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, I should say. 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.

However, climate change and enhanced disasters will exacerbate the COVID-19 pandemic.

Thanks.
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,
leading to food insecurity,
leading to malnourished people who have weakened immune systems
who will be more susceptible to the virus.
Next slide, please.
So there are many parallels between the pandemic and climate change.
So let me state some of those.
So first, of course, there have been long-standing warnings by scientists that have not been heeded about the risk of pandemics and about climate change.
And since they’ve not been heeded, prevention and preparedness efforts have been woefully inadequate.
Secondly, for both the pandemic and climate change, they’re both disasters for public health and for the economy, and we’ll get back to the economy.
Both prey on the most vulnerable, including the elderly, poor and people of color.
For both, an effective response requires early action,
federal government leadership, international cooperation,
and unprecedented societal mobilization.
So for climate change,
these four responses 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.
Next slide, please.
So both crises can be solved by science.
For the pandemic, we’ve been talking a lot, of course,
00:05:29.170 --> 00:05:32.050 about physical distancing, testing,
00:05:32.050 --> 00:05:34.743 contact tracing, quarantining, PPE,
00:05:36.300 --> 00:05:37.860 ventilators,
00:05:37.860 --> 00:05:41.000 the need to develop through scientific research
00:05:41.000 --> 00:05:44.733 antiviral medications, as well as a vaccine.
00:05:46.690 --> 00:05:48.090 So I think it’s pretty clear
00:05:49.478 --> 00:05:52.670 how science needs to be used to solve the pan-
demic.
00:05:52.670 --> 00:05:54.780 With regard to climate change,
00:05:54.780 --> 00:05:57.560 scientists have shown that it’s real,
00:05:57.560 --> 00:05:59.950 that it’s caused by humans,
00:05:59.950 --> 00:06:02.400 that it’s harming public health,
00:06:02.400 --> 00:06:05.273 and that the longer we delay, the worse it will get.
00:06:06.310 --> 00:06:09.730 And through science, we actually know what the
solution is,
00:06:09.730 --> 00:06:11.300 which essentially is to convert
00:06:11.300 --> 00:06:13.610 from a fossil-fuel-based economy
00:06:13.610 --> 00:06:16.083 to a renewable-energy-based economy.
00:06:17.150 --> 00:06:21.140 That’s a tall order, but as we’ll talk about, it’s
doable.
00:06:21.140 --> 00:06:22.243 Next slide, please.
00:06:24.820 --> 00:06:29.820 So, the world economy has taken a big hit, as you
all know.
00:06:30.000 --> 00:06:31.940 It’s gonna need to be rebuilt
00:06:32.810 --> 00:06:34.530 and I would suggest that there are
00:06:34.530 --> 00:06:37.500 two paths for rebuilding the world economy.
00:06:37.500 --> 00:06:39.660 There’s the path backwards,
00:06:39.660 --> 00:06:43.410 in which we would double down on our fossil fuel
economy,
00:06:43.410 --> 00:06:45.030 or the path forward,
00:06:45.030 --> 00:06:48.850 in which we would seize this unprecedented op-
portunity
00:06:48.850 --> 00:06:51.920 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, 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. Next slide, please.

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
00:08:12.670 --> 00:08:15.020 more heavily on video conferencing.
00:08:15.020 --> 00:08:17.540 We’ve all or a lot of us have really
00:08:17.540 --> 00:08:20.160 taken up video conferencing in a big way
00:08:20.160 --> 00:08:24.653 and we know how to do it and it’s actually quite
useful.
00:08:27.730 --> 00:08:29.800 And of course, if we reduce business travel,
00:08:29.800 --> 00:08:32.550 that reduces greenhouse gas emissions.
00:08:32.550 --> 00:08:35.120 We could see an increase in remote working,
00:08:35.120 --> 00:08:37.220 which many of us have been doing
00:08:37.220 --> 00:08:39.163 and we’ve got a taste for that.
00:08:40.260 --> 00:08:41.880 It’s not that hard to do,
00:08:41.880 --> 00:08:44.713 and that would also decrease greenhouse gas emis-
sions.
00:08:45.640 --> 00:08:48.260 We could produce more of our own goods,
00:08:48.260 --> 00:08:50.750 such as drugs, medical equipment,
00:08:50.750 --> 00:08:53.550 and personal protective equipment
00:08:53.550 --> 00:08:55.230 in order to reduce vulnerability
00:08:55.230 --> 00:08:57.103 to globalized supply networks.
00:08:57.959 --> 00:09:00.190 So that would reduce shipping
00:09:00.190 --> 00:09:02.840 and also greenhouse gas emissions
00:09:02.840 --> 00:09:05.550 and we can convert
00:09:05.550 --> 00:09:08.660 healthcare systems from single-use to reusable
PPE
00:09:09.910 --> 00:09:11.473 masks, gowns, gloves.
00:09:12.550 --> 00:09:15.290 Single-use is tremendously wasteful
00:09:15.290 --> 00:09:18.660 and has a larger greenhouse gas footprint
00:09:18.660 --> 00:09:20.563 than doing reusable.
00:09:21.440 --> 00:09:22.513 Next slide, please.
00:09:24.840 --> 00:09:27.420 So the main element of the path forward
00:09:27.420 --> 00:09:30.870 is to heavily invest in renewable energy.
00:09:30.870 --> 00:09:34.160 So the foundation of a transition
00:09:34.160 --> 00:09:36.770 to a renewable energy economy
00:09:36.770 --> 00:09:39.653 is to generate electricity with renewable energy.
00:09:40.530 --> 00:09:45.110 So once that’s done, we can electrify transportation,
00:09:45.110 --> 00:09:47.343 heating of buildings, and industry.
00:09:49.030 --> 00:09:52.160 All of that’s gonna require a huge amount of electricity.
00:09:52.160 --> 00:09:53.670 So it’s important to develop
00:09:53.670 --> 00:09:56.210 energy efficiency and conservation,
00:09:56.210 --> 00:09:58.120 which could include
00:09:58.120 --> 00:10:00.600 dense well-designed livable cities
00:10:01.859 --> 00:10:03.743 that are a lot more energy efficient,
00:10:05.020 --> 00:10:06.810 developing mass transportation,
00:10:06.810 --> 00:10:08.790 which is also much more energy efficient
00:10:08.790 --> 00:10:09.623 than
00:10:11.620 --> 00:10:13.823 single-occupied automobiles,
00:10:14.930 --> 00:10:15.780 and high-speed
00:10:16.950 --> 00:10:20.393 inter-city trains to replace regional air travel.
00:10:22.370 --> 00:10:26.510 Parenthetically air travel is one of the complicated issues
00:10:26.510 --> 00:10:30.870 with regard to accomplishing zero greenhouse gas emissions
00:10:30.870 --> 00:10:35.870 because we don’t know yet how we’re gonna fly airplanes
00:10:36.030 --> 00:10:37.833 without burning fossil fuels.
00:10:39.660 --> 00:10:42.290 Then the final element that I’ll mention
00:10:42.290 --> 00:10:43.470 that’s related to all this
00:10:43.470 --> 00:10:46.063 is carbon dioxide capture and storage.
00:10:47.810 --> 00:10:50.960 Unfortunately the world has dithered so long
00:10:50.960 --> 00:10:54.040 with regard to reducing greenhouse gas emissions
00:10:54.040 --> 00:10:57.670 that in addition to reducing emissions,
00:10:57.670 --> 00:10:59.400 we’re gonna have to also
00:11:00.440 --> 00:11:02.600 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.

Next slide, please.

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, about its public health impacts and the feasibility of both solutions.

Next slide, please.

This is looking at generation of electricity by different types of renewable energy and it’s comparing the cost in dollars per kilowatt hour on the y-axis between 2010 and 2018. 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, that I won’t go into the details, 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, 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 technological 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.