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Priorities for climate change action after COP 24
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PITA: Welcome to Intersections, the podcast where two experts explore and explain important issues of the day. We're part of the Brookings Podcast Network, and I'm your host Adriana Pita.

From December 3rd to 14th, representatives from nearly 200 countries are convening for the 24th Conference of the Parties of the United Nations Climate Change Convention, commonly known as COP 24, to continue progress toward implementation of the Paris Climate Agreement. With us today to discuss some of the key issues at stake in these meetings, the effects of the withdrawal of U.S. federal leadership on climate, and strategies for continuing to push progress forward are two experts from across the Brookings Initiative on Energy and Science.

We have with us Todd Stern, who was formerly the special envoy for climate change and the chief climate negotiator in the Obama administration, and David Victor, a professor of International Relations at the School of Global Policy and Strategy and Director of the Laboratory on International Law and Regulation at the University of California San Diego. Gentlemen, thank you for being here today.

STERN: Thanks very much.

VICTOR: It's great to be here.

PITA: So, before we get to the actual discussion of the COP 24 meetings, I wanted to start by talking about some of the two major reports that have come out in just the last couple of months that highlighted the increasing urgency of making progress on climate change. The UN's Intergovernmental Panel on Climate Change, the IPCC. And then there was the U.S. government's own National Climate Assessment. Can I ask you to start by telling us about what was new in these reports and why is that the urgency showing up like it's increasing like the carbon emissions are back on the rise, what's happening?

STERN: Well, maybe I'll take a quick cut at that. I think first on the IPCC report, the so-called one point five report, to some extent I think the thing that is most striking is what it said about two degrees, because two degrees has been the kind of landmark safe zone articulated by science for some time. People were getting nervous about that already. But here you had kind of in black and white. It gets pretty bad already when you get to two. Now, some people might think that it already is problematic, and they'd be right at one point five, but it would take an unbelievable

heroic effort to get to one point five. But I think, again the report to me is most striking in the trouble that we're already in at two, which is still going to be very difficult. The one thing I would say about the fourth assessment is in the tradition of the 2014, the third assessment very strong report. I think what's most striking about it is oh my god this report came out from this administration. Right. And obviously not with much input from the White House and from the political people there. But quite extraordinary that the civil servants were able to put that out.

VICTOR: You know I think that's right. And it's very clear from the sciences there is no safe zone. There are impacts of climate change that arise at very modest levels of climate change, especially in unmanaged ecosystems, and there are some that get really bad at much higher levels, especially when you've got systems that are very hardened against extremes in weather, storm surges, and so on. I think Todd's right in saying that the report is pretty grim reading about two degrees, and not even one point five degrees has some pretty significant impacts, I think to me what's really striking about both these reports is that the scientific community on the one hand it's getting better at talking with even finding degrees of resolution about what might happen, what can you do, what are the potential extreme events? That's all that's very, very important. That's on the one side and on the other side the efforts to control emissions have really lagged. And so, there's like two ships sailing in opposite directions. We have a paper just out in nature suggesting that grim reading, as the IPCC special report is, that the rate of warming already is in fact faster than the IPCC had warned. And so, this is really I think what we have to grapple with is that the science is getting stronger, that the problem is really serious and getting worse quickly, and many of the extreme events that people imagined it could have, only partially, are now happening and the serious work to control emissions is really lagging far behind.

PITA: What's leading to the speed up in the rate of warming?

VICTOR: Well, there are a lot of different factors. The dominant one is emissions, that we've been talking, ratio of talking to doing on climate change has been high, and so emissions continue almost on track with the worst case scenarios that the IPCC has envisioned over the last few years, that do these different scenarios in the future, scenarios where everything is great, scenarios where emissions are really high, for the most part the world is tracking the worst case scenarios. There's a new data set out estimating emissions for 2017. They're almost two percent

higher than they were in 2016. That same data set suggests that emissions next year going to be two percent higher than they were last year. There's been a big shift to all the growth is happening in emerging economies because they're emerging, but the shift is now more about India and less about China. So, the Chinese emissions are not rising as rapidly as people expected for a variety of reasons whereas the emissions from the rapidly growing Indian economy are growing. I think 2017 they grew four percent, almost four percent year on year.

PITA: Wow. So, that brings us to some of the discussions underway at COP. What can you tell us about what are the goals at this year's meeting?

STERN: I think the real goal is to negotiate the set of guidelines and rules and procedures that are supposed to put Paris into action, to take Paris from being an agreement on paper into a working and functional effective regime, and that's the moniker for that in the press as the rulebook. And so, I think, that to me is the central feature of the negotiations this year. It's supposed to get finished this year. I think it will. But there have been a lot of challenges. In addition, I think that there will be a lot of people looking for at least some kind of signal from countries about increased ambition coming, the Secretary General of the UN is holding a big summit next fall which will be focused very much on trying to urge countries to crank up their ambition, and then in 2020 will be the first of the so-called five year review cycles that are built into the Paris Agreement. And again, they'll be a lot of people looking for some forward motion there. But even here I think there will be a look for a signal. But the rulebook is job one.

PITA: OK. I was going to ask you about some of the sticking points that you think that they're running into in some of these conversations.

STERN: Well, you know, look, these negotiations have always been marked by that divide between developed and developing countries. Paris was a breakthrough for a number of reasons, but one of those reasons was that while preserving the principle of differentiation it changed it, it does differentiation in different ways. Countries do nationally determined targets so that you don't see developed countries do X, and developing do Y, but it differentiates across the spectrum in the transparency regime. There is flexibility, which is the differentiation word there that is supposed to be available to those developing countries who need it on the basis of capacities, so not just anybody. But if you've got a real capacity need there's been a lot of push this year from any

number of developing countries to basically re-bifurcate some of those things, and in other provisions as well. And that's a big fight. There are always great anxieties that relate to financial assistance. Developing countries wanting to see more than has been put forward that it will be a feature of these discussions as well.

VICTOR: I think that's the genius of the Paris approach is that you have a big umbrella, binding umbrella, under which countries have flexibility to say what they're willing and able to do, and that flexibility allowed Todd and his colleagues negotiating this to put together a package where the world is no longer divided into two camps - developed and developing - but into many camps, arguably the total number of camps is a number of countries on the planet.

I think the problem is that that mechanism on this kind of decentralized country-led mechanism only works if there is a way to check up sporadically, and to ratchet up ambition, and so on, and that's what this rule book is about. I think these meetings make progress when there are leaders and there are deadlines. And I think one of the challenges right now is the United States has traditionally been a key leader in this area, it's not playing that role right now, other than a lot of clutching and gearing. Europe, expected to play a leadership role, the French are in the middle of a huge political crisis directly related to carbon policy, some other things going on as well, Britain is leaving Europe, and China is wary about playing the leadership role. And so, there's all this kind of clutching and gearing going on without an absolute hard deadline. And so, I expect this process is actually going to push on for a while.

And what we're really looking for are some countries to come forward and say here's what our plan is here's how we're going to ratchet up the ambition our plan. Here's how you other countries are going to know that what we're doing real and to check up on us because, you know, as much as we've been talking about the gap that's growing between what countries say they're willing to do and the total emission reduction that you need to stop warming at two degrees, let alone one point five degrees, is still the case that almost all the Western countries are not even on track to meet their own pledges and so that's the that's where we are right now.

STERN: I want to just come back and agree with David on one point and pick up on a question you asked me and one other aspect, which is you can't underestimate the impact of the absence of the United States at a political level. The U.S. is actually still there at a technical level,

and has been all year and that's useful, but the absence of the U.S. at a political level is just huge. The U.S. was the player that sort of formed this partnership with the Chinese, where you had the biggest development, the biggest developing country being able to help lead, the U.S. always had tremendous convening power with Obama in office, the U.S. had a lot of credibility not just on the international stage, but based on sort of walking the walk at home, and the U.S. was a central kind of architect of the innovations in Paris, which forced some countries to kind of get out of their comfort zone to come along. Right? And so, we do this the country get out of their comfort zone and then boom the U.S. says we're out, right? We're going out. So, that has made things much more complicated and difficult and some of the ways that David has just said, but I just I say that it's been a big problem.

PITA: What does that mean in terms of you mentioned the technical that, yes, we still have people there they're still negotiating, has it changed the number of people the seniority people that were sending, how does that affect the U.S. party that's there taking part in these discussions?

STERN: Yes, and yes. That changes the number of people and it changes the seniority. So, I mean, I was in international parlance I was the U.S. Climate Minister so I was at that level I was at meetings all the time and we had a bigger team, but also it's not just, I'm at a higher level, but I'm also was directly plugged into the highest level of political leadership in the U.S. Secretary of State and the president, and I was able to speak on that basis and speak minister to minister. And that just that's not there. And the credibility is not there because people are negotiating with the United States. We are still in, we are still a big player, it's still a quasi-consensus-based rule. So, you've got to have a deal that the U.S. is going to be part of, but it's just a very different picture in terms of credibility and leverage. And we had a ton of both when I was there.

VICTOR: These negotiations always come down to some big sticking points. Somebody has to do the deal, and that's ultimately what a leader does as they do the deal that might have to put some more money on the table or something else on the table. Right now, there isn't really anybody who can do the deal.

PITA: I also wanted to come back to the question of, the different countries, everyone makes these commitments, the nationally determined contributions in terms of what their goals are in reducing emissions. What has changed since the 2015, 2016 era of signing Paris? Have some

countries started stepping up their commitments? Are they stepping back? How often do they talk about this explicitly?

STERN: So, this isn't a point in the way the process is set up in which in general countries would be stepping forward to do more. Now the EU recently, just very recently, made a very important announcement of a goal to hit carbon neutrality for the whole EU by 2050. I think, there's still some elements of that that need to get ironed out, and we'll see how that goes, but it certainly would be a powerful goal. In general, though, the countries, the vast majority of countries, actually put forward targets in Paris that extend all the way to 2030. We, the U.S., put a target forward to 2025, we think targets of that length essentially five-year blocks make a lot more sense than ten year blocks, just given how fast this problem is changing and metastasizing. But, even on the basis of looking at a target of the size that we put forward, you wouldn't be looking to get to a point where you're re-upping that until 2020. That doesn't mean there aren't all sorts of observers all sorts of NGOs and environmental groups, everybody all over the world looking at the IPCC report, looking at the fourth assessment, looking at what nature is putting in front of us every day, who don't want to say, "ramp up ambition right now," but it's mostly not in the sequence of what countries would have been doing. As I said before, I think looking for a signal that more is going to start to happen in 2019 and 2020 is probably about as much as you're going to get here.

VICTOR: And that's, I think, what's really changed a lot is the role of actors other than nation states. So, they were always there, and they had been present all these COP meetings, and they were certainly present in Paris, but partly fueled by the lack of US federal leadership in this area. You've seen all kinds of states and firms and all kinds of other groups come forward and say, "here are things we're going to do." We were both at the San Francisco summit organized by Gov. Jerry Brown in California in September. And there the discussion was much more upbeat, and maybe a little too upbeat, because there's a kind of a lot of smoking inhaling going on right now in terms of the targets that these cities and states say they're going to meet. But a lot of the political energy has shifted away from the nation state, and so there's this intergovernmental process that continues forward in the rulebook, and COP 24, and so on. But the real political energy is moving for the most part down locally, and even into many firms that are worried about their ability to continue operating and their ability to thrive as businesses in a low carbon world.

PITA: They're obviously not part of the official negotiations that COP 24, but are there a lot of representatives from these state and cities?

VICTOR: The official delegations or are now a small and declining fraction of the people actually at these meetings. Most of what makes these meetings interesting, as an observer, is the opportunity to see all the side events, and so on. And Paris was that in spades. The meeting that's going on right now in Poland will be that to some degree as well.

STERN: I agree with David that there has been a tremendous amount of energy particularly stimulated by President Trump's announcement last year that he was going to take the U.S. out of the agreement, although very much in evidence as David said in Paris, and even before Paris. So, there is a lot of that energy happening, but there's no substitution for energy at the national level. And so, what needs to happen in the U.S., obviously, is to get the U.S. national administration that is recommitted to the reality and importance of the issue. At the same time all of this subnational all of this corporate stuff that has been motivated and has been mobilized. Now that's got to be in play, even if you have a very positive national administration. So, in that sense, I wouldn't go so far as to say it's a silver lining in terms of the Trump walk away. But, that mobilization is something that will continue to be useful even when we have a different history.

VICTOR: I don't think the Trump administration thought they were creating an effective climate policy by mobilizing everybody else.

STERN: I don't think so.

VICTOR: And absolutely, action on the national level is really important. To me what's interesting here is the metaphor at work is an experimental one. What's happening here is, for various reasons, different countries and jurisdictions are under pressure to do something about the problems, a hard problem, the low carbon energy systems are not cheaper than the high carbon ones, despite lots of technological progress, maybe that'll change in the future. So, this is something that costs money now for benefits that are in the future. And as a society, we tend not to do very well with problems that have that kind of structure, especially when they're global problems. But there's a growing number of jurisdictions that for different reasons are under pressure to do something about this, and they're trying stuff out. And that's we're in the early stages right now of this experimentalist approach.

PITA: Great. And am I going to come back to that later have some questions for you about that experimenting and how they all talk to each other, but I just want to stay on some of the couple of other issues a COP a little bit first. David you had recently hosted Rachel Kyte, she's the head of the Sustainable Energy for All, and she had this really compelling quote as part of her remarks, she said that at the very heart of the Paris climate agreement, and at the very heart the Sustainable Development Goals is the notion that we won't leave anybody behind, so you cannot build a decarbonized economy that only works for the 1 percent. But, of course, as you've already mentioned, that it's these poorer countries who are both the most immediately vulnerable to a lot of the climate impacts, and they need the most help to implant more efficient and lower carbon energy sources, energy systems. So, the financing of clean energy is one of the big issues of discussion at COP. Can you talk a little bit more about this financing issue, some of the issues that are coming up, and where we've seen progress and where we haven't?

VICTOR: Yeah. So, it's a very important set of questions, and the cruel irony in the middle of the climate change topic is that the poor societies have a lower responsibility for emissions and are most exposed to the impacts and that is a core question of justice and appropriate behavior, and so on. Finance picture is complicated. There were bold pledges made in Paris about, and prior to Paris, about 100 billion dollars or so a year of new climate finance depending on how you add up the numbers. The world's actually maybe not quite on track but actually doing reasonably well in part because there are now all these incentives for private investment in lower carbon infrastructures including renewable energy infrastructures, smarter grid systems, and so on. So, depending on how you add it all up, it's actually a lot happening. One of these I found very striking about that discussion we had with Rachel Kyte, who's the head of Sustainable Energy for All, which was part of the UN that is responsible for overseeing Sustainable Development Goals 7, so this is the goal for including everyone and also decarbonizing the global energy system. One of the things I found most striking about that discussion is that the problem of lack of inclusion of people in energy services is increasingly becoming a problem of a dozen or two countries that have chronic problems of underdevelopment. They are increasingly, just as a fraction of the world, in Africa. It's been tremendous progress in South Asia and India, notably amazing progress in China. As of 2015 everybody in China essentially is connected to the grid. A lot of progress in Indonesia,

some in the Philippines. But now this is increasingly an African problem, and a problem that has caught up in underdevelopment. The other thing that I found very striking about the discussion with Rachel was that this is also increasingly a cooking problem, we're actually making a lot of progress on electricity and electrification. Still, almost a billion people or so don't have access to the grid, but all kinds of new technologies are making that more viable. And a lot of investment in that area. But three billion people or so, depending on how you count, don't have access reliable access to clean cooking fuels cooking is for poor households the dominant part of the energy budget and that's the big problem now. So, this is increasingly a cooking problem and a problem that's bound up and underdevelopment. And when you look at the data that way it's really shocking to see the low levels of capital investment in advanced cooking technologies and simple things like providing LBG liquefied petroleum gas so that people can cook with cleaner fuels rather than dung and biomass, and so on.

PITA: For the financing element, is it a question of raising more money from donor countries? Is it about the World Bank and IMF? Who are some of the major players here?

VICTOR: It's everybody. The plate is out for everybody. I think the most progress has been made on the private sector where the incentives are right. I mean this is an area where Todd and his colleagues in the diplomatic community are crucial because countries are expecting to see more tangible investment in this area and they don't think it's just going to come from the private sector. They want to see new windows in the regional development banks and the World Bank and bilateral aid programs that I'd say said that story remains mixed to flat.

STERN: But the one thing I would add to that, I agree with everything David just said, but the one thing I would add is that the name of the game here is to have public funds or public instruments used to mobilize private. Those two things have to get mashed up together. There's some elements of climate change, more on the side of building resilience and adaptation than mitigation, where you will mostly need public money, although, even there, there's some possibilities for mobilization but the mobilization is quite, quite inadequate so far and that's because in a great many cases the risk-reward equation doesn't add up to draw the private sector in. There are counterexamples, and you've seen countries like Nicaragua, countries like Morocco, and the Philippines, and others who have made the right kind of adjustments, regulatory

adjustments, and other adjustments, in their own countries so as to affect that calculation, that risk calculation in a positive way. And so, as to draw in capital, but people been talking about this for a long time, they're talking about it very intensively now, there is some progress being made, but not nearly enough. I mean we ought to be able to get way, way beyond the numbers that were promised all the way back in Copenhagen.

VICTOR: If we're doing it right now you know I think this is a very important point because when we talk about mobilizing capital in international financial institutions, we're sitting here in Washington D.C, so we think about these big multilateral development banks and private sector and so on. They tend to operate in foreign currency and in the places where the mobilize in the capital is the hardest problem, the investments have to take place locally and in local currency, and if you expose the investor to all that currency risk along with all the other political risks and so on, that these risks didn't exist these countries would not be deeply underdeveloped, and so that's the core of the problem. So, I think one of the areas where the investment community has done a lot of innovation has been to find ways to pool and unlock a local capital that is less exposed to those kinds of currency risks. And this is I think actually one of the bright spots, there's a few bright spots in the climate debate right now and this is one of them.

PITA: Todd, I wanted to ask you about the U.S. China relationship. One of your key accomplishments was about that U.S. China bilateral agreement that helped really make Paris happen with those two countries being able to make an agreement. Now there's all these tensions, there's the trade war, what's the state of U.S. and China cooperation on energy issues, in particular have they been affected by the trade war?

STERN: So, it's interesting I've been asked this question a number of times in the last couple of months. What I would say is that the tensions that are exogenous to climate and energy that are outside of that world trade and other things may be making it worse. But, the thing that is most centrally making it worse is that there is no political level partner for the Chinese to cooperate with, with respect to climate, all the way back to 2009 when I started working with my Chinese counterpart Xie Zhenhua, who still runs the Chinese delegation. I started talking to him about the notion that we could turn climate change into a positive pillar in the U.S. China bilateral relationship, which was not self-evident. I mean China and the U.S. were at loggerheads on

climate change historically, and it was never easy, all the way through Paris it wasn't easy, but we got onto that path. And when I was in the bilateral between Xi Jinping and President Obama in Paris, Xi Jinping basically repeated that line back to the president, right? This needs to be a strong part of our relationship, so that was sort of the foundation of how we move forward. Now, you have the U.S. president having said we're out we don't want to do this, it's not a real issue, et cetera. So, the Chinese don't have a player at the political level to interact with. One of the reasons that I focus on trying to make it a positive pillar in a relationship was that there are so many other elements of the relationship that were fraught and that were full of tension back then. There are now, maybe there's elements that are worse now, maybe there's elements that are better now, but the main thing that's missing is the climate relationship.

VICTOR: You know just a historical perspective here, going back to the kind of height, one of the heights of the Cold War, one of the places where the United States and the Soviet Union, the West and the Soviet Union cooperated with their own environment, because the other topics were too hard. Human rights was too hard, economic cooperation, our systems were different planets, so environment became a place to cooperate. And then from that cooperation, that helped expand out and then solidify the other relationships that then turned out to be very, very important. At the end of the Cold War it's hard to imagine a more important bilateral relationship or geopolitical relationship of any form than the U.S.-Chinese relationship, which is not in good shape right now. And so, rebuilding that's going to be crucial. And absent that relationship it's not that the Chinese won't be doing anything on climate, but they're going to be doing it almost entirely through the lens of what is in their interest, which makes complete sense, so they're doing a lot to make the economy more efficient, to do more renewables, to invest more nuclear power, to clean up the coal fleet, not so much because they're concerned about global climate change, although that may be coming, but more because they're concerned about building local industries and especially cleaning up their locally internationally.

PITA: I they're the top country for investing in clean energy, is that correct?

VICTOR: Yes, they are. And, you know, that's an extraordinary story. The engine of a global clean energy revolution in the 90s and early 2000s was Germany, which was trying to build the German industry that didn't work out so well but trying to also build out a new German grid of

solar and wind. And they along the way bought down the learning curve for the whole planet. They helped make all the renewables more cost effective and that mantle has now moved decisively to China.

PITA: David, I want to stay on you for this. You have written a lot about your skepticism of these really large-scale multilateral, get everybody in the same boat sort of agreements, in terms of moving the needle on climate issues. Can you talk a little bit about what are some of the other approaches that you would rather see implemented, whether it's in conjunction or instead of - talk to me about that?

VICTOR: So, I mean you can't just stay on me because I'm sure Todd and I will disagree to some degree, but one of the things I've learned along the way is you need to have some kind of global umbrella so that everybody sees a place where they can go be heard, they can file reports, they can have discussions, and so on. And so, the legitimacy of the global umbrella, and right now that's Paris, is crucially important. My concern as an analyst is that it's hard to get serious things done that require really economic tradeoffs and political difficulties in a group of 200, where you've got countries of lots of different diverging preferences, that those deals are just too complex to put together. And so, one of the reasons why I was very skeptical of most of global diplomacy on climate change until Paris is that it was trying to do big deals with lots of countries to make too much of those deals binding which made countries risk averse. And what's new about Paris is that it's a combination of the binding umbrella and then flexible deals that can be done on anything relevant, I think when you rewind the tape of history and go back and look at what made Paris happen, what made Paris happen, in addition to the French leadership and vision and commitment, was the bilateral U.S.-Chinese relationship which happened, was cemented, in some sense, a year prior and that helped define the art of the possible for lots of other countries, so that's an example of where the real progress gets made and smaller groups. I think plausibly something similar is now happening with lots of different cities and states. I think the jury's still out as to whether that's talking or doing. But there's quite a lot of doing happening there. And that's, that's kind of experimental this idea that we're in a stage where nobody really knows exactly what to do, and so they're trying things out and it's easier to do that in small groups and figure out what works. The problem is, one last comment on this, is that the climate scientists say we don't have

time for all this slow cautious experimentation because the train is speeding, and that I think is just the nature of the problem, it's the result of having spent a long time talking about the climate problem and formats that didn't really make a lot of progress.

STERN: Let me add a comment there. I don't actually disagree with the way David talked about the need for the global umbrella, but you got to have other kinds of groupings in order to make progress. I've thought the same thing. You can't I think work it without the global umbrella. You need a global umbrella that for all the reasons that David just said, I won't repeat. But I want to just give an example of something that I think at one point had potential, and maybe there'll be a time for it to have potential again with different U.S. leadership. But, we started something called the Major Economies Forum, kind of inherited the grouping and changed the name and a mission a little bit from President George W. Bush, but so was the Major Economies Forum. It sent more or less the G20 minus three countries. But so, you had most of the big developed and developing countries together, and we would always invite a few additional friends to come to these meetings. And when we set that up back in 2009 we had in mind that the first mission would be to facilitate the climate negotiations, but that a second important mission would be to look at this group of countries in the room, 17 players who collectively probably accounted for 75 to 80 percent of global emissions, and try to look at what we could do collaboratively on a clean energy basis to reduce emissions. So, for a number of reasons, that part of the mission kind of didn't really, the gears didn't click for, actually, I think for reasons that related to the negotiations, but actually in a paper that I did for Brookings this fall, toward the end I talked about how there could be new collaborations that could get together, and, I think, to me, given the scope of this problem if you could start to put some group of countries, maybe that same group of countries, but a group of countries like that back together, maybe even have every other year a meeting at the leader level to have an action forcing event that can drive collaboration that could be one of many, many other kinds of small grouping collaborations. I think we have to look at big payoffs given where we are, but absolutely that can ride alongside the full scale.

VICTOR: I think what's interesting is that, in addition to that logic, which is a nation state logic, there's now a similar logic playing out in some industries. So, there's a large and growing consortium of oil and gas companies, oil and gas climate initiative that have organized to create a

fund not massive, but a billion dollars the place to start to work on two big problems in the oil and gas industry. One is how to cut essentially to zero releases of methane, very strong greenhouse gas, it's a byproduct of producing oil and gas, cut those emissions essentially to zero, share best practices, build new technologies and industries that can do that, and then also to commercialize carbon capture and storage. When you look at almost all the economic models when they ask the model, what's the lowest cost way to make big reductions in emissions? A big part of that is using a technology that captures the carbon dioxide, the main pollutant that causes global warming, keeps it from going up in the atmosphere and said injects it underground, and we've known how to do that from an engineering point of view for a long time. But doing that in a commercially viable way is much harder, and that's what this consortium of oil and gas companies is doing. They're not doing this because they're starry eyed altruists, they are doing this because they see that as existential for the future of the industry and that kind of motivation, t's happened to some degree in the palm oil industry, it's happened in a bunch of other industries, cement now, big effort, and that, cement is a big emitter industrial emitter of carbon dioxide. So, I think that's, again, a slow, but those are the signs that the folks who are responsible for most of the emissions are starting to get with the program.

PITA: You had written a piece about the need for greater communication between people who are working on this issue and starting to make progress on this issue and sharing their experiments, both their successes and their failures, more necessarily and you talked about the lack of information that we have about doing, making the really deep cuts in emissions like OK we're starting to learn how to cut emissions a little bit, but I think you called it Deep Decarbonization. Can you talk a little more about that communication? Like how, say, you know, California's making some big strides in progress. What are some of these groups that you could put together for information sharing? Who should most be talking to each other?

VICTOR: Yeah, so I mean the folks who were doing stuff are the ones who need to lead this. And you know there's a kind of pointy headed academic part of experimental governance where we're interested in how countries make, and firms make decisions under uncertainty, which is the example here. But, I think, if you use that same language in trying to explain what's going on right now it actually makes a lot of sense. Examples, I live in California, the state of California has

made massive investment in this area as well as many of the cities. And so, California has an interest in doing more, in part because it wants to help spread the technologies and the practice around the world. California's less than 1 percent of global emissions. So, California could be as green as any place on the planet and be irrelevant to the climate problem, which is a globally mixed pollutants problem. So, in California for reasons of building markets and for reasons of solving the climate problem has an incentive to go build these kinds of clubs if you like that engage in peer review. I think the key mechanism here is to be able to compare experiences. That's the logic built into Paris around these periodic pledges and ramping up of emissions and then its periodic stock takings, its peer review. It sounds like a weird idea. We actually do it all the time in international governance. This is how the IMF works with countries that are having problems with their financial policy. They engage in a process of setting goals and regular peer review. This is what the OACD does on a whole range of policy topics. This is what the United States and China did to each other when they pledged to each other that they would reduce subsidies, harmful subsidies for fossil fuels as part of the G20 processes. They said OK we made these pledges. Let's go check up on each other and set up a panel to look at each other's behavior and progress, and that's the kind of logic that I think needs to play out more internationally now.

PITA: We've been talking a little bit about China, and a little bit about India, as well. You both went to Beijing recently, and David you were also in India. What observations can you bring back from your trips there about what each of those countries are doing?

STERN: Well, you know China I think is a mixed bag. I think that China has done tremendous things in terms of its development of renewable energy and indeed in terms of the decoupling of economic growth from emissions growth I think, roughly, if I have these numbers right, China has grown around 40 percent over the last five years while their emissions growth has been in the zero to three percent growth range, so that's very impressive. It's also true that China still uses half of all the coal used in the world, that they still have an economy that gets something like 70 percent of its energy from coal, to is still engaging in some kinds of activity called a gas kinds of initiatives that are even worse the regular coal. So, it's mixed. And all of that is internal, there's a big enormous external focus on infrastructure from the Chinese right now that goes under the rubric of the Belt and Road Initiative that's actually got tremendous upside potential in terms of

bringing infrastructure to countries all over the world. And it has a particularly big upside potential if it's as green as the Chinese rhetoric and principles would suggest, but it's way not right now, it's not at all. They're building coal plants all over the world. That's a big problem. So, everything that climate change has to run through China, it's so important and it is doing a lot of good stuff, but it's got to do a lot more good stuff, a lot better stuff.

VICTOR: I agree with that. I think the Chinese behavior reflects the incentives that work, and so they're building industries. They have an incentive for reasons of local air pollution to make the coal fleet, for example, less polluting. So, they've installed a lot of pollution control equipment. Ironically, some of the pollutants that are caused by coal plants actually cool the planet a little bit, so that mask is removed quickly. It's actually accelerating global warming a little bit. They're doing a huge amount. Total coal consumption in China is flat, and through the reasons that Todd laid out, China is crucial, as is the United States and other countries, to the future. I think the really interesting story now is emerging in India. India in some sense is the new China, in the sense that ten years ago when we looked at the forward projections for energy consumption, we saw almost all the growth in energy consumption, almost all the growth in coal, almost all the growth in emissions was a Chinese story. And now the Chinese emissions are flat, and they still need to come way down if we're going to stop global warming. But now, when you look at the forward projections, other countries, Indonesia and a few others are an important part of that story, but the main story is India. The Indian economy is growing rapidly, and while they're investing massively in renewables they're investing, they're in the process of connecting the last households in the last villages to the grid. All these things that are fantastic for economic development. It's come at a very substantial environmental cost. When I landed, the pollution index was at 999 and that's because the device only had three digits, the pollution levels in Delhi in November, December are now what everybody was always talking about in Beijing. And so, there is a lot of pressure politically. One of the big differences between the Chinese and the Indian story is, in the Indian case, everybody knows where the pollution is coming from, but nobody can really do anything about it because India is a federal democracy and power is not really located anywhere. We're about to observe actually a much harder pollution control effort in India than we have seen in China because when the Chinese party was worried about its stability and authority because of all the pollution problems

they got mobilized and motivated and they did a lot very quickly. The Indian elite are mobilized, but they can't do nearly as much.

PITA: So, we're basically coming up on time here, so I wanted to ask as a final question that depending on what happens in Poland, what progress they make, what would each of you propose be the next steps? What are some of the next ways to move forward following this meeting?

STERN: Well, number one, to get the rulebook done in an adequate way. I think, as I said at the top of our talk, there's going to be a lot of focus, assuming that does happen both this coming year 2019 focused on the Secretary General's summit and that in 2020 will be the first of the five-year reviews, they have countries augment their ambition. So, in this kind of narrow context of the U.N.F.C.C.C., I think those are probably the biggest issues. I think, you know, pulling back to the broadest level, the thing that is the most absent all over the world is that we know essentially what we need to do and know how to do it with respect to innovation, with respect to policy, and with respect to financing. There's challenges in all of those areas, but all of those, if that was all we had to worry about, we would completely take care of this problem. The issue is human motivation, the issue is will the issue is the change of norms and attitude, from leaders down. And that is just way, way, way short. All over the world people often get that there is a climate problem. They do not internalize, and this is true with the leader level, among political leaders, among business leaders, and so forth, they do not get the scale and speed of what needs to happen in order to avoid really, really serious problems. And so, I don't have a magic wand to wave as to how that changes. I think it is changing, I think if you look at now as compared to 10 years ago, as compared to 20 years ago, it's changing, but it's got to change a whole lot faster, and that goes way, way beyond the U.N.F.C.C.C., although a well-functioning Paris system helps. But it's by no means the whole answer.

VICTOR: I was hoping you'd have the magic wand, because I wanted- Procedurally, I agree completely with Todd. There are lots of meetings. The energy will shift after the Poland meeting to next September and the Secretary General is meeting a lot of eyes on that. I think the key problems, I'm less sanguine that we know what to do. I think we know the direction to move, I think when you scale, when you move an energy system as quickly as is needed to very low emissions,

a radical transformation the energy system, the system wide behaviors and effects are actually very hard to dissipate. So, I'm, maybe I'm too deep in the weeds here, but I'm actually less sanguine about that, but I'm optimistic that when societies go off and make those investments that they start to solve these problems. We used to think for a long time that you know five or ten percent renewables, that was the limit, and they will get really hard. Now it's like a third to a half, then it gets hard. I think it actually does get very hard beyond that. But we're working on all these technical problems, so that I think is an evolution, but an evolution that's happening at a much slower time constant than we need. To me, the most interesting thing to watch in the coming year or two will be whether all this evidence that climate change is having tangible harm will change the politics, we see that with the wildfires in California you see that, you know, when you have an octopus in a parking garage in Miami, that's a problem. And so, you're seeing regardless of their political persuasion, local towns and councils and regional planning authorities needing to grapple with the impacts of climate change because they're tangible and real. There's a little bit of polling data to suggest that that's changed the polarization in American politics about climate change, in particular made some Republicans more supportive of this. But that evidence remains thin and uneven. And so that's what I'm going to be watching for.

PITA: All right. Well, gentlemen, thank you very much for being here today and for explaining these issues to us, and we look forward to reading your forthcoming paper and we'll have links to everything as always in the show notes.

STERN: Thanks very much.

VICTOR: Thank you.

PITA: Thanks for listening.

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