



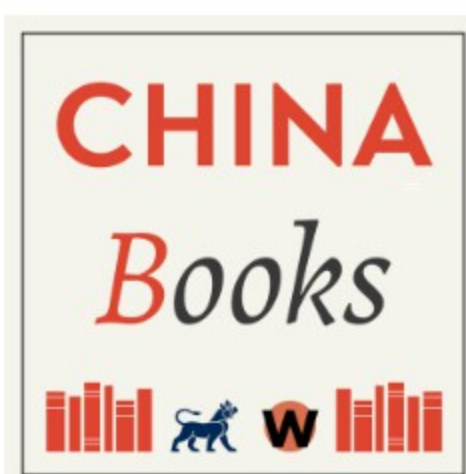
PODCAST

Ep. 7: China's Green Energy Gold Rush

The race to go green is as much a business opportunity as a climate imperative. And China is winning. We asked a leading expert why — and how the rest of the world can catch up.

MARY KAY MAGISTAD — APRIL 2, 2024

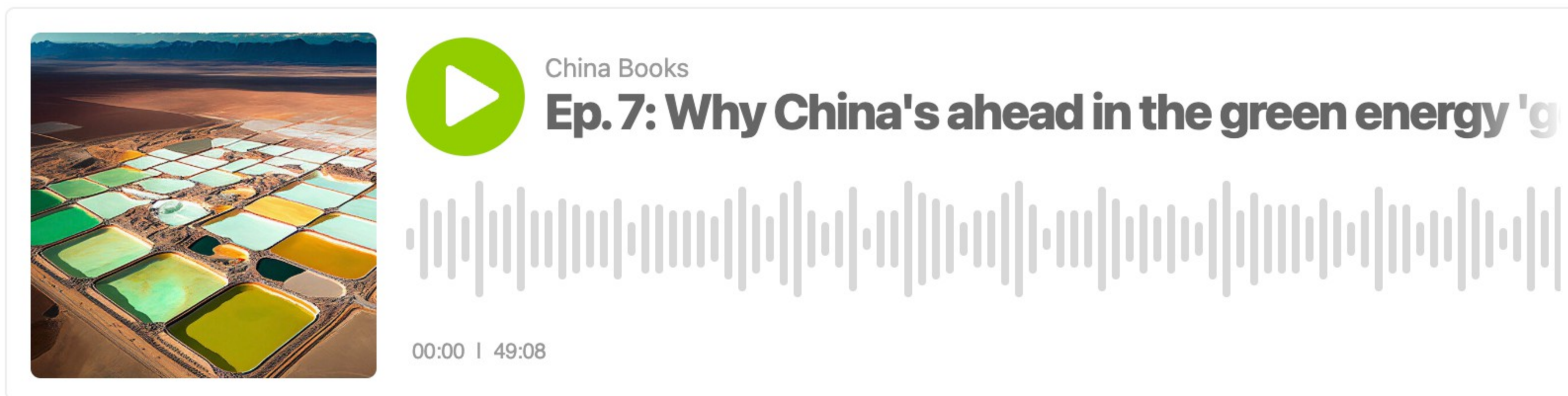
ENVIRONMENT



This is an episode of the China Books podcast, published by China Books Review. Subscribe on your favorite podcast platform, including [Apple Podcasts](#) and [Spotify](#), where a new episode lands on the first Tuesday of each month. Or listen right here, including to all our [past episodes](#).

China has bet big on its renewable energy sector — solar panels, wind turbines, electric vehicles and their batteries, and the metals and minerals that make them all possible — in order to achieve a dominant global position in a growing field. So far, with intensifying climate change making urgent the need to speed the transition from fossil fuels to renewables, China is winning that bet. Their efforts, with fierce competition within its private sector spurred by government incentives, have driven down the global cost of solar panels and electric vehicles, and have given China a near-monopoly globally on processing rare earths, as well as in mining and processing nickel, cobalt, magnesium and more.

This episode of the China Books podcast focuses on the story of how China achieved this lead in the green energy “gold rush,” and what the West is doing to try to catch up. My guest is Henry Sanderson, a former China correspondent and author of [Volt Rush: The Winners and Losers in the Race to Go Green](#) (2022), for which he reported on the ground, from the lithium fields in Chile to cobalt mines in the Congo. We also talked about the environmental trade-offs of mining minerals for renewable energy, promising alternatives such as sodium ion batteries and recycling metals in old computers and mobile phones, and what the rest of the world can learn from China’s experience as an early leader in green energy:



Guest



Henry Sanderson is a London-based journalist and author focused on green energy and the politics of the global energy transition. He lived and reported in China for seven years as a correspondent for The Associated Press and Bloomberg, then became a commodities reporter for *The Financial Times*, and is now executive editor for [Benchmark Mineral Intelligence](#). He is author of *Volt Rush* (2022) and co-author with Michael Forsythe of *China's Super Bank* (2013).

“ China has a 10+ year head start against the West in a lot of these industries. And the fundamental question now is, how do we catch up? ”

— *Henry Sanderson*

Transcript

MARY KAY MAGISTAD: We're living in an era of broken records – hottest year on record, hottest decade on record, highest level of climate change-causing carbon dioxide in some three million years. And soaring profits for the oil and gas sector.

But it's not all bad news. There are also positive things happening on climate change. Tumbling costs of renewable energy are spurring a faster-than-expected global energy transition – though there's still a long ways to go, and resistance from the fossil fuel industry doesn't help.

Also, both of the world's biggest greenhouse gas emitters – China and the United States – still each get around 80 percent of their total energy from fossil fuels. Still – both are moving rapidly to embrace renewable energy. In the United States, that's thanks in part to the tax credits, rebates and other incentives funded by the Inflation Reduction Act.

And in China – well, China still uses more coal than the rest of the world combined, it also added more renewable energy capacity in 2023 than the rest of the world combined. It has set a goal for itself of becoming a global leader in renewable energy, having already driven down costs around the world on solar panels, electric vehicles, and EV batteries.

China also leads in mining and processing the materials needed for the green energy transition – rare earths, copper, cobalt, nickel and lithium – though, not without their own cost to the environment, including sometimes using coal-fired power to do the mining and processing.

How did China get ahead in the green energy gold rush? And what impact is that having on China's economy and on our shared environmental future? That's what this episode is all about.

(Music up)

This is the China Books podcast, a companion of the China Books Review. I'm Mary Kay Magistad.

(Music under)

And I'll let my guest introduce himself:

(02:10): **HENRY SANDERSON:** I'm Henry Sanderson. I'm the author of *Volt Rush: The Winners and Losers, and The Race to Go Green*. And I'm the executive editor, Benchmark Mineral Intelligence. We're a company that provides pricing and data for everything in the electric vehicle and lithium ion batteries supply chain.

(02:30): **MARY KAY MAGISTAD:** Henry was also a Beijing-based correspondent in China for seven years – first for the Associated Press, then for Bloomberg. We overlapped as correspondents in China, from 2007 to 2013. Henry then went on to become a commodities correspondent for The Financial Times. He draws from all that experience in his book *Volt Rush*, with on-the-ground reporting and vivid descriptions of mining in Chile, Indonesia and the Congo – and profiles of Chinese entrepreneurs who saw their futures and made their fortunes in the green energy transition. Here's our conversation.

(03:00): **MARY KAY MAGISTAD:** So you start the book, *Volt Rush*, on a personal note. You talk about how the birth of your son just before COVID hit made you think in a more concrete way about how climate change might affect our shared global future. And you wrote, "I knew that our son's future would depend on decisions we made now, not later." How do you feel about the choices we collectively are making now in 2024 and the impact it's having on climate change?

(03:30): **HENRY SANDERSON:** Yeah, it's a good question. I think when you have children, the future days that always seem far off in reports about climate change actually seem much nearer, when you consider your child's only going to be 20 by then, or 30. So it brings home the future in quite a concrete way, as did COVID in just having all that time to be so isolated.

I think the actions we're taking now are hopeful in many respects in terms of both renewable energy technologies are being deployed and governments have really got behind the clean energy transition by actually putting money into projects and into industries, motivated in a lot of ways by competition with China, and we can come onto that. But regardless, what we want to see is money going in. So it's good news. And we do just see things like electric vehicles, certainly where I am in London, just becoming much more present than I could have ever dreamed of. So I think we've got the technologies. They work, they've become much cheaper – again, that's a lot down to China. And we're deploying them at speed.

On the other hand, we do have challenges in the West, in our democratic systems, with convincing the public that this is the way we need to go, or that this is the cost that we need to bear, or the government support that we need. And there's always lobbies out there that are willing to use misinformation and mislead people, and (it) can be more of a fight in Western democracies to bring people onside. Whereas China obviously can, in some senses, more strategically direct the direction of the country. So, you know, I do worry about the need to get people on board in democracies and the potential for backlash, and the potential to delay the speed of the transition, which needs to happen much faster than historical transitions. So there are concerns. And this transition won't be smooth, and it won't be linear. There'll be bumps in the road, but I think we are on the right track. Probably the most meaningful, significant thing we've seen is the U.S. coming out with climate legislation and really putting a lot of money behind this sector.

(05:26): **MARY KAY MAGISTAD:** Yeah, so there's a perception in the United States for sure that China competes unfairly, at least quite often, and that includes by using industrial policy: subsidies, preferential treatment of national champions in certain sectors, easy access to low interest loans, especially for state-owned enterprises, and sometimes forgiveness of those loans. And of course, with the Inflation Reduction Act, the United States has gotten into the industrial policy game too, in the face of the urgent action needed to limit the impact of climate change. After doing all the research for this book, how do you see the role of industrial policy related to the green transition, not just in China, but in terms of what other countries should be considering and doing as well?

(06:11) **HENRY SANDERSON:** It's very important. And I can't overstate that. And in a way, countries have always done industrial policy, right? It's naive to think the West hasn't done it. And countries like France have always done it, and the US has done it for certain sectors. So government's always involved in the economy one way or the other. But when it comes to green energy, you absolutely need government to support both the demand and the supply side to help cover some of the initial costs for the public.

For instance, electric vehicles can have high upfront costs, but low running costs, so subsidies help support their deployment. And things like feed-in tariffs for solar and wind have really helped, spur renewable energy, going back to Germany's early feed-in tariffs that really sparked a solar boom in the early 2000s. And fossil fuels have had government subsidies for many years.

So when it comes to things like energy, which is critical for people's lives, for the economy, there's just no way for the government not to be involved. So they should most definitely be involved.

Now, of course, there are countries that don't have the budget or the ability to provide a lot of money, countries in Europe, the UK, where I am. The issue now, where everyone wants these industries, wants these jobs, it's become a competition between governments, between countries. So the issue now is what happens to countries that don't have those kind of resources to deploy, and especially developing countries, how are they going to fit into this new landscape, right? How are they going to be included in these supply chains? That's also a really important issue.

(07:38): **MARY KAY MAGISTAD:** Yeah, both how are they going to be included and also how much say do they have in how they're going to be included, right? Like you reported in the Congo and in Indonesia and, arguably, Indonesia has had more of a say in how they're going to be included than the Congo because they banned the export of raw nickel.

HENRY SANDERSON: Yes, that's right.

MARY KAY MAGISTAD: But there's still a price to be paid for mining in Indonesia.

(08:02): **HENRY SANDERSON:** That's right. So we're entering an era where competition is intensifying for these supply chains and also for the critical minerals. So countries that have these critical minerals, you're right, they often don't have a say about how they're going to be included in the policies of the big industrial nations.

For instance, the U.S. Inflation Reduction Act stipulated that minerals must come from free trade agreement countries. The Congo DRC doesn't have that kind of agreement. Neither does Indonesia, neither does Argentina. So in a way, they were locked out of that opportunity, without their say. They are also trying to come up with policies to improve the value they can get from this energy transition. But I do think that's the risk with these industrial policies in the U.S. and Europe and elsewhere is, are we just deciding which countries will be included and which not? How do we decide that?

(08:49): **MARY KAY MAGISTAD:** Yeah. And I want to get more into this a little later, but first I wanted to ask you another personal question, if I may. You mentioned your EV. Is it still a Tesla?

HENRY SANDERSON: Yeah, it is.

MARY KAY MAGISTAD: You bought a Tesla about four years ago. And you write in the book about how your dad came along with you when you picked it up. And you mentioned that your dad was born in Iraq because your grandfather had been based there for years in the 1950s and after.

HENRY SANDERSON: Yeah, that's right.

MARY KAY MAGISTAD: Working for the Iraqi Petroleum Company, a consortium of four of the world's largest oil companies. And that of course, literally fueled the era of the car, which was great for mobility, not so great for the environment. I'm just wondering how that sat with you as you were growing up, and how much it impacted what you decided to focus on as a journalist, especially over the years you were based in China.

(09:35): **HENRY SANDERSON:** I mean, I think not so much. What's interesting about our generation, we just grew up, didn't really think, certainly I didn't think too much about the way the economy was structured. And you took sort of fossil fuels for granted.

And so I think in a way it was when I got to China, and also I spent part of my time growing up in Hong Kong and visiting China. When I saw China, the development of the auto market there and the pollution that resulted, I was living through that was very eye-opening about the toll on our planet of these industries. Because I think the scale of it in China is so big, and the auto market grew so rapidly. That really opened my eyes to, well, we've got to do something to shift this huge tanker around.

And I think one of the tragedies of climate history is that China went along that path of development and didn't, at an earlier point, try to adopt renewable energy technologies or electric vehicles. And it's just one of those timing tragedies. I wish the technology was further ahead when China started to go down that path of development. And it is sad because the '70s, before I was born, were a period of real enthusiasm for clean energy in the West, especially in the U.S., as a result of the oil embargos. In a way, the '70s was the West's moment to capitalize on public feeling, and do more about moving away from fossil fuels. And it's a real missed opportunity that we didn't quite do it. And then when you got to the '80s, you had more oil company lobbying and fossil fuel lobbying. You know, we could have set it up so that when China developed, there could have been more technologies available. So that, I think, is a huge tragedy.

(11:10): **MARY KAY MAGISTAD:** Yeah. So as you say, you were in China, we were both in China in 2007 to 2013. You were there until 2014. And it was a time when, construction was booming, car ownership surged, energy use surged. And of course, air pollution got worse and we were both there for the airpocalypse, when particulate matter in the air shot way above the maximum that was even on the scale.

But there was also this interesting paradox that the Chinese government was still arguing on one hand in 2007, '08, '09, including at the Copenhagen climate summit, that the West prospered during its 150 years of dirty

development with fossil fuels, and now it was China's turn. But at the same time, China's government was beginning to incentivize private entrepreneurs to invest in solar energy in particular, also in wind energy, but in solar for export, to places like Japan and Germany, initially. And fierce competition ensued, which started to drive down the cost of solar panels globally. China doesn't always get full credit for that, but that was something that happened. And so began China's headstart in the renewable energy field. So you write *in Volt Rush* about some of the Chinese entrepreneurs who saw this opportunity early and seized it. Who were some of the ones who stood out for you and why?

(12:30): **HENRY SANDERSON:** Yeah, so I think your point is a really interesting one. And I think when it comes to China, there's a lot of talk about, "is China a climate saint or villain?" et cetera. But a lot of the way I think they do think about it is national security, energy security. And basically they've got mountains of domestic coal, but yeah, they increasingly, as we lived in China, they relied on more and more oil imports, more and more gas imports, and the air pollution was getting worse and worse.

Of course, the solution is electric vehicles that reduce your imports of oil, China massively developing renewables, but it's a sort of renewables plus coal idea. And I think the aim is, you know, reduce that massive import reliance that was worrying Chinese leaders, and obviously developing its own economic industries, very important.

And I think what is interesting about the early history of these Chinese entrepreneurs is, they did take advantage of some of this market opening, and also, government policy supported the direction. So it's a combination of some government policy and then quite wild west capitalism, entrepreneurship. And a lot of these companies originated in southern China in the 1990s where, as you know, Shenzhen was opening, all these areas were opening, and you could start businesses easily.

(13:47): **MARY KAY MAGISTAD:** Shenzhen, which started out as a collection of fishing villages and became a city of 20 million people.

HENRY SANDERSON: Precisely, yeah. And you start businesses early and people left the state sector to be entrepreneurs. And if you look at CATL, the biggest battery producer, he headed south at this time. If you look at BYD, he headed south and then started BYD. And then if you look at some of the other companies, the lithium and cobalt, they a lot of times did come out of the state sector. A lot of these people are classic entrepreneurs as we know them in America, right, grew up in poverty or difficult early lives, and driven in a capitalistic sense. So it's that combination of that, and the Chinese government support and policy, and the local government support, right, eventually when China was building these plants, the local government support. So in terms of people that stood out to me, I write about CATL because it's such a fascinating story and it's so big now. It's the dominant battery producer in the world by a big margin. And it supplies batteries to Tesla, to many other auto companies. And if you think of what's actually making EVs possible, and I write this in the book, the batteries are a key reason that we are where we are, because they're a huge part of the cost of the vehicle.

And when you talk about climate change and making a dent on emissions, you need scale. You need size. And China is the one that's done it. And a lot of these entrepreneurs are the ones that've done it. And of course, we can say, yeah, China's subsidized and yes, they have. But it's not the whole story. These entrepreneurs have been dynamic, and moved fast and seen the opportunity in the market. The lithium, cobalt companies that I write about – again, very early on secured resources overseas and set up the processing abilities in China to be able to supply these markets. So that when the electric vehicle came along, China was very competitive and very far ahead. So now China has a 10+ year head start against the West in a lot of these industries. And the fundamental question now is, how do we catch up, right? So we all accept we don't want to rely on China for 90 percent of supply of these things. But what do we do about it? How do we catch up? We can have policy, but how do we actually do it? And this is one of the fundamental challenges we face.

(16:00): **MARY KAY MAGISTAD:** Yeah, And you write about some interesting ways in which different countries and regions are starting to try to catch up. Obviously, the Inflation Reduction Act is one of them. You also talk about new policies in Europe, including possibly having a battery passport. What is that about?

HENRY SANDERSON: Yeah, so there's different policies. If you look at the U. S. side, it's very much tax credits, subsidies, production tax credits, loans from the Department of Energy. But if you look at the European side, it's slightly more about regulation, environmental standards, targets for what we want to achieve, and money as well. Money is coming in Europe. But it's much more about the standards, the environmental standards, sustainability standards, and battery passports. Part of that is where you can track every battery in theory, and have the information about the battery, the CO2 footprint, the sustainability characteristics, where the raw materials came from, that's the sort of theory. And in Europe's view, having high sustainability standards will help support homegrown companies in a way, because they might be more sustainable than the Chinese counterparts.

(17:05): And I write in the book about Northvolt, which is a really interesting success for the West, where from nothing, a Western startup launched a battery company. And this is in a period when the Chinese companies

BYD, CATL were growing massively and investing billions and billions. And yet a Swedish startup managed to build a battery factory, and it's in production now in the north of Sweden. And they managed to raise, again, billions of dollars and get a lot of support. But they've done it.

And they say, Northvolt, this is an industry where you go big or you go home. And that's so true, and that encapsulates the challenge for the West, which is, you know, it's not just a matter of a startup in a university or a spinout. Building this stuff is hard and you've got to do a scale to make a difference and to get the economies of scale. So how do you do that? How do you get the money to do it, to compete with China? Is it government money? Where does it come from? And it's still an open question whether the sustainability standards in Europe, the aim for more sustainable supply chains – will the Chinese just improve their game and improve sustainability and come to Europe and compete against the homegrown champions? So it's very hard to know how to compete with China, because they have not only a head start, but also they have very admirable abilities at manufacturing clusters and supply chains and local government support.

(18:27): **MARY KAY MAGISTAD:** And they're also very agile about adjusting to new circumstances and new regulations, right? So if the U.S. is limiting Chinese exports from China, China just goes to Vietnam or to Mexico and they process and manufacture there. And it's hard for the U.S. to ban Chinese-made products in Mexico. I guess they could try, but it ends up looking patently unfair then.

(18:51): **HENRY SANDERSON:** I think that's right. And I think if you look at the solar industry, I think you're right. There have been many tariffs and governments have launched various actions. But look where we are. China is still 90+ percent of the industry, right? So it obviously hasn't worked to any meaningful way. So now the U.S. is trying another tack, which is these massive incentives. And we are seeing a huge amount of investment in the U.S. in solar manufacturing, battery manufacturing, et cetera. And the tax credits help support the cost difference between starting a plant in the U.S. and in China, by providing meaningful support. And we still have to see whether these projects can be competitive in the way that we need them, so clean energy gets cheaper and batteries get cheaper. Or do we somehow support two-tier markets, where customers are willing to pay more for U.S. supply or something like that? But at the moment it is not quite clear how it's all going to develop. Because you're basically taking globalization and you're fracturing it, right? And you're creating these market distortions. So we haven't quite worked out how it's all going to economically come together.

But I think what's so interesting about Northvolt and other examples is customers came in to support this industry. So customers came in and said, "we'll buy these batteries" from the company, and then financial support came on the back of that. So I think that's very important, getting the customers involved to support these industries. But on the other hand, in the West, companies are companies, right? They're not going to pay huge amounts of money to support political imperatives. So it's a really tricky balance.

And in a lot of ways, we're trying something new, by this industrial policy. And I think there may be failures, there may be setbacks. But we should try and hold our momentum, and that involves getting the public along, because to do this properly, we need to hold our momentum and keep going if we actually want to diversify from China.

(20:40): **MARY KAY MAGISTAD:** So speaking of the public, electric vehicle owners, and there are more and more of them, feel good about doing something to help the environment. That's why many people switch over to electric vehicles. But as you pointed out, and as related to the EU's idea of having a battery passport, even if an EV is charged with renewable energy, that prevents carbon emissions once the EV is out and on the road. But there still can be, and are, significant carbon emissions in the supply chain. For instance, the nickel mines in Indonesia, in Sulawesi, at least one Chinese company there is using coal-fired power to do the mining. And I'm wondering how not just Chinese companies, but Chinese companies and others can be incentivized to be thinking about reducing carbon emissions, even in the supply chain. What are you seeing that's working on that front?

(21:33): **HENRY SANDERSON:** It's a really important question. The supply chain is problematic. And I think, in part because China dominates and also for other reasons, producing these electric vehicle batteries has a high carbon footprint and a high toll in other ways. And I think people would be shocked if they visited these sites and saw what's actually involved. But you don't make something out of thin air, right? You actually have to get these raw materials, and process them into a form that could be used in batteries. And we're talking incredibly energy intense process steps. For instance, making synthetic graphite for the battery, you're talking about heating it to 3000 degrees.

So all these processes are industrial energy intense processes. And so far, they've often been in China relying on coal-fired power. Yes, that's changing, but that's where a lot of the carbon footprint comes from. And then the battery factories are huge, and they consume huge amounts of energy. So there's problems in the supply chain all the way from the raw material to the battery.

And I think what we are seeing is that things are changing. And even within China, companies are moving to provinces with hydropower. Or they are cleaning up their sources of energy, etc. But you've still got the

processing of the materials. You've still got this requirement for energy and heat and chemicals. So we do need innovation in these areas. And that is coming as well.

(23:00): So the big issue is, what actually is the incentive to have a greener supply chain? And this comes back to so many issues with the climate problem, which is we don't, globally, put a price on carbon. It's free to emit. So if that cost is free, why wouldn't you go down that route? And I think the challenge we have is we need to make electric vehicles cheaper, so that more people can own them. And China is the one who's got the cost down, and they control a lot of this supply chain.

So we need to somehow incentivize more sustainable production in the supply chain.

And that's starting to happen, just because automotive companies, it's not a "nice to have", it's necessary to have a cleaner supply chain, because you're selling an electric vehicle product, right? And you can't really market it if you have all these other issues.

But now what we're seeing is the potential for, can you price these raw materials based on their sustainability characteristics? Can we move eventually to a premium being paid for more sustainable raw materials? We're not there yet, doesn't seem. Potentially we could move in that direction. But then big regulatory pushes, like I say, in Europe – the battery passport, battery regulation – that also shifts the landscape because actually to sell a battery into Europe or to bring those materials into Europe, they need to meet these requirements. But I think until we see people willing to pay more for sustainable supply, it's difficult to incentivize that massive change.

And actually what we're seeing at the moment with low prices for a lot of raw materials is the sustainable producers are the ones that are stopping production, or having to shut mines, so it's the opposite of what we want to see is happening. So that's just, that's market forces, right? Yeah, so you need government to step in this way, because otherwise, what's the incentive?

So not only the consuming country like Europe, or the European Union, but countries like Indonesia, they're realizing that eventually if you have a nickel industry that's destructive, environmentally damaging, you're going to lose some of this business eventually. So they are also stepping in. And that's what you need to see is government stepping in and providing that incentive as well.

(25:00): There are incentives to be more sustainable, for sure. Companies, Tesla and others, they, just from a simple brand point of view, don't want to be associated with bad practices. But there's still a lot of opacity in the supply chain, and there's still things that people don't realize, like the graphite, which is in your battery, 90-plus percent comes from China. What actually is the carbon footprint and sustainability of that? And at Benchmark, where I work now, we do a lot of work on sustainability of these supply chains and analyzing it. So, yeah, we're moving in the right direction, but we don't want to move to a world where we're producing cheaper EVs, which will really unlock adoption, but based on bad supply chains. And that's the direction we're heading. China's already there with mass market cheap EVs. But the next step is for Western automotive companies like Tesla, like others, to really launch EVs that are \$25,000 or cheaper. But, you know, we need a supply chain that's about scale, that's greener.

(25:50): **MARY KAY MAGISTAD:** There's a tension there, right?, that you don't want to let the perfect be the enemy of the good, but you also don't want to speed the emission of carbon that speeds up climate change, that makes living on earth more difficult for everybody. Is that another place where a kind of industrial policy, or at least incentivizing, comes into play where governments make it cheaper for individuals to buy EVs? I mean, the Inflation Reduction Act offers rebates and, and tax credits.

(26:24): **HENRY SANDERSON:** Yeah, you've got to do that. Because at the end of the day, the electric vehicle might have this carbon footprint up front, but you pay it off quickly, right? From an air pollution point of view, you have no air pollution, right? So air pollution kills so many people. And as we know from our time in China, it's just incredibly damaging to people's health.

MARY KAY MAGISTAD: Like something like a million people were dying prematurely every year in China due to causes related to air pollution.

(26:19) **HENRY SANDERSON:** Precisely. So you get all these benefits with EVs and as I say, you do pay it off, especially if you're using electricity from new renewable resources.

I don't like this argument that everything needs to be perfect, otherwise we can't do it, or poking holes in clean energy in all these ways. Because also there's a fundamental difference between this and fossil fuels, is you can recycle these batteries. Eventually we will get to a more closed loop system. But of course, everything takes energy. Everything is an industrial process. So it's about decarbonizing those processes. And this is just a huge challenge. If you look at China, so much of their emissions is from industrial processes, refining, chemical processing, steel, aluminum. Decarbonizing these industrial processes is one of the biggest challenges that we face and, especially, China faces. And it's a huge challenge.

(27:40): **MARY KAY MAGISTAD:** So how much of the – resistance is too strong of a word, but how much of the propensity in China right now to continue to use as much coal as China is using, and Xi Jinping has said, this is going to remain one of our main fuels for awhile yet, comes from the fact that it's there in China and it's cheap, and so it's a known secure supply? And how much is it, do you think, having reported in China on these issues, also related to the politics of it, that there are major state-owned enterprises that have a stake in continuing to have coal be a major supply of fuel?

(28:18): **HENRY SANDERSON:** Definitely a bit of both, right? There are definitely these, as you say, big companies, loads of jobs attached to it, definitely factions that support it. And then there's the fear of disruptions, and we did see last year or the year before, we did see cases where there were power disruptions because not enough coal-fired power was there, so they don't want those kind of disruptions, and coal-fired power is a stable source of power.

MARY KAY MAGISTAD: And also, if I can just interject, ironically, in the summer when there was this massive heat wave, there wasn't enough hydropower, because the water was evaporating.

(28:50): **HENRY SANDERSON:** Yeah, precisely. So how can they use coal-fired power so you may not be operating the coal-fired power plant all the time, but you're there as a backup source of power. So I think this is a point that people say is that yes, they may be building more coal-fired power plants, but they're not – it's not 100 percent utilization. They're using them less, and maybe as a source of backup for the grid. And that, along with hydropower, along with nuclear, can help the Chinese grid.

But if you look at the numbers for solar and wind, they're really massively accelerating, installing more solar than the whole rest of the world combined last year. So they're definitely moving forward aggressively and very fast. But yes, they still have that coal as like the secure baseload backup power, along with nuclear and hydropower.

Let's see how things develop and how they can integrate the renewables into the grid, and the methods that they do to do that. And batteries is one technology that can help integrate renewables as well. So it's very exciting, the speed that China's moving, but the scale of the challenge is also enormous.

And I think to your point earlier about the climate negotiations, I think maybe they see that side of things a bit differently. They have this historical thing of being a developing country and not responsible for historical emissions.

(30:08): **MARY KAY MAGISTAD:** They definitely turned a corner soon after the Copenhagen summit, in fact. And it was like, oh, this is actually going to be bad for us too. Climate change. We should, we really need to move more rapidly to do something about that. And then renewable energy started scaling up much more quickly.

HENRY SANDERSON: It's interesting, because now the renewable energy industry in China is so large, it's become a real powerful player now, right? If you've got companies like CATL, which are the biggest battery company in the world by a long way, companies like BYD or solar companies that are hugely dominant, these are huge assets for China. And they then become a powerful political force, pushing this industry forward.

It's also an industry that Xi Jinping wants, because it's high value jobs. If you visit these plants, battery plants, it's robots doing the work on the floor, but it's high quality technician jobs and people in lab coats, et cetera, that this comes with. And a company like CATL has, I think I was looking today, over 20,000 R&D staff, huge numbers of qualified people. And this is exactly the direction I think he wants to go in, which is massively moving up the value chain to producing high-value goods. In a way that might help propel China's climate ambitions forward. You've now got this powerful force.

In the West, it's not the opposite, but we have these powerful fossil fuel-based forces that we have to deal with. We also need to have – you know, one of the advantages of industrial policy of stimulating jobs and companies in this area is they become a powerful lobbying force to push forward and self-reinforce the direction we want to go in.

(31:42): **MARY KAY MAGISTAD:** I mean, say what you will about industrial policy for better or worse, but the Chinese government is very good at having long-term strategies, and then sort of marching purposively toward fulfilling them, sometimes with greater success and sometimes less. But, there's a reason why China now has a monopoly or near-monopoly on the world's supply of many minerals and metals. You mentioned graphite. There's magnesium. Seventy percent of the world's cobalt, which comes from the Democratic Republic of the Congo, largely. What else is on the list, and why does it matter that China has this near monopoly?

(32:20): **HENRY SANDERSON:** Rare earths are mostly used in magnets, which go in the motors in electric vehicles, but also wind turbines and many other applications. And China, again, not only is dominant in the mining of rare earths, but also the processing, but also the production of magnets. So they have really the whole supply chain. So for the West to try and catch up in rare earths is just extremely challenging, because

they have the many decade head start, but they have that whole supply chain and there, we're catching a moving train, right? These magnet producers are massively expanding production, so we're trying to always catch up with the bigger dominance by China. So rare earths, definitely on the list. Graphite, as I said, is one where China's really dominant. In solar, things like polysilicon, which goes into solar panels, China's very dominant there. And then copper, steel, aluminum, industrial metals.

(33:13): **MARY KAY MAGISTAD:** On copper, you had mentioned that in your Tesla, there's like a mile of copper, and in bigger vehicles, there's even more. I mean, that's a little mindblowing.

HENRY SANDERSON: Yeah, there's huge amounts of copper, and also in wind turbines, other clean energy, and then just for all the wiring that we need to transform our grids. China is not resource-rich in copper, but it has a lot of the processing industry in copper. And it's also secured some mines overseas. China made a lot of these acquisitions of mines overseas when the West wasn't really paying attention or just didn't really care. One of the cases I write about was the purchase of this amazing copper/cobalt mine in the Democratic Republic of Congo from an American company. It was totally willingly, an American company sold to China this amazing asset, because it just wasn't on people's minds necessarily that these things will become strategic.

And I think what's so interesting, after my book was published, is the level at which now critical minerals, the political level, the importance they now have in Western governments is extraordinary. We've never seen this much attention. And this is now leading to money going into projects. Australia just agreed to give hundreds of millions to a rare earth project in Australia, and the U.S. Department of Energy agreed to loan, or conditionally loan, over \$2 billion to a lithium mine in Nevada. We're seeing that attention turn into meaningful money on the ground.

And the other way it's changed is, all those deals that happened in the past probably couldn't happen now. We've seen Canada reject Chinese acquisitions or tell Chinese companies to even divest from companies they'd already invested in. It's a complete turnaround. But in my book, I show how China was able to buy the best lithium mine on the planet in Australia, or this amazing cobalt copper mine in DRC. And there was just no, not only was there no resistance, but Western lawyers helped. We helped China in a way become very dominant.

MARY KAY MAGISTAD: So, in some ways, it's kind of ironic that there's been a chain reaction from China's long term strategic thinking. It's kind of forced long term strategic thinking on other countries.

(35:15): **HENRY SANDERSON:** Yeah, and I think, in one sense, it's good that China's dominance has prodded the U.S. into this direction of trying to out-China China, but it's in a positive direction of more clean energy, right? And I think the risk is that governments or companies think, "oh, we shouldn't go towards clean energy because we're just funding China. We're just supporting our strategic rival." That's always the risk with China's dominance. And yes, China would like us all to still be relying on them and support their companies and industries. But I think they should realize that also we need – for the Western political public to get onboard, they also need to see some benefits from this energy transition, real jobs, real industries emerging. And if every time an industry comes up in the U.S. or Europe, and then it's just destroyed by low Chinese prices, in the end of the day, that's not beneficial for them either.

(36:09): **MARY KAY MAGISTAD:** Hmm. Interesting. One of the things we haven't talked about yet that you write about in the book and I found really interesting, was the potential of deep sea mining, the potential and the risks, including to biodiversity on and near the ocean floor. Can you describe briefly, what's down there that's of such interest to those who would like to mine? And why do we need to think carefully about unintended consequences before mining there?

HENRY SANDERSON: Yeah, it's a complex issue. And I did write in the book, but I wouldn't call myself an expert on it. But I think what is interesting about the deep sea is there are these polymetallic nodules down there. It's like nature left us these nodules for when we needed them. And they do have nickel and cobalt and other metals. And potentially, you could Hoover them up or and then pump them up to the surface and then process them and we'd have a supply of these battery minerals.

But the other way of looking at it is the deep sea – it is studied and obviously lots of work is going on, but there's so much more that we need to understand, all the species down there. And this is deep sea, it used to be thought it was devoid of life, but it's actually full of life. And I think the question is, we've damaged the planet so much and damaged so many species. Do we then want to create these consequences in the deep sea, consequences that we may not fully understand?

On the other hand, mining on land can be destructive and damaging. And if this is an alternative source of supply, we should investigate it and then see how we should do it. And I think it's a kind of race that we have kickstarted and I think it will eventually happen. And we've seen countries like Norway recently actually say yes to deep sea mining within their own waters. So what I write about mostly is the International Seabed Authority, which is talking about international waters. But Norway's gone ahead and said it could be done in its own waters. So we're going to see it happen. But again, there's big questions about not only the economic

costs, the economic model, but also, the impacts on the biodiversity, the deep sea life. Some people calling for a moratorium while we do further study. Others are pro it. And China's, I think, has been quite supportive of going ahead with it. But some consumers have also decided not to support it. So I think it's a really delicate, tricky issue. And probably most tricky is also getting the countries at the International Seabed Authority to agree on the mining regulations, the exploitation regulations. How do you share the revenue? How do you come to an agreement on the regulations so that it can then go ahead?

We do face this challenge where the resources we're going to need for this energy transition have to come from somewhere. And we have to find the best way of doing it. But often new technologies do come along that can offer solutions. So we have things like sodium ion batteries now. Sodium is quite abundant. So there are new technologies, but it's often not the best technology that gets scaled up. So I think we are going to need a lot more of these minerals

(39:00): **MARY KAY MAGISTAD:** Didn't you say demand is likely to quadruple this decade, demand for some of these minerals and metals because of EV use, but also for other ways that we're transitioning to more green energy?

HENRY SANDERSON: Yeah, we need a lot more of these minerals, lithium will more than quadruple this decade, nickel, copper, graphite, all these things, at least according to projections, the demand is going to increase rapidly. So we do need more supply. The issue is, going back to what I say earlier, will people pay for different types of supply, more sustainable supply? How is it all going to work out?

MARY KAY MAGISTAD: So China's also interested in mining in space. How viable do you think that is?

(39:45): **HENRY SANDERSON:** I haven't paid too much attention to that, because I see it as so far off. But who knows? As I say, we do need a lot more of these minerals. But I think we're going to see recycling kick in much more. And it's already providing some meaningful supply in some areas. I do think we are going to move towards a more closed loop situation. So I'm not sure I necessarily see us, the need for us to plunder other planets.

(40:08): **MARY KAY MAGISTAD:** And you write really interestingly about this, that recycling can actually play a bigger role than I think a lot of people realize is possible. There's like this vast amount of metal out there in people's old computers and cell phones and various other things that they have in their basements or their studies or whatever. I mean, how much can recycling actually do?

(40:30): **HENRY SANDERSON:** Yeah, huge. And if you think about it's quite interesting, which is China is mining or processing these minerals, producing these batteries, and then exporting it to the West, and in essence, giving us these minerals and materials, we then can recycle in the West and then feed our own industry. So it's actually quite a gift. So I think we need to make sure that when these batteries come to the end of their life, that we keep them within our borders for recycling. Again, market forces work against a lot of the goals that we desire, right? Often people pay more for this material in Asia. So this material ends up going to Asia, rather than staying and being recycled in Europe or the US. And that's what we need to ensure happens. If we could do that, we'd be in a really good situation from the terms of building more localized supply chains. But of course, it's not as simple as that, right? It needs to be economic. We need to somehow figure out how the whole system's going to work, getting these batteries back, recycling them. They're also lasting a long time. Most people just don't drive that much. For instance, with Tesla, I think you get an eight-year warranty on your battery. That's just a minimum. It'll last longer than that. So the timing of it all, how are we going to get this material back, is complicated.

(41:36): **MARY KAY MAGISTAD:** So the last chapters of your book are kind of hopeful. They look at recycling, they look at innovation and other ways that we can move toward a greener future without necessarily causing more environmental damage and putting more carbon into the atmosphere. On innovation, China has been innovative along the way in driving down the cost of solar panels, in making EV batteries. What are you seeing now that gives you an idea of the kind of role China can play going forward on that front, on innovation in renewable energy?

(42:10): **HENRY SANDERSON:** Yeah, I think it's really interesting because you're right. We're seeing China be innovative. Often it's not a brand new thing. It's been in academic literature before, or – but working out how to actually produce it and make it work is innovation, right? And actually commercializing it is what China's doing. But they're at the forefront of these new technologies like sodium ion, I mentioned. China's by far the biggest producer of sodium ion batteries, and planned capacity. And that's a brand new technology that could help reduce some of these resource requirements, and China's leading on that. And again, other batteries, solid state batteries, they are working on all these things. And I think commercializing it, actually investing in plants to produce this stuff and getting it out to market is really what they're good at. But we are seeing them innovating. We are seeing companies like CATL have huge R&D teams. We haven't seen from China, like a big breakthrough innovation – fusion or something like that. But we do see these innovations of deploying these new technologies and making them work.

There's been loads of engineering innovations that they've done. And a lot of these clean energy billionaires in China are engineers through and through. And the founder of BYD is an engineer to his core. So they have made huge innovations in terms of how you put the battery in a car, to minimize the packaging you need to reduce space and weight. And these things really matter, because it helps drive down the cost and improve the range of your vehicle. So these are really hugely significant engineering innovations that they've done that enable electric vehicles to be viable, to be cheaper and to advance us towards clean energy. So yes, Western startups and others are working on innovations as well, but – to what use? We need them to be commercialized and scaled up and in a mass scale. And I think that's something China is very good at.

(43:55) **MARY KAY MAGISTAD:** So it feels like there are a lot of paradoxes related to China and renewable energy. There's the fact that China's the world's biggest polluter at the moment, not the biggest historical polluter -- that's us in the United States – but biggest polluter at the moment. The majority of its energy mix is still coal. But it's also ramping up renewable energy faster than anyone else. It's using industrial policy in ways that other countries, including the United States, find unfair, but has actually spurred industrial policy to be used in those very countries, and that that's leading to a kind of competition that might actually lead us more quickly to the kind of energy transition we need to make if we're not going to be living in a world where climate change intensifies and makes it kind of harder for all living beings. Given your long history reporting in China, writing about China, writing here about the role that China's playing in the green transition, how have you come to think of China's role overall related to energy use and the green transition?

(45:58): **HENRY SANDERSON:** It's like China's leaders always talk about contradiction, and it being easy to hold these contradictions in your head. I don't want to give too weak an answer, but I think we do need to give China credit for driving down the cost of these clean energy technologies. It's not simple, it's not easy, and there's been a lot of innovation along the way. And they've also moved fast and in many ways been very capitalist. It hasn't been a whole state-orchestrated thing, and they deserve credit for that.

On the other hand, as you said, they are the biggest polluter. They do have this massive coal-fired power industry. And what's a concern is if there are problems or bumps in the road, are they going to pull back? Are they going to go back to coal? And because of the scale of China, that's just hugely damaging for the planet and for this issue.

And another point is that depending on how the politics plays out on China's alliances and everything, could Chinese batteries, other clean energy technologies, become too toxic? That would also be damaging for the fight against climate change, you know? And I think we've seen Xi Jinping and Putin, we've seen those meetings. And that also could set back the fight against climate change, if literally it becomes impossible for the West to rely on Chinese batteries and solar panels. That's also a worry. But unfortunately, we're in the situation where we are. We've been too slow to move away from fossil fuels, but it is ginormous task to shift this whole energy system away.

So the challenge now geopolitically is trying to build up Western supply chains, support our own industries to reduce reliance on China, where we don't want to be 90-plus percent reliant on China for this decarbonization, right? So areas where China has excessive dominance, I think we need to get that down. But we can't have a situation where we have no Chinese involvement at all. That's just not realistic or possible at this point in time. And therefore, how do we deal with that? How do we accept that, but also try to de-risk in other ways? So I think that's the fundamental challenge.

MARY KAY MAGISTAD: And our shared global future depends on getting the balance right, between competing and cooperating with China, *and* in finding the most environmentally-friendly way possible, as soon as possible, to create the energy we need.

Many thanks to Henry Sanderson for his thought-provoking book, *Volt Rush: The Winners and Losers in the Race to Go Green*, and for this conversation. You'll find a transcript at chinabooksreview.com – go to the tab that says “columns” at the top of the landing page, and click on the “China Books Podcast.” While you're on the website, check out the many engaging essays, interviews, book reviews, and more on all things China books, curated by editor Alec Ash, with help from assistant editor Taili Ni.

You might also want to read some of the excellent in-depth reporting on China's green energy mining at thewirechina.com – including a February 4th story by Eliot Chen that says, quoting the lede here, “An avalanche of cheap minerals originating from Chinese producers is thwarting Western governments' hopes of fighting back against China's dominance over the electric vehicle supply chain.”

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Thanks for listening. See you next time on the first Tuesday of the month. Meanwhile, happy reading. ■

Feature image: AI-simulated aerial view of lithium mining fields (Adobe Stock).



Mary Kay Magistad is a senior fellow at Asia Society's Center on US-China Relations. An award-winning journalist, she lived and reported in East Asia for more than two decades, including in China for NPR (1995-99) and PRI/BBC's *The World* (2003-13). She has created two critically acclaimed podcasts, *On China's New Silk Road* and *Whose Century Is It?* She is host and producer of the China Books podcast.