So I’m gonna talk about COVID-19, Science, and the way forward on climate change, and this talk will be more conceptual and not so much presenting my research.

So firstly,

there’s really no evidence that climate change caused the COVID-19 pandemic. However we should note that climate change does cause increased spread of infectious diseases and could contribute to future pandemics. Simply put, mosquitoes, ticks, and other disease vectors do better in a warming world.

Floods, which are more frequent under climate change, spread waterborne diseases, or infections. And with regard to future pandemics, climate change causes migration of both human and animal populations and this facilitates mixing of these populations which could contribute to viruses spilling over from animals to humans.

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However, climate change and enhanced disasters will exacerbate the COVID-19 pandemic.
I think that’s almost guaranteed. So we could see floods in the Midwest. We almost certainly will see wildfires in California later in the season. Almost certainly we’ll see hurricanes in the Caribbean along the Gulf Coast or along the Eastern U.S., and those will produce climate refugees who will likely be housed in shelters. And of course, during a pandemic, we don’t want people housed in shelters, that it’s closed quarters and not a good idea. There could be destruction of healthcare system infrastructure by hurricanes, wildfires, et cetera, and we could see more overwhelming of the healthcare systems, the various healthcare systems with both disaster-related patients, in addition to COVID-19 patients. Another example of how climate change and COVID-19 pandemic could interact is the Locust plague, which you’ve probably heard about, that’s going on in East Africa. It’s been happening for the last several months. It’s thought that very heavy rains in East Africa precipitated this locust plague, probably related to climate change. The Locust plague has been causing agricultural failures,
00:02:44.810 --> 00:02:46.530 leading to food insecurity,
00:02:46.530 --> 00:02:48.850 leading to malnourished people
00:02:48.850 --> 00:02:50.880 who have weakened immune systems
00:02:50.880 --> 00:02:53.863 who will be more susceptible to the virus.
00:02:54.850 --> 00:02:55.923 Next slide, please.
00:02:57.320 --> 00:02:58.690 So there are many parallels
00:02:58.690 --> 00:03:00.760 between the pandemic and climate change.
00:03:00.760 --> 00:03:02.930 So let me state some of those.
00:03:02.930 --> 00:03:05.080 So first, of course,
00:03:05.080 --> 00:03:06.930 there have been long-standing warnings
00:03:06.930 --> 00:03:09.710 by scientists that have not been heeded
00:03:09.710 --> 00:03:14.710 about the risk of pandemics and about climate change.
00:03:14.890 --> 00:03:17.260 And since they’ve not been heeded,
00:03:17.260 --> 00:03:19.040 prevention and preparedness efforts
00:03:19.040 --> 00:03:20.743 have been woefully inadequate.
00:03:22.440 --> 00:03:23.273 Secondly,
00:03:24.713 --> 00:03:28.000 for both the pandemic and climate change,
00:03:28.000 --> 00:03:30.760 they’re both disasters for public health
00:03:30.760 --> 00:03:33.510 and for the economy, and we’ll get back to the economy.
00:03:34.950 --> 00:03:37.220 Both prey on the most vulnerable,
00:03:37.220 --> 00:03:40.523 including the elderly, poor and people of color.
00:03:43.430 --> 00:03:48.360 For both, an effective response requires early action,
00:03:48.360 --> 00:03:52.730 federal government leadership, international cooperation,
00:03:52.730 --> 00:03:56.070 and unprecedented societal mobilization.
00:03:56.070 --> 00:03:59.560 So for climate change,
00:03:59.560 --> 00:04:01.500 these four
00:04:01.500 --> 00:04:03.030 responses
00:04:03.030 --> 00:04:03.990 have been
extremely poor. I'd say actually somewhat better for the pandemic. We could have a discussion about that, but also a lot of failings for the pandemic as well. Next slide, please.

So both crises are urgent, but on different timescales. For the pandemic, it will probably play out over a period of months to several years. We could say it’s the worst acute public health crisis in a century. I would argue that it’s probably not the worst, at least not yet, not the worst public health crisis in a century.

We have to compare it with the tobacco epidemic, obesity, HIV. So it remains to be seen where this pandemic will be situated overall, but certainly as an acute public health crisis, it’s the worst. With regard to climate change, the timescale is decades to centuries, and it’s possibly the worst public health crisis in human history, depending on what we do over the next decade or two.

So both crises can be solved by science.
about physical distancing, testing, contact tracing, quarantining, PPE, ventilators, the need to develop through scientific research antiviral medications, as well as a vaccine. So I think it’s pretty clear how science needs to be used to solve the pandemic. With regard to climate change, scientists have shown that it’s real, that it’s caused by humans, that it’s harming public health, and that the longer we delay, the worse it will get. And through science, we actually know what the solution is, which essentially is to convert from a fossil-fuel-based economy to a renewable-energy-based economy. That’s a tall order, but as we’ll talk about, it’s doable. Next slide, please. So, the world economy has taken a big hit, as you all know. It’s gonna need to be rebuilt and I would suggest that there are two paths for rebuilding the world economy. There’s the path backwards, in which we would double down on our fossil fuel economy, or the path forward, in which we would seize this unprecedented opportunity to build a renewable energy economy.
So first, the path backwards. This path would pit the environment against the economy. It’s a tried-and-true tactic that’s been used and we continue to rollback environmental regulations and suspend enforcement. There will be stimulus infrastructure and/or infrastructure packages, no matter what the path, and the path backwards will attempt to do that for decades to come. That we’d have a package that first has no environmental requirements for bailed-out industries, like airlines, cruise ships and industrial agriculture, and that, second, resuscitates and entrenches the fossil fuel industry, which as you know, is currently kind of on its heels, and the path backwards will attempt to do that for decades to come. So then there’s the path forward. So first, I would say, and this isn’t the main part of the path forward, but I think it’s important to note, we would retain what we’ve learned during the pandemic. So that would include reducing business travel by relying
more heavily on video conferencing.

We've all or a lot of us have really taken up video conferencing in a big way and we know how to do it and it's actually quite useful.

And of course, if we reduce business travel, that reduces greenhouse gas emissions.

We could see an increase in remote working, which many of us have been doing and we've got a taste for that.

It's not that hard to do, and that would also decrease greenhouse gas emissions.

We could produce more of our own goods, such as drugs, medical equipment and personal protective equipment in order to reduce vulnerability to globalized supply networks.

So that would reduce shipping and also greenhouse gas emissions and we can convert healthcare systems from single-use to reusable PPE.

Single-use is tremendously wasteful and has a larger greenhouse gas footprint than doing reusable.

So the main element of the path forward is to heavily invest in renewable energy.
is to generate electricity with renewable energy. So once that’s done, we can electrify transportation, heating of buildings, and industry. All of that’s gonna require a huge amount of electricity. So it’s important to develop energy efficiency and conservation, which could include dense well-designed livable cities that are a lot more energy efficient, developing mass transportation, which is also much more energy efficient than single-occupied automobiles, and high-speed inter-city trains to replace regional air travel. Parenthetically air travel is one of the complicated issues with regard to accomplishing zero greenhouse gas emissions because we don’t know yet how we’re gonna fly airplanes without burning fossil fuels. Then the final element that I’ll mention that’s related to all this is carbon dioxide capture and storage. Unfortunately the world has dithered so long with regard to reducing greenhouse gas emissions that in addition to reducing emissions, we’re gonna have to also capture and store CO2.
Now that could be done through natural mechanisms by reforestation, and also agricultural soil management, which, unfortunately, that might not be enough. And so people are trying to develop technologies to remove CO2 from the atmosphere, and then store it underground. Those technologies are not there yet, but we could invest in research on those technologies.

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Then the final part of the path forward that I see is to invest in science education and literacy. The COVID-19 experience I think shows that people respond to clear science-based messages from trusted sources. So it hasn’t been perfect, obviously, and we haven’t seen those science-based messages from some of our leadership, but we have seen it from other leadership, a lot of the governors, from medical leadership, such as Doctor Fauci and others, and it’s actually been to me quite remarkable how much adherence there has been to the physical distancing. Now we might see some degradation and change in that.

There’s gonna be political demagoguery and there’s a lot of misinformation on the internet,
but nevertheless I think we could point to a positive experience with regards to science communication for COVID-19. So we need to do the same thing with climate change and we need to educate the general public, policy makers, medical and public health professionals, and really students at all levels about climate change and its public health impacts and the feasibility of both solutions. Next slide, please.

So this is a little complicated, but I think it’s an important slide. So I’ll walk you through it. This is looking at generation of electricity by different types of renewable energy and it’s comparing the cost in dollars per kilowatt hour. It’s important to note the kind of light tan coloring, and that’s the fossil fuel cost range. Now, just to go through this quickly, then, you could see that for bioenergy, geothermal, and hydro, those are all at the lower end of the fossil fuel cost range.
Then very notably for solar voltaics, between 2010 and 2018, we saw a dramatic drop in costs. We’re now, in 2018, the cost is in the low range of the fossil fuel cost range. Concentrated solar power, which is another type of solar power, there’s been a very dramatic drop as well, although it’s actually still a bit above the fossil fuel cost range. And then for offshore wind, has gone down to the mid range for fossil fuels and onshore wind is at the lower end now in terms of the range of fossil fuels. So the point I’d like to make here is that fossil fuel advocates say renewable energy would be nice, but it’s really not feasible, it’s not cost effective, but the fact is that that’s not true, that we’ve reached a point technologically that it is feasible to make this transition from fossil fuels to renewable energy. There are still a few technical improvements that need to be made, such as battery storage of energy, but it’s really there and so this is very feasible.
It just requires political will and the necessary investments. Final slide, please. So I'd like to end with this quote that, "optimism is a moral imperative," and that’s because pessimism is a self-fulfilling prophecy. So I think we have a long road ahead with regard to climate change, but it’s important to have optimism to motivate and sustain our work. So, thank you.