

China is the world's largest producer of both CO2 emissions and green technology to cut those emissions. It installed more solar panels last year than the U.S. has in its history, and yet keeps building coal-fired plants too. And Chinese officials just announced that the country will accelerate the construction of solar, wind and hydropower. So, China plays an outsized and even paradoxical role in deploying clean energy technologies to address the climate crisis.

To predict what the future might hold, it helps to consult history. Joanna Lewis' recent book, "Cooperating for the Climate" does that by examining the motivations, science, and politics behind international clean energy technology collaboration with China. Drawing from 434 bilateral agreements between 43 countries and China, she analyzes the key characteristics of successful projects, like the U.S.-China Clean Energy Research Center, or CERC. Lewis is Provost's Distinguished Associate Professor of Energy and Environment and Director of the Science, Technology and International Affairs Program at Georgetown University's Edmund A. Walsh School of Foreign Service. She recently came to the UCLA Emmett Institute to talk with me about the findings in her book and what it means for the future of collaboration.

You can view the whole presentation and discussion below. The following Q&A has been edited slightly for clarity.

Alex Wang: I want to start with your thinking about how China got to where it is on clean energy. I noticed in the book that you extend the timeline a little bit earlier than some people do. You know, some people focus on the transition maybe around Hu Jintao early 2000's as the scientific development push in China. And you've actually added some important contextualization to say, "look, there were elements of this even earlier that people might not know about." How did China get to this position of dominance in clean energy and what were the drivers of that?

Joanna Lewis: I'm not a historian, but I look at these things mostly just having experienced them. You know, I started as a student studying all this in the Nineties. And it was a really different situation then. I went to China for the first time around the year 2000 and was trying to figure out what I was going to do my PhD on. I would speak to Chinese officials and say, "I'm really interested in renewables, I think this would be a great opportunity for China." And they would laugh in my face and say, "Oh, we're never going to do renewables in China. Wind and solar, these are expensive technologies reserved for wealthy European countries, we're never going to take this seriously." And we now know, of course, this is really a different world that we're in today. So, it was interesting to see this evolution. It used to be, I would travel all around the country to try to find a single wind turbine. But what was fascinating is you would find that single wind turbine and it had probably come from a Danish company or an American company, and there would be all these engineers from all over the world side by side, from China, from Denmark, from California, Germany, all together, trying to assess what was going on; what is the potential for wind power development in China? How could we do more? And it was interesting to kind of see the gears starting to turn. I think a lot of the clean energy development that was successful in China wasn't actually a top down kind of process.

We think in China that the government snaps fingers and things happen, right, because it's a centralized one-party state. But actually with renewables and wind in particular, you had a lot of these local entrepreneurs in Xinjiang, Inner Mongolia, that found these areas where they would potentially be great and then brought the technology and they built it up with local government support. And then the national government caught wind of it—no pun intended—and started to put in place in very strategic subsidies. I think what China did well, you know, over the last

few decades that now we're trying to do in the United States today is have a strategic roadmap for science and technology development in these technologies. And they would sort of say, if you read documents from 20 years ago that say, "We want to develop batteries, they are crucial for electric vehicles, for energy storage. So we want to become the world leaders in lithium ion batteries, etc." And like they said this 20 years ago, and then they put the money behind it, you know, and they develop huge research laboratories just focused on these technologies that they have state support.

Now we're in a situation where we have the Inflation Reduction Act, and we're using it as a way to use state support to catch up with China. Right. Or compete directly. So, I think they had a lot of foresight. You can definitely point to problematic tools that were used in terms of, what we would call anti-dumping and other illegal measures—depending how you look at it—that were protectionist and problematic. But they were always strategic and always transparent about what their aims were. And I think that it was this three-decade or so concerted effort to really identify what are the key technologies and how are we going to support them.

Wang: How do you think about the balance of renewables and coal? The presence of coal in the Chinese energy mix is still a huge issue, it's still controversial from the outside. People who don't follow it closely still cite that often as the number one reason why China is not a climate leader. So how are you thinking about that these days in your research?

Lewis: On the one hand, China is building more solar and more wind than any country in the world. They're also building more coal plants than any country in the world—they have more, but they're also building more new coal plants than any other country in the world, which is terrifying from a climate perspective because these plants are going to lock in carbon for 50 years. The good news is they're building these coal plants and they're not actually running them. It makes absolutely no economic sense for the most part. But it has to do with this non-market economy signal. You have a lot of energy security concerns in the wake of some local blackouts in the wake of the Russia-Ukraine war. Coal is just a tried and true way that China can build huge baseload power with domestic resources and avoid energy security concerns. Wind and solar are also domestic resources and can also be good for energy security. But because of the way China's grid is structured, they still have problems with integrating huge amounts of renewables.

So, they're in the situation where they would like to shift away from coal, but

they're still building the plants, even though wind and solar are usually cheaper in most contexts now. Even if the plants get shut down before their useful lifetime—and there actually are plants that are already being repurposed for other things—the key is storage. Right now, you can't build a solar project in China without building storage with it as well. That's now mandated. It didn't used to be the case. So you had all these projects built not necessarily strategically all over the country and then it would take a while for the transmission to keep up or, you know, things like that. They're being much more strategic now about how you do that. And hopefully we will get to a point where they were able to move away from coal. Some people think that could be in the next year. China does have a target to peak emissions by 2030. It's 2024 and you can't peak emissions unless you peak coal. So it has to happen in the next couple of years.

Wang: Now on cooperation, given all your research for the book, did you end up thinking that these bilateral activities are *more* effective or *less* effective than you had originally thought before you started the research?

Lewis: I'm now a student of cooperation trying to understand how cooperation works. But I came at this originally as a person who was doing the cooperating. My first job in this area was working in the China Energy Group at Lawrence Berkeley Lab, where our job was to do all these cooperative projects with China. A lot of them were the DOE bilateral agreements that were signed in the '90s and 2000s. And I got to see firsthand what worked, what didn't work. Often it would be particularly if you're trying to impose something on a country they don't want to do. Surprise, surprise, that probably won't work, whereas if you sit down at the table and mutually decide, here's what we should do together, that tends to work better. These are kind of basic things. But again, I only had this anecdotal evidence and so wanted to look at it in a more systematic way because I felt like we hadn't really done that before and because I knew a lot of people in the space, it allowed me to take a more analytic look at what was happening. I think it's a mixed bag. I found a lot of examples of things that didn't work well. So you have to try to figure out why.

Wang: What do you think are the biggest successes in terms of case studies you highlight in the book, or other things that you thought were most successful, when it comes to cooperation with China?

Lewis: Of three main case studies, I would say that the U.S.-China Clean Energy Research Center—this was called the CERC—was the most ambitious thing any country has ever done bilaterally with China in the climate and energy space. There

were other countries that tried to do things of that scale. For example, the UK had a very ambitious project I write about in the book to build carbon capture and sequestration (CCS) plants with China. So putting carbon capture on huge coal plants and they had a joint project with millions of dollars of funding and they were going to build these projects together with China, but they were never able to get these projects to move forward. They brought in the whole EU and it still didn't happen.

The CERC was successful in that it was truly bilateral in that you had the U.S. and China at the table, you had the presidents, then you had the ministers, then you had all the researchers, and everyone was in alignment in putting together what the projects would be. So, it was set at the high level, but then every cycle, the researchers would get together and say, "What should we work on? What do you want to work on?" And you would decide on this work plan in a truly joint way. It was truly jointly funded, which is another key thing. A lot of countries that cooperate with China, though not the United States, use foreign aid money to support what they do—Denmark and others. The United States stopped using foreign aid money to support work in China many years ago. So, with the CERC, China was paying its side, and the U.S. was paying its side. And I think that dynamic is actually very successful, because not only is it a better political dynamic for Congress, it means that they have buy-in or skin in the game, as it were, and they have much more vested interest in the outcome.

Wang: So where do you see this kind of cooperation going in the future? China is advertising a lot of their South-South cooperation. We've been all talking about the potential for maybe the US and China to get involved in kind of working together with the Global South countries and developing countries. Where do you see this headed?

Lewis: I think the real shift isn't just about how we help China decarbonize. I mean, China still has a long way to go and there is still space to do good work there. But now China is engaging in its own bilateral activities with a lot of the emerging and developing world. And what that looks like is really important. Some of this is South-South climate cooperation. Will it be that China just takes solar panel overcapacity and solar panels and dumps them in other countries? Or is it building big hydropower projects with a lot of environmental impacts? Or is it something more constructive? And we find a huge range of activities in terms of what China is doing overseas, in terms of energy investments. China just has far more resources to engage with a lot of the countries where most of the new energy capacity is going

to be built in the next few decades. The question for the future is: What is China going to do there and how can the US government or others influence that? How can they complement or leverage that investment so that it goes toward the most constructive, effective, low-carbon types of projects while also building capacity in these countries so that they can actually do these projects in a viable way?