

Remarks at TEDxMIT: Operation Earth (December 6 2019)

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Climate change represents possibly the greatest threat that humanity has ever faced and there's no one simple solution that will solve it.

Research from the Intergovernmental Panel on Climate Change (IPCC) suggests that human activities have already caused our atmosphere to warm about 1 degree Celsius above pre-industrial levels. The IPCC estimates that number will go up to 1.5 degrees Celsius sometime between 2030 and 2052 if human activity induced warming continues at the current rate.¹

That timeline should worry us. According to UN Climate Change, we must limit warming levels to no more than 2 degrees Celsius to avoid many of the worst-case scenarios.² Even at the 1.5 degree level, we'll start to see sea level rises, extreme temperatures in many regions, heavy precipitation in some regions and droughts in others.³

We're not talking about some distant future. This July was the hottest month on record.⁴ We turn on the news and watch videos of the Amazon jungle and the Borneo jungle burning. Climate change isn't *going* to happen—it's happening right now.

As scientists, we've long studied climate change, and sought to understand its causes. Now, we must take the next step and seek out and implement solutions.

Policy still matters—of course it does. But we don't have to wait on new policies to act. Great work has been done by Project Drawdown and others to show how behavioral changes can slow the rate of warming.

As a technologist, I believe there is also great potential for technology to make a major difference.

New innovations can slow the impacts of warming, whether through stopping deforestation, preserving biodiversity, or ensuring there's enough food to go around and food is not wasted.

But there's also opportunity to address some of the underlying causes.

An industrial greenhouse in Zurich is pumping in carbon dioxide using the world's first commercial direct air capture plant. The CO₂ boosts plant yields and extracts around 900 tonnes of CO₂ a year from the air.⁵

¹ IPCC, 2018: Summary for Policymakers. In: *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*, <https://www.ipcc.ch/sr15/chapter/spm/>

² United Nations and Climate Change, Climate action and support trends, https://unfccc.int/sites/default/files/resource/Climate_Action_Support_Trends_2019.pdf

³ IPCC, 2018 (above).

⁴ New York Times, August 15, 2019, <https://www.nytimes.com/2019/08/15/climate/hottest-july-noaa.html>

⁵ The Guardian, September 14, 2017, <https://www.theguardian.com/sustainable-business/2017/sep/14/entrepreneurs-turn-carbon-dioxide-into-fuels-artificial-photosynthesis>

Two professors of Harvard have devised a system—known as the artificial leaf—that completes the process of making liquid fuel from sunlight, carbon dioxide, and water. And they've done it at an efficiency of 10 percent, using pure carbon dioxide.⁶

These two projects are just the tip of a much wider iceberg. Research designed to combat climate change is happening in pockets all over the world.

Silicone Valley startup Blue Planet employs a chemical process to capture the carbon dioxide from the atmosphere and turn it into pellets that can be integrated in cement for construction.

Two London-based architects have even developed algae-filled plastic curtains designed to help purify dirty air. The curtains they draped over Dublin Castle in Ireland can suck more than two pounds of carbon dioxide from the air each day.⁷

Now, it would take a lot of curtains on a lot of buildings to capture enough CO₂ to solve climate change. But I believe it's the sum of all these efforts that will make the difference.

If we—as a scientific community—choose to focus our energy and investments in this area, I believe that we have the power to slow—and maybe even begin to reverse—the damage we've done to our climate and our planet.

We know change can happen.

It was only a few decades ago that scientists discovered the hole in the ozone layer. But with global efforts to eliminate the use of [chlorofluorocarbons](#) also known as CFCs, we were able to reverse those trends. Recently, scientists from MIT have even found signs that the Antarctic ozone hole has shrunk by more than 4 million square kilometers.⁸

We can't wait for Siberia to thaw and release the methane from its permafrost. We can't wait for islands of garbage to decimate our oceans. And we cannot wait for unsustainable agriculture to destroy what remains of the rain forests. The damage is happening right now, and we need to act with a sense of urgency.

Skeptics may not believe that we can reverse the global warming trends—but then, many didn't believe we'd ever walk on the moon.

Skepticism has never stopped scientists and engineers from doing the impossible. So let's embrace the challenge. Our planet is a feedback system. Reducing the carbon emissions is not enough to reverse climate change. We need to cool the planet. Instead of aiming to limit global warming temperature increase by 1 degree Celsius, we have to think about what we'd need to do to reduce temperatures by 1 degree Celsius. This is a vital aspect of Operation Earth. Let us seek and develop solutions to decrease the planet temperature, let us work globally to adjust our carbon footprint to reduce our impact on global warming.

⁶ MIT Technology Review, June 7, 2016, <https://www.technologyreview.com/s/601641/a-big-leap-for-an-artificial-leaf/>

⁷ NBC News, December 12, 2018, <https://www.nbcnews.com/mach/science/eco-friendly-algae-curtains-could-help-curb-air-pollution-crowded-ncna946946>

⁸ MIT News, June 30, 2016, <http://news.mit.edu/2016/signs-healing-antarctic-ozone-layer-0630>