TRANSCRIPT

Energy 360: New Shores
“From the Mine to the Battery”

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FEATURING

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Jay Turner: We are tracking 62 newly-announced projects since last August. That adds up to about $53 billion in new investments and the potential for more than 37,000 jobs.

Allegra Dawes: That's Jay Turner, a professor of environmental studies at Wellesley College. He's been tracking investments made in the battery supply chain since the passage of the IRA in August of 2022. And if we want to assess the successes and challenges of onshoring supply chains, batteries are a good place to start. This is because batteries are critical for the energy transition. Decarbonizing transportation will require electric vehicles, which require batteries. Adding renewable resources to the power grid will require more electrical storage, adding more demand for larger battery storage systems. Batteries also exhibit some of the domestic and international goals and tensions of onshoring supply chains that we talked about in the previous episode.

From the Energy Security and Climate Change team at CSIS, I'm Allegra Dawes. And this is News Shores, a podcast series on green industrial policy and the U.S.' effort to onshore and friendshore clean energy supply chains. On today's episode, we're continuing our discussion of the U.S.' on- and friendshoring experiment by looking at supply chain for batteries. We will look at each segment of the battery supply chain and explore some of the geopolitical and business considerations that are impacting this sector. Building a resilient and domestic supply chain for batteries has been a priority for EV manufacturers and the U.S. government. Let's take a closer look at this effort.

Batteries are a particularly interesting case study for onshoring and offshoring. For one thing, the battery supply chain exemplifies some of the geopolitical goals of onshoring. As we covered previously, China dominates a lot of green technology and that includes battery supply chains. China's control of this technology has raised security concerns. The concentration of battery supply chains in China is not only a geopolitical concern, but also a concern for EV producers looking to increase resilience. To some extent, the semiconductor shortages following the COVID pandemic showed how concentrated supply chains can rapidly become a problem. Manufacturing and shipping slowdowns in South Korea and Taiwan had significant impacts on the automotive industry globally. Jasper Jung, the executive director of global strategic initiatives and public policy with General Motors, says that this supply chain challenge had impacts on the company's sourcing strategy.

Jasper Jung: It's been a tumultuous and unprecedented recent few years. I think when we look at the semiconductor crisis in particular, we're still dealing with shortages as part of that and really trying to ramp back up our production, but taking the lessons learned from that and applying that to

just good business strategy around protecting our commercial interests, looking at ways to make our supply chain more resilient, much more secure.

Allegra Dawes: In particular, China dominates the upstream segments of the battery supply chain. That means that China plays a significant role in producing the raw materials and minerals like lithium, nickel, cobalt, manganese, and graphite that are required to manufacture batteries. These minerals require processing for use in batteries. China also dominates this segment of the supply chain. From a resilient standpoint, Jasper sees China's concentration of critical minerals as a key challenge.

Jasper Jung: And to make it more resilient, I think when we look at concentration risks, particularly around critical minerals and processed materials and components for EV batteries and for EVs themselves, I think you look at critical minerals and rare earths, these types of inputs anywhere from 70 to 90% are really dominated in focus in China when it comes to both extraction and processing of these critical minerals.

Allegra Dawes: There is growing awareness that China's concentration of critical mineral production could undermine resilient supply chains. Still, to date there has been relatively limited domestic investment in the upstream and processing segments. Steve LeVine is the editor of the online publication, The Electric, which covers batteries and EVs. He thinks that there's been too much focus on later stages of battery production with companies building gigafactories to assemble battery packs.

Steve LeVine: Everyone thinks it's cool to have a gigafactory and everyone wants one, but a gigafactory just makes the cell. There's some power and influence and industry strength that goes with that, but the bigger piece of that is the midstream. It's the processing. The commanding heights of batteries of the EV industry is having the capacity in your own country to process all those minerals from the raw or near raw, all the way to the finished electrodes and separators and electrolytes.

Allegra Dawes: However, there are some signs that U.S. companies are looking to onshore and vertically integrate some mining and processing of critical minerals. While tracking new project announcements, Jay Turner is seeing a pickup in domestic production of one critical mineral in particular: lithium.

Jay Turner: There's a lot of activity around lithium. The U.S. has historically had one lithium mine that's been operating in the U.S., the Silver Peak Mine over the last few decades, but a new mine just opened up in Quebec, American Lithium's facility. There are a lot of projects that are in planning in the U.S. The Thacker Pass Project out in Nevada has drawn attention, but you can go down the list of other projects. Piedmont Lithium in North

Carolina and Albemarle in North Carolina are both potentially big projects. Jindalee McDermitt has another big lithium project that's out on the Oregon-Nevada border.

Allegra Dawes: But why is lithium specifically so important? It is essential for the lithium-ion battery, the most popular battery storage option today. In addition, demand for lithium is projected to increase from 500,000 metric tons to over 3 million metric tons by 2030. But can new investments in lithium help diversify the supply of this critical mineral, a supply chain that China currently holds the majority of? Jay mentioned the Thacker Pass, a lithium project in Nevada, owned and operated by Lithium Americas. Once completed, Thacker Pass would produce enough lithium for one million EVs per year. Critically though the project is not just mining.

Jon Evans: So from the ground all the way to a material at the end when it leaves the plant gate, it can go right to a cathode facility to be integrated into that cathode, which will go into a battery. So we don't consider ourselves a mining company. We do the extraction from the deposit all the way through to the processing, to final product all in one spot in Nevada.

Allegra Dawes: That's Jon Evans, the CEO of Lithium Americas. He agrees that the domestic supply of critical minerals and domestic capacity for processing those minerals is investment protection. He uses the semiconductor crisis as an example.

Jon Evans: There's a tremendous amount of investment going in right now in gigafactories and associated inputs into those gigafactories. But again, just like the last example, if you don't have the raw materials to treat those cathodes and to build that stuff, your capital is at risk. You saw that in semiconductors, where during COVID you have all the facilities to put those semiconductors into cars and engines and so forth, but you didn't have control over the semiconductor supply chain.

Allegra Dawes: Controlling the upstream and midstream of the battery supply chain is essential for achieving the goals of onshoring and friendshoring. The IRA has injected money and demand for domestic supplies, but there are challenges in building mines such as obtaining permits and securing the financing required to build the mine.

Jon Evans: Permitting is a challenge. It takes a long time. I mean, the formal permitting process took about two years. The appeal took another two years, and the preparation for the formal permitting process took nearly a decade. But financing is still a big barrier, and again, that's where the government has stepped in with things like the ATVM Loan Program, grants from the DOD.

Allegra Dawes: Another issue facing the development of the mining industry in the U.S. is labor. Onshoring clean energy supply chains, including batteries, will require a workforce ready to support these new and growing industries. According to Steve LeVine, training a skilled labor force could be a bottleneck for the growing battery industry in the U.S.

Steve LeVine: The creation of the skilled population that can staff these industries, that's a fundamental priority. I think it's underplayed. It is from one end of the industry all the way to the other. They don't have enough people who know what the hell they're doing or are in the pipeline to get there.

Allegra Dawes: Permitting, financing, and labor, these are challenges to building domestic battery production capacity. In addition, mining for critical minerals also faces the challenge of "Not in My Back Yard" reactions and environmental concerns.

News Clip: A group of Gaston County homeowners are trying to prevent a proposed lithium mine from digging any further.

News Clip: People camping in tents, braving these harsh conditions is an act of resistance against proposed mining for lithium.

News Clip: Blowing up a mountain for coal mining is wrong. I think blowing up a mountain for lithium mining is just as wrong.

News Clip: They say what will become the largest federally-approved lithium mining project operating in the U.S. comes at an environmental cost.

Allegra Dawes: Community support for these projects is critical. Thacker Pass has established a community benefits agreement to address concerns. Jon explains the importance of developing a relationship with the community.

Jon Evans: The first thing is just a relationship and open and transparent communication where the first step is letting the community understand what's coming. Also, demystifying all the jargon that's in permitting because there's a lot of scientific terminology in there where we have two community agreements. We have one with the local community, I'll say the communities that are around us, and then we have one with the tribal community, which is about 40 miles to the north.

Allegra Dawes: Partnering with the community is one approach to addressing NIMBYism and ensuring that communities near mining projects feel their concerns are addressed and see direct economic benefits. But even if all of these issues are addressed, the U.S. cannot be entirely self-sufficient.

The domestic front of battery supply chain development is promising. However, sourcing minerals will require friends. Here's Jasper.

Jasper Jung: For GM, we are focused on building a North American-based value chain as we make these investments, but I think even with that North American focus, there's the reality that we can't do everything here in the U.S.? I think the reality is some of these critical minerals, they're buried where they are around the world. They're not all buried here in the U.S. I mean, you've got lithium and nickel and manganese and rare earths that just have to come in from other markets.

Allegra Dawes: The IRA requires 40% of the value of critical minerals to be extracted and processed in the U.S. or in a country with a free trade agreement. However, the countries that have large amounts of critical minerals are not always FTA partners or close allies. These countries can be problematic partners for the U.S. due to a variety of geopolitical reasons. U.S. companies operate with different risk and financial assessments than that of Chinese companies in this sector. That can make partnerships and countries that lack environmental standards and transparency difficult. Jay Turner believes that improving standards for mining can help to build stronger supply chains for critical minerals.

Jay Turner: Priorities that I think are important to these supply chains are, one, transparency, ensuring that there's daylight on where materials are being sourced from, the conditions under which they're being sourced. And as part of that, I think ensuring that these supply chains include certification processes. We've seen this on a material-by-material basis, whether it's a standard around cobalt or standards around lithium, but having an overarching set of standards to provide accountability and accessibility and audits of mining facilities so that it's possible to make comparisons between the working conditions, the greenhouse gas intensity producing these different materials.

Allegra Dawes: On the positive side, some U.S. allies have started to use the IRA as a blueprint despite mixed reactions to the legislation initially. Jay Turner gives us an example.

Jay Turner: The one that really kind of jumped off the map for me wasn't actually in the United States, but it's the one in St. Thomas, Ontario. This is the PowerCo, the battery factory, which was announced, I don't know, maybe June, but this is Volkswagen's big battery factory, and it went to St. Thomas, Ontario because Canada was willing to match the Inflation Reduction Act's incentives. And so just to see how consequential the IRA was that Canada felt like it needed to step up and match those incentives to draw this enormous project.

Allegra Dawes: At the end of the day, even with U.S. allies' support, it will be challenging to meet projected demand without China. This reality has sparked many domestic debates. Jay explains this.

Jay Turner: I mean, this has been an incredibly contentious issue. Is the money coming from China, are these workers coming from China, or just the companies coming from China and investing in the United States? Just the reality of it is that there is a lot of intellectual property in China and just a lot of practical know-how around how to build lithium-ion batteries and other aspects of the clean energy supply chain. And if we're going to scale this industry up, and we're going to do it as quickly as we're trying to, to meet the goals that the Biden administration has and the larger goals around addressing climate change set out by the intergovernmental panel on climate change, then we're going to need partnerships.

Allegra Dawes: Addressing climate change without any role for China will be challenging. Partnerships with allies will be critical, but the U.S. will also need to build broader coalitions to diversify the supply chain for critical minerals. At the company level, supply chain partnerships will also be critical.

Partnerships between companies and between companies and governments can lead the way. The Thacker Pass Project is an example of company partnership. GM is a joint investor in the project and will receive exclusive access to the first phase of production. Jon Evans sees this as an important strategy for EV manufacturers like GM.

Jon Evans: General Motors, they've been very, very aggressive. We're not the only area that they've invested in. They've invested in nickel. They have invested in semiconductors, I believe, with global foundries in Upstate New York and also now with lithium. So I think GM looks at this in the same way in that they want a complete solution and they want it to have visibility over their supply chains and control.

Allegra Dawes: Jasper also highlighted partnerships as the foundation of EV supply chain decisions for GM.

Jasper Jung: When we look at our strategic approach, I'd say four things really kind of got our strategy. Scalability is really important, so we look at all different types of partnerships. Like I said, whether they're offtake agreements, equity partnerships and investment in companies like Lithium Americas and Thacker Pass in Nevada.

Allegra Dawes: And the IRA includes government incentives for partnerships between industry and companies.

Jasper Jung: Public-private partnerships I think are really important. I think when you look at governmental support, incentives are important here in the U.S. between the infrastructure funding, CHIPS and Science Act funding, the Inflation Reduction Act funding.

Allegra Dawes: The IRA doesn't solve everything. The challenges we heard about earlier surrounding workforce development, permitting and financing will require targeted solutions. Jasper thinks that partnerships across government, industry, academia, and communities can play a role in solving some of the challenges in building a domestic battery supply chain.

Jasper Jung: How are we going to develop the workforce that we need going forward, right? Working not just with governments, but with the academia. We need metallurgical engineers. We need geologists. We need miners. We need chemical engineers.

Allegra Dawes: There is still a lot of work to be done to achieve the goals of onshoring and friendshoring battery supply chains. However, in the first year of the IRA, there are signs that the U.S. supply chain will grow rapidly. The scale of the U.S.' battery industry is set to grow dramatically over the coming years.

Jay Turner: Another thing that has surprised me is just how much battery manufacturing capacity is scheduled to come online between now and 2030? We're tracking at this point in North America, 1,071 gigawatt hours of battery capacity. And if you assume each EV has 75 kilowatt-hour battery in it, you do the math. That's enough battery capacity to support manufacturing 14 million EVs per year, and that's a lot of vehicles to manufacture per year.

Allegra Dawes: These projects will need raw materials. They will also need customers. Consumer adoption of EVs is important for addressing transportation sector emissions. It is also important for the ultimate success or failure of these domestic industries. Jasper puts it this way.

Jasper Jung: Scaling consumer EV adoption, we take a very holistic approach at GM. All the things that we're doing upstream is about bringing the best technology, the best products at the most competitive cost possible to the consumer, and then downstream, looking at charging infrastructure, looking at the different ways that we can support with different products, and not just the EVs themselves, but to really kind of build up residential charging, workplace charging.

Allegra Dawes: While the IRA includes consumer tax credits, electric vehicles remain more expensive on average than internal combustion engine vehicles. Steve LeVine believes this is a problem.

Steve LeVine: The one thing we don't know in our equation is we don't know consumer uptake. What are they really going to buy? I do think that there's an overestimate of the appetite to spend 60, 70, $80,000 on an EV and the name plate price tag for one of these vehicles, they'll name a price in the 40s or in the 30s, but there are no vehicles available at that price.

Allegra Dawes: Costs may emerge as one of the largest challenges for the onshoring and friendshoring experiment. Even with consumer tax credits in the IRA, accelerating adoption of EVs will impart depend on cost declines in these vehicles and battery production. How we get there remains to be seen.

To recap, battery supply chains are a good sector to assess the successes and shortcomings of onshoring and friendshoring of the green industrial policy experiment. The goals of friendshoring and onshoring are all in play in battery supply chains. Geopolitical competition, supply chain resilience, and domestic economic development, the U.S. cannot build battery supply chains alone. Finding the right balance for domestic production and for sourcing from friends in China will be a large task in the coming years.

In the next episode, we will take a look at the solar and offshore wind industries. How will onshoring and friendshoring impact the pace and scale of deploying these two technologies? How are macroeconomic challenges impacting these spaces? Tune in next week to New Shores to find out.

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