

Al Gore: The case for optimism on climate change

00:11

I was excited to be a part of the "Dream" theme, and then I found out I'm leading off the "Nightmare?" section of it.

00:19

(Laughter)

00:22

And certainly there are things about the climate crisis that qualify. And I have some bad news, but I have a lot more good news. I'm going to propose three questions and the answer to the first one necessarily involves a little bad news. But -- hang on, because the answers to the second and third questions really are very positive.

00:48

So the first question is, "Do we really have to change?" And of course, the Apollo Mission, among other things changed the environmental movement, really launched the modern environmental movement 18 months after this Earthrise picture was first seen on earth, the first Earth Day was organized. And we learned a lot about ourselves looking back at our planet from space. And one of the things that we learned confirmed what the scientists have long told us. One of the most essential facts about the climate crisis has to do with the sky. As this picture illustrates, the sky is not the vast and limitless expanse that appears when we look up from the ground. It is a very thin shell of atmosphere surrounding the planet. That right now is the open sewer for our industrial civilization as it's currently organized. We are spewing 110 million tons of heat-trapping global warming pollution into it every 24 hours, free of charge, go ahead.

01:57

And there are many sources of the greenhouse gases, I'm certainly not going to go through them all. I'm going to focus on the main one, but agriculture is involved, diet is involved, population is involved. Management of forests, transportation, the oceans, the melting of the permafrost. But I'm going to focus on the heart of the problem, which is the fact that we still rely on dirty, carbon-based fuels for 85 percent of all the energy that our world burns every year. And you can see from this image that after World War II, the emission rates started really accelerating. And the accumulated amount of man-made, global warming pollution that is up in the atmosphere now traps as much extra heat energy as would be released by 400,000 Hiroshima-class atomic bombs exploding every 24 hours, 365 days a year. Fact-checked over and over again, conservative, it's the truth. Now it's a big planet, but --

02:58

(Explosion sound)

03:00

that is a lot of energy, particularly when you multiply it 400,000 times per day. And all that extra heat energy is heating up the atmosphere, the whole earth system.

03:12

Let's look at the atmosphere. This is a depiction of what we used to think of as the normal distribution of temperatures. The white represents normal temperature days; 1951-1980 are arbitrarily chosen. The blue are cooler than average days, the red are warmer than average days. But the entire curve has moved to the right in the 1980s. And you'll see in the lower right-hand corner the appearance of statistically significant numbers of extremely hot days. In the 90s, the curve shifted further. And in the last 10 years, you see the extremely hot days are now more numerous than the cooler than average days. In fact, they are 150 times more common on the surface of the earth than they were just 30 years ago.

04:00

So we're having record-breaking temperatures. Fourteen of the 15 of the hottest years

ever measured with instruments have been in this young century. The hottest of all was last year. Last month was the 371st month in a row warmer than the 20th-century average. And for the first time, not only the warmest January, but for the first time, it was more than two degrees Fahrenheit warmer than the average. These higher temperatures are having an effect on animals, plants, people, ecosystems.

04:34

But on a global basis, 93 percent of all the extra heat energy is trapped in the oceans. And the scientists can measure the heat buildup much more precisely now at all depths: deep, mid-ocean, the first few hundred meters. And this, too, is accelerating. It goes back more than a century. And more than half of the increase has been in the last 19 years. This has consequences.

04:58

The first order of consequence: the ocean-based storms get stronger. Super Typhoon Haiyan went over areas of the Pacific five and a half degrees Fahrenheit warmer than normal before it slammed into Tacloban, as the most destructive storm ever to make landfall. Pope Francis, who has made such a difference to this whole issue, visited Tacloban right after that. Superstorm Sandy went over areas of the Atlantic nine degrees warmer than normal before slamming into New York and New Jersey. The second order of consequences are affecting all of us right now. The warmer oceans are evaporating much more water vapor into the skies. Average humidity worldwide has gone up four percent. And it creates these atmospheric rivers. The Brazilian scientists call them "flying rivers." And they funnel all of that extra water vapor over the land where storm conditions trigger these massive record-breaking downpours. This is from Montana. Take a look at this storm last August. As it moves over Tucson, Arizona. It literally splashes off the city. These downpours are really unusual.

06:14

Last July in Houston, Texas, it rained for two days, 162 billion gallons. That represents more than two days of the full flow of Niagara Falls in the middle of the city, which was, of course, paralyzed. These record downpours are creating historic floods and mudslides.

06:31

This one is from Chile last year. And you'll see that warehouse going by. There are oil tankers cars going by. This is from Spain last September, you could call this the running of the cars and trucks, I guess. Every night on the TV news now is like a nature hike through the Book of Revelation.

06:53

(Laughter)

06:55

I mean, really.

06:58

The insurance industry has certainly noticed, the losses have been mounting up. They're not under any illusions about what's happening. And the causality requires a moment of discussion. We're used to thinking of linear cause and linear effect -- one cause, one effect. This is systemic causation. As the great Kevin Trenberth says, "All storms are different now. There's so much extra energy in the atmosphere, there's so much extra water vapor. Every storm is different now." So, the same extra heat pulls the soil moisture out of the ground and causes these deeper, longer, more pervasive droughts and many of them are underway right now.

07:41

It dries out the vegetation and causes more fires in the western part of North America. There's certainly been evidence of that, a lot of them.

07:50

More lightning, as the heat energy builds up, a considerable amount of additional lightning also.

07:57

These climate-related disasters also have geopolitical consequences and create instability. The climate-related historic drought that started in Syria in 2006 destroyed 60 percent of the farms in Syria, killed 80 percent of the livestock, and drove 1.5 million climate refugees into the cities of Syria, where they collided with another 1.5 million refugees from the Iraq War. And along with other factors, that opened the gates of Hell that people are trying to close now. The US Defense Department has long warned of consequences from the climate crisis, including refugees, food and water shortages and pandemic disease.

08:45

Right now we're seeing microbial diseases from the tropics spread to the higher latitudes; the transportation revolution has had a lot to do with this. But the changing conditions change the latitudes in the areas where these microbial diseases can become endemic and change the range of the vectors, like mosquitoes and ticks that carry them. The Zika epidemic now -- we're better positioned in North America because it's still a little too cool and we have a better public health system. But when women in some regions of South and Central America are advised not to get pregnant for two years -- that's something new, that ought to get our attention. The Lancet, one of the two greatest medical journals in the world, last summer labeled this a medical emergency now. And there are many factors because of it.

09:39

This is also connected to the extinction crisis. We're in danger of losing 50 percent of all the living species on earth by the end of this century. And already, land-based plants and animals are now moving towards the poles at an average rate of 15 feet per day.

09:55

Speaking of the North Pole, last December 29, the same storm that caused historic flooding in the American Midwest, raised temperatures at the North Pole 50 degrees Fahrenheit warmer than normal, causing the thawing of the North Pole in the middle of the long, dark, winter, polar night. And when the land-based ice of the Arctic melts, it raises sea level.

10:21

Paul Nicklen's beautiful photograph from Svalbard illustrates this. It's more dangerous coming off Greenland and particularly, Antarctica. The 10 largest risk cities for sea-level rise by population are mostly in South and Southeast Asia. When you measure it by assets at risk, number one is Miami: three and a half trillion dollars at risk. Number three: New York and Newark. I was in Miami last fall during the supermoon, one of the highest high-tide days. And there were fish from the ocean swimming in some of the streets of Miami Beach and Fort Lauderdale and Del Rey. And this happens regularly during the highest-tide tides now. Not with rain -- they call it "sunny-day flooding." It comes up through the storm sewers. And the Mayor of Miami speaks for many when he says it is long past time this can be viewed through a partisan lens. This is a crisis that's getting worse day by day. We have to move beyond partisanship.

11:22

And I want to take a moment to honor these House Republicans --

11:26

(Applause)

11:27

who had the courage last fall to step out and take a political risk, by telling the truth about the climate crisis.

11:37

So the cost of the climate crisis is mounting up, there are many of these aspects I haven't even mentioned. It's an enormous burden. I'll mention just one more, because the World Economic Forum last month in Davos, after their annual survey of 750 economists, said the climate crisis is now the number one risk to the global economy. So you get central

bankers like Mark Carney, the head of the UK Central Bank, saying the vast majority of the carbon reserves are unburnable. Subprime carbon. I'm not going to remind you what happened with subprime mortgages, but it's the same thing. If you look at all of the carbon fuels that were burned since the beginning of the industrial revolution, this is the quantity burned in the last 16 years. Here are all the ones that are proven and left on the books, 28 trillion dollars. The International Energy Agency says only this amount can be burned. So the rest, 22 trillion dollars -- unburnable. Risk to the global economy. That's why divestment movement makes practical sense and is not just a moral imperative.

12:46

So the answer to the first question, "Must we change?" is yes, we have to change. Second question, "Can we change?" This is the exciting news! The best projections in the world 16 years ago were that by 2010, the world would be able to install 30 gigawatts of wind capacity. We beat that mark by 14 and a half times over. We see an exponential curve for wind installations now. We see the cost coming down dramatically. Some countries -- take Germany, an industrial powerhouse with a climate not that different from Vancouver's, by the way -- one day last December, got 81 percent of all its energy from renewable resources, mainly solar and wind. A lot of countries are getting more than half on an average basis.

13:35

More good news: energy storage, from batteries particularly, is now beginning to take off because the cost has been coming down very dramatically to solve the intermittency problem. With solar, the news is even more exciting! The best projections 14 years ago were that we would install one gigawatt per year by 2010. When 2010 came around, we beat that mark by 17 times over. Last year, we beat it by 58 times over. This year, we're on track to beat it 68 times over.

14:06

We're going to win this. We are going to prevail. The exponential curve on solar is even steeper and more dramatic. When I came to this stage 10 years ago, this is where it was. We have seen a revolutionary breakthrough in the emergence of these exponential curves.

14:24

(Applause)

14:27

And the cost has come down 10 percent per year for 30 years. And it's continuing to come down.

14:35

Now, the business community has certainly noticed this, because it's crossing the grid parity point. Cheaper solar penetration rates are beginning to rise. Grid parity is understood as that line, that threshold, below which renewable electricity is cheaper than electricity from burning fossil fuels. That threshold is a little bit like the difference between 32 degrees Fahrenheit and 33 degrees Fahrenheit, or zero and one Celsius. It's a difference of more than one degree, it's the difference between ice and water. And it's the difference between markets that are frozen up, and liquid flows of capital into new opportunities for investment. This is the biggest new business opportunity in the history of the world, and two-thirds of it is in the private sector. We are seeing an explosion of new investment. Starting in 2010, investments globally in renewable electricity generation surpassed fossils. The gap has been growing ever since. The projections for the future are even more dramatic, even though fossil energy is now still subsidized at a rate 40 times larger than renewables. And by the way, if you add the projections for nuclear on here, particularly if you assume that the work many are doing to try to break through to safer and more acceptable, more affordable forms of nuclear, this could change even more dramatically.

16:00

So is there any precedent for such a rapid adoption of a new technology? Well, there are

many, but let's look at cell phones. In 1980, AT&T, then Ma Bell, commissioned McKinsey to do a global market survey of those clunky new mobile phones that appeared then. "How many can we sell by the year 2000?" they asked. McKinsey came back and said, "900,000." And sure enough, when the year 2000 arrived, they did sell 900,000 -- in the first three days. And for the balance of the year, they sold 120 times more. And now there are more cell connections than there are people in the world.

16:36

So, why were they not only wrong, but way wrong? I've asked that question myself, "Why?"

16:43

(Laughter)

16:44

And I think the answer is in three parts. First, the cost came down much faster than anybody expected, even as the quality went up. And low-income countries, places that did not have a landline grid -- they leap-frogged to the new technology. The big expansion has been in the developing countries. So what about the electricity grids in the developing world? Well, not so hot. And in many areas, they don't exist. There are more people without any electricity at all in India than the entire population of the United States of America. So now we're getting this: solar panels on grass huts and new business models that make it affordable. Muhammad Yunus financed this one in Bangladesh with micro-credit. This is a village market. Bangladesh is now the fastest-deploying country in the world: two systems per minute on average, night and day. And we have all we need: enough energy from the Sun comes to the Earth every hour to supply the full world's energy needs for an entire year. It's actually a little bit less than an hour. So the answer to the second question, "Can we change?" is clearly "Yes." And it's an ever-firmer "yes."

17:54

Last question, "Will we change?" Paris really was a breakthrough, some of the provisions are binding and the regular reviews will matter a lot. But nations aren't waiting, they're going ahead. China has already announced that starting next year, they're adopting a nationwide cap and trade system. They will likely link up with the European Union. The United States has already been changing. All of these coal plants were proposed in the next 10 years and canceled. All of these existing coal plants were retired. All of these coal plants have had their retirement announced. All of them -- canceled. We are moving forward. Last year -- if you look at all of the investment in new electricity generation in the United States, almost three-quarters was from renewable energy, mostly wind and solar.

18:41

We are solving this crisis. The only question is: how long will it take to get there? So, it matters that a lot of people are organizing to insist on this change. Almost 400,000 people marched in New York City before the UN special session on this. Many thousands, tens of thousands, marched in cities around the world. And so, I am extremely optimistic. As I said before, we are going to win this.

19:14

I'll finish with this story. When I was 13 years old, I heard that proposal by President Kennedy to land a person on the Moon and bring him back safely in 10 years. And I heard adults of that day and time say, "That's reckless, expensive, may well fail." But eight years and two months later, in the moment that Neil Armstrong set foot on the Moon, there was great cheer that went up in NASA's mission control in Houston. Here's a little-known fact about that: the average age of the systems engineers, the controllers in the room that day, was 26, which means, among other things, their age, when they heard that challenge, was 18.

19:56

We now have a moral challenge that is in the tradition of others that we have faced. One

of the greatest poets of the last century in the US, Wallace Stevens, wrote a line that has stayed with me: "After the final 'no,' there comes a 'yes,' and on that 'yes', the future world depends." When the abolitionists started their movement, they met with no after no after no. And then came a yes. The Women's Suffrage and Women's Rights Movement met endless no's, until finally, there was a yes. The Civil Rights Movement, the movement against apartheid, and more recently, the movement for gay and lesbian rights here in the United States and elsewhere. After the final "no" comes a "yes."

20:38

When any great moral challenge is ultimately resolved into a binary choice between what is right and what is wrong, the outcome is fore-ordained because of who we are as human beings. Ninety-nine percent of us, that is where we are now and it is why we're going to win this. We have everything we need. Some still doubt that we have the will to act, but I say the will to act is itself a renewable resource.

21:08

Thank you very much.

21:09

(Applause)

21:46

Chris Anderson: You've got this incredible combination of skills. You've got this scientist mind that can understand the full range of issues, and the ability to turn it into the most vivid language. No one else can do that, that's why you led this thing. It was amazing to see it 10 years ago, it was amazing to see it now.

22:04

Al Gore: Well, you're nice to say that, Chris. But honestly, I have a lot of really good friends in the scientific community who are incredibly patient and who will sit there and explain this stuff to me over and over and over again until I can get it into simple enough language that I can understand it. And that's the key to trying to communicate.

22:26

CA: So, your talk. First part: terrifying, second part: incredibly hopeful. How do we know that all those graphs, all that progress, is enough to solve what you showed in the first part?

22:40

AG: I think that the crossing -- you know, I've only been in the business world for 15 years. But one of the things I've learned is that apparently it matters if a new product or service is more expensive than the incumbent, or cheaper than. Turns out, it makes a difference if it's cheaper than.

22:58

(Laughter)

22:59

And when it crosses that line, then a lot of things really change. We are regularly surprised by these developments. The late Rudi Dornbusch, the great economist said, "Things take longer to happen than you think they will, and then they happen much faster than you thought they could." I really think that's where we are. Some people are using the phrase "The Solar Singularity" now, meaning when it gets below the grid parity, unsubsidized in most places, then it's the default choice.

23:28

Now, in one of the presentations yesterday, the jitney thing, there is an effort to use regulations to slow this down. And I just don't think it's going to work.

23:43

There's a woman in Atlanta, Debbie Dooley, who's the Chairman of the Atlanta Tea Party. They enlisted her in this effort to put a tax on solar panels and regulations. And she had just put solar panels on her roof and she didn't understand the request.

23:56

(Laughter)

23:58

And so she went and formed an alliance with the Sierra Club and they formed a new organization called the Green Tea Party.

24:05

(Laughter)

24:06

(Applause)

24:07

And they defeated the proposal. So, finally, the answer to your question is, this sounds a little corny and maybe it's a cliché, but 10 years ago -- and Christiana referred to this -- there are people in this audience who played an incredibly significant role in generating those exponential curves. And it didn't work out economically for some of them, but it kick-started this global revolution. And what people in this audience do now with the knowledge that we are going to win this. But it matters a lot how fast we win it.

24:44

CA: Al Gore, that was incredibly powerful. If this turns out to be the year, that the partisan thing changes, as you said, it's no longer a partisan issue, but you bring along people from the other side together, backed by science, backed by these kinds of investment opportunities, backed my reason that you win the day -- boy, that's really exciting.

25:06

Thank you so much.

25:07

AG: Thank you so much for bringing me back to TED. Thank you!

25:11

(Applause)