, they'll have Brexit in their profile. If they're from Canada, they'll have something about hating the prime minister in their profile. If they're from Australia, they'll have something about loving the prime minister in their profile.

**Katharine Hayhoe 00:11:42:**

So political factors are the number one common denominator. It is very rare to have an apolitical, not unheard of, but rare to have an apolitical problem. Now, the second common denominator, very sorry to say is gender.

**Peter McCormack 00:11:57:**

Oh, no, it seems so and from my own experience of ... I put out this very provocative tweet. I kind of regret it actually because I think it was unfair but anyway, I put it out and I just said, "You're an idiot if you do not believe climate change is real. If you don't think it's caused by humans, you think the models are fake, et cetera, et cetera." And I got a lot of hate from it, a lot of unfollows, and I think it was right actually because I think it was the wrong choice of language.

**Peter McCormack 00:12:23:**

But at the same time, it was almost entirely men, and I don't know why but it just was

entirely men, and generally ... Because of the circles which followed me on Twitter tend to be more libertarians but also conservatives. So one of the things that I started to question and I think I might have stolen this from you actually. You did a TED Talk, right?

**Katharine Hayhoe 00:12:49:**

I did.

**Peter McCormack 00:12:50:**

Did you say in your TED Talk that their opinions here on climate change are tied to their identity? Therefore, if you're challenging their opinions, you're insulting them in one way or another.

**Katharine Hayhoe 00:13:02:**

Yes, that is definitely what I said.

**Peter McCormack 00:13:04:**

Okay, I've been stealing that line.

**Katharine Hayhoe 00:13:05:**

No worries.

**Peter McCormack 00:13:06:**

Okay.

**Katharine Hayhoe 00:13:06:**

It's the best form of flattery.

**Peter McCormack 00:13:08:**

But actually, that's a really important point. Therefore, we're really in the era of identity politics with regards to climate change which becomes really unfortunate, I think, because you really want this to cross the aisle. I'm using American terms. We don't have the aisle in the UK, but I'm saying this is what you want to do. You want consensus from people. You want it to be apolitical, but you don't have this.

**Katharine Hayhoe 00:13:37:**

That's right. A thermometer is not liberal or conservative. It doesn't give you a different answer depending on how you vote. The solutions are, but we have to begin from a place of shared understanding that climate is changing, humans really are responsible. We've checked. The impacts are serious and we do need to act.

**Katharine Hayhoe 00:13:54:**

So when people have these sciencey-sounding objections through, the way I try to respond is by saying those are good questions. You're not an idiot for saying, "Isn't it just a solar cycle?" Because we know that solar cycles are real. We know that there are volcanoes that produce heat-trapping gases. We know that there are natural factors that have caused climate to change in the past, and in fact, we climate scientists are the ones who study those.

**Katharine Hayhoe 00:14:17:**

So by validating people's questions, I think, then we can start to begin often to have a

constructive dialog, not all the time. About 10% of the population are what social scientists called dismissive, and dismissive people will dismiss anything and everything and they're literally incapable of clicking on a link. And we see this a lot online.

**Katharine Hayhoe 00:14:38:**

If somebody cannot click a link, they are physically and mentally unable to just point their finger there and click it and read it. They are likely dismissive and you can't have a constructive conversation because their entire identity is so built on rejecting what you stand for that they're not even willing to dialog.

**Katharine Hayhoe 00:14:54:**

But 90% of us are not dismissive. And then, if we approach this topic from a place of mutual respect, very important, and mutual shared values, then as I talk about in my TED Talk, then we can have a positive constructive conversation.

**Peter McCormack 00:15:11:**

So it's really interesting that you talk about the political side because I've been around the circles with my own politics. I was very socialist when I was younger. And then I became very conservative. Then I threw myself down to libertarian rabbit hole and I've actually got a point where I really struggled with all of them, and I kind of like a bit of each.

**Peter McCormack 00:15:28:**

I really enjoy the libertarians' view on free markets. I really like ... Socialist is the wrong view there. The liberal view on personal choice and personal freedoms with regards to the choices you want to make in life. And with conservatives, I kind of like their approach to the economy. There's just different aspects I like about it, but I've tried to separate myself in the politics now because that does tend to become a problem.

**Katharine Hayhoe 00:15:54:**

Yes.

**Peter McCormack 00:15:55:**

Yeah.

**Katharine Hayhoe 00:15:57:**

As do I, as do I. Yes.

**Peter McCormack 00:15:58:**

Yeah, because I don't think it's helpful and I think it's a block to actually making any progress. I likened it to the fact that with Donald Trump, there's a lot of people who support him, think he's great. I think there's certain things about his character I'm not particularly a fan of. But I think if you're conservative, you will instantly jump to the defense of Donald Trump because you're conservative.

**Peter McCormack 00:16:17:**

Similar with Bernie Sanders. There's a lot of things I think are quite scary about the policies he has, but there will be people who jump to his defense because they're liberal. And we've become so divided. We've become so extreme on each ends of the spectrum, we're starting to develop all these impossible problems to debate.

**Peter McCormack 00:16:36:**

It doesn't matter whether it's gun rights. It doesn't matter whether it's the climate. It doesn't matter whether it's abortion. There's these particular topics now that separate us and I'm seeing very little intellectual debate around it with people willing to hear the other side of the argument.

**Katharine Hayhoe 00:16:53:**

Yes, you're right. Climate change has become one of the top most politicised issues not just in the US but in the UK, in Canada, Australia, Brazil and beyond. So let's have that conversation then. Let's get those questions out.

**Peter McCormack 00:17:06:**

Actually, can we start a step earlier?

**Katharine Hayhoe 00:17:08:**

Sure.

**Peter McCormack 00:17:08:**

Because we should do the science, because I'm fortunate enough to have this time with you. You have done a TED Talk. You are one of those people who I put out there on the ... I level you up above everybody else because you've done a TED Talk. I think once you've done a TED Talk, you've kind of made it.

**Katharine Hayhoe 00:17:26:**

Okay, I've done a few other things too.

**Peter McCormack 00:17:28:**

I know, but the TED Talk for me is always like, "Ah, you're definitely an expert." So can you please explain the science? For those who don't understand, please explain the science of climate change and CO<sub>2</sub> in the atmosphere. Because some people do, they will argue against this point itself.

**Katharine Hayhoe 00:17:46:**

And most of us don't understand it to begin with. I mean if you ask me to explain the basis of GMOs for example, I would struggle to do that too. And that's because we are all cognitive misers. So not since the days of Francis Bacon has one human brain been able to contain the essential information about every field that we have and probably not even him either.

**Katharine Hayhoe 00:18:06:**

But in the case of climate change, it's actually very easy to explain. So our planet has a natural blanket of heat-trapping gases: Carbon dioxide, methane, water vapor and more. The sun's energy shines right down through the atmosphere like a window and the earth heats up, and the earth gives off heat energy.

**Katharine Hayhoe 00:18:26:**

The heat energy is a lot longer wavelength than the sun's energy and this natural blanket traps that heat just like a blanket traps your body heat on a cold night. It keeps us over 30 degrees Celsius warmer than we would be otherwise. In fact, our planet would be a frozen ball of ice if we did not have this amazing natural blanket.



**Katharine Hayhoe 00:18:47:**

So then you might say, "Well, if it's natural and if it's responsible for life, what's the problem?" The problem is, is that by digging up and burning coal and gas and oil, we are wrapping an extra blanket of heat-trapping gases around our planet that it does not need. And just like you would if you were sleeping and somebody snuck into your room and put an extra blanket on you and you woke up sweating saying, "I didn't need this blanket."

**Katharine Hayhoe 00:19:10:**

In the same way, we are wrapping an extra blanket around our planet and that is the reason why the planet is running a fever.

**Peter McCormack 00:19:18:**

So a lot of people have come back and challenged a lot of the science with this. And we should run through a couple of the common arguments back. So the first one is people said, "This is a solar cycle we're in."

**Katharine Hayhoe 00:19:32:**

Well, there's a very interesting website called [skepticalscience.com](http://skepticalscience.com), and they have ranked the common objections. So interestingly, I think that one is number two. Number one is it's been warmer before. But Skeptical Science is a great resource if you want to dig into further after we've chatted.

**Katharine Hayhoe 00:19:49:**

We've known though that the sun goes through an 11-year sunspot cycle since the work of Galileo. And we also know that the sun's energy goes slightly up and slightly down over longer periods of time. So when we look at the planet getting warmer, the number one question is, is it because of the sun? That's where we get most of our energy from.

**Katharine Hayhoe 00:20:09:**

So when we look at the sun's energy, we see that there is this 11-year sunspot cycle where it goes up and down, and up and down, but we see that long-term over the last few decades since the 1970s, the sun's energy has actually been going down, not up. So if we were being controlled primarily by the sun right now, we would have been getting cooler, not warmer. In fact, the sun has been helping us out.

**Peter McCormack 00:20:32:**

Right, okay. Interesting. But we're in a natural cycle.

**Katharine Hayhoe 00:20:38:**

Well, the natural cycle is a common argument. And for that, we have to understand what natural cycle we're talking about because people often say natural cycles as if it served like unicorns and rainbows and fairies. You don't really know what they are.

**Katharine Hayhoe 00:20:51:**

But we do know what they are because again, we are the ones who study them. So first of all, we have natural cycles that are inside the climate system. These are like El Nino or the North Atlantic Oscillation. What these natural cycles do is the move heat and moisture around the climate system to rebalance it so one part doesn't get too hot and another part gets too cold.

**Katharine Hayhoe 00:21:13:**

They move heat from east to west, north to south from ocean to the atmosphere and back again. We know that there have been large natural cycles in the past. In fact, the medieval warm period is probably the most famous example of a natural cycle. That was when it was unusually warm over the North Atlantic in Greenland. And so that's when a lot of Vikings came all the way to Canada. They went to Greenland. It wasn't green back then. It was called Greenland as a great PR stunt to get people to move there, but it was at least warm enough that they could get to Greenland.

**Katharine Hayhoe 00:21:42:**

But the interesting thing is that the way natural cycles operate is by moving heat around the climate system. So if you live in Siberia at the time of the medieval warm period over the North Atlantic, it was actually the medieval cold period in Siberia at the same time because the heat was moving around the climate system.

**Katharine Hayhoe 00:22:00:**

So if we are warming due to a natural cycle today, the entire atmosphere is warming so that heat would have to be coming from a different part of the climate system. The only part it can be coming from is the ocean. So if we see the heat content of the atmosphere going up over time as it has, and if we see the heat content of the ocean going down by an equal but opposite amount over at the same period of time, we know that that would have to be a natural cycle.

**Katharine Hayhoe 00:22:26:**

But when we look at that, that is not what we see. In fact, the heat content of the ocean has increased 20 times more than the atmosphere, the land surface and the cryosphere or the ice all put together. In fact, using air temperature as a measure of global warming using thermometers up here in the atmosphere is like measuring the size of an iceberg from just a tiny tip that's poking up from beneath the ocean.

**Katharine Hayhoe 00:22:52:**

So then people say, "Well, why aren't we talking about what's happening in the ocean then?" And the only answer I have is we're not dolphins. If we were dolphins, we'd be like, "Oh, my goodness people, look at what's happening in the ocean. The changes we're seeing here are crazy compared to what's happening on the land." But because we live here on the land, we talk a lot about what's happening above the ocean. So that's how we know it is not a natural cycle. The whole planet is heating up.

**Peter McCormack 00:23:14:**

Something else I saw that's come up a lot is charts which are based on the analysis of ice cores and they have predictions that go back hundreds of thousands of years. How accurate are these predictions from the ice cores? Because myself personally as a non-scientist, I'm wondering how much information would be stored in this ice cores that you could accurately predict hundreds of thousands of years of climate.

**Katharine Hayhoe 00:23:41:**

Yes, so ice cores are one type of natural thermometer. We also use tree rings, pollen records, sediment cores and more and they are absolutely fascinating. So you can get an ice core anywhere where there's permanent ice. So in other words, you can get them from

the top of tropical glaciers. You can get them from Greenland and Antarctica, and in those big ice sheets, you can go more than a mile down and you can go back almost a million years.

**Katharine Hayhoe 00:24:07:**

So how did they tell us what climate was like back then? How did they act as natural thermometers? Well, what happens is as the snow falls and it becomes compacted as more snow falls on top, there's little bubbles of air in the snow that gets sealed off and in that bubble is a record, literally like a fossil record almost of what the atmosphere was like when that pocket of air lost contact with the atmosphere.

**Katharine Hayhoe 00:24:34:**

We can analyze the air in those bubbles to see what the levels of heat-trapping gases were. We can look to see dust, for example, to see if there were dust storms or soot or ash from volcanic eruptions and we can even look at oxygen isotope ratios that tell us what the temperature was like back then.

**Katharine Hayhoe 00:24:51:**

So layer by layer by layer, these ice cores go back in time and they don't have annual resolution. Most of them are maybe a decade or 50 years or sometimes a hundred years or more, but we can trap how levels of heat-trapping gases and temperature have varied in the atmosphere over hundreds of thousands of years.

**Katharine Hayhoe 00:25:10:**

And what we see is we see a very regular natural cycle. And this is second type of natural cycle. This type of natural cycle is not one that occurs inside the climate system. This is one that's caused by changes in the earth orbit around the sun. We know that over time the earth's orbit becomes more circular and more elliptical. We also know that the axis of rotation is inclined by 23.5 degrees relative to the plane of our orbit.

**Katharine Hayhoe 00:25:39:**

So imagine one of those old children's tops and you spin it and it goes around really fast, that's like our planet going around once a day but it also precesses around really slowly and that's what our planet does too. So as it does that, it changes how sunlight falls on the earth. If the earth were all the same everywhere, if we're all ice or all desert or all water, it wouldn't matter.

**Katharine Hayhoe 00:26:01:**

But we know that we have more ocean in the southern hemisphere. We have more land in the northern hemisphere. So how the sunlight hits the earth depends on how much of the sun's light we absorb versus how much gets reflected back. And that is what initiates the ice ages and the warm periods like we're in today.

**Katharine Hayhoe 00:26:20:**

So people say, "Well, okay, then aren't we just getting warmer after the last ice age?" Well, we can look both at the record in the ice cores as well as we can look at the equations that I originally learned about in my astrophysics class. We can look at the equations that dictate where we are in the earth's orbit to say, "What should be happening now?"

**Katharine Hayhoe 00:26:39:**

And when we look at both of these together, we see the same answer. Warming after the last ice age peaked about 6,000 to 8,000 years ago. And since then, we were starting to very gradually slowly cool because the next thing on our geologic calendar was another ice age in about 1,500 years. Until the Industrial Revolution and when the Industrial Revolution hit, we started to warm so fast that it is 10 times faster than the warming between the last ice age and the warmest period 6,000 to 8,000 years ago.

**Katharine Hayhoe 00:27:13:**

So that is how we know it is not an orbital cycle. We should be getting cooler, not warmer.

**Peter McCormack 00:27:18:**

Does it frustrate you that people cherry pick bits of data to use as an argument? So a couple I've seen recently is well, Antarctica has gained ice or that Greenland has gained ice and a very quick search on Greenland, it was one particular ice shelf but there was a net loss. Does it frustrate you that people are cherry picking? And we now have very significant group of amateur climate scientists.

**Katharine Hayhoe 00:27:43:**

My google is better than your PhD, yes. It is very frustrating and there is certainly a lot of mansplaining that goes on where people think that their google search somehow tells them more than 25 years of your research. But it's all part and parcel of the same issue which is that it's something that in psychology they call it inferred justification.

**Katharine Hayhoe 00:28:05:**

In other words, we have already decided that this can't be real. If it's real, we have to fix it and I don't want to fix it because I've been told the only solutions are inconsistent and incompatible with my ideology, which is false, and we will get to that. But because I've decided it can't be real, I have to figure out reasons to explain that because I'm a rational person. I don't just say it isn't real. I have to have reasons.

**Katharine Hayhoe 00:28:26:**

So what they're doing in saying it's just the sun or it's just natural cycles or it's just volcanoes or Antarctica is gaining ice, or it's cold outside today. What people are doing is we're looking for reasons to support what we've already decided must be true. And so that's why although it's important to have answers to these sciencey-sounding arguments, only responding to the sciencey arguments is not sufficient to change people's minds because it's a smokescreen. They're almost an excuse or a justification for an opinion that they've already formed because of a very different reason.

**Peter McCormack 00:28:57:**

You've obviously mixed in circles of other climate scientists. And you obviously must talk about this, talk about that happened quite regularly. How do you feel about the fact that there's so much disinformation put out there? So another thing that I was doing, again, my amateur google research was every time somebody would post me an article and say, "Well, this scientist has posted this, and here's this piece of research." And I would google them and I very quickly find them tied to a lobbying group, which is then tied to the oil and gas industry, without fail.

**Peter McCormack 00:29:32:**

But what was happening as well, and bear with me on this is that I started to get my own doubts in there. And I started to become a little bit of conspiracy theorist myself and I was wondering why did these lobbying groups really exist? Are these web pages real? Are these scientists actually real scientists? But there are people out there who are seemingly credible scientists who don't agree with you.

**Katharine Hayhoe 00:29:57:**

There are a handful. In North America, I can literally count them on the fingers of one hand.

**Peter McCormack 00:30:03:**

Credible?

**Katharine Hayhoe 00:30:03:**

Credible.

**Peter McCormack 00:30:04:**

Okay.

**Katharine Hayhoe 00:30:04:**

But you hear, "Oh, 500 scientists signed a letter saying there's no global climate emergency."

**Peter McCormack 00:30:11:**

I saw that. I went through the first four, and I was like, "Well, this one is tied to this lobbying group. This one is tied to the Koch brothers. This one is tied ..." And very quickly.

**Katharine Hayhoe 00:30:21:**

And if they're even legitimate scientists in a legitimate field, I mean often, it's like asking a podiatrist who may be a very competent podiatrist to do brain surgery, or asking a brain surgeon to do cardiology. It's not the same expertise and they can often find people who sadly don't know enough or are biased because of their political agenda, to be willing to say something that's not true when they just are not even an expert in the field.

**Katharine Hayhoe 00:30:45:**

So there are a very small number of people who are credible and how do have the expertise to prance on climate science who, they wouldn't go so far as to say it isn't real but they generally tend to say, "It's not a big deal or we shouldn't really do anything or it's too expensive to fix it." So here's what I did being a scientist. I went out and I bought the books that they'd written and I read the interviews that they'd done and I wanted to figure out what makes them tick.

**Katharine Hayhoe 00:31:16:**

Because here we have 200 years of science, we have tens of thousands of peer-reviewed scientific studies. They're based on such basic physics that it underlies most of our modern technology today, and today we have tens of thousands of scientists around the world who all agree. So what makes this tiny little weensy, very loud handful of people disagree?

**Katharine Hayhoe 00:31:38:**

So I went and I read what they wrote because I want to know. And what I found was that

each one of them had something different that had nothing to do with the science that was very clearly motivating their opinion. One book was an entire libertarian manifesto. It was basically saying, "I don't want the government to interfere with my life. Climate solutions involve government solutions, therefore, we can't have climate solutions, therefore, it's not a real problem."

**Peter McCormack 00:32:02:**

And they would hate the Green New Deal?

**Katharine Hayhoe 00:32:04:**

Yes. Another one was ... Well, poor people need fossil fuels so it's really evil and just immoral to say that they can't use fossil fuels. Because the world needs fossil fuels, then we still have to keep using them. So because we have to keep using them, climate change can't be a big deal because I'm a good person. And if this was really a problem, I would care about it.

**Katharine Hayhoe 00:32:29:**

So they'll have very different reasons. And then the funniest one was one where he complained that he wasn't getting enough air time because of his contrarian perspective. So a colleague of mine, this is a number of years ago, a colleague of mine who's also a scientist, he went and he added up the air time minutes that any climate scientists had gotten that year and he found that this one man who was complaining that he didn't get enough, he'd gotten more air time than all the rest of the scientists put together.

**Peter McCormack 00:32:53:**

Right.

**Katharine Hayhoe 00:32:54:**

Yes. So there's just very different motivations that they have, but when you start to really follow people, you see that somebody says, "Oh, well, I don't trust those weather stations." And then the next breath without even taking a pause, "I don't trust those weather stations and the government just wants to control my choices."

**Katharine Hayhoe 00:33:11:**

So there's an immediate connection between solution aversion and inferred justification. In other words, I don't like the solutions so therefore, I have to have a reason that makes sense why I reject the problem.

**Peter McCormack 00:33:22:**

Okay. Another interesting and frustrating part of doing the research, and there's so much research. And actually, this is a common thing with any topic I look at. It doesn't matter whether I'm in Bolivia looking at Evo Morales and the opinions of indigenous people versus the people who think Evo Morales is a dictator and the arguments and the fad and the stuff that comes against that, or whether it was something to do with Bitcoin. It doesn't matter what subject, there is an information warfare.

**Peter McCormack 00:33:53:**

But one of the most difficult things I struggle with is people kept recommending other people that I should have on the show. Have you seen the film Contagion?

**Katharine Hayhoe 00:34:03:**

No.

**Peter McCormack 00:34:04:**

There's a film called Contagion and there's a guy in it that Jude Law plays Alan Krumwiede. He's a blogger. No background in ... It's about a pandemic. He's got no background in medicine but he's a blogger who has lots of followers and there's a number of these people who have started to appear. So there's about, I think, one was called ecosense maybe, I can't remember the tech names. But two or three that people kept recommending and I just refuse to even enter into a debate because they have no background.

**Peter McCormack 00:34:31:**

But they seemed to be gaining a following from the videos they're putting out and what I noticed specifically what they're doing is they're knitting together these little bit of information. They're creating a YouTube video that knits this together and I can see how they're building a compelling argument if you're not smart enough just to go and research and realise they're not a scientist.

**Katharine Hayhoe 00:34:52:**

Yes, that is exactly what is happening. And they're very successful. Some of them are self-supported and self-funded. Others have very large budgets like PragerU, for example, on YouTube for advertising. And they're wildly successful because they are giving people the information that they want to justify the opinion they already have.

**Katharine Hayhoe 00:35:13:**

So social media platforms, unfortunately like YouTube, are actually designed to radicalised people. I mean, social scientists have done studies on YouTube showing that if you watch a video on topic X, YouTube will recommend another video for you to watch subsequently on topic X that is further down the rabbit hole, more radical than the one you just watched.

**Katharine Hayhoe 00:35:37:**

And it happens in both directions on the political spectrum. And so people might watch one of my videos. I have a YouTube series called Global Weirding. And then afterwards, it might recommend that you watch something by a blogger who's put together some sensationalist video full of half-truths and mistruths and false information but YouTube is actually leading you to these.

**Katharine Hayhoe 00:35:57:**

And we cease on them when we're looking for information to justify why I don't have to do anything. In fact, I shouldn't do anything. In fact, the right thing to do is to do nothing. That's what we're looking for. And the media and the internet and social media is actually making it worse.

**Peter McCormack 00:36:14:**

How is the mainstream media making things worse? Because I don't see ... And maybe something different happened here on Fox News. But generally speaking, I don't see any rejection of the climate science in mainstream media whether I'm watching the BBC, Sky News, reading The Guardian, The Telegraph, The Times, whether I'm watching CNN, whether I'm watching MSNBC, they all tend to be reporting the same issues.

**Katharine Hayhoe 00:36:41:**

Yes and no. So for a long time, mainstream media had this idea of we need to be balanced. So if we have one scientist saying this is a terrible problem, we need to find another scientist saying it's not. And for a long time, there was this idea of false balance where you have 10,000 people in one side, and 10 people on the other side but somehow you keep recycling those 10 voices because you need to show that it's 50/50.

**Katharine Hayhoe 00:37:02:**

And this is a very serious problem because research has shown that one of the most convincing arguments when it comes to climate change is the simple statement that scientists agree. So if you are implicit, if you are showing one talking head versus another, you are implicitly communicating to people that it isn't 97 to 3 or 99 to 1, it's 50/50 and communicating that scientists don't agree.

**Katharine Hayhoe 00:37:25:**

Nowadays, a number of organisations, the BBC, the CBC, The Guardian have made commitments to only report the actual facts in climate change. So we have seen a significant shift. But media today is still often based on clicks and hits. Media is a business for many organisations. It's not the BBC, not the CBC, but for many others, from CNN to MSNBC to Fox, it is a business. And because it's a business, controversy sells.

**Katharine Hayhoe 00:37:53:**

So let me just give you one example. I'm a lead author on the US National Climate Assessment which is a fantastic resource if anybody wants the latest on the science. And we who worked on this project did so on a volunteer basis. We were not paid for it. We spent hundreds of hours working on this assessment because we were convinced the people need that kind of summary of the science.

**Katharine Hayhoe 00:38:15:**

So then, CNN gets a politician on who is supported by the coal industry and no longer an active politician and he gets on then and says, "Oh, those climate scientists, they're just doing this report for the money." So I get on Twitter, and I say, "That's not true. We are paid zero dollars."

**Katharine Hayhoe 00:38:32:**

So CNN says, "Well, would you like to come on and explain how we're not paid to do this and this is the summary of the science." So I recorded a nice interview with Anderson Cooper, and they said, "Well, we'll be playing it tonight." So then I was busy actually about TED, practicing for my TED Talk, and I started to get these text messages saying, "Well, you said that you're going to be on tonight but we only saw the same politician repeating that you're in it for the money. What happened to your interview?" They didn't even air it.

**Peter McCormack 00:38:59:**

What?

**Katharine Hayhoe 00:39:00:**

Because it wasn't as controversial as having somebody say things that were untrue, but they would make people want to click. So the media is definitely trying and they have definitely improved. But the whole subculture of blogs, of internet news sites, of YouTube or social media, that's where a lot of these echo chamber of half truths and lies and deceptions



is really circulating and percolating and reaching people in ways that it couldn't have done 20 years ago.

**Peter McCormack 00:39:27:**

Well, it makes me worry about the work I do sometimes as well. I am a one-man team. Well, a two-man, I have an engineer. But I do interviews. I report on issues and I have an opinion and I've been wrong in the past, factually wrong and also I changed my opinion on things which are subjective. What can people like myself do then to help the situation?

**Katharine Hayhoe 00:39:48:**

That's a great question. So one of the most important things we can actually do is talk about it. Because data has shown that even though the vast majority of people now would agree that this thing is real even though they wouldn't agree that it affects us or it's necessarily humans. Most of us agree it's real but we don't think it matters to us. We think it matters to future generations or to people or places who live far away.

**Katharine Hayhoe 00:40:12:**

So actually engaging and having a conversation about the two most important things we can talk about is key. And those two things are these. Number one, how climate change affects the things that we already care about. So not the polar bears unless we already care about polar bears. Not poor people living on low-lying islands in the South Pacific although if we care about them and I do, then we care about that too. But our interests, who we are, how climate change affects what we already do, number one.

**Katharine Hayhoe 00:40:40:**

And then number two, what are practical positive beneficial solutions that would help us, that would help our industry, that would help our lives, that would help the economy and that would also help with climate change at the same time. These are two most important things to talk about. So any conversations that you can have about those two things, I think, would be incredibly helpful.

**Peter McCormack 00:41:01:**

Okay, that's very interesting. We'll get into those two things but that's very interesting because there was another climate scientist I approached and I won't name him, and he said, "Oh, come on, and I'll talk to you but I don't want to talk about any of the arguments about this being not true, this not being human cause." He said, "It's a waste of time." He said, "The arguments are stupid. I don't want to waste anymore time on this." He said this, which I thought was kind of interesting.

**Peter McCormack 00:41:26:**

He just wanted to talk about the facts and what we can do, nothing about the arguments against. But you're obviously willing to talk about it, which is fine.

**Katharine Hayhoe 00:41:34:**

I am because we've heard these so frequently that we need answers before we can move beyond them. They are good questions. How do we know that it isn't the sun or a natural cycle or volcanoes, or just getting warmer after the last ice age? We've been told this so frequently that we need answers to those questions to move us to a place where we're willing to engage about talking about why this matters and what we can do to fix it.

**Katharine Hayhoe 00:41:57:**

It's not sufficient, but it's sort of a necessary step to take us like from a -10 to a 0. And then to go from a 0 to a 10, we have to connect the dots to why this matters to us personally and what we can do to fix it.

**Peter McCormack 00:42:10:**

How do we know it's not volcanoes?

**Katharine Hayhoe 00:42:13:**

Well, you may have heard because there is a meme circulating the internet. You may have heard that one volcanic eruption produces more carbon pollution than humans do in 10 years. That is false. When we look not just at every volcano, we look at all geologic activity around the whole world including things like Yellowstone and Azerbaijan and places where they have gases creeping up through fissures in the earth.

**Katharine Hayhoe 00:42:40:**

We look at all geologic activity around the whole world and it turns out that it produces as much heat-trapping gases as three medium-sized states in the United States.

**Peter McCormack 00:42:50:**

Okay, so it's not the volcanoes?

**Katharine Hayhoe 00:42:53:**

It can't be. And in fact, a really big volcanic eruption cools the earth.

**Peter McCormack 00:42:57:**

Okay.

**Katharine Hayhoe 00:42:58:**

Yes, because it spews all these particles all the way up into the upper atmosphere that act like an umbrella. They reflect the sun's energy away from the earth anywhere from weeks up to a really big volcanic eruption two or three years. So volcanoes can help us out temporarily but they're not causing the warming.

**Peter McCormack 00:43:15:**

But there are clearly people out there then who are purposely disseminating misinformation, paid for by the oil and gas industry, very much in the similar way that people compare it to the tobacco industry. There's that one particular PR firm, I forgot their name, you all know them. How do you feel about these people? Because they are purposely, on purpose, they are misleading people about something which could be catastrophic.

**Katharine Hayhoe 00:43:42:**

Yes.

**Peter McCormack 00:43:42:**

Now, people don't like the alarmist. We're going to talk about the alarmist side of things but there are people who are disseminating misinformation on purpose for financial gain. How do you feel about that?

**Katharine Hayhoe 00:43:53:**

I'm glad you brought that up, because that is absolutely true. And in terms of frustration, that is what frustrates me the most. I first learned about this organised effort when I read a book by a fellow Canadian called Jim Hoggan. It's a book called Climate Cover-Up. Jim is a long-term PR expert. He's been doing this his entire career. And in Climate Cover-Up, he laid out the well-documented and tested PR strategies that very wealthy corporations, if you look at the Wikipedia list of the richest companies in the world, you have Walmart at the top, and then the rest of the top 10 are all companies that made their money off of fossil fuels whether digging them up, processing them, selling them or selling things that burn them, cars.

**Katharine Hayhoe 00:44:34:**

These very well-funded companies are using well-known, well-tested PR techniques to deliberately muddy the waters and disinform us. When I read that book, that was the closest that I have ever come to quitting, because I felt like I'm like a girl guide against the Marines. I had no idea those even existed let alone that they were using all of these techniques and here I am with my little truth trying to think that, "Oh, maybe if I just tell people the truth, they will change their minds." I thought, "How naive of me, how foolish? How could I ever compete?"

**Katharine Hayhoe 00:45:04:**

And then it got worse. Merchants of Doubt is a tremendous book or movie, yes-

**Peter McCormack 00:45:10:**

Well, I've got the book.

**Katharine Hayhoe 00:45:10:**

Oh, you got the book. The movie is slightly different but it's equally horrifying where it lays out in detail the names of the people, the amounts of money and the companies and the messages that they crafted, first of all to muddy the waters on tobacco. Then to muddy the waters on flame retardants in mattresses. Who knew? I had no idea. And then lastly, climate change and in some cases, they are the same people doing the same thing, using the same approaches.

**Katharine Hayhoe 00:45:38:**

Cherry picking, false experts, logical fallacies and misrepresentations? It is a playbook. It is a script and they are rolling it out with precision, with accuracy, with great intelligence and with enormous amounts of money all for the purpose of maintaining their grasp on their financial returns as long as possible.

**Peter McCormack 00:45:59:**

Well, that playbook is super interesting. So I've got the audio book and I'm partway through but I found a summary of the playbook online. And then one of the most interesting parts for me was that one of the strategies is to encourage the debate. It's not to flat out deny, so flat out deny, say, something you would say is to say, "Yes, we should debate this because there's some uncertainty," because by creating the debate itself creates more uncertainty and gives more time for the debate itself. That kind of blew me away because it wasn't a logical part of the playbook for me.

**Katharine Hayhoe 00:46:36:**

It is genius.

**Peter McCormack 00:46:37:**

Yeah.

**Katharine Hayhoe 00:46:37:**

Because what it does is it makes you seem open-minded. It makes you seem shrewd. It makes you seem careful, all good characteristics, but it completely paralyzes action because all you need to say is I'm not sure to paralyze action. You don't have to say, "Does it really?" You just have to say, "We don't know."

**Peter McCormack 00:46:52:**

Can I tell you my really unscientific reason, I believe, climate change is real?

**Katharine Hayhoe 00:46:57:**

Absolutely.

**Peter McCormack 00:46:59:**

... And caused by humans. So someone like me has to trust other people. So I have to read all the information out there. And so I go through the process. I'll read what you've put. I'll watch your TED Talk. I'll watch other talks. I'll research the people behind it. And the people I trust tend to be academics, and the people I don't trust tend to be backed by the oil and gas industry but it's just some chain.

**Peter McCormack 00:47:21:** But also, add into that, there were just little things that seemed to me very obvious and I don't believe the mainstream media is lying when it reports this, that, I don't know, 9 of the last 10 years have been the hottest on record. The UK has record flood warnings. We just had record flood warnings. We just had a record temperature recorded, was it in Greenland or-

**Katharine Hayhoe 00:47:42:**

Antarctica.

**Peter McCormack 00:47:42:**

... Antarctica.

**Katharine Hayhoe 00:47:43:**

Over 20 degrees.

**Peter McCormack 00:47:44:**

Yes. So I keep seeing all these information and I really struggle to picture that this is a coordinated global effort by the governments of the world because they want to tax us more. And we will talk about the solutions and tax. It is sadly one of the things that people focus on, but I struggle to think this is a coordinated effort by the governments of the world to tax us more and they're managing to infiltrate every news organisation with misinformation. I find that idiotic to believe.

**Katharine Hayhoe 00:48:22:**

Well, the fascinating thing is that that is exactly the projection that these genius PR people

are making. So the reality is, is that the richest companies in the world whose bottom line depends on fossil fuels, continuing our addiction to fossil fuels as long as possible, they have made a very cold and calculated decision that the best use of their money is to muddy the waters and delay action as long as possible.

**Katharine Hayhoe 00:48:46:**

And part of that is accusing scientists of doing exactly what they're doing. We are often accused of being in it for the money. And I find that to be sort of humorous because I would make the same amount of money if I was an astrophysics professor as I do as a climate scientist. And if you compare my salary to that of an oil companies executive, there would be a few extra zeros at the end before you would even get close.

**Peter McCormack 00:49:07:**

I'm sure you could earn more money to be a climate change denier working for oil and gas industry company, can you? And that does come up. People keep saying, "Well, because you say all these people are funded by the oil and gas industry." And they say, "Well, these people are funded by the government."

**Katharine Hayhoe 00:49:22:**

Well, the interesting thing is that people often think, "Oh, you get those big grants. So all the big grants that you get from the government go right into your Swiss bank account to pay for your luxurious vacations." And the reality is, is that people don't realise if you get a million dollars, so I actually get a million dollars one time. That sounds like a lot of money, right?

**Katharine Hayhoe 00:49:39:**

There were five of us on the grant. So you divide that by five. That's \$200,000 each. That's pretty decent. But it was a four-year grant, so that means you get \$50,000 a year. Okay, that's still respectable, \$50,000 a year. Then the university takes a third of that. So all of a sudden, you're down to just over \$30,000. So what do you do with \$30,000? Well, I paid for graduate student. They make the princely sum of about \$24,000 a year, which you can live on but it doesn't allow for a lot of luxuries. And then you have to pay their tuition on top of that which is an extra \$10,000.

**Katharine Hayhoe 00:50:14:**

So I'd already spent everything I had plus some extra and I didn't even have money left to buy them a computer or to pay for them to publish their journal articles which cost between \$500 and \$2,000 to publish. They don't pay us. We pay the journals. That's how you break down a million dollars. And not a penny went into my own pocket and people don't realise that. We hear about these astronomical sums and we think, "Oh, they've just got this wheelbarrow full of cash, they roll into the bank in a private island somewhere in the Caribbean."

**Katharine Hayhoe 00:50:40:**

Whereas in reality, we're all working at the same level and we're doing so because we want to uncover the truth.

**Peter McCormack 00:50:46:**

And there's no secret meeting in Washington because they hand over the million dollars

where they say, "Katharine, we're going to give you the grant, but we just need the data to look terrible because we've got new taxation plans."

**Katharine Hayhoe 00:50:58:**

I have never been invited to one of those. And in fact, if anything, in my field, people are worried that there are secret meetings taking place saying, "Oh, if any of those grant proposals come in with the words climate change on them, strike them." So I've even heard anecdotally from colleagues that they have been self-policing themselves on research grants because they're concerned with the current administration that if they propose to do work related to climate change, it wouldn't be funded.

**Peter McCormack 00:51:22:**

Another interesting question before we start getting to some of the juicier bits is-

**Katharine Hayhoe 00:51:26:**

Oh, it's been pretty juicy, I think so far.

**Peter McCormack 00:51:28:**

Well, I think this is a juicy question. If you consider the climate change scientist as a community, what mistakes do you think you as a community, not you individual, have made which have not helped your cause? There's been a big debate about the 97% consensus which has been an issue and people keep saying, "Well, the models are wrong. We were meant to be underwater by this time, blah-blah-blah."

**Peter McCormack 00:51:52:**

There are a couple of things that come up. But for you yourself, are there any kind of key mistakes that you think as a community that you've made that hasn't helped the cause?

**Katharine Hayhoe 00:52:01:**

Oh, yes. That's a great question. I love that. There absolutely have been but they're not the ones you list because those are straw man arguments. A straw man argument is where you say something that isn't true, like those models that we'd all be underwater and we're not. That's not true. And then you asked someone, "Why did you say that?" So it's like, "Why do you beat your spouse," and then you're kind of caught back footed saying, "Beat my spouse? I don't beat my spouse," and then you're recorded saying you beat your spouse.

**Katharine Hayhoe 00:52:27:**

The reality though is that we absolutely have committed errors, and here are some of them. The first one is that we believed in the knowledge deficit model. That is an educational model where the idea is if people don't have the correct opinion about something, if they think two plus two equals five, you've explained the facts to them and they change their minds. We have been operating on a science deficit of a knowledge deficit model for decades. The idea that, "Oh, if we just tell them the truth, they'll change their minds."

**Katharine Hayhoe 00:52:57:**

So when we hear all these people making up these reasons why climate change can't be real, the scientist had just doubled down on, "It's real, it's real, it's real. Here's the data, here's the data, here's the data." And that has not changed anybody's mind. In fact, it has fed right into what you refer to earlier. It is fed right into the idea that there is a debate. So there are still many scientists to this day who are saying, "Oh, yes. If you have questions, I'll

engage with you. I'll listen to everything you have to say. I will patiently point out for the 10 billionth time why we do trust this data and why this data is releasing this."

**Katharine Hayhoe 00:53:29**

And so by engaging in this, by giving the loudest voice as the most airtime, by believing in the knowledge deficit model, we are actually actively contributing to the idea that there is a debate. That's error number one. Error number two is scientists are inherently conservative. And by that, I mean small C conservative. We hate being called alarmists. If we have a choice between underestimating versus overestimating, we will always underestimate. And so in recent years, people have started to actually dig into this and show that we have systematically underestimated the risks associated with climate change.

**Katharine Hayhoe 00:54:10:**

We have lowballed ourselves on what is already happening today, the Australian wildfires. They're what we expected in 2050, not 2020.

**Peter McCormack 00:54:20:**

But people will say the arsonists started this.

**Katharine Hayhoe 00:54:23:**

They say, sorry, what?

**Peter McCormack 00:54:23:**

They were started by arsonists.

**Katharine Hayhoe 00:54:25:**

Oh, dear. Yes, so it's really interesting because talking about the internet and fake news, within days of the bush fires and of people standing up and saying climate change made them worse, there was these reports circulating of 200 arsonists. And in fact, people even said and I saw this on social media, the arsonists were climate activists who were lighting the fires on purpose to make us more worried about climate change. That's a rabbit hole if you've ever seen one.

**Katharine Hayhoe 00:54:49:**

But then when you start to dig in to where did these 200 arsonists come from, it turns out there's no such thing. There were some comment that was made out of context that related some record that was dating back for months. And there were not 200 arsonists that went around lighting the fires, it's just that fires are always being ignited due to human carelessness as well as some deliberate arson. In California, one of the recent wildfires was due to somebody dumping a load of flaming garbage in the dry brush. How stupid do you have to be to do that in California in the middle of the dry season?

**Katharine Hayhoe 00:55:25:**

But how climate change is interacting with these is it's not igniting the fires. The fires are ignited by us, but when they're ignited, the hotter, drier conditions mean that they run wild, burning much more area than they would otherwise. So we scientists have been too conservative with our projections and we bought into the idea that we should pay the most attention to the loudest voices. But the loudest voices on this one are the dismissives, the people who will never be convinced.

**Katharine Hayhoe 00:55:51:**

So when I talk to my fellow colleagues about climate science, I'd say, "Look, facts are important," of course they are, "but facts are not enough to change people's minds on highly politically polarised issues." We have to connect over our shared values and identity. And if we can't do that, we are not the right person to be having that conversation.

**Peter McCormack 00:56:09:**

Okay, two main mistakes. Anything else to add into that?

**Katharine Hayhoe 00:56:16:**

I don't think that this is a mistake, but I think that this is a limitation. And that is the fact that what makes a good scientist, the ability to think in abstract terms and to think in theoretical terms, to think long-term rather than here and now in the concrete, that ability that makes us a good scientist, it actually often makes us a very poor communicator.

**Katharine Hayhoe 00:56:38:**

So it's nobody's fault but we have this situation where the people who know the most about this huge global problem that is threatening our civilisation are the people who in many ways are least equipped to talk about it in the public sphere in a way that relates to people and resonates with people.

**Katharine Hayhoe 00:56:54:**

So just to give you an example, here in the US, there's a senator, Jim Inhofe from Oklahoma, who is very opposed to climate change. And he is a very concrete thinker. And so for example, one day it snowed on Washington, DC. He brought a snowball into the senate and held it up and said so much for global warming. That was genius. It was a genius piece of communication. It was dead wrong, but it was genius.

**Katharine Hayhoe 00:57:18:**

Whereas a scientist would be saying, "Well, climate is the long-term average of weather in at least 28 to 30 years. When we look at the average statistics of how snowfall has gone," they've lost you after four words. And here is a man holding up a snowball saying, "It's cold outside. Where's global warming?"

**Katharine Hayhoe 00:57:34:**

So, this isn't an error that we committed but it is an inherent limitation and that what makes us good scientists makes us really bad at communicating basic essential information to people. And that's why it shouldn't just be on the shoulders of the scientists. We really need everybody including people who are really good talking about it to be part of this.

**Peter McCormack 00:57:53:**

So my friend, Jamie Bartlett, and I say friend, because the guy has been on my podcast a couple of times. He also did a really great podcast himself. He's written a lot. He wrote an article specifically about climate change demonstrators, and he says they don't tend to bring great PR for themselves because of they tend to be very hippy, tend to be doing things like dancing outside of buildings and closing down roads and frustrating people. And he said they haven't brought the greatest PR to themselves. After that, there is some quite alarmist behavior around this. We can use Greta Sundberg as an example. Do you think she has been good for the cause or bad?



**Katharine Hayhoe 00:58:42:**

Well, I would separate what you're talking about from the children because I feel like the children have been very different. They are there saying, "Our future is at risk. Please, do your job as adults." And so they are out there sounding the alarming saying, "We need you to act." And in terms of Greta herself, her speeches are fact-checked by scientists before she gets them. You can't say that for other organisations, the Extinction Rebellion or the Sunrise Movement and a lot of politicians. You can't say that their speeches are necessarily fact-checked by scientists.

**Katharine Hayhoe 00:59:16:**

But for her specifically, they are. And if it sounds alarmist, it's because we scientists have been pulling our punches. We have been pulling the punches. The science is there. She has not said anything I am aware of that is not backed up by peer-reviewed science. It is really bad and it's probably worse than we think. But acting now, we can avoid the worst of the impacts. But the future really is in our hands. It's not inevitable yet. Some of it is. It's like you've been smoking a pack of cigarettes a day for decades already but you don't have emphysema, you don't have lung cancer and you're not dead.

**Katharine Hayhoe 00:59:49:**

So the time to act is now and there is hope, but we have to recognise. We have to have that moment where you sit down with the physician. The physician says, "You have spots on your lungs. It is going in one direction. If you continue on your current pathway, I give you a 90 whatever percent chance of lung cancer before you die and that is a terrible way to go." So now is the time to make a better decision and that is really what the children are telling us.

**Peter McCormack 01:00:13:**

I feel like those messages have been out there. I feel like I've heard them. I felt like we've been told again and again if we do not achieve a certain reduction in carbon emissions by a certain date, these are the problems we will be facing.

**Katharine Hayhoe 01:00:30:**

Well, I'm glad you brought that up because this is one of the big miscommunications between science and between people who talk about the science. The idea that there's a magic threshold that we have 12 years, now 11 years, now 10 years to do something. If we do something in 10 years, it will be okay, if we do nothing in 10 years, it's all over. People say, "Oh, but we got that number from the science." Well, they didn't. Here's where it comes from.

**Peter McCormack 01:00:53:**

Brilliant.

**Katharine Hayhoe 01:00:54:**

Yes. So in 2015, the world came to Paris for the climate conference and they said, "We need a goal or a target." As scientists, we know that every little bit that the world warms carries additional impacts with it. We know that just as there's no magic number of cigarettes you can smoke and be okay and then if you smoke one more you die, in the same way there's no magic threshold of this amount of warming as totally fine but if you go half a degree over, it's all over. But as humans, we need a target.

**Katharine Hayhoe 01:01:24:**

So the world came to Paris and they said, "All right. We have a target. We're going to set a target of two degrees C." And then a number of countries got together and said, "Well, actually for us, two degrees C is horrible. What about one and a half degrees?" So the IPCC went back to the scientists who write those reports, the big climate reports, and they said, "We don't even know what the difference is between one and a half and two degrees C. We know that it will be worse but in what way? Could you put some numbers on the difference?"

**Katharine Hayhoe 01:01:48:**

So the scientists said, "Yes, we could do that." So they produced a report called the One and a Half Degree report that came out in October 2018 that quantified the difference between a one and a half and a two-degree world. And the impacts are certainly bad on one and a half degrees. They're worse under two. They're even worse under two and a half. They're worse still under three. There's no magic threshold that we're okay at. But the more we produce of heat-trapping gases, the worse the impacts.

**Katharine Hayhoe 01:02:13:**

Then they said, "Okay, so to achieve one and a half degrees, there's only so much carbon we can produce." It's sort of like a budget. You have so much money and you have to eat off that money for the whole year. That's what the science tells us, the carbon budget that will get us to one and a half degrees. But as humans, we don't just want to budget, we want to know how do we break that out by year because every year, we have to say, "Okay, this year we're doing this. And this year we're doing that. And that year, we're doing that." It's kind of like if you have to lose 15 pounds to fit in the dress you want to wear to the wedding, you can't lose 15 pounds in one day. So you count your calories day by day, hoping to lose a fraction of a pound every day.

**Katharine Hayhoe 01:02:48:**

So the IPCC said, "Okay. For example we could take the one and a half degree carbon budget and we could allocate it out year by year such that if we reduce our emissions 40% by 2030, that would be consistent with the one and a half degree budget." Somehow, that statement got turned into we have 12 years until we all die.

**Peter McCormack 01:03:08:**

Yes, 12 years. So that must be very frustrating then. So it appears that there is only misinformation coming from pseudoscientists, bloggers-

**Katharine Hayhoe 01:03:24:**

Activists.

**Peter McCormack 01:03:24:**

Social media activists.

**Katharine Hayhoe 01:03:26:**

People who are worried and scared.

**Peter McCormack 01:03:27:**

There is also Chinese whispers.

**Katharine Hayhoe 01:03:32:**

Oh, yes, I do know what you mean.

**Peter McCormack 01:03:33:**

Yeah, Chinese whispers.

**Katharine Hayhoe 01:03:34:**

Telephone game.

**Peter McCormack 01:03:35:**

Yeah. I mean the Chinese whispers of what happened in the Australia, with the fire, and said, "Blame the 200 arsonists." You got Chinese whispers here.

**Katharine Hayhoe 01:03:44:**

And that was a deliberately coordinated campaign, that 200 arsonists? The University in Australia actually tracked it to where it came from, and it was a deliberately engineered disinformation campaign on social media.

**Peter McCormack 01:03:56:**

Do we know actually where it came from?

**Katharine Hayhoe 01:03:58:**

I believe so. I believe they tracked down. Anyways, yeah.

**Peter McCormack 01:04:01:**

So how precarious is the situation now? Because I have my concerns, I have children. You can visually see the weather changing in the world. You can see it. How precarious is the situation now? Because another thing that keeps coming up is as you mentioned earlier, actually every time we get a new report it seems to be it's worse than what's previously suggested.

**Katharine Hayhoe 01:04:26:**

It is, it is.

**Peter McCormack 01:04:27:**

And Greenland is melting quicker than previously thought. And once the permafrost is gone, it's not going to reflect anymore which escalates the problem. And now the seas, because the sea is warming up is actually melting the ice. All these things, it seems to be escalating. How precarious is the situation right now?

**Katharine Hayhoe 01:04:47:**

Well, it absolutely is getting worse. You're totally right and we understand with every new study that comes out that it's worse than we thought. So some amount of damage is irreversible.

**Peter McCormack 01:05:00:**

Okay, so we're at that point?,

**Katharine Hayhoe 01:05:01:**

We are going to have to live with some of the damage, yes. So for example from the 1960s until now, climate change has already increased the economic gap between the richest and

poorest countries in the world by 25%. That has already happened. Since the 1980s, we have been losing about a billion dollars' worth of crop losses due to climate change, most of it in poor countries. That's already happened.

**Katharine Hayhoe 01:05:21:**

We have already seen about eight to nine inches of sea level rise, and a few more feet are already inevitable and that will displace millions of people around the world. That has already happened. But, and this is the research I do, I look into the future and I say what if. What if we continue to depend on fossil fuels for the next century? What if we transition off fossil fuels very slowly at the rate that we're doing today? What if we transition off a bit quickly and what if it's all-hands-on-deck climate emergency, let's do this as quick as possible? What is the difference between those different futures?

**Katharine Hayhoe 01:05:58:**

And I believe that by studying the difference that will actually help us make a choice. So the difference is not the survival of the planet. The planet will still be orbiting the sun long after we're gone. It's not about saving the planet, it's about saving us. After the polar bear, we humans, our civilisation is the most vulnerable on the entire planet.

**Katharine Hayhoe 01:06:17:**

We have almost eight billion people and we have built our entire civilisation, our economy, our infrastructure, our food and our water systems, our political systems are all predicated on the assumption of a largely stable climate as it has been over the history of human civilisation.

**Katharine Hayhoe 01:06:33:**

Our fluctuations have been very minor over the last few thousand years that we've developed our economic and our infrastructure and our agricultural systems. We are what is at risk. And the difference between those future scenarios that I look at is the difference between the survival of human civilisation or not. That is what is at risk.

**Peter McCormack 01:06:53:**

That's a big bold statement. It's going to piss some people off.

**Katharine Hayhoe 01:06:57:**

It's the truth.

**Peter McCormack 01:06:57:**

Excuse my language, yeah. So I think we should go into that a bit more.

**Katharine Hayhoe 01:07:02:**

Well, as a physician, I feel like we are the physicians of the planet. You don't want a physician to tell you that your lifestyle choices have put your life at risk. But the physician's moral responsibility is to say that. And you could turn to the physician and say, "Oh, you're just in the pay of big pharma. You're just telling me this because you want me to take expensive drugs, or you want me to stop eating something that you might have a stake in."

**Katharine Hayhoe 01:07:27:**

You could attack the physician. You could say, "Well, I don't believe you. You're part of a global conspiracy. I feel fine today. I didn't cough today, so I'm okay." How you react is your

choice, but as a physician, the physician has the responsibility to tell people the truth. And so as climate scientists, that is our responsibility, I believe, is to tell people that our lifestyle choices will determine our future. It is not too late to preserve our civilisation. It is not too late to transition our entire economy to a better future.

**Peter McCormack 01:08:00:**

When you talk about the civilisation, are you talking about as it is at the moment? Or are you talking about a complete wipeout of the human race? Or are you talking about that it will be just so, they'll be such catastrophic change that humans will just be in survival mode in little tiny units in countries? What are we talking about here?

**Katharine Hayhoe 01:08:18:**

I'm not talking about the human race either. Now, I'm not a biologist, so don't quote me on this. But it is my considered opinion that there will certainly still be humans in a world with unchecked climate change.

**Peter McCormack 01:08:28:**

But not as civilised as we can see societies we have now?

**Katharine Hayhoe 01:08:32:**

Right. So let me give you some examples. So if sea level rise continues unchecked, it would displace hundreds of millions of people. Think of the Syrian refugee crisis. That was about the external refugees where, what, somewhere around two million, no more than that, and that was a huge issue.

**Katharine Hayhoe 01:08:48:**

So imagine the Syrian refugee crisis times a hundred, then times a thousand. Imagine that number of people with nowhere to live and that's only sea level rise. Then you factor in the crop failures, you factor in the droughts, you factor in the extreme heat. I mean where would you even put all those people?

**Katharine Hayhoe 01:09:11:**

So then you think about the economic response. It would have a huge economic response. It would have a huge response on people's health and welfare. It would have a huge response on political systems. People would harden the borders. They would shut down the borders. The world will become much more isolated, but then all of the goods that we used to get from different countries, where would they come from. I mean political scientists are probably some of the most concerned people because they understand that our political systems require stability.

**Peter McCormack 01:09:38:**

In some ways, are we getting a small window into this for what's happening with coronavirus and in China and that the supply chain systems are breaking down?

**Katharine Hayhoe 01:09:49:**

Yes, in a way. So coronavirus is not caused by climate change at all.

**Peter McCormack 01:09:53:**

Yeah, of course. What I'm saying is-

**Katharine Hayhoe 01:09:54:**

Some people asked.

**Peter McCormack 01:09:55:**

... You're talking about the movement of goods and such like we are seeing at the moment where a country shuts down, the supply systems break down. Therefore, for example, the car manufacturers can't make cars alone because they can't get the parts they were getting from China. So you're talking about, essentially we have a very fragile global economy which is based on having a stable climate. Without that, everything will start to break down?

**Katharine Hayhoe 01:10:22:**

Exactly. It's like dominoes. Let me give you another concrete example. So in 2011, there were some devastating floods in Thailand. And we know that as the world gets warmer, warmer air holds more water vapor. So when a storm comes along and it's warmer, there's more water vapor for it to sweep up and dump on us than there was 50 or 100 years ago. So the floods in Thailand were made worse by climate change and it turns out that that is where a key part of hard drives is manufactured.

**Katharine Hayhoe 01:10:47:**

So because they had to shut down, then I think something like 50% of the world's hard drives supply was affected. In the United States, it affected Apple and Hewlett-Packard and all the big computer manufacturers. The cost doubled because you couldn't even get anything out of Thailand. And so there was this crisis in the computer industry because of a flood in a country in the other side of the world. And that's just the very most tip of the iceberg.

**Peter McCormack 01:11:12:**

And we're starting to see more of these extreme weather events.

**Katharine Hayhoe 01:11:14:**

Yes. That's why I think that the most appropriate colloquial term for this issue is global weirding, and that's what I call my YouTube series, Global Weirding. Because global warming, that increase in the average temperature of the planet by one or two degrees, none of us can ever actually experience that personally. We would have to add up the temperature at every weather station around the world for multiple decades and add it all up. And that's just not something we identify with.

**Katharine Hayhoe 01:11:39:**

What we identify with that was the fact that it is getting weird. In other words, we've always had storms and droughts and floods and heat waves, cyclones, hurricanes. We've always had those, but we can see that they are getting stronger. They are getting bigger. In some cases, they're getting more frequent. The summer heat is getting more intense. We're breaking more records. We're seeing things happen that are not normal.

**Katharine Hayhoe 01:12:03:**

And they don't just affect our perception of the world, they're affecting our bottom line. They're affecting our economy, our food, our health, our air quality, our water resources, our energy, our trillions of dollars of infrastructure which was all designed to building codes based on a last century, not this one. We have our entire civilisation that is currently at risk

because our civilisation is based on a concept of stationarity, the idea that climate is relatively stable which it has been over the course of our civilisation.

**Katharine Hayhoe 01:12:33:**

So we have, in effect, been driving down the road looking in the rear view mirror. We have been planning everything we do whether it's our economy, our building codes, our energy or water allocation. We've been planning it based on the past rather than the future. And driving down the road as you know here in West Texas, it works great if the road is straight. You can get away down the road just looking in the rear view mirror.

**Katharine Hayhoe 01:12:58:**

But if there is a curve in the road and you are looking in the rear view mirror, you will run off the road. And today, there is a massive curve in the climate road and our collective wheels are already on the rumble strip.

**Peter McCormack 01:13:13:**

Again, it is quite a scary scenario you paint, and you're going to not like this question. But what kind of time frame are we looking at? Is this something that's a century away or is this something that could be 30 years away? Is it really that hard to give any kind of picture?

**Katharine Hayhoe 01:13:32:**

Yes and no. Some of the impacts are here today.

**Peter McCormack 01:13:35:**

Yeah, of course, yeah.

**Katharine Hayhoe 01:13:36:**

It's not like it's the future. It is now. We have already seen them. What I do is I look to the future and I say, "If the world gets warmer by one degree or two degrees or three degrees, what will happen to our water supply in a given place? What will it feel like in terms of if you live in New York City, will it feel like Washington DC? Will it feel eventually like Atlanta, Georgia?" We can actually put numbers on these.

**Katharine Hayhoe 01:13:59:**

So I can tell you, for example, I can look at corn production. I can look at water supply for a water district here in Texas. I can look at wildfire risk. I can look at these things and I can say, "If the world gets warmer by one and a half degrees or two degrees or three or four degrees, here's what's going to happen." You know what the biggest uncertainty is? Us. We are the ones who are going to decide what level of warming we will see. We are the biggest uncertainty in our future.

**Peter McCormack 01:14:27:**

See, I have very little confidence in us as human race. I just do. I do, because you know why? Because it feels like very little is being done at a government level. It feels like this requires some international coordination to make something happen. It feels like ... And I think one of the biggest problems for this is the term length of a president or prime minister.

**Katharine Hayhoe 01:14:51:**

I agree.

**Peter McCormack 01:14:51:**

... And that they have four or five years and the decisions they have to make could have such a severe impact on people that they worry that they won't get reelected, or they worry about their legacy. And they know in five years the problem from now to five years away won't be that significantly different that you can blame them. I've always found that I think that's one of the biggest problems.

**Katharine Hayhoe 01:15:14:**

I think you're absolutely right. And that's why as a Canadian, I'm very glad that we now have Prince Harry. Maybe he can help us with that long-range plan and return to the monarchy would really help because you've got the queen, how long has she been queen? She's passing onto her family, so she's very invested on the centennial timescale.

**Peter McCormack 01:15:28:**

Be careful. People are going to listen to this. They're going to say, "That will be the quotes. That will be the quote right there. Well, **Katharine Hayhoe**, her solution to this is to reinstate the monarchy."

**Katharine Hayhoe 01:15:44:**

Exactly.

**Peter McCormack 01:15:44:**

Yeah, okay.

**Katharine Hayhoe 01:15:44:**

Now, I'm saying that will a very large grain of salt. But I do think you're right because our current political systems are motivated and our current financial systems, if you are looking at your quarterly returns for your stock prices, all of our current decision-making focuses on the short-term, and climate change is a long-term problem.

**Katharine Hayhoe 01:16:02:**

Now, for the US, the cost of meeting the Paris Agreement versus the benefits of doing so, so the impacts avoided, the breakeven is about 5 to 10 years. But you wouldn't see the benefits until after you weren't president anymore where you'd bear the costs now. So it really is part of ... It's not only a psychological challenge that we are talking about before, it is also a political challenge. We have built the challenge into our political systems because we have no motivation to make choices for long-term benefit.

**Peter McCormack 01:16:37:**

Okay, so let's talk about two different scenarios of change. Let's talk about individual and then let's talk about at state level. So I am a huge hypocrite. I have a huge carbon footprint. Absolute transparency, I flew 92 times last year. I've already flown 20 times this year. What are the things I can do at a personal level that will genuinely make a difference? Or is it futile? Is anyone on an individual level, is it futile? Because if I don't fly, that plane is still going to fly. The airline industry is still projected to grow. So is it really futile, or there are things that we can as individuals do that will make a genuine difference?

**Katharine Hayhoe 01:17:19:**

I would say that one of the most common questions that I get is, is it a system-wide solution that we need or individual solutions? And my answer to that is yes.



**Peter McCormack 01:17:29:**

Yes, both.

**Katharine Hayhoe 01:17:30:**

Yes, exactly.

**Peter McCormack 01:17:30:**

Yeah, I know and I can understand that because everything contributes.

**Katharine Hayhoe 01:17:33:**

It does. So if you look at our carbon emissions since the beginning of the industrial era, 100 companies are responsible for 70% of emissions. 100 companies, since the beginning of the industrial era.

**Peter McCormack 01:17:48:**

How many of them are here in the US?

**Katharine Hayhoe 01:17:50:**

A number are here in the US, a number are in the UK. Some still exists, some don't and they are the big fossil fuel companies, the Shells, the BPs, the Exxons and Chevrons of the world.

**Peter McCormack 01:18:00:**

Whose scientists backing the late '70s knew the science.

**Katharine Hayhoe 01:18:04:**

Oh, yes. In fact, I interned at Exxon during my master's degree and we published research on climate change and heat-trapping gases. So in that sense, we have to have a system-wide change because our fossil fuel use is heavily subsidised. In the United States, fossil fuel subsidies top \$650 billion US per year which exceeds the Pentagon's budget. And some people may argue that part of the Pentagon's budget is also a fossil fuel subsidy because why would you care about certain countries if they don't have large fossil fuel reserves?

**Peter McCormack 01:18:35:**

I did not know this. I did not know it's subsidised.

**Katharine Hayhoe 01:18:37:**

That's according to the International Monetary Fund, not Greenpeace.

**Peter McCormack 01:18:41:**

We can trust the IMF.

**Katharine Hayhoe 01:18:41:**

Yes, you would think so. Globally, fossil fuel subsidies are 6% of the world's GDP, 6%. The fraction of subsidies, the go-to renewables is minuscule compared to that. So the reason why we need system-wide change is because we don't have a free market. It is not a free market. Fossil fuel use is heavily subsidised which means that the market is slanted towards continuing to use these sources even though we really have no financial reason to do so.

**Peter McCormack 01:19:08:**

Good one for the libertarians?

**Katharine Hayhoe 01:19:09:**

Absolutely. In fact, if you're a libertarian, you should be outraged by the fact that we are subsidising the richest companies in the world. If you go again to Wikipedia, you look at the richest companies in the world, you've got Walmart at the top, which is planning to be 50% clean energy by 2025 and then all the rest the way down, you've got all these fossil fuel and energy companies that are making all of their money off us.

**Katharine Hayhoe 01:19:32:**

So that's why we need system-wide change, and this change is happening. So I'm from Canada where we have a price on carbon. A price on carbon is what, nearly every economist in the world including the two who won the Nobel Prize for economics last year agree, is the most effective way to use the free market to reduce emissions. Yanking all of the subsidies is difficult because some of them date back to land leases in the 1800s. So instead putting a price on carbon and taking the dividends and returning them to middle and low income household, so individuals are not harmed by it, is really effective.

**Katharine Hayhoe 01:20:05:**

And in fact, in early 2020, there was a conservative think tank called the climate leadership counsel in the US that's led by Bush era republicans, they released a plan to put carbon pricing in the US. And they estimate that starting in year one, the average American household would receive \$2,000 back in their taxes due to the carbon price. And you can ratchet it up year after year as they're doing in Canada, and the economy will in turn wean itself off carbon to make more money in other ways.

**Katharine Hayhoe 01:20:36:**

So in Canada, the four provinces that had a price on carbon before it became a federal policy were the four provinces that actually led the country in economic output over that time. That's pretty amazing.

**Peter McCormack 01:20:48:**

How do you put a price on carbon?

**Katharine Hayhoe 01:20:50:**

Well, the easiest way is to do it at the production site. So in other words, if you are going to sell gasoline, then you add not very much. I mean it's a matter of like 5, 10 cents which given prices today is not much. You add that to the price. The government collects all of that from the producers. It's not from the individual gas station but from the producers and then you use that money to, first of all, make sure that middle and lower income households are not harmed, and then use the remaining stuff to subsidise and incentivise energy efficiency programs, electric cars, clean energy technology, research and development to accelerate the economy in that direction.

**Peter McCormack 01:21:29:**

Conservatives will not like this as a policy if it's income redistribution.

**Katharine Hayhoe 01:21:33:**

Well, first of all-

**Peter McCormack 01:21:35:**

They'll call you a communist.

**Katharine Hayhoe 01:21:36:**

It's desocialising the current situation which is highly socialised. We are paying for the fossil fuel companies. But the interesting thing is it's a free market mechanism. And so the Climate Leadership Council in the US who just put this forward is a conservative organisation. And there is something in congress called the bipartisan Climate Solutions Caucus. You can only join if you join with somebody from the other party, so you have to join ... A democrat has to join with a republican and they support carbon pricing because it is a truly bipartisan solution.

**Katharine Hayhoe 01:22:06:**

So as a climate scientist, I'm in favor of anything that cuts carbon and doesn't hurt people. But as a human, I like the pragmatic approach of something that you can get people onboard with across the political spectrum because otherwise with you, I don't think that's going to happen if we can't all get onboard.

**Peter McCormack 01:22:23:**

This isn't the carbon tax credits, right? This isn't the tax credit system that allowed people to buy and sell?

**Katharine Hayhoe 01:22:28:**

No.

**Peter McCormack 01:22:29:**

Because that is thoroughly disliked, right? Because it can be abused.

**Katharine Hayhoe 01:22:33:**

It can be very much abused. And Russia really abused that system because their economy took a downturn after they've gotten their carbon credits. They sold hot air to other countries essentially that they weren't ever going to produce but they had the credits for. So, no, this is very much if you use it, you pay for it.

**Katharine Hayhoe 01:22:49:**

And so if somebody still wants to drive a Hummer, you can drive a Hummer. Nobody is taking your Hummer away but you just pay the real cost. Now the interesting thing is, I don't know if you saw during the Super Bowl which of course, is a big thing here in the US, there was a commercial for a new electric Hummer, a thousand horsepower electric Hummer. So the world is starting to change and individual choices are part of this too.

**Katharine Hayhoe 01:23:13:**

Like what? Well, a lot of these big corporations have shareholders who have been attending their meetings saying, "We need you to change." So for example in 2020, BP announced they plan to be carbon neutral by 2050.

**Peter McCormack 01:23:28:**

Yeah, I see that but-

**Katharine Hayhoe 01:23:29:**

How, I'm not quite sure.

**Peter McCormack 01:23:29:**

Yeah, how, out of all companies. But it was so far in the distance is going to ... That policy, whoever is the CEO probably won't be alive at that time, 2050.

**Katharine Hayhoe 01:23:40:**

Yeah, probably not. But if they want to transition to be an energy company, that is what they have to do because we need energy but we've been using fossil fuel since the Middle Ages. I mean we've been burning coal since ... Did you know the very first air quality legislation due to pollution from burning coal was in the 1300s in London? King Edward announced that if anybody burn coal within the city limits while his queen was in residence, the Tower of London, they would be killed. The penalty was death.

**Katharine Hayhoe 01:24:09:**

Once the queen was gone, all that is wrought. But we've been using this stuff for hundreds of years. It is very old technology and it really is time to move on.

**Peter McCormack 01:24:18:**

What is the best clean energy renewables that you like? Because again this is another thing, you'll say something like wind farms, I say, "Well, the energy that goes into producing the wind turbines and then they can't be recycled so they have to be buried in the ground. They're very inefficient," or, "The energy used to produce the electricity to power the Tesla has to come from cold place power plants, actually power that provide the electricities of the house." Is this all just another bunch of nonsense or is there some valid criticisms?

**Katharine Hayhoe 01:24:46:**

There always a grain of truth to these, but it's just a grain. So for example, it takes, I think about six to eight months for if you created the wind turbines using fossil fuels, it would take six to eight months to break even and then start producing more clean energy. But the average wind farm lasts for well over a decade, not six to eight months. And increasingly, a lot of companies like for example Tesla, they are powering their production with clean energy. So there is no lag to payoff. It's 100% clean energy from the get-go.

**Katharine Hayhoe 01:25:15:**

Recycling solar panels and wind turbines is a big deal and people are looking at that because already here in West Texas, they've replaced the blades already once with much longer, more powerful blades. You have to recycle this material, otherwise, you're creating a worse problem but it's not as bad a problem as fossil fuel pollution that kills millions of people around the world. Wind turbines are not killing millions of people around the world.

**Katharine Hayhoe 01:25:38:**

There is no free lunch yet when it comes to energy, but the best source of energy in my opinion is a mix. There is no one magic silver bullet but depending on where you are and what resources you have, there's different ways to get energy that are cheaper and more affordable than others. So for example, here where we live in West Texas, wind is the cheapest type of energy. It's even cheaper than natural gas. In California, solar with storage is cheaper than natural gas.

**Katharine Hayhoe 01:26:03:**

If you live up in Alaska or the Arctic, solar is a little bit of a challenge there. So they're getting very creative with hydrokinetic energy from streams. A lot of remote villages are

using that. Some of them are using geothermal energy. Some of them are using biomass energy. There's a company in Iowa that collects used cooking oil and turns it into biodiesel for trucks which I think is amazing. The United Airlines is flying biofuel flights out of the LAX airport.

**Peter McCormack 01:26:31:**

I have been in one of those.

**Katharine Hayhoe 01:26:32:**

You probably were. So the solution is not for us all to go without because so often we hear ... Speaking of individual solutions, we hear, "If everybody went vegan, that would fix the problem." Well, first of all, animal agriculture is 14% of the problem, just 14%.

**Peter McCormack 01:26:48:**

So Cowsspiracy was wrong?

**Katharine Hayhoe 01:26:51:**

Absolutely dead wrong, I'm sorry to say. And then how many people are actually going to go vegan? Well, in a lot of developing countries, animal agriculture is used on marginal lands where you can't grow food crops and it's the staple of their diet. They don't have a different way to get much protein. So if you say, "Okay, how about in wealthy countries, we all go vegan?" well, maybe say 50% of us would be willing to do that. So 50% of us in developing countries where here in the US, animal agriculture is only 9%, it's not even 14%, you're talking about a fraction.

**Katharine Hayhoe 01:27:23:**

And then people say, "Well, if we all stop flying, that will do it." Well, flights, they are a problem. They produce a lot of carbon. They're the biggest part of my personal carbon footprint which is why I've transitioned 80% of the talks I give to virtual talks and when I do travel, I only travel when I bundle. So I have so many events in one place, it's as if I just go to one place and then I just take the train to all these different places and then I fly back.

**Katharine Hayhoe 01:27:46:**

But aviation is only 2% to 3% of the total problem worldwide. So the solution is not to say, if everybody stops flying and goes vegan, that will fix the problem, because it won't. But the solution is to say, I want biofuel flights. I fly on American Airlines. American Airlines, why aren't you doing what United Airlines is doing? I think you should.

**Peter McCormack 01:28:07:**

It's everything.

**Katharine Hayhoe 01:28:08:**

Yes, it's everything.

**Peter McCormack 01:28:08:**

It's attacked at every angle.

**Katharine Hayhoe 01:28:09:**

Yes, eat more plants. Check out Beyond Meat, or Impossible Burgers. Use energy efficient light bulbs in your home. Consider an electric car. I use one. It's actually not that much more

expensive. If you live in a place like London or when I used to live in Toronto, I didn't even own a car because I could just use public transportation. It all matters and the most important thing that any single human can do is talk about it because if we don't talk about it, why would we care? And if we don't care, why would we act?

**Peter McCormack 01:28:34:**

Thinking about my own footprint, does offsetting work? Can you offset in a way whereby whatever I'm contributing, is there a way of paying to offset that in the equivalent amount of carbon will be taken out of the atmosphere? Is that possible?

**Katharine Hayhoe 01:28:51:**

It is possible but it is not possible for everybody to do.

**Peter McCormack 01:28:54:**

No, no, I'm addressing purely on my personal level because if I'm going to tackle this as a subject and talk about it with people, I'm a huge hypocrite if I lied nearly a hundred times a year. But if I can financially pay for that amount of carbon to be taken out of the atmosphere so I'm net neutral way before BP, I'm carbon neutral way before 2050, I can do this right now, how I actually do that? And how does it actually happen? Which companies, what do they actually do? Are they planting trees? What's going on here?

**Katharine Hayhoe 01:29:28:**

We absolutely can, but it is not a fix-all because we don't have enough that we could do to take all the emissions of all the people in rich countries out of the picture.

**Peter McCormack 01:29:35:**

So a trillion trees isn't enough?

**Katharine Hayhoe 01:29:37:**

A trillion trees is not enough. It would offset maybe a year's worth of total emissions. But that doesn't mean you shouldn't do it, we should. So what I do is I use a company called Climate Stewards. It's a charity in the US, the UK and the Netherlands. It is registered and certified and that's really important. There's a lot of good organisations in Canada. We have something called Zero. There's good carbon offset organisations all over but they should be certified because you don't want them going on and planting trees and then somebody else cuts the tree down and burns it the next year. I mean that's pointless.

**Katharine Hayhoe 01:30:08:**

So use an organisation that is certified and look at what they do. Read their materials. See if what they're doing is actually useful and helpful. So the organisation that I use, they have a motto which I completely agree with which is reduce everything you can first and then offset the rest. So in other words, don't go to Bali for a yoga retreat, sorry, in another week and then just offset it like some Middle Age indulgence, "I'll get to have them because I've paid the priest."

**Katharine Hayhoe 01:30:34:**

Reduce what you can. Be conscious about your footprint but then offset what you can because you can help other people by doing so. And so that is exactly what I do. They have a website where you can enter your flights. You can enter your lifestyle. It really doesn't even cost that much. And what we're doing is we're sending a price signal to say, "I'm

willing to pay for this." And United Airlines will actually let you do it on their website. They will let you pick an offset on their website.

**Peter McCormack 01:30:56:**

British Airways do that as well.

**Katharine Hayhoe 01:30:57:**

Oh, yes. BA does too, yes. And I think JetBlue is planning to be 100% carbon neutral. They're the first carbon neutral airline. JetBlue, I believe, you have to check on this, they are personally offsetting their emissions.

**Peter McCormack 01:31:09:**

I think that's the best internal airline here in the US, by the way. Yeah, having flown them all. Okay, so that's interesting. Yes, a tough one, I get a lot of criticism for the number of flights I've done and I do want to offset, do I want to change my career? I mean, I could do more of my interviews on Skype, that I know is good.

**Katharine Hayhoe 01:31:27:**

I would.

**Peter McCormack 01:31:28:**

Yeah, I mean I'd certainly look into that. So there's a number of things we can do personally. I still fundamentally believe that it requires global coordinated government effort. I'm very doubtful if it will happen.

**Katharine Hayhoe 01:31:39:**

I'm not sure about government. The industry and cities are a big part of it too.

**Peter McCormack 01:31:46:**

Yeah. I just think the problem we have is competition.

**Katharine Hayhoe 01:31:50:**

Mm-hmm.

**Peter McCormack 01:31:50:**

And we have competitions between governments. We have competition between companies. It's a great marketing message to say, "We'll be carbon neutral by 2050." But really, how much is the incentive there right now to do this? You said some things that are kind of scary, so I feel like it needs a coordinated effort and I feel like it won't happen.

**Katharine Hayhoe 01:32:13:**

You're right. So let's close with this question which is the number one question that I get anywhere I speak, and it's, what gives you hope?

**Peter McCormack 01:32:20:**

I had that as a question.

**Katharine Hayhoe 01:32:23:**

That's the number one.

**Peter McCormack 01:32:24:**

Actually, can we do one more question before that because I think it'll lead up better before we ask "What gives you hope"? For anybody out there who is doubtful and dismissive, what would you say to them? Obviously, I personally would say to them, "Why don't you approach this with an open mind? Just forget your base. Just quietly on your own, just consider the consequences and have an open mind," but what are the things that you would say right now to say, "Look, you really need to reconsider your opinions here?"

**Katharine Hayhoe 01:32:55:**

I would say that you already care about this issue, you just don't realise it, because it affects every single one of us. We are humans. We live on this planet. It provides the air we breathe and the water we drink and the food we eat and the materials we use to make every single thing we care about. To care about climate change, we don't have to be a liberal. We don't have to be a socialist, a communist. We don't have to be a kid doing a climate strike or a hippie. We only have to be one thing and that is a human living on planet earth.

**Katharine Hayhoe 01:33:25:**

So I would say learn more about what you care about and how that's affected by climate change. And, number two, learn more about solutions because there are positive solutions that you can get onboard with if you're libertarian, if you're conservative, if you're free market, if you're bipartisan, if you're liberal, if you're socialist, if you're communist. There are solutions that you can get onboard with from every part of the political spectrum. And it just makes sense rather than saying it isn't true and burying our head in the sand like an ostrich to say, "Okay, it's true."

**Katharine Hayhoe 01:33:56:**

But you know what? There's something that we can do about it that is entirely consistent and compatible with my values, my ideology and who I am. And so I'm going to stand up and I'm going to advocate for a solution that I think is the right one.

**Peter McCormack 01:34:08:**

Okay, that's fantastic. So final question, what gives you hope?

**Katharine Hayhoe 01:34:15:**

That is the question that I hear the most. And first of all, I would say that what does not give me hope is the science. Every new study that comes out seems like it's happening faster or to a greater extent than we thought. And the politics don't give me a lot of hope either. Everywhere we look, it is just more talking heads arguing. Whether it's in the UK, whether it's in Canada, whether it's Australia or the US, neither the science nor the politics gives me hope.

**Katharine Hayhoe 01:34:41:**

So what does give me hope? What gives me hope is looking at the real changes that are already happening. Some of those are happening at the highest levels, whether it's the richest company in the world, Walmart, which is planning to be 50% clean energy by 2025, not 2050 and they want to take a gigaton of carbon out of the global supply chain. They're reaching out to all of their suppliers in their chain.

**Katharine Hayhoe 01:35:06:**

Apple which is currently number 11 richest in the world, they're doing one better. They're



already 100% clean energy and they are decarbonising their supply chain as well through China. China has more wind and solar energy than any other country in the world. Canada has a price on carbon and they are going to be banning coal. Finland is also going to be banning coal. The Norwegian wealth fund is divesting from oil and gas exploration.

**Peter McCormack 01:35:28:**

These are all individual acts?

**Katharine Hayhoe 01:35:30:**

They are country, national acts.

**Peter McCormack 01:35:32:**

So an opposition to my point of thinking that needs global coordination, people are just doing this.

**Katharine Hayhoe 01:35:36:**

They're doing it. Ireland has divested from fossil fuels entirely and the Church of Ireland has as well. Many universities and seminaries and large organisations are divesting. BlackRock, which is a huge investment firm that controls over seven trillion dollars, they just announced they're divesting from coal and it sent enormous tidal waves, not just ripples but tsunamis throughout the financial world when they said that.

**Katharine Hayhoe 01:36:01:**

So there really is action happening. And then you look around the world and you realise that 70% of new electricity being installed around the world today is clean energy. In our current skewed market with fossil fuels being heavily subsidised, you look at how they're revolutionising the lives of poor people in countries that don't have fossil fuels, but they do have sun and they do have wind. They don't have transmission grids but you can plug your cellphone into the solar panel and you can plug a light bulb into and your kids can do their homework at night and you can have a much better life.

**Katharine Hayhoe 01:36:32:**

And then I look at what's happening here in Texas. So here in Texas, we have the biggest army base in the US. Everything really is bigger in Texas. And it went with wind and solar energy two years ago because it would save taxpayers \$150 million over natural gas. We have the first carbon neutral airport in North America, it's in Dallas-Fort Worth. We have almost 20% of our electricity in this state, which is known for oil and gas, from wind and solar. 10 years ago, Texas was not even on the map for solar. Now, it's the fifth state in terms of the most installed solar and our installed solar is doubling this year and it's planning to double the next year.

**Katharine Hayhoe 01:37:13:**

So looking for hope in places that you wouldn't even expect, the fact that ... Last Christmas, I got one of those emails that you dread saying that somebody pulled your credit records. I said, "What? They've stolen my ID, I have to shut down the credit cards." And my husband said, "No, don't do that." And I'm like, "What do you mean don't do that?" He's like, "Well, I might know what it's about." And I'm like, "What is it about?" He said, "Well, I can't tell you." I'm like, "What do you mean you can't tell me? Is there something I need to know?"

**Katharine Hayhoe 01:37:39:**

But eventually he cracked and he told me that he had taken advantage of the tax rebate. He had crunched the numbers, he had gotten us solar panels for Christmas and they were from a local company in San Antonio, Texas that the last time oil prices tanked and a lot of people in the oil fields in West Texas lost their jobs, Mission Solar took these guys in, trained them to have a permanent job in solar panel manufacturing right here in Texas and that's where got our solar panels from.

**Peter McCormack 01:38:04:**

That is a man who knows his wife.

**Katharine Hayhoe 01:38:05:**

Yes, best present ever.

**Peter McCormack 01:38:08:**

That's a man who knows his wife. Well, listen, this has been very helpful to me. I definitely learned more in the session. I hope that other people will. I think we could have probably gone on for three or four hours. There's so much I didn't ask but I've got to come back in-season to watch a Texas Tech game anyways, so we will follow up. But, no, absolutely fascinating. I'm very grateful for your time. We've clearly overrun.

**Peter McCormack 01:38:30:**

Just to close out, if people want to follow you, where can they see your work? Where can they find out more about what you're doing?

**Katharine Hayhoe 01:38:36:**

First of all, if you want more on solutions, check out Project Drawdown. We have not even talked about carbon farming or anything like that which is amazing. The idea of putting carbon back in the soil where we actually wanted rather than up in the atmosphere where we don't. So check out Project Drawdown which is online at [drawdown.org](http://drawdown.org) and then you can find me on social media.

**Katharine Hayhoe 01:38:57:**

Our YouTube series is called Global Weirding, not warming, weirding. I'm also on Twitter and Facebook and Instagram. And I tried to post information that is first of all factual, second of all, they're hopeful because we all need hope. And so especially this last year in social media, I've been trying to post something hopeful a couple of times a week to say, "Here's our hope for today. Look at this conversation that somebody had with their mother who's a dedicated Fox News Rush Limbaugh watcher who finally said, 'You know what? I think this actually might be real. Let's have a conversation about it.'"

**Katharine Hayhoe 01:39:31:**

Or a conversation that somebody had with their students, where they trained their students to go and talk to and interview people they knew about climate change. And the students came back and they said, "This was amazing. This is the best conversation I've ever had with this person even though I've known them for years. We really move forward on this even though I've been dreading having that conversation."

**Katharine Hayhoe 01:39:51:**

So on social media, I tried to share these hopeful stories because we can find hope anywhere and we need to. Otherwise, we will be a self-fulfilling prophecy of doom.

**Peter McCormack 01:40:00:**

It's a great ending.

**Katharine Hayhoe 01:40:01:**

Doom.

**Peter McCormack 01:40:04:**

Doom. Well, listen, thank you for your time. I'm going to go and get myself a steak now. I'm going to fly there by plane, get a steak. Now I'm only kidding. Listen, look, I really appreciate your time, amazing interview. I'm sure we're going to talk again.

**Katharine Hayhoe 01:40:17:**

Yes.

**Peter McCormack 00:03:54:**

I wanted was to speak to somebody whose job is to know this stuff, to really rather than when getting into a debate, some people throw me all these charts and "have you seen this" and "it's the solar sun cycles". I just want somebody who's an expert I can put in and say, "Look, I'm not going to debate this." Katharine is the expert, speak to her.

**Katharine Hayhoe 00:04:17:**

Thank you.

**Peter McCormack 00:04:17:**

I'll tell you something funny. The first ever college football game I watched was with the Texas Tech game.

**Katharine Hayhoe 00:04:21:**

What?

**Peter McCormack 00:04:22:**

Yeah. Are you a local long time here? Right, so you know the game? I was at my 30th birthday. I was in Las Vegas, so which was 11 years ago. Texas Tech v. Texas, do you remember the game?

**Katharine Hayhoe 00:04:38:**

Yes.

**Peter McCormack 00:04:38:**

Crabtree?

**Katharine Hayhoe 00:04:39:**

Yes, Crabtree last second-

**Peter McCormack 00:04:40:**

Last second touchdown.

**Katharine Hayhoe 00:04:41:**

Absolutely.

**Peter McCormack 00:04:42:**

I was in the state restaurant on my birthday and the game was on. And I didn't recognise the team names. So I said to somebody. So he said, "No, this is college football. This is much better."

**Katharine Hayhoe 00:04:50:**

Yes, all right.

**Peter McCormack 00:04:50:**

But how can it be? And this game, I can't remember. It was something like at 45, 43.

**Katharine Hayhoe 00:04:58:**

Yes, something like that.

**Peter McCormack 00:04:59:**

It was back and forth and then Crabtree got that last second touchdown and it just went crazy. So when anyone ever says who's your college team? I always say Texas Tech. Now, I'm here.

**Katharine Hayhoe 00:05:11:**

All right, so you obviously need to visit the bookstore and get a T-shirt or something like that?

**Peter McCormack 00:05:16:**

Yes, I do. Where is it?

**Katharine Hayhoe 00:05:17:**

Yes, I can show you where afterwards, no worries.

**Peter McCormack 00:05:19:**

Well, I would get a hoodie for my son and I want to maybe get a shirt for me or something.

**Katharine Hayhoe 00:05:24:**

Yes, you can get lots of-

**Peter McCormack 00:05:26:**

How funny is that?

**Katharine Hayhoe 00:05:27:**

That is amazing. Yeah, I love that.

**Peter McCormack 00:05:31:**

Yeah. I didn't know. I flew into Lubbock and I was like ... And then my Uber driver picked me up. I was like, "Is that the Texas Tech Stadium?" He's like, "Yeah." And I was like, "Oh, my god." And so I was telling him the same story. He didn't know the game, but what an ... I still think to this day it's the best game of football I've ever seen.

**Katharine Hayhoe 00:05:49:**

See, I'm Canadian. So for me, it's hockey, I'm sorry.

**Peter McCormack 00:05:53:**

I don't mind a bit of hockey although whenever I talk to Canadians about hockey, they always say, "Yeah, but if you're watching the American stuff, it's not the proper hockey. You got to come to Canada. You got to go to Montreal or Toronto. That's where they really fight. That's where they really lose teeth."

**Katharine Hayhoe 00:06:11:**

There literally is blood and teeth on the ice. You can see it, yes.

**Peter McCormack 00:06:15:**

Well, anyway, we should really talk about climate stuff because this is what I'm here for. And so thank you for giving me up your time. I'd give a bit of context. I can't remember exactly how but we ended up in a thread together on Twitter. And I just interviewed Nathaniel Rich about his book which is about the origins of climate change denialism, which itself is an inflammatory term that upsets people.

**Peter McCormack 00:06:43:**

But I ended up in a thread with you and then every time someone was arguing me, I kept copying your name in and say, Katharine will answer. So just to give people the context, I think it would be good to start by you explaining what your role is, what your background is, what your experience is so they understand why you are one of the experts we came to, to talk about this.

**Katharine Hayhoe 00:07:06:**

So my name is Katharine Hayhoe and I am a legit climate scientist. My undergraduate degree is in physics and astronomy and my master's and PhD is in atmospheric science. So climate scientists can be many different things. They can come from an earth science perspective or oceanography, ecology. My particular area is atmospheric science and I specifically study what climate change means in the places where we live.

**Katharine Hayhoe 00:07:31:**

So often we think of it as this big global issue that affects polar bears or people who live far away, but what does it actually mean for us? And the answer is it depends on what we are already vulnerable to in the places where we live. If we're already vulnerable to heavy rain or flood, to hurricanes or cyclones or storms, to wild fire or heat waves, climate change is often exacerbating those things making them worse.

**Katharine Hayhoe 00:07:54:**

But to understand how that's happening, we have to understand the physics of the climate system. So that's what I do.

**Peter McCormack 00:07:59:**

Right, okay. So it must be very frustrating for you as somebody, it's not even that you're convinced. My expectation of your answer is that you know that climate change is real and it's caused by humans. So it must be frustrating that there is this constant debate about it.

**Katharine Hayhoe 00:08:18:**

Well, what most people don't realise is we have been kicking the tires of this thing for almost 200 years. We have known that digging up and burning coal and then later oil and natural gas is wrapping an extra blanket around our planet. And that is the reason why the planet is heating up.

**Katharine Hayhoe 00:08:37:**

The basic science that tells us that was done in the 1850s and it's the same basic science that explains how refrigerators cool food and how stoves heat food and even how airplanes fly. So when people say, "Oh, that can't be real," if they really want to be consistent, they would have to throw pretty much every piece of modern technology with that.

**Katharine Hayhoe 00:08:59:**

But they don't actually have a problem with the climate science, because again if they did, they would also have a problem with stoves and fridges and airplanes. What they have a problem with are the perceived solutions, because they've been told that the only solutions are so antithetical to their ideology and their values that we can't possibly do them.

**Katharine Hayhoe 00:09:20:**

But our defense mechanism as humans is we can't say, "Oh, it's a real problem but I don't want to fix it," because that would make us the bad guy. And none of us wants to be the bad person. We want to be the good person. So our psychological defense mechanism is to say it can't be real because if it was real, I'd want to fix it. But it isn't real. So that means that we don't have to endorse any of those horrible solutions I've heard about that include socialism, communism, destroying the economy and letting China or the United Nations or the Antichrist take over the world.

**Peter McCormack 00:09:51:**

Well, the solutions topic is quite complicated itself. So I think we should build ourselves up to that. And you said people don't deny that the science is real but actually, they do and I've experienced that.

**Katharine Hayhoe 00:10:04:**

Oh, no, that's not what I said.

**Peter McCormack 00:10:04:**

All right.

**Katharine Hayhoe 00:10:11:**

I said they don't actually have a problem with the basic physics.

**Peter McCormack 00:10:12:**

Because of the fact that they use stoves-

**Katharine Hayhoe 00:10:13:**

And fridges and airplanes and things like that. But what they do have and this relates to the psychological mechanism, they have sciencey-sounding objections to say the problem can't be real. Because our defense mechanism is we have to say it's not a real problem because otherwise, if it was real, we have to fix it. But if we don't agree with any of the solutions, we have to reject the reality of the problem itself.

**Katharine Hayhoe 00:10:34:**

So we use sciencey-sounding objections as smokescreens to cover the real problem which is solution aversion.

**Peter McCormack 00:10:43:**

Okay, when you're dealing with people who deny this or argue or object, do you notice any consistency in the type of person, the demographic, maybe we can throw the Bitcoin people in there because a lot of them just don't believe it. But do you notice a specific type of person who wants to argue this, who wants to debate it?

**Katharine Hayhoe 00:11:04:**

Absolutely. I have a sample of thousands of people, many of them collected on social media, some in person, many via letter or email or even phone call. And what I can tell you is that the number one predictor of whether we agree with the science or not is where we fall on the political spectrum.

**Katharine Hayhoe 00:11:24:**

So if somebody on social media is attacking me and they're from the US, chances are they'll have Mega in their profile. If they're from the UK, they'll have Brexit in their profile. If they're from Canada, they'll have something about hating the prime minister in their profile. If they're from Australia, they'll have something about loving the prime minister in their profile.

**Katharine Hayhoe 00:11:42:**

So political factors are the number one common denominator. It is very rare to have an apolitical, not unheard of, but rare to have an apolitical problem. Now, the second common denominator, very sorry to say is gender.

**Peter McCormack 00:11:57:**

Oh, no, it seems so and from my own experience of ... I put out this very provocative tweet. I kind of regret it actually because I think it was unfair but anyway, I put it out and I just said, "You're an idiot if you do not believe climate change is real. If you don't think it's caused by humans, you think the models are fake, et cetera, et cetera." And I got a lot of hate from it, a lot of unfollows, and I think it was right actually because I think it was the wrong choice of language.

**Peter McCormack 00:12:23:**

But at the same time, it was almost entirely men, and I don't know why but it just was entirely men, and generally ... Because of the circles which followed me on Twitter tend to be more libertarians but also conservatives. So one of the things that I started to question and I think I might have stolen this from you actually. You did a TED Talk, right?

**Katharine Hayhoe 00:12:49:**

I did.

**Peter McCormack 00:12:50:**

Did you say in your TED Talk that their opinions here on climate change are tied to their identity? Therefore, if you're challenging their opinions, you're insulting them in one way or another.

**Katharine Hayhoe 00:13:02:**

Yes, that is definitely what I said.

**Peter McCormack 00:13:04:**

Okay, I've been stealing that line.

**Katharine Hayhoe 00:13:05:**

No worries.

**Peter McCormack 00:13:06:**

Okay.

**Katharine Hayhoe 00:13:06:**

It's the best form of flattery.

**Peter McCormack 00:13:08:**

But actually, that's a really important point. Therefore, we've really in the era of identity politics with regards to climate change which becomes really unfortunate, I think, because you really want this to cross the aisle. I'm using American terms. We don't have the isle in the UK, but I'm saying this is what you want to do. You want consensus from people. You want it to be apolitical, but you don't have this.

**Katharine Hayhoe 00:13:37:**

That's right. A thermometer is not liberal or conservative. It doesn't give you a different answer depending on how you vote. The solutions are, but we have to begin from a place of shared understanding that climate is changing, humans really are responsible. We've checked. The impacts are serious and we do need to act.

**Katharine Hayhoe 00:13:54:**

So when people have these sciencey-sounding objections through, the way I try to respond is by saying those are good questions. You're not an idiot for saying, "Isn't it just a solar cycle?" Because we know that solar cycles are real. We know that there are volcanoes that produce heat-trapping gases. We know that there are natural factors that have caused climate to change in the past, and in fact, we climate scientists are the ones who study those.

**Katharine Hayhoe 00:14:17:**

So by validating people's questions, I think, then we can start to begin often to have a constructive dialog, not all the time. About 10% of the population are what social scientists called dismissive, and dismissive people will dismiss anything and everything and they're literally incapable of clicking on a link. And we see this a lot online.

**Katharine Hayhoe 00:14:38:**

If somebody cannot click a link, they are physically and mentally unable to just point their finger there and click it and read it. They are likely dismissive and you can't have a constructive conversation because their entire identity is so built on rejecting what you stand for that they're not even willing to dialog.

**Katharine Hayhoe 00:14:54:**

But 90% of us are not dismissive. And then, if we approach this topic from a place of mutual



respect, very important, and mutual shared values, then as I talk about in my TED Talk, then we can have a positive constructive conversation.

**Peter McCormack 00:15:11:**

So it's really interesting that you talk about the political side because I've been around the circles with my own politics. I was very socialist when I was younger. And then I became very conservative. Then I threw myself down to libertarian rabbit hole and I've actually got a point where I really struggled with all of them, and I kind of like a bit of each.

**Peter McCormack 00:15:28:**

I really enjoy the libertarians' view on free markets. I really like ... Socialist is the wrong view there. The liberal view on personal choice and personal freedoms with regards to the choices you want to make in life. And with conservatives, I kind of like their approach to the economy. There's just different aspects I like about it, but I've tried to separate myself in the politics now because that does tend to become a problem.

**Katharine Hayhoe 00:15:54:**

Yes.

**Peter McCormack 00:15:55:**

Yeah.

**Katharine Hayhoe 00:15:57:**

As do I, as do I. Yes.

**Peter McCormack 00:15:58:**

Yeah, because I don't think it's helpful and I think it's a block to actually making any progress. I likened it to the fact that with Donald Trump, there's a lot of people who support him, think he's great. I think there's certain things about his character I'm not particularly a fan of. But I think if you're conservative, you will instantly jump to the defense of Donald Trump because you're conservative.

**Peter McCormack 00:16:17:**

Similar with Bernie Sanders. There's a lot of things I think are quite scary about the policies he has, but there will be people who jump to his defense because they're liberal. And we've become so divided. We've become so extreme on each ends of the spectrum, we're starting to develop all these impossible problems to debate.

**Peter McCormack 00:16:36:**

It doesn't matter whether it's gun rights. It doesn't matter whether it's the climate. It doesn't matter whether it's abortion. There's these particular topics now that separate us and I'm seeing very little intellectual debate around it with people willing to hear the other side of the argument.

**Katharine Hayhoe 00:16:53:**

Yes, you're right. Climate change has become one of the top most politicised issues not just in the US but in the UK, in Canada, Australia, Brazil and beyond. So let's have that conversation then. Let's get those questions out.

**Peter McCormack 00:17:06:**

Actually, can we start a step earlier?

**Katharine Hayhoe 00:17:08:**

Sure.

**Peter McCormack 00:17:08:**

Because we should do the science, because I'm fortunate enough to have this time with you. You have done a TED Talk. You are one of those people who I put out there on the ... I level you up above everybody else because you've done a TED Talk. I think once you've done a TED Talk, you've kind of made it.

**Katharine Hayhoe 00:17:26:**

Okay, I've done a few other things too.

**Peter McCormack 00:17:28:**

I know, but the TED Talk for me is always like, "Ah, you're definitely an expert." So can you please explain the science? For those who don't understand, please explain the science of climate change and CO2 in the atmosphere. Because some people do, they will argue against this point itself.

**Katharine Hayhoe 00:17:46:**

And most of us don't understand it to begin with. I mean if you ask me to explain the basis of GMOs for example, I would struggle to do that too. And that's because we are all cognitive misers. So not since the days of Francis Bacon has one human brain been able to contain the essential information about every field that we have and probably not even him either.

**Katharine Hayhoe 00:18:06:**

But in the case of climate change, it's actually very easy to explain. So our planet has a natural blanket of heat-trapping gases: Carbon dioxide, methane, water vapor and more. The sun's energy shines right down through the atmosphere like a window and the earth heats up, and the earth gives off heat energy.

**Katharine Hayhoe 00:18:26:**

The heat energy is a lot longer wavelength than the sun's energy and this natural blanket traps that heat just like a blanket traps your body heat on a cold night. It keeps us over 30 degrees Celsius warmer than we would be otherwise. In fact, our planet would be a frozen ball of ice if we did not have this amazing natural blanket.

**Katharine Hayhoe 00:18:47:**

So then you might say, "Well, if it's natural and if it's responsible for life, what's the problem?" The problem is, is that by digging up and burning coal and gas and oil, we are wrapping an extra blanket of heat-trapping gases around our planet that it does not need. And just like you would if you were sleeping and somebody snuck into your room and put an extra blanket on you and you woke up sweating saying, "I didn't need this blanket."

**Katharine Hayhoe 00:19:10:**

In the same way, we are wrapping an extra blanket around our planet and that is the reason why the planet is running a fever.

**Peter McCormack 00:19:18:**

So a lot of people have come back and challenged a lot of the science with this. And we should run through a couple of the common arguments back. So the first one is people said, "This is a solar cycle we're in."

**Katharine Hayhoe 00:19:32:**

Well, there's a very interesting website called [skepticalscience.com](http://skepticalscience.com), and they have ranked the common objections. So interestingly, I think that one is number two. Number one is it's been warmer before. But Skeptical Science is a great resource if you want to dig into further after we've chatted.

**Katharine Hayhoe 00:19:49:**

We've known though that the sun goes through an 11-year sunspot cycle since the work of Galileo. And we also know that the sun's energy goes slightly up and slightly down over longer periods of time. So when we look at the planet getting warmer, the number one question is, is it because of the sun? That's where we get most of our energy from.

**Katharine Hayhoe 00:20:09:**

So when we look at the sun's energy, we see that there is this 11-year sunspot cycle where it goes up and down, and up and down, but we see that long-term over the last few decades since the 1970s, the sun's energy has actually been going down, not up. So if we were being controlled primarily by the sun right now, we would have been getting cooler, not warmer. In fact, the sun has been helping us out.

**Peter McCormack 00:20:32:**

Right, okay. Interesting. But we're in a natural cycle.

**Katharine Hayhoe 00:20:38:**

Well, the natural cycle is a common argument. And for that, we have to understand what natural cycle we're talking about because people often say natural cycles as if it served like unicorns and rainbows and fairies. You don't really know what they are.

**Katharine Hayhoe 00:20:51:**

But we do know what they are because again, we are the ones who study them. So first of all, we have natural cycles that are inside the climate system. These are like El Nino or the North Atlantic Oscillation. What these natural cycles do is the move heat and moisture around the climate system to rebalance it so one part doesn't get too hot and another part gets too cold.

**Katharine Hayhoe 00:21:13:**

They move heat from east to west, north to south from ocean to the atmosphere and back again. We know that there have been large natural cycles in the past. In fact, the medieval warm period is probably the most famous example of a natural cycle. That was when it was unusually warm over the North Atlantic in Greenland. And so that's when a lot of Vikings came all the way to Canada. They went to Greenland. It wasn't green back then. It was called Greenland as a great PR stunt to get people to move there, but it was at least warm enough that they could get to Greenland.

**Katharine Hayhoe 00:21:42:**

But the interesting thing is that the way natural cycles operate is by moving heat around the

climate system. So if you live in Siberia at the time of the medieval warm period over the North Atlantic, it was actually the medieval cold period in Siberia at the same time because the heat was moving around the climate system.

**Katharine Hayhoe 00:22:00:**

So if we are warming due to a natural cycle today, the entire atmosphere is warming so that heat would have to be coming from a different part of the climate system. The only part it can be coming from is the ocean. So if we see the heat content of the atmosphere going up over time as it has, and if we see the heat content of the ocean going down by an equal but opposite amount over at the same period of time, we know that that would have to be a natural cycle.

**Katharine Hayhoe 00:22:26:**

But when we look at that, that is not what we see. In fact, the heat content of the ocean has increased 20 times more than the atmosphere, the land surface and the cryosphere or the ice all put together. In fact, using air temperature as a measure of global warming using thermometers up here in the atmosphere is like measuring the size of an iceberg from just a tiny tip that's poking up from beneath the ocean.

**Katharine Hayhoe 00:22:52:**

So then people say, "Well, why aren't we talking about what's happening in the ocean then?" And the only answer I have is we're not dolphins. If we were dolphins, we'd be like, "Oh, my goodness people, look at what's happening in the ocean. The changes we're seeing here are crazy compared to what's happening on the land." But because we live here on the land, we talk a lot about what's happening above the ocean. So that's how we know it is not a natural cycle. The whole planet is heating up.

**Peter McCormack 00:23:14:**

Something else I saw that's come up a lot is charts which are based on the analysis of ice cores and they have predictions that go back hundreds of thousands of years. How accurate are these predictions from the ice cores? Because myself personally as a non-scientist, I'm wondering how much information would be stored in this ice cores that you could accurately predict hundreds of thousands of years of climate.

**Katharine Hayhoe 00:23:41:**

Yes, so ice cores are one type of natural thermometer. We also use tree rings, pollen records, sediment cores and more and they are absolutely fascinating. So you can get an ice core anywhere where there's permanent ice. So in other words, you can get them from the top of tropical glaciers. You can get them from Greenland and Antarctica, and in those big ice sheets, you can go more than a mile down and you can go back almost a million years.

**Katharine Hayhoe 00:24:07:**

So how did they tell us what climate was like back then? How did they act as natural thermometers? Well, what happens is as the snow falls and it becomes compacted as more snow falls on top, there's little bubbles of air in the snow that gets sealed off and in that bubble is a record, literally like a fossil record almost of what the atmosphere was like when that pocket of air lost contact with the atmosphere.

**Katharine Hayhoe 00:24:34:**

We can analyze the air in those bubbles to see what the levels of heat-trapping gases were. We can look to see dust, for example, to see if there were dust storms or soot or ash from volcanic eruptions and we can even look at oxygen isotope ratios that tell us what the temperature was like back then.

**Katharine Hayhoe 00:24:51:**

So layer by layer by layer, these ice cores go back in time and they don't have annual resolution. Most of them are maybe a decade or 50 years or sometimes a hundred years or more, but we can trap how levels of heat-trapping gases and temperature have varied in the atmosphere over hundreds of thousands of years.

**Katharine Hayhoe 00:25:10:**

And what we see is we see a very regular natural cycle. And this is second type of natural cycle. This type of natural cycle is not one that occurs inside the climate system. This is one that's caused by changes in the earth orbit around the sun. We know that over time the earth's orbit becomes more circular and more elliptical. We also know that the axis of rotation is inclined by 23.5 degrees relative to the plane of our orbit.

**Katharine Hayhoe 00:25:39:**

So imagine one of those old children's tops and you spin it and it goes around really fast, that's like our planet going around once a day but it also precesses around really slowly and that's what our planet does too. So as it does that, it changes how sunlight falls on the earth. If the earth were all the same everywhere, if we're all ice or all desert or all water, it wouldn't matter.

**Katharine Hayhoe 00:26:01:**

But we know that we have more ocean in the southern hemisphere. We have more land in the northern hemisphere. So how the sunlight hits the earth depends on how much of the sun's light we absorb versus how much gets reflected back. And that is what initiates the ice ages and the warm periods like we're in today.

**Katharine Hayhoe 00:26:20:**

So people say, "Well, okay, then aren't we just getting warmer after the last ice age?" Well, we can look both at the record in the ice cores as well as we can look at the equations that I originally learned about in my astrophysics class. We can look at the equations that dictate where we are in the earth's orbit to say, "What should be happening now?"

**Katharine Hayhoe 00:26:39:**

And when we look at both of these together, we see the same answer. Warming after the last ice age peaked about 6,000 to 8,000 years ago. And since then, we were starting to very gradually slowly cool because the next thing on our geologic calendar was another ice age in about 1,500 years. Until the Industrial Revolution and when the Industrial Revolution hit, we started to warm so fast that it is 10 times faster than the warming between the last ice age and the warmest period 6,000 to 8,000 years ago.

**Katharine Hayhoe 00:27:13:**

So that is how we know it is not an orbital cycle. We should be getting cooler, not warmer.

**Peter McCormack 00:27:18:**

Does it frustrate you that people cherry pick bits of data to use as an argument? So a couple I've seen recently is well, Antarctica has gained ice or that Greenland has gained ice and a very quick search on Greenland, it was one particular ice shelf but there was a net loss. Does it frustrate you that people are cherry picking? And we now have very significant group of amateur climate scientists.

**Katharine Hayhoe 00:27:43:**

My google is better than your PhD, yes. It is very frustrating and there is certainly a lot of mansplaining that goes on where people think that their google search somehow tells them more than 25 years of your research. But it's all part and parcel of the same issue which is that it's something that in psychology they call it inferred justification.

**Katharine Hayhoe 00:28:05:**

In other words, we have already decided that this can't be real. If it's real, we have to fix it and I don't want to fix it because I've been told the only solutions are inconsistent and incompatible with my ideology, which is false, and we will get to that. But because I've decided it can't be real, I have to figure out reasons to explain that because I'm a rational person. I don't just say it isn't real. I have to have reasons.

**Katharine Hayhoe 00:28:26:**

So what they're doing in saying it's just the sun or it's just natural cycles or it's just volcanoes or Antarctica is gaining ice, or it's cold outside today. What people are doing is we're looking for reasons to support what we've already decided must be true. And so that's why although it's important to have answers to these sciencey-sounding arguments, only responding to the sciencey arguments is not sufficient to change people's minds because it's a smokescreen. They're almost an excuse or a justification for an opinion that they've already formed because of a very different reason.

**Peter McCormack 00:28:57:**

You've obviously mixed in circles of other climate scientists. And you obviously must talk about this, talk about that happened quite regularly. How do you feel about the fact that there's so much disinformation put out there? So another thing that I was doing, again, my amateur google research was every time somebody would post me an article and say, "Well, this scientist has posted this, and here's this piece of research." And I would google them and I very quickly find them tied to a lobbying group, which is then tied to the oil and gas industry, without fail.

**Peter McCormack 00:29:32:**

But what was happening as well, and bear with me on this is that I started to get my own doubts in there. And I started to become a little bit of conspiracy theorist myself and I was wondering why did these lobbying groups really exist? Are these web pages real? Are these scientists actually real scientists? But there are people out there who are seemingly credible scientists who don't agree with you.

**Katharine Hayhoe 00:29:57:**

There are a handful. In North America, I can literally count them on the fingers of one hand.

**Peter McCormack 00:30:03:**

Credible?

**Katharine Hayhoe 00:30:03:**

Credible.

**Peter McCormack 00:30:04:**

Okay.

**Katharine Hayhoe 00:30:04:**

But you hear, "Oh, 500 scientists signed a letter saying there's no global climate emergency."

**Peter McCormack 00:30:11:**

I saw that. I went through the first four, and I was like, "Well, this one is tied to this lobbying group. This one is tied to the Koch brothers. This one is tied ..." And very quickly.

**Katharine Hayhoe 00:30:21:**

And if they're even legitimate scientists in a legitimate field, I mean often, it's like asking a podiatrist who may be a very competent podiatrist to do brain surgery, or asking a brain surgeon to do cardiology. It's not the same expertise and they can often find people who sadly don't know enough or are biased because of their political agenda, to be willing to say something that's not true when they just are not even an expert in the field.

**Katharine Hayhoe 00:30:45:**

So there are a very small number of people who are credible and how do have the expertise to prance on climate science who, they wouldn't go so far as to say it isn't real but they generally tend to say, "It's not a big deal or we shouldn't really do anything or it's too expensive to fix it." So here's what I did being a scientist. I went out and I bought the books that they'd written and I read the interviews that they'd done and I wanted to figure out what makes them tick.

**Katharine Hayhoe 00:31:16:**

Because here we have 200 years of science, we have tens of thousands of peer-reviewed scientific studies. They're based on such basic physics that it underlies most of our modern technology today, and today we have tens of thousands of scientists around the world who all agree. So what makes this tiny little weensy, very loud handful of people disagree?

**Katharine Hayhoe 00:31:38:**

So I went and I read what they wrote because I want to know. And what I found was that each one of them had something different that had nothing to do with the science that was very clearly motivating their opinion. One book was an entire libertarian manifesto. It was basically saying, "I don't want the government to interfere with my life. Climate solutions involve government solutions, therefore, we can't have climate solutions, therefore, it's not a real problem."

**Peter McCormack 00:32:02:**

And they would hate the Green New Deal?

**Katharine Hayhoe 00:32:04:**

Yes. Another one was ... Well, poor people need fossil fuels so it's really evil and just immoral to say that they can't use fossil fuels. Because the world needs fossil fuels, then we still have to keep using them. So because we have to keep using them, climate change

can't be a big deal because I'm a good person. And if this was really a problem, I would care about it.

**Katharine Hayhoe 00:32:29:**

So they'll have very different reasons. And then the funniest one was one where he complained that he wasn't getting enough air time because of his contrarian perspective. So a colleague of mine, this is a number of years ago, a colleague of mine who's also a scientist, he went and he added up the air time minutes that any climate scientists had gotten that year and he found that this one man who was complaining that he didn't get enough, he'd gotten more air time than all the rest of the scientists put together.

**Peter McCormack 00:32:53:**

Right.

**Katharine Hayhoe 00:32:54:**

Yes. So there's just very different motivations that they have, but when you start to really follow people, you see that somebody says, "Oh, well, I don't trust those weather stations." And then the next breath without even taking a pause, "I don't trust those weather stations and the government just wants to control my choices."

**Katharine Hayhoe 00:33:11:**

So there's an immediate connection between solution aversion and inferred justification. In other words, I don't like the solutions so therefore, I have to have a reason that makes sense why I reject the problem.

**Peter McCormack 00:33:22:**

Okay. Another interesting and frustrating part of doing the research, and there's so much research. And actually, this is a common thing with any topic I look at. It doesn't matter whether I'm in Bolivia looking at Evo Morales and the opinions of indigenous people versus the people who think Evo Morales is a dictator and the arguments and the fad and the stuff that comes against that, or whether it was something to do with Bitcoin. It doesn't matter what subject, there is an information warfare.

**Peter McCormack 00:33:53:**

But one of the most difficult things I struggle with is people kept recommending other people that I should have on the show. Have you seen the film Contagion?

**Katharine Hayhoe 00:34:03:**

No.

**Peter McCormack 00:34:04:**

There's a film called Contagion and there's a guy in it that Jude Law plays Alan Krumwiede. He's a blogger. No background in ... It's about a pandemic. He's got no background in medicine but he's a blogger who has lots of followers and there's a number of these people who have started to appear. So there's about, I think, one was called ecosense maybe, I can't remember the tech names. But two or three that people kept recommending and I just refuse to even enter into a debate because they have no background.

**Peter McCormack 00:34:31:**

But they seemed to be gaining a following from the videos they're putting out and what I



noticed specifically what they're doing is they're knitting together these little bit of information. They're creating a YouTube video that knits this together and I can see how they're building a compelling argument if you're not smart enough just to go and research and realise they're not a scientist.

**Katharine Hayhoe 00:34:52:**

Yes, that is exactly what is happening. And they're very successful. Some of them are self-supported and self-funded. Others have very large budgets like PragerU, for example, on YouTube for advertising. And they're wildly successful because they are giving people the information that they want to justify the opinion they already have.

**Katharine Hayhoe 00:35:13:**

So social media platforms, unfortunately like YouTube, are actually designed to radicalised people. I mean, social scientists have done studies on YouTube showing that if you watch a video on topic X, YouTube will recommend another video for you to watch subsequently on topic X that is further down the rabbit hole, more radical than the one you just watched.

**Katharine Hayhoe 00:35:37:**

And it happens in both directions on the political spectrum. And so people might watch one of my videos. I have a YouTube series called Global Weirding. And then afterwards, it might recommend that you watch something by a blogger who's put together some sensationalist video full of half-truths and mistruths and false information but YouTube is actually leading you to these.

**Katharine Hayhoe 00:35:57:**

And we cease on them when we're looking for information to justify why I don't have to do anything. In fact, I shouldn't do anything. In fact, the right thing to do is to do nothing. That's what we're looking for. And the media and the internet and social media is actually making it worse.

**Peter McCormack 00:36:14:**

How is the mainstream media making things worse? Because I don't see ... And maybe something different happened here on Fox News. But generally speaking, I don't see any rejection of the climate science in mainstream media whether I'm watching the BBC, Sky News, reading The Guardian, The Telegraph, The Times, whether I'm watching CNN, whether I'm watching MSNBC, they all tend to be reporting the same issues.

**Katharine Hayhoe 00:36:41:**

Yes and no. So for a long time, mainstream media had this idea of we need to be balanced. So if we have one scientist saying this is a terrible problem, we need to find another scientist saying it's not. And for a long time, there was this idea of false balance where you have 10,000 people in one side, and 10 people on the other side but somehow you keep recycling those 10 voices because you need to show that it's 50/50.

**Katharine Hayhoe 00:37:02:**

And this is a very serious problem because research has shown that one of the most convincing arguments when it comes to climate change is the simple statement that scientists agree. So if you are implicit, if you are showing one talking head versus another, you are implicitly communicating to people that it isn't 97 to 3 or 99 to 1, it's 50/50 and communicating that scientists don't agree.

**Katharine Hayhoe 00:37:25:**

Nowadays, a number of organisations, the BBC, the CBC, The Guardian have made commitments to only report the actual facts in climate change. So we have seen a significant shift. But media today is still often based on clicks and hits. Media is a business for many organisations. It's not the BBC, not the CBC, but for many others, from CNN to MSNBC to Fox, it is a business. And because it's a business, controversy sells.

**Katharine Hayhoe 00:37:53:**

So let me just give you one example. I'm a lead author on the US National Climate Assessment which is a fantastic resource if anybody wants the latest on the science. And we who worked on this project did so on a volunteer basis. We were not paid for it. We spent hundreds of hours working on this assessment because we were convinced the people need that kind of summary of the science.

**Katharine Hayhoe 00:38:15:**

So then, CNN gets a politician on who is supported by the coal industry and no longer an active politician and he gets on then and says, "Oh, those climate scientists, they're just doing this report for the money." So I get on Twitter, and I say, "That's not true. We are paid zero dollars."

**Katharine Hayhoe 00:38:32:**

So CNN says, "Well, would you like to come on and explain how we're not paid to do this and this is the summary of the science." So I recorded a nice interview with Anderson Cooper, and they said, "Well, we'll be playing it tonight." So then I was busy actually about TED, practicing for my TED Talk, and I started to get these text messages saying, "Well, you said that you're going to be on tonight but we only saw the same politician repeating that you're in it for the money. What happened to your interview?" They didn't even air it.

**Peter McCormack 00:38:59:**

What?

**Katharine Hayhoe 00:39:00:**

Because it wasn't as controversial as having somebody say things that were untrue, but they would make people want to click. So the media is definitely trying and they have definitely improved. But the whole subculture of blogs, of internet news sites, of YouTube or social media, that's where a lot of these echo chamber of half truths and lies and deceptions is really circulating and percolating and reaching people in ways that it couldn't have done 20 years ago.

**Peter McCormack 00:39:27:**

Well, it makes me worry about the work I do sometimes as well. I am a one-man team. Well, a two-man, I have an engineer. But I do interviews. I report on issues and I have an opinion and I've been wrong in the past, factually wrong and also I changed my opinion on things which are subjective. What can people like myself do then to help the situation?

**Katharine Hayhoe 00:39:48:**

That's a great question. So one of the most important things we can actually do is talk about it. Because data has shown that even though the vast majority of people now would agree that this thing is real even though they wouldn't agree that it affects us or it's necessarily

humans. Most of us agree it's real but we don't think it matters to us. We think it matters to future generations or to people or places who live far away.

**Katharine Hayhoe 00:40:12:**

So actually engaging and having a conversation about the two most important things we can talk about is key. And those two things are these. Number one, how climate change affects the things that we already care about. So not the polar bears unless we already care about polar bears. Not poor people living on low-lying islands in the South Pacific although if we care about them and I do, then we care about that too. But our interests, who we are, how climate change affects what we already do, number one.

**Katharine Hayhoe 00:40:40:**

And then number two, what are practical positive beneficial solutions that would help us, that would help our industry, that would help our lives, that would help the economy and that would also help with climate change at the same time. These are two most important things to talk about. So any conversations that you can have about those two things, I think, would be incredibly helpful.

**Peter McCormack 00:41:01:**

Okay, that's very interesting. We'll get into those two things but that's very interesting because there was another climate scientist I approached and I won't name him, and he said, "Oh, come on, and I'll talk to you but I don't want to talk about any of the arguments about this being not true, this not being human cause." He said, "It's a waste of time." He said, "The arguments are stupid. I don't want to waste anymore time on this." He said this, which I thought was kind of interesting.

**Peter McCormack 00:41:26:**

He just wanted to talk about the facts and what we can do, nothing about the arguments against. But you're obviously willing to talk about it, which his fine.

**Katharine Hayhoe 00:41:34:**

I am because we've heard these so frequently that we need answers before we can move beyond them. They are good questions. How do we know that it isn't the sun or a natural cycle or volcanoes, or just getting warmer after the last ice age? We've been told this so frequently that we need answers to those questions to move us to a place where we're willing to engage about talking about why this matters and what we can do to fix it.

**Katharine Hayhoe 00:41:57:**

It's not sufficient, but it's sort of a necessary step to take us like from a -10 to a 0. And then to go from a 0 to a 10, we have to connect the dots to why this matters to us personally and what we can do to fix it.

**Peter McCormack 00:42:10:**

How do we know it's not volcanoes?

**Katharine Hayhoe 00:42:13:**

Well, you may have heard because there is a meme circulating the internet. You may have heard that one volcanic eruption produces more carbon pollution than humans do in 10 years. That is false. When we look not just at every volcano, we look at all geologic activity

around the whole world including things like Yellowstone and Azerbaijan and places where they have gases creeping up through fissures in the earth.

**Katharine Hayhoe 00:42:40:**

We look at all geologic activity around the whole world and it turns out that it produces as much heat-trapping gases as three medium-sized states in the United States.

**Peter McCormack 00:42:50:**

Okay, so it's not the volcanoes?

**Katharine Hayhoe 00:42:53:**

It can't be. And in fact, a really big volcanic eruption cools the earth.

**Peter McCormack 00:42:57:**

Okay.

**Katharine Hayhoe 00:42:58:**

Yes, because it spews all these particles all the way up into the upper atmosphere that act like an umbrella. They reflect the sun's energy away from the earth anywhere from weeks up to a really big volcanic eruption two or three years. So volcanoes can help us out temporarily but they're not causing the warming.

**Peter McCormack 00:43:15:**

But there are clearly people out there then who are purposely disseminating misinformation, paid for by the oil and gas industry, very much in the similar way that people compare it to the tobacco industry. There's that one particular PR firm, I forgot their name, you all know them. How do you feel about these people? Because they are purposely, on purpose, they are misleading people about something which could be catastrophic.

**Katharine Hayhoe 00:43:42:**

Yes.

**Peter McCormack 00:43:42:**

Now, people don't like the alarmist. We're going to talk about the alarmist side of things but there are people who are disseminating misinformation on purpose for financial gain. How do you feel about that?

**Katharine Hayhoe 00:43:53:**

I'm glad you brought that up, because that is absolutely true. And in terms of frustration, that is what frustrates me the most. I first learned about this organised effort when I read a book by a fellow Canadian called Jim Hoggan. It's a book called Climate Cover-Up. Jim is a long-term PR expert. He's been doing this his entire career. And in Climate Cover-Up, he laid out the well-documented and tested PR strategies that very wealthy corporations, if you look at the Wikipedia list of the richest companies in the world, you have Walmart at the top, and then the rest of the top 10 are all companies that made their money off of fossil fuels whether digging them up, processing them, selling them or selling things that burn them, cars.

**Katharine Hayhoe 00:44:34:**

These very well-funded companies are using well-known, well-tested PR techniques to

deliberately muddy the waters and disinform us. When I read that book, that was the closest that I have ever come to quitting, because I felt like I'm like a girl guide against the Marines. I had no idea those even existed let alone that they were using all of these techniques and here I am with my little truth trying to think that, "Oh, maybe if I just tell people the truth, they will change their minds." I thought, "How naive of me, how foolish? How could I ever compete?"

**Katharine Hayhoe 00:45:04:**

And then it got worse. Merchants of Doubt is a tremendous book or movie, yes-

**Peter McCormack 00:45:10:**

Well, I've got the book.

**Katharine Hayhoe 00:45:10:**

Oh, you got the book. The movie is slightly different but it's equally horrifying where it lays out in detail the names of the people, the amounts of money and the companies and the messages that they crafted, first of all to muddy the waters on tobacco. Then to muddy the waters on flame retardants in mattresses. Who knew? I had no idea. And then lastly, climate change and in some cases, they are the same people doing the same thing, using the same approaches.

**Katharine Hayhoe 00:45:38:**

Cherry picking, false experts, logical fallacies and misrepresentations? It is a playbook. It is a script and they are rolling it out with precision, with accuracy, with great intelligence and with enormous amounts of money all for the purpose of maintaining their grasp on their financial returns as long as possible.

**Peter McCormack 00:45:59:**

Well, that playbook is super interesting. So I've got the audio book and I'm partway through but I found a summary of the playbook online. And then one of the most interesting parts for me was that one of the strategies is to encourage the debate. It's not to flat out deny, so flat out deny, say, something you would say is to say, "Yes, we should debate this because there's some uncertainty," because by creating the debate itself creates more uncertainty and gives more time for the debate itself. That kind of blew me away because it wasn't a logical part of the playbook for me.

**Katharine Hayhoe 00:46:36:**

It is genius.

**Peter McCormack 00:46:37:**

Yeah.

**Katharine Hayhoe 00:46:37:**

Because what it does is it makes you seem open-minded. It makes you seem shrewd. It makes you seem careful, all good characteristics, but it completely paralyzes action because all you need to say is I'm not sure to paralyze action. You don't have to say, "Does it really?" You just have to say, "We don't know."

**Peter McCormack 00:46:52:**

Can I tell you my really unscientific reason, I believe, climate change is real?

**Katharine Hayhoe 00:46:57:**

Absolutely.

**Peter McCormack 00:46:59:**

... And caused by humans. So someone like me has to trust other people. So I have to read all the information out there. And so I go through the process. I'll read what you've put. I'll watch your TED Talk. I'll watch other talks. I'll research the people behind it. And the people I trust tend to be academics, and the people I don't trust tend to be backed by the oil and gas industry but it's just some chain.

**Peter McCormack 00:47:21:** But also, add into that, there were just little things that seemed to me very obvious and I don't believe the mainstream media is lying when it reports this, that, I don't know, 9 of the last 10 years have been the hottest on record. The UK has record flood warnings. We just had record flood warnings. We just had a record temperature recorded, was it in Greenland or-

**Katharine Hayhoe 00:47:42:**

Antarctica.

**Peter McCormack 00:47:42:**

... Antarctica.

**Katharine Hayhoe 00:47:43:**

Over 20 degrees.

**Peter McCormack 00:47:44:**

Yes. So I keep seeing all these information and I really struggle to picture that this is a coordinated global effort by the governments of the world because they want to tax us more. And we will talk about the solutions and tax. It is sadly one of the things that people focus on, but I struggle to think this is a coordinated effort by the governments of the world to tax us more and they're managing to infiltrate every news organisation with misinformation. I find that idiotic to believe.

**Katharine Hayhoe 00:48:22:**

Well, the fascinating thing is that that is exactly the projection that these genius PR people are making. So the reality is, is that the richest companies in the world whose bottom line depends on fossil fuels, continuing our addiction to fossil fuels as long as possible, they have made a very cold and calculated decision that the best use of their money is to muddy the waters and delay action as long as possible.

**Katharine Hayhoe 00:48:46:**

And part of that is accusing scientists of doing exactly what they're doing. We are often accused of being in it for the money. And I find that to be sort of humorous because I would make the same amount of money if I was an astrophysics professor as I do as a climate scientist. And if you compare my salary to that of an oil companies executive, there would be a few extra zeros at the end before you would even get close.

**Peter McCormack 00:49:07:**

I'm sure you could earn more money to be a climate change denier working for oil and gas industry company, can you? And that does come up. People keep saying, "Well, because

you say all these people are funded by the oil and gas industry." And they say, "Well, these people are funded by the government."

**Katharine Hayhoe 00:49:22:**

Well, the interesting thing is that people often think, "Oh, you get those big grants. So all the big grants that you get from the government go right into your Swiss bank account to pay for your luxurious vacations." And the reality is, is that people don't realise if you get a million dollars, so I actually get a million dollars one time. That sounds like a lot of money, right?

**Katharine Hayhoe 00:49:39:**

There were five of us on the grant. So you divide that by five. That's \$200,000 each. That's pretty decent. But it was a four-year grant, so that means you get \$50,000 a year. Okay, that's still respectable, \$50,000 a year. Then the university takes a third of that. So all of a sudden, you're down to just over \$30,000. So what do you do with \$30,000? Well, I paid for graduate student. They make the princely sum of about \$24,000 a year, which you can live on but it doesn't allow for a lot of luxuries. And then you have to pay their tuition on top of that which is an extra \$10,000.

**Katharine Hayhoe 00:50:14:**

So I'd already spent everything I had plus some extra and I didn't even have money left to buy them a computer or to pay for them to publish their journal articles which cost between \$500 and \$2,000 to publish. They don't pay us. We pay the journals. That's how you break down a million dollars. And not a penny went into my own pocket and people don't realise that. We hear about these astronomical sums and we think, "Oh, they've just got this wheelbarrow full of cash, they roll into the bank in a private island somewhere in the Caribbean."

**Katharine Hayhoe 00:50:40:**

Whereas in reality, we're all working at the same level and we're doing so because we want to uncover the truth.

**Peter McCormack 00:50:46:**

And there's no secret meeting in Washington because they hand over the million dollars where they say, "Katharine, we're going to give you the grant, but we just need the data to look terrible because we've got new taxation plans."

**Katharine Hayhoe 00:50:58:**

I have never been invited to one of those. And in fact, if anything, in my field, people are worried that there are secret meetings taking place saying, "Oh, if any of those grant proposals come in with the words climate change on them, strike them." So I've even heard anecdotally from colleagues that they have been self-policing themselves on research grants because they're concerned with the current administration that if they propose to do work related to climate change, it wouldn't be funded.

**Peter McCormack 00:51:22:**

Another interesting question before we start getting to some of the juicier bits is-

**Katharine Hayhoe 00:51:26:**

Oh, it's been pretty juicy, I think so far.

**Peter McCormack 00:51:28:**

Well, I think this is a juicy question. If you consider the climate change scientist as a community, what mistakes do you think you as a community, not you individual, have made which have not helped your cause? There's been a big debate about the 97% consensus which has been an issue and people keep saying, "Well, the models are wrong. We were meant to be underwater by this time, blah-blah-blah."

**Peter McCormack 00:51:52:**

There are a couple of things that come up. But for you yourself, are there any kind of key mistakes that you think as a community that you've made that hasn't helped the cause?

**Katharine Hayhoe 00:52:01:**

Oh, yes. That's a great question. I love that. There absolutely have been but they're not the ones you list because those are straw man arguments. A straw man argument is where you say something that isn't true, like those models that we'd all be underwater and we're not. That's not true. And then you asked someone, "Why did you say that?" So it's like, "Why do you beat your spouse," and then you're kind of caught back footed saying, "Beat my spouse? I don't beat my spouse," and then you're recorded saying you beat your spouse.

**Katharine Hayhoe 00:52:27:**

The reality though is that we absolutely have committed errors, and here are some of them. The first one is that we believed in the knowledge deficit model. That is an educational model where the idea is if people don't have the correct opinion about something, if they think two plus two equals five, you've explained the facts to them and they change their minds. We have been operating on a science deficit of a knowledge deficit model for decades. The idea that, "Oh, if we just tell them the truth, they'll change their minds."

**Katharine Hayhoe 00:52:57:**

So when we hear all these people making up these reasons why climate change can't be real, the scientist had just doubled down on, "It's real, it's real, it's real. Here's the data, here's the data, here's the data." And that has not changed anybody's mind. In fact, it has fed right into what you refer to earlier. It is fed right into the idea that there is a debate. So there are still many scientists to this day who are saying, "Oh, yes. If you have questions, I'll engage with you. I'll listen to everything you have to say. I will patiently point out for the 10 billionth time why we do trust this data and why this data is releasing this."

**Katharine Hayhoe 00:53:29:**

And so by engaging in this, by giving the loudest voice as the most airtime, by believing in the knowledge deficit model, we are actually actively contributing to the idea that there is a debate. That's error number one. Error number two is scientists are inherently conservative. And by that, I mean small C conservative. We hate being called alarmists. If we have a choice between underestimating versus overestimating, we will always underestimate. And so in recent years, people have started to actually dig into this and show that we have systematically underestimated the risks associated with climate change.

**Katharine Hayhoe 00:54:10:**

We have lowballed ourselves on what is already happening today, the Australian wildfires. They're what we expected in 2050, not 2020.



**Peter McCormack 00:54:20:**

But people will say the arsonists started this.

**Katharine Hayhoe 00:54:23:**

They say, sorry, what?

**Peter McCormack 00:54:23:**

They were started by arsonists.

**Katharine Hayhoe 00:54:25:**

Oh, dear. Yes, so it's really interesting because talking about the internet and fake news, within days of the bush fires and of people standing up and saying climate change made them worse, there was these reports circulating of 200 arsonists. And in fact, people even said and I saw this on social media, the arsonists were climate activists who were lighting the fires on purpose to make us more worried about climate change. That's a rabbit hole if you've ever seen one.

**Katharine Hayhoe 00:54:49:**

But then when you start to dig in to where did these 200 arsonists come from, it turns out there's no such thing. There were some comment that was made out of context that related some record that was dating back for months. And there were not 200 arsonists that went around lighting the fires, it's just that fires are always being ignited due to human carelessness as well as some deliberate arson. In California, one of the recent wildfires was due to somebody dumping a load of flaming garbage in the dry brush. How stupid do you have to be to do that in California in the middle of the dry season?

**Katharine Hayhoe 00:55:25:**

But how climate change is interacting with these is it's not igniting the fires. The fires are ignited by us, but when they're ignited, the hotter, drier conditions mean that they run wild, burning much more area than they would otherwise. So we scientists have been too conservative with our projections and we bought into the idea that we should pay the most attention to the loudest voices. But the loudest voices on this one are the dismissives, the people who will never be convinced.

**Katharine Hayhoe 00:55:51:**

So when I talk to my fellow colleagues about climate science, I'd say, "Look, facts are important," of course they are, "but facts are not enough to change people's minds on highly politically polarised issues." We have to connect over our shared values and identity. And if we can't do that, we are not the right person to be having that conversation.

**Peter McCormack 00:56:09:**

Okay, two main mistakes. Anything else to add into that?

**Katharine Hayhoe 00:56:16:**

I don't think that this is a mistake, but I think that this is a limitation. And that is the fact that what makes a good scientist, the ability to think in abstract terms and to think in theoretical terms, to think long-term rather than here and now in the concrete, that ability that makes us a good scientist, it actually often makes us a very poor communicator.

**Katharine Hayhoe 00:56:38:**

So it's nobody's fault but we have this situation where the people who know the most about this huge global problem that is threatening our civilisation are the people who in many ways are least equipped to talk about it in the public sphere in a way that relates to people and resonates with people.

**Katharine Hayhoe 00:56:54:**

So just to give you an example, here in the US, there's a senator, Jim Inhofe from Oklahoma, who is very opposed to climate change. And he is a very concrete thinker. And so for example, one day it snowed on Washington, DC. He brought a snowball into the senate and held it up and said so much for global warming. That was genius. It was a genius piece of communication. It was dead wrong, but it was genius.

**Katharine Hayhoe 00:57:18:**

Whereas a scientist would be saying, "Well, climate is the long-term average of weather in at least 28 to 30 years. When we look at the average statistics of how snowfall has gone," they've lost you after four words. And here is a man holding up a snowball saying, "It's cold outside. Where's global warming?"

**Katharine Hayhoe 00:57:34:**

So, this isn't an error that we committed but it is an inherent limitation and that what makes us good scientists makes us really bad at communicating basic essential information to people. And that's why it shouldn't just be on the shoulders of the scientists. We really need everybody including people who are really good talking about it to be part of this.

**Peter McCormack 00:57:53:**

So my friend, Jamie Bartlett, and I say friend, because the guy has been on my podcast a couple of times. He also did a really great podcast himself. He's written a lot. He wrote an article specifically about climate change demonstrators, and he says they don't tend to bring great PR for themselves because of they tend to be very hippy, tend to be doing things like dancing outside of buildings and closing down roads and frustrating people. And he said they haven't brought the greatest PR to themselves. After that, there is some quite alarmist behavior around this. We can use Greta Sundberg as an example. Do you think she has been good for the cause or bad?

**Katharine Hayhoe 00:58:42:**

Well, I would separate what you're talking about from the children because I feel like the children have been very different. They are there saying, "Our future is at risk. Please, do your job as adults." And so they are out there sounding the alarming saying, "We need you to act." And in terms of Greta herself, her speeches are fact-checked by scientists before she gets them. You can't say that for other organisations, the Extinction Rebellion or the Sunrise Movement and a lot of politicians. You can't say that their speeches are necessarily fact-checked by scientists.

**Katharine Hayhoe 00:59:16:**

But for her specifically, they are. And if it sounds alarmist, it's because we scientists have been pulling our punches. We have been pulling the punches. The science is there. She has not said anything I am aware of that is not backed up by peer-reviewed science. It is really bad and it's probably worse than we think. But acting now, we can avoid the worst of the

impacts. But the future really is in our hands. It's not inevitable yet. Some of it is. It's like you've been smoking a pack of cigarettes a day for decades already but you don't have emphysema, you don't have lung cancer and you're not dead.

**Katharine Hayhoe 00:59:49:**

So the time to act is now and there is hope, but we have to recognise. We have to have that moment where you sit down with the physician. The physician says, "You have spots on your lungs. It is going in one direction. If you continue on your current pathway, I give you a 90 whatever percent chance of lung cancer before you die and that is a terrible way to go." So now is the time to make a better decision and that is really what the children are telling us.

**Peter McCormack 01:00:13:**

I feel like those messages have been out there. I feel like I've heard them. I felt like we've been told again and again if we do not achieve a certain reduction in carbon emissions by a certain date, these are the problems we will be facing.

**Katharine Hayhoe 01:00:30:**

Well, I'm glad you brought that up because this is one of the big miscommunications between science and between people who talk about the science. The idea that there's a magic threshold that we have 12 years, now 11 years, now 10 years to do something. If we do something in 10 years, it will be okay, if we do nothing in 10 years, it's all over. People say, "Oh, but we got that number from the science." Well, they didn't. Here's where it comes from.

**Peter McCormack 01:00:53:**

Brilliant.

**Katharine Hayhoe 01:00:54:**

Yes. So in 2015, the world came to Paris for the climate conference and they said, "We need a goal or a target." As scientists, we know that every little bit that the world warms carries additional impacts with it. We know that just as there's no magic number of cigarettes you can smoke and be okay and then if you smoke one more you die, in the same way there's no magic threshold of this amount of warming as totally fine but if you go half a degree over, it's all over. But as humans, we need a target.

**Katharine Hayhoe 01:01:24:**

So the world came to Paris and they said, "All right. We have a target. We're going to set a target of two degrees C." And then a number of countries got together and said, "Well, actually for us, two degrees C is horrible. What about one and a half degrees?" So the IPCC went back to the scientists who write those reports, the big climate reports, and they said, "We don't even know what the difference is between one and a half and two degrees C. We know that it will be worse but in what way? Could you put some numbers on the difference?"

**Katharine Hayhoe 01:01:48:**

So the scientists said, "Yes, we could do that." So they produced a report called the One and a Half Degree report that came out in October 2018 that quantified the difference between a one and a half and a two-degree world. And the impacts are certainly bad on one and a half degrees. They're worse under two. They're even worse under two and a half.

They're worse still under three. There's no magic threshold that we're okay at. But the more we produce of heat-trapping gases, the worse the impacts.

**Katharine Hayhoe 01:02:13:**

Then they said, "Okay, so to achieve one and a half degrees, there's only so much carbon we can produce." It's sort of like a budget. You have so much money and you have to eat off that money for the whole year. That's what the science tells us, the carbon budget that will get us to one and a half degrees. But as humans, we don't just want to budget, we want to know how do we break that out by year because every year, we have to say, "Okay, this year we're doing this. And this year we're doing that. And that year, we're doing that." It's kind of like if you have to lose 15 pounds to fit in the dress you want to wear to the wedding, you can't lose 15 pounds in one day. So you count your calories day by day, hoping to lose a fraction of a pound every day.

**Katharine Hayhoe 01:02:48:**

So the IPCC said, "Okay. For example we could take the one and a half degree carbon budget and we could allocate it out year by year such that if we reduce our emissions 40% by 2030, that would be consistent with the one and a half degree budget." Somehow, that statement got turned into we have 12 years until we all die.

**Peter McCormack 01:03:08:**

Yes, 12 years. So that must be very frustrating then. So it appears that there is only misinformation coming from pseudoscientists, bloggers-

**Katharine Hayhoe 01:03:24:**

Activists.

**Peter McCormack 01:03:24:**

Social media activists.

**Katharine Hayhoe 01:03:26:**

People who are worried and scared.

**Peter McCormack 01:03:27:**

There is also Chinese whispers.

**Katharine Hayhoe 01:03:32:**

Oh, yes, I do know what you mean.

**Peter McCormack 01:03:33:**

Yeah, Chinese whispers.

**Katharine Hayhoe 01:03:34:**

Telephone game.

**Peter McCormack 01:03:35:**

Yeah. I mean the Chinese whispers of what happened in the Australia, with the fire, and said, "Blame the 200 arsonists." You got Chinese whispers here.

**Katharine Hayhoe 01:03:44:**

And that was a deliberately coordinated campaign, that 200 arsonists? The University in

Australia actually tracked it to where it came from, and it was a deliberately engineered disinformation campaign on social media.

**Peter McCormack 01:03:56:**

Do we know actually where it came from?

**Katharine Hayhoe 01:03:58:**

I believe so. I believe they tracked down. Anyways, yeah.

**Peter McCormack 01:04:01:**

So how precarious is the situation now? Because I have my concerns, I have children. You can visually see the weather changing in the world. You can see it. How precarious is the situation now? Because another thing that keeps coming up is as you mentioned earlier, actually every time we get a new report it seems to be it's worse than what's previously suggested.

**Katharine Hayhoe 01:04:26:**

It is, it is.

**Peter McCormack 01:04:27:**

And Greenland is melting quicker than previously thought. And once the permafrost is gone, it's not going to reflect anymore which escalates the problem. And now the seas, because the sea is warming up is actually melting the ice. All these things, it seems to be escalating. How precarious is the situation right now?

**Katharine Hayhoe 01:04:47:**

Well, it absolutely is getting worse. You're totally right and we understand with every new study that comes out that it's worse than we thought. So some amount of damage is irreversible.

**Peter McCormack 01:05:00:**

Okay, so we're at that point?,

**Katharine Hayhoe 01:05:01:**

We are going to have to live with some of the damage, yes. So for example from the 1960s until now, climate change has already increased the economic gap between the richest and poorest countries in the world by 25%. That has already happened. Since the 1980s, we have been losing about a billion dollars' worth of crop losses due to climate change, most of it in poor countries. That's already happened.

**Katharine Hayhoe 01:05:21:**

We have already seen about eight to nine inches of sea level rise, and a few more feet are already inevitable and that will displace millions of people around the world. That has already happened. But, and this is the research I do, I look into the future and I say what if. What if we continue to depend on fossil fuels for the next century? What if we transition off fossil fuels very slowly at the rate that we're doing today? What if we transition off a bit quickly and what if it's all-hands-on-deck climate emergency, let's do this as quick as possible? What is the difference between those different futures?

**Katharine Hayhoe 01:05:58:**

And I believe that by studying the difference that will actually help us make a choice. So the difference is not the survival of the planet. The planet will still be orbiting the sun long after we're gone. It's not about saving the planet, it's about saving us. After the polar bear, we humans, our civilisation is the most vulnerable on the entire planet.

**Katharine Hayhoe 01:06:17:**

We have almost eight billion people and we have built our entire civilisation, our economy, our infrastructure, our food and our water systems, our political systems are all predicated on the assumption of a largely stable climate as it has been over the history of human civilisation.

**Katharine Hayhoe 01:06:33:**

Our fluctuations have been very minor over the last few thousand years that we've developed our economic and our infrastructure and our agricultural systems. We are what is at risk. And the difference between those future scenarios that I look at is the difference between the survival of human civilisation or not. That is what is at risk.

**Peter McCormack 01:06:53:**

That's a big bold statement. It's going to piss some people off.

**Katharine Hayhoe 01:06:57:**

It's the truth.

**Peter McCormack 01:06:57:**

Excuse my language, yeah. So I think we should go into that a bit more.

**Katharine Hayhoe 01:07:02:**

Well, as a physician, I feel like we are the physicians of the planet. You don't want a physician to tell you that your lifestyle choices have put your life at risk. But the physician's moral responsibility is to say that. And you could turn to the physician and say, "Oh, you're just in the pay of big pharma. You're just telling me this because you want me to take expensive drugs, or you want me to stop eating something that you might have a stake in."

**Katharine Hayhoe 01:07:27:**

You could attack the physician. You could say, "Well, I don't believe you. You're part of a global conspiracy. I feel fine today. I didn't cough today, so I'm okay." How you react is your choice, but as a physician, the physician has the responsibility to tell people the truth. And so as climate scientists, that is our responsibility, I believe, is to tell people that our lifestyle choices will determine our future. It is not too late to preserve our civilisation. It is not too late to transition our entire economy to a better future.

**Peter McCormack 01:08:00:**

When you talk about the civilisation, are you talking about as it is at the moment? Or are you talking about a complete wipeout of the human race? Or are you talking about that it will be just so, they'll be such catastrophic change that humans will just be in survival mode in little tiny units in countries? What are we talking about here?

**Katharine Hayhoe 01:08:18:**

I'm not talking about the human race either. Now, I'm not a biologist, so don't quote me on

this. But it is my considered opinion that there will certainly still be humans in a world with unchecked climate change.

**Peter McCormack 01:08:28:**

But not as civilised as we can see societies we have now?

**Katharine Hayhoe 01:08:32:**

Right. So let me give you some examples. So if sea level rise continues unchecked, it would displace hundreds of millions of people. Think of the Syrian refugee crisis. That was about the external refugees where, what, somewhere around two million, no more than that, and that was a huge issue.

**Katharine Hayhoe 01:08:48:**

So imagine the Syrian refugee crisis times a hundred, then times a thousand. Imagine that number of people with nowhere to live and that's only sea level rise. Then you factor in the crop failures, you factor in the droughts, you factor in the extreme heat. I mean where would you even put all those people?

**Katharine Hayhoe 01:09:11:**

So then you think about the economic response. It would have a huge economic response. It would have a huge response on people's health and welfare. It would have a huge response on political systems. People would harden the borders. They would shut down the borders. The world will become much more isolated, but then all of the goods that we used to get from different countries, where would they come from. I mean political scientists are probably some of the most concerned people because they understand that our political systems require stability.

**Peter McCormack 01:09:38:**

In some ways, are we getting a small window into this for what's happening with coronavirus and in China and that the supply chain systems are breaking down?

**Katharine Hayhoe 01:09:49:**

Yes, in a way. So coronavirus is not caused by climate change at all.

**Peter McCormack 01:09:53:**

Yeah, of course. What I'm saying is-

**Katharine Hayhoe 01:09:54:**

Some people asked.

**Peter McCormack 01:09:55:**

... You're talking about the movement of goods and such like we are seeing at the moment where a country shuts down, the supply systems break down. Therefore, for example, the car manufacturers can't make cars alone because they can't get the parts they were getting from China. So you're talking about, essentially we have a very fragile global economy which is based on having a stable climate. Without that, everything will start to break down?

**Katharine Hayhoe 01:10:22:**

Exactly. It's like dominoes. Let me give you another concrete example. So in 2011, there were some devastating floods in Thailand. And we know that as the world gets warmer,

warmer air holds more water vapor. So when a storm comes along and it's warmer, there's more water vapor for it to sweep up and dump on us than there was 50 or 100 years ago. So the floods in Thailand were made worse by climate change and it turns out that that is where a key part of hard drives is manufactured.

**Katharine Hayhoe 01:10:47:**

So because they had to shut down, then I think something like 50% of the world's hard drives supply was affected. In the United States, it affected Apple and Hewlett-Packard and all the big computer manufacturers. The cost doubled because you couldn't even get anything out of Thailand. And so there was this crisis in the computer industry because of a flood in a country in the other side of the world. And that's just the very most tip of the iceberg.

**Peter McCormack 01:11:12:**

And we're starting to see more of these extreme weather events.

**Katharine Hayhoe 01:11:14:**

Yes. That's why I think that the most appropriate colloquial term for this issue is global weirding, and that's what I call my YouTube series, Global Weirding. Because global warming, that increase in the average temperature of the planet by one or two degrees, none of us can ever actually experience that personally. We would have to add up the temperature at every weather station around the world for multiple decades and add it all up. And that's just not something we identify with.

**Katharine Hayhoe 01:11:39:**

What we identify with that was the fact that it is getting weird. In other words, we've always had storms and droughts and floods and heat waves, cyclones, hurricanes. We've always had those, but we can see that they are getting stronger. They are getting bigger. In some cases, they're getting more frequent. The summer heat is getting more intense. We're breaking more records. We're seeing things happen that are not normal.

**Katharine Hayhoe 01:12:03:**

And they don't just affect our perception of the world, they're affecting our bottom line. They're affecting our economy, our food, our health, our air quality, our water resources, our energy, our trillions of dollars of infrastructure which was all designed to building codes based on a last century, not this one. We have our entire civilisation that is currently at risk because our civilisation is based on a concept of stationarity, the idea that climate is relatively stable which it has been over the course of our civilisation.

**Katharine Hayhoe 01:12:33:**

So we have, in effect, been driving down the road looking in the rear view mirror. We have been planning everything we do whether it's our economy, our building codes, our energy or water allocation. We've been planning it based on the past rather than the future. And driving down the road as you know here in West Texas, it works great if the road is straight. You can get away down the road just looking in the rear view mirror.

**Katharine Hayhoe 01:12:58:**

But if there is a curve in the road and you are looking in the rear view mirror, you will run off the road. And today, there is a massive curve in the climate road and our collective wheels are already on the rumble strip.



**Peter McCormack 01:13:13:**

Again, it is quite a scary scenario you paint, and you're going to not like this question. But what kind of time frame are we looking at? Is this something that's a century away or is this something that could be 30 years away? Is it really that hard to give any kind of picture?

**Katharine Hayhoe 01:13:32:**

Yes and no. Some of the impacts are here today.

**Peter McCormack 01:13:35:**

Yeah, of course, yeah.

**Katharine Hayhoe 01:13:36:**

It's not like it's the future. It is now. We have already seen them. What I do is I look to the future and I say, "If the world gets warmer by one degree or two degrees or three degrees, what will happen to our water supply in a given place? What will it feel like in terms of if you live in New York City, will it feel like Washington DC? Will it feel eventually like Atlanta, Georgia?" We can actually put numbers on these.

**Katharine Hayhoe 01:13:59:**

So I can tell you, for example, I can look at corn production. I can look at water supply for a water district here in Texas. I can look at wildfire risk. I can look at these things and I can say, "If the world gets warmer by one and a half degrees or two degrees or three or four degrees, here's what's going to happen." You know what the biggest uncertainty is? Us. We are the ones who are going to decide what level of warming we will see. We are the biggest uncertainty in our future.

**Peter McCormack 01:14:27:**

See, I have very little confidence in us as human race. I just do. I do, because you know why? Because it feels like very little is being done at a government level. It feels like this requires some international coordination to make something happen. It feels like ... And I think one of the biggest problems for this is the term length of a president or prime minister.

**Katharine Hayhoe 01:14:51:**

I agree.

**Peter McCormack 01:14:51:**

... And that they have four or five years and the decisions they have to make could have such a severe impact on people that they worry that they won't get reelected, or they worry about their legacy. And they know in five years the problem from now to five years away won't be that significantly different that you can blame them. I've always found that I think that's one of the biggest problems.

**Katharine Hayhoe 01:15:14:**

I think you're absolutely right. And that's why as a Canadian, I'm very glad that we now have Prince Harry. Maybe he can help us with that long-range plan and return to the monarchy would really help because you've got the queen, how long has she been queen? She's passing onto her family, so she's very invested on the centennial timescale.

**Peter McCormack 01:15:28:**

Be careful. People are going to listen to this. They're going to say, "That will be the quotes.

That will be the quote right there. Well, **Katharine Hayhoe**, her solution to this is to reinstate the monarchy."

**Katharine Hayhoe 01:15:44:**

Exactly.

**Peter McCormack 01:15:44:**

Yeah, okay.

**Katharine Hayhoe 01:15:44:**

Now, I'm saying that will a very large grain of salt. But I do think you're right because our current political systems are motivated and our current financial systems, if you are looking at your quarterly returns for your stock prices, all of our current decision-making focuses on the short-term, and climate change is a long-term problem.

**Katharine Hayhoe 01:16:02:**

Now, for the US, the cost of meeting the Paris Agreement versus the benefits of doing so, so the impacts avoided, the breakeven is about 5 to 10 years. But you wouldn't see the benefits until after you weren't president anymore where you'd bear the costs now. So it really is part of ... It's not only a psychological challenge that we are talking about before, it is also a political challenge. We have built the challenge into our political systems because we have no motivation to make choices for long-term benefit.

**Peter McCormack 01:16:37:**

Okay, so let's talk about two different scenarios of change. Let's talk about individual and then let's talk about at state level. So I am a huge hypocrite. I have a huge carbon footprint. Absolute transparency, I flew 92 times last year. I've already flown 20 times this year. What are the things I can do at a personal level that will genuinely make a difference? Or is it futile? Is anyone on an individual level, is it futile? Because if I don't fly, that plane is still going to fly. The airline industry is still projected to grow. So is it really futile, or there are things that we can as individuals do that will make a genuine difference?

**Katharine Hayhoe 01:17:19:**

I would say that one of the most common questions that I get is, is it a system-wide solution that we need or individual solutions? And my answer to that is yes.

**Peter McCormack 01:17:29:**

Yes, both.

**Katharine Hayhoe 01:17:30:**

Yes, exactly.

**Peter McCormack 01:17:30:**

Yeah, I know and I can understand that because everything contributes.

**Katharine Hayhoe 01:17:33:**

It does. So if you look at our carbon emissions since the beginning of the industrial era, 100 companies are responsible for 70% of emissions. 100 companies, since the beginning of the industrial era.

**Peter McCormack 01:17:48:**

How many of them are here in the US?

**Katharine Hayhoe 01:17:50:**

A number are here in the US, a number are in the UK. Some still exists, some don't and they are the big fossil fuel companies, the Shells, the BPs, the Exxons and Chevrons of the world.

**Peter McCormack 01:18:00:**

Whose scientists backing the late '70s knew the science.

**Katharine Hayhoe 01:18:04:**

Oh, yes. In fact, I interned at Exxon during my master's degree and we published research on climate change and heat-trapping gases. So in that sense, we have to have a system-wide change because our fossil fuel use is heavily subsidised. In the United States, fossil fuel subsidies top \$650 billion US per year which exceeds the Pentagon's budget. And some people may argue that part of the Pentagon's budget is also a fossil fuel subsidy because why would you care about certain countries if they don't have large fossil fuel reserves?

**Peter McCormack 01:18:35:**

I did not know this. I did not know it's subsidised.

**Katharine Hayhoe 01:18:37:**

That's according to the International Monetary Fund, not Greenpeace.

**Peter McCormack 01:18:41:**

We can trust the IMF.

**Katharine Hayhoe 01:18:41:**

Yes, you would think so. Globally, fossil fuel subsidies are 6% of the world's GDP, 6%. The fraction of subsidies, the go-to renewables is minuscule compared to that. So the reason why we need system-wide change is because we don't have a free market. It is not a free market. Fossil fuel use is heavily subsidised which means that the market is slanted towards continuing to use these sources even though we really have no financial reason to do so.

**Peter McCormack 01:19:08:**

Good one for the libertarians?

**Katharine Hayhoe 01:19:09:**

Absolutely. In fact, if you're a libertarian, you should be outraged by the fact that we are subsidising the richest companies in the world. If you go again to Wikipedia, you look at the richest companies in the world, you've got Walmart at the top, which is planning to be 50% clean energy by 2025 and then all the rest the way down, you've got all these fossil fuel and energy companies that are making all of their money off us.

**Katharine Hayhoe 01:19:32:**

So that's why we need system-wide change, and this change is happening. So I'm from Canada where we have a price on carbon. A price on carbon is what, nearly every economist in the world including the two who won the Nobel Prize for economics last year agree, is the most effective way to use the free market to reduce emissions. Yanking all of

the subsidies is difficult because some of them date back to land leases in the 1800s. So instead putting a price on carbon and taking the dividends and returning them to middle and low income household, so individuals are not harmed by it, is really effective.

**Katharine Hayhoe 01:20:05:**

And in fact, in early 2020, there was a conservative think tank called the climate leadership counsel in the US that's led by Bush era republicans, they released a plan to put carbon pricing in the US. And they estimate that starting in year one, the average American household would receive \$2,000 back in their taxes due to the carbon price. And you can ratchet it up year after year as they're doing in Canada, and the economy will in turn wean itself off carbon to make more money in other ways.

**Katharine Hayhoe 01:20:36:**

So in Canada, the four provinces that had a price on carbon before it became a federal policy were the four provinces that actually led the country in economic output over that time. That's pretty amazing.

**Peter McCormack 01:20:48:**

How do you put a price on carbon?

**Katharine Hayhoe 01:20:50:**

Well, the easiest way is to do it at the production site. So in other words, if you are going to sell gasoline, then you add not very much. I mean it's a matter of like 5, 10 cents which given prices today is not much. You add that to the price. The government collects all of that from the producers. It's not from the individual gas station but from the producers and then you use that money to, first of all, make sure that middle and lower income households are not harmed, and then use the remaining stuff to subsidise and incentivise energy efficiency programs, electric cars, clean energy technology, research and development to accelerate the economy in that direction.

**Peter McCormack 01:21:29:**

Conservatives will not like this as a policy if it's income redistribution.

**Katharine Hayhoe 01:21:33:**

Well, first of all-

**Peter McCormack 01:21:35:**

They'll call you a communist.

**Katharine Hayhoe 01:21:36:**

It's desocialising the current situation which is highly socialised. We are paying for the fossil fuel companies. But the interesting thing is it's a free market mechanism. And so the Climate Leadership Council in the US who just put this forward is a conservative organisation. And there is something in congress called the bipartisan Climate Solutions Caucus. You can only join if you join with somebody from the other party, so you have to join ... A democrat has to join with a republican and they support carbon pricing because it is a truly bipartisan solution.

**Katharine Hayhoe 01:22:06:**

So as a climate scientist, I'm in favor of anything that cuts carbon and doesn't hurt people.

But as a human, I like the pragmatic approach of something that you can get people onboard with across the political spectrum because otherwise with you, I don't think that's going to happen if we can't all get onboard.

**Peter McCormack 01:22:23:**

This isn't the carbon tax credits, right? This isn't the tax credit system that allowed people to buy and sell?

**Katharine Hayhoe 01:22:28:**

No.

**Peter McCormack 01:22:29:**

Because that is thoroughly disliked, right? Because it can be abused.

**Katharine Hayhoe 01:22:33:**

It can be very much abused. And Russia really abused that system because their economy took a downturn after they've gotten their carbon credits. They sold hot air to other countries essentially that they weren't ever going to produce but they had the credits for. So, no, this is very much if you use it, you pay for it.

**Katharine Hayhoe 01:22:49:**

And so if somebody still wants to drive a Hummer, you can drive a Hummer. Nobody is taking your Hummer away but you just pay the real cost. Now the interesting thing is, I don't know if you saw during the Super Bowl which of course, is a big thing here in the US, there was a commercial for a new electric Hummer, a thousand horsepower electric Hummer. So the world is starting to change and individual choices are part of this too.

**Katharine Hayhoe 01:23:13:**

Like what? Well, a lot of these big corporations have shareholders who have been attending their meetings saying, "We need you to change." So for example in 2020, BP announced they plan to be carbon neutral by 2050.

**Peter McCormack 01:23:28:**

Yeah, I see that but-

**Katharine Hayhoe 01:23:29:**

How, I'm not quite sure.

**Peter McCormack 01:23:29:**

Yeah, how, out of all companies. But it was so far in the distance is going to ... That policy, whoever is the CEO probably won't be alive at that time, 2050.

**Katharine Hayhoe 01:23:40:**

Yeah, probably not. But if they want to transition to be an energy company, that is what they have to do because we need energy but we've been using fossil fuel since the Middle Ages. I mean we've been burning coal since ... Did you know the very first air quality legislation due to pollution from burning coal was in the 1300s in London? King Edward announced that if anybody burn coal within the city limits while his queen was in residence, the Tower of London, they would be killed. The penalty was death.

**Katharine Hayhoe 01:24:09:**

Once the queen was gone, all that is wrought. But we've been using this stuff for hundreds of years. It is very old technology and it really is time to move on.

**Peter McCormack 01:24:18:**

What is the best clean energy renewables that you like? Because again this is another thing, you'll say something like wind farms, I say, "Well, the energy that goes into producing the wind turbines and then they can't be recycled so they have to be buried in the ground. They're very inefficient," or, "The energy used to produce the electricity to power the Tesla has to come from cold place power plants, actually power that provide the electricities of the house." Is this all just another bunch of nonsense or is there some valid criticisms?

**Katharine Hayhoe 01:24:46:**

There always a grain of truth to these, but it's just a grain. So for example, it takes, I think about six to eight months for if you created the wind turbines using fossil fuels, it would take six to eight months to break even and then start producing more clean energy. But the average wind farm lasts for well over a decade, not six to eight months. And increasingly, a lot of companies like for example Tesla, they are powering their production with clean energy. So there is no lag to payoff. It's 100% clean energy from the get-go.

**Katharine Hayhoe 01:25:15:**

Recycling solar panels and wind turbines is a big deal and people are looking at that because already here in West Texas, they've replaced the blades already once with much longer, more powerful blades. You have to recycle this material, otherwise, you're creating a worse problem but it's not as bad a problem as fossil fuel pollution that kills millions of people around the world. Wind turbines are not killing millions of people around the world.

**Katharine Hayhoe 01:25:38:**

There is no free lunch yet when it comes to energy, but the best source of energy in my opinion is a mix. There is no one magic silver bullet but depending on where you are and what resources you have, there's different ways to get energy that are cheaper and more affordable than others. So for example, here where we live in West Texas, wind is the cheapest type of energy. It's even cheaper than natural gas. In California, solar with storage is cheaper than natural gas.

**Katharine Hayhoe 01:26:03:**

If you live up in Alaska or the Arctic, solar is a little bit of a challenge there. So they're getting very creative with hydrokinetic energy from streams. A lot of remote villages are using that. Some of them are using geothermal energy. Some of them are using biomass energy. There's a company in Iowa that collects used cooking oil and turns it into biodiesel for trucks which I think is amazing. The United Airlines is flying biofuel flights out of the LAX airport.

**Peter McCormack 01:26:31:**

I have been in one of those.

**Katharine Hayhoe 01:26:32:**

You probably were. So the solution is not for us all to go without because so often we hear ... Speaking of individual solutions, we hear, "If everybody went vegan, that would fix the problem." Well, first of all, animal agriculture is 14% of the problem, just 14%.

**Peter McCormack 01:26:48:**

So Cowspiracy was wrong?

**Katharine Hayhoe 01:26:51:**

Absolutely dead wrong, I'm sorry to say. And then how many people are actually going to go vegan? Well, in a lot of developing countries, animal agriculture is used on marginal lands where you can't grow food crops and it's the staple of their diet. They don't have a different way to get much protein. So if you say, "Okay, how about in wealthy countries, we all go vegan?" well, maybe say 50% of us would be willing to do that. So 50% of us in developing countries where here in the US, animal agriculture is only 9%, it's not even 14%, you're talking about a fraction.

**Katharine Hayhoe 01:27:23:**

And then people say, "Well, if we all stop flying, that will do it." Well, flights, they are a problem. They produce a lot of carbon. They're the biggest part of my personal carbon footprint which is why I've transitioned 80% of the talks I give to virtual talks and when I do travel, I only travel when I bundle. So I have so many events in one place, it's as if I just go to one place and then I just take the train to all these different places and then I fly back.

**Katharine Hayhoe 01:27:46:**

But aviation is only 2% to 3% of the total problem worldwide. So the solution is not to say, if everybody stops flying and goes vegan, that will fix the problem, because it won't. But the solution is to say, I want biofuel flights. I fly on American Airlines. American Airlines, why aren't you doing what United Airlines is doing? I think you should.

**Peter McCormack 01:28:07:**

It's everything.

**Katharine Hayhoe 01:28:08:**

Yes, it's everything.

**Peter McCormack 01:28:08:**

It's attacked at every angle.

**Katharine Hayhoe 01:28:09:**

Yes, eat more plants. Check out Beyond Meat, or Impossible Burgers. Use energy efficient light bulbs in your home. Consider an electric car. I use one. It's actually not that much more expensive. If you live in a place like London or when I used to live in Toronto, I didn't even own a car because I could just use public transportation. It all matters and the most important thing that any single human can do is talk about it because if we don't talk about it, why would we care? And if we don't care, why would we act?

**Peter McCormack 01:28:34:**

Thinking about my own footprint, does offsetting work? Can you offset in a way whereby whatever I'm contributing, is there a way of paying to offset that in the equivalent amount of carbon will be taken out of the atmosphere? Is that possible?

**Katharine Hayhoe 01:28:51:**

It is possible but it is not possible for everybody to do.

**Peter McCormack 01:28:54:**

No, no, I'm addressing purely on my personal level because if I'm going to tackle this as a subject and talk about it with people, I'm a huge hypocrite if I flied nearly a hundred times a year. But if I can financially pay for that amount of carbon to taken out of the atmosphere so I'm net neutral way before BP, I'm carbon neutral way before 2050, I can do this right now, how I actually do that? And how does it actually happen? Which companies, what do they actually do? Are they planting trees? What's going on here?

**Katharine Hayhoe 01:29:28:**

We absolutely can, but it is not a fix-all because we don't have enough that we could do to take all the emissions of all the people in rich countries out of the picture.

**Peter McCormack 01:29:35:**

So a trillion trees isn't enough?

**Katharine Hayhoe 01:29:37:**

A trillion trees is not enough. It would offset maybe a year's worth of total emissions. But that doesn't mean you shouldn't do it, we should. So what I do is I use a company called Climate Stewards. It's a charity in the US, the UK and the Netherlands. It is registered and certified and that's really important. There's a lot of good organisations in Canada. We have something called Zero. There's good carbon offset organisations all over but they should be certified because you don't want them going on and planting trees and then somebody else cuts the tree down and burns it the next year. I mean that's pointless.

**Katharine Hayhoe 01:30:08:**

So use an organisation that is certified and look at what they do. Read their materials. See if what they're doing is actually useful and helpful. So the organisation that I use, they have a motto which I completely agree with which is reduce everything you can first and then offset the rest. So in other words, don't go to Bali for a yoga retreat, sorry, in another week and then just offset it like some Middle Age indulgence, "I'll get to have them because I've paid the priest."

**Katharine Hayhoe 01:30:34:**

Reduce what you can. Be conscious about your footprint but then offset what you can because you can help other people by doing so. And so that is exactly what I do. They have a website where you can enter your flights. You can enter your lifestyle. It really doesn't even cost that much. And what we're doing is we're sending a price signal to say, "I'm willing to pay for this." And United Airlines will actually let you do it on their website. They will let you pick an offset on their website.

**Peter McCormack 01:30:56:**

British Airways do that as well.

**Katharine Hayhoe 01:30:57:**

Oh, yes. BA does too, yes. And I think JetBlue is planning to be 100% carbon neutral. They're the first carbon neutral airline. JetBlue, I believe, you have to check on this, they are personally offsetting their emissions.

**Peter McCormack 01:31:09:**

I think that's the best internal airline here in the US, by the way. Yeah, having flown them all.



Okay, so that's interesting. Yes, a tough one, I get a lot of criticism for the number of flights I've done and I do want to offset, do I want to change my career? I mean, I could do more of my interviews on Skype, that I know is good.

**Katharine Hayhoe 01:31:27:**

I would.

**Peter McCormack 01:31:28:**

Yeah, I mean I'd certainly look into that. So there's a number of things we can do personally. I still fundamentally believe that it requires global coordinated government effort. I'm very doubtful if it will happen.

**Katharine Hayhoe 01:31:39:**

I'm not sure about government. The industry and cities are a big part of it too.

**Peter McCormack 01:31:46:**

Yeah. I just think the problem we have is competition.

**Katharine Hayhoe 01:31:50:**

Mm-hmm.

**Peter McCormack 01:31:50:**

And we have competitions between governments. We have competition between companies. It's a great marketing message to say, "We'll be carbon neutral by 2050." But really, how much is the incentive there right now to do this? You said some things that are kind of scary, so I feel like it needs a coordinated effort and I feel like it won't happen.

**Katharine Hayhoe 01:32:13:**

You're right. So let's close with this question which is the number one question that I get anywhere I speak, and it's, what gives you hope?

**Peter McCormack 01:32:20:**

I had that as a question.

**Katharine Hayhoe 01:32:23:**

That's the number one.

**Peter McCormack 01:32:24:**

Actually, can we do one more question before that because I think it'll lead up better before we ask "What gives you hope"? For anybody out there who is doubtful and dismissive, what would you say to them? Obviously, I personally would say to them, "Why don't you approach this with an open mind? Just forget your base. Just quietly on your own, just consider the consequences and have an open mind," but what are the things that you would say right now to say, "Look, you really need to reconsider your opinions here?"

**Katharine Hayhoe 01:32:55:**

I would say that you already care about this issue, you just don't realise it, because it affects every single one of us. We are humans. We live on this planet. It provides the air we breathe and the water we drink and the food we eat and the materials we use to make every single thing we care about. To care about climate change, we don't have to be a liberal. We don't

have to a socialist, a communist. We don't have to be a kid doing a climate strike or a hippie. We only have to be one thing and that is a human living on planet earth.

**Katharine Hayhoe 01:33:25:**

So I would say learn more about what you care about and how that's affected by climate change. And, number two, learn more about solutions because there are positive solutions that you can get onboard with if you're libertarian, if you're conservative, if you're free market, if you're bipartisan, if you're liberal, if you're socialist, if you're communist. There are solutions that you can get onboard with from every part of the political spectrum. And it just makes sense rather than saying it isn't true and burying our head in the sand like an ostrich to say, "Okay, it's true."

**Katharine Hayhoe 01:33:56:**

But you know what? There's something that we can do about it that is entirely consistent and compatible with my values, my ideology and who I am. And so I'm going to stand up and I'm going to advocate for a solution that I think is the right one.

**Peter McCormack 01:34:08:**

Okay, that's fantastic. So final question, what gives you hope?

**Katharine Hayhoe 01:34:15:**

That is the question that I hear the most. And first of all, I would say that what does not give me hope is the science. Every new study that comes out seems like it's happening faster or to a greater extent than we thought. And the politics don't give me a lot of hope either. Everywhere we look, it is just more talking heads arguing. Whether it's in the UK, whether it's in Canada, whether it's Australia or the US, neither the science nor the politics gives me hope.

**Katharine Hayhoe 01:34:41:**

So what does give me hope? What gives me hope is looking at the real changes that are already happening. Some of those are happening at the highest levels, whether it's the richest company in the world, Walmart, which is planning to be 50% clean energy by 2025, not 2050 and they want to take a gigaton of carbon out of the global supply chain. They're reaching out to all of their suppliers in their chain.

**Katharine Hayhoe 01:35:06:**

Apple which is currently number 11 richest in the world, they're doing one better. They're already 100% clean energy and they are decarbonising their supply chain as well through China. China has more wind and solar energy than any other country in the world. Canada has a price on carbon and they are going to be banning coal. Finland is also going to be banning coal. The Norwegian wealth fund is divesting from oil and gas exploration.

**Peter McCormack 01:35:28:**

These are all individual acts?

**Katharine Hayhoe 01:35:30:**

They are country, national acts.

**Peter McCormack 01:35:32:**

So an opposition to my point of thinking that needs global coordination, people are just doing this.

**Katharine Hayhoe 01:35:36:**

They're doing it. Ireland has divested from fossil fuels entirely and the Church of Ireland has as well. Many universities and seminaries and large organisations are divesting. BlackRock, which is a huge investment firm that controls over seven trillion dollars, they just announced they're divesting from coal and it sent enormous tidal waves, not just ripples but tsunamis throughout the financial world when they said that.

**Katharine Hayhoe 01:36:01:**

So there really is action happening. And then you look around the world and you realise that 70% of new electricity being installed around the world today is clean energy. In our current skewed market with fossil fuels being heavily subsidised, you look at how they're revolutionising the lives of poor people in countries that don't have fossil fuels, but they do have sun and they do have wind. They don't have transmission grids but you can plug your cellphone into the solar panel and you can plug a light bulb into and your kids can do their homework at night and you can have a much better life.

**Katharine Hayhoe 01:36:32:**

And then I look at what's happening here in Texas. So here in Texas, we have the biggest army base in the US. Everything really is bigger in Texas. And it went with wind and solar energy two years ago because it would save taxpayers \$150 million over natural gas. We have the first carbon neutral airport in North America, it's in Dallas-Fort Worth. We have almost 20% of our electricity in this state, which is known for oil and gas, from wind and solar. 10 years ago, Texas was not even on the map for solar. Now, it's the fifth state in terms of the most installed solar and our installed solar is doubling this year and it's planning to double the next year.

**Katharine Hayhoe 01:37:13:**

So looking for hope in places that you wouldn't even expect, the fact that ... Last Christmas, I got one of those emails that you dread saying that somebody pulled your credit records. I said, "What? They've stolen my ID, I have to shut down the credit cards." And my husband said, "No, don't do that." And I'm like, "What do you mean don't do that?" He's like, "Well, I might know what it's about." And I'm like, "What is it about?" He said, "Well, I can't tell you." I'm like, "What do you mean you can't tell me? Is there something I need to know?"

**Katharine Hayhoe 01:37:39:**

But eventually he cracked and he told me that he had taken advantage of the tax rebate. He had crunched the numbers, he had gotten us solar panels for Christmas and they were from a local company in San Antonio, Texas that the last time oil prices tanked and a lot of people in the oil fields in West Texas lost their jobs, Mission Solar took these guys in, trained them to have a permanent job in solar panel manufacturing right here in Texas and that's where got our solar panels from.

**Peter McCormack 01:38:04:**

That is a man who knows his wife.

**Katharine Hayhoe 01:38:05:**

Yes, best present ever.

**Peter McCormack 01:38:08:**

That's a man who knows his wife. Well, listen, this has been very helpful to me. I definitely learned more in the session. I hope that other people will. I think we could have probably gone on for three or four hours. There's so much I didn't ask but I've got to come back in-season to watch a Texas Tech game anyways, so we will follow up. But, no, absolutely fascinating. I'm very grateful for your time. We've clearly overrun.

**Peter McCormack 01:38:30:**

Just to close out, if people want to follow you, where can they see your work? Where can they find out more about what you're doing?

**Katharine Hayhoe 01:38:36:**

First of all, if you want more on solutions, check out Project Drawdown. We have not even talked about carbon farming or anything like that which is amazing. The idea of putting carbon back in the soil where we actually wanted rather than up in the atmosphere where we don't. So check out Project Drawdown which is online at [drawdown.org](http://drawdown.org) and then you can find me on social media.

**Katharine Hayhoe 01:38:57:**

Our YouTube series is called Global Weirding, not warming, weirding. I'm also on Twitter and Facebook and Instagram. And I tried to post information that is first of all factual, second of all, they're hopeful because we all need hope. And so especially this last year in social media, I've been trying to post something hopeful a couple of times a week to say, "Here's our hope for today. Look at this conversation that somebody had with their mother who's a dedicated Fox News Rush Limbaugh watcher who finally said, 'You know what? I think this actually might be real. Let's have a conversation about it.'"

**Katharine Hayhoe 01:39:31:**

Or a conversation that somebody had with their students, where they trained their students to go and talk to and interview people they knew about climate change. And the students came back and they said, "This was amazing. This is the best conversation I've ever had with this person even though I've known them for years. We really move forward on this even though I've been dreading having that conversation."

**Katharine Hayhoe 01:39:51:**

So on social media, I tried to share these hopeful stories because we can find hope anywhere and we need to. Otherwise, we will be a self-fulfilling prophecy of doom.

**Peter McCormack 01:40:00:**

It's a great ending.

**Katharine Hayhoe 01:40:01:**

Doom.

**Peter McCormack 01:40:04:**

Doom. Well, listen, thank you for your time. I'm going to go and get myself a steak now. I'm

going to fly there by plane, get a steak. Now I'm only kidding. Listen, look, I really appreciate your time, amazing interview. I'm sure we're going to talk again.

**Katharine Hayhoe 01:40:17:**

Yes.