

How critical are critical minerals in the Brazil-US economic relationship?

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[00:00:14.26] - Monica de Bolle

Hello and welcome. Today's discussion focuses on critical minerals, the raw materials that power modern technologies, and their growing importance to the Brazil-US and Economic Partnership. Critical minerals are a set of metals and non-metals whose supply is essential to industries such as tech, defense, and energy, and whose sourcing risks pose economic or security challenges. They include rare earth elements, battery metals, specialty semiconductors and compounds, and industrial inputs such as niobium, with Brazil being the world's dominant exporter of niobium. These materials are central to electric vehicles and batteries, wind turbines and high-performance magnets, advanced electronics and data center infrastructure, defense systems, and green energy technologies. Brazil is a strategically significant supplier —of critical minerals. It hosts substantial deposits of several materials, has a mature mining sector, and has some downstream processing and refining capabilities. The country's geology includes notable rare earth elements, and expanding exploration is revealing further potential for lithium and other battery-relevant metals. Brazil's ports, manufacturing base, and regional logistics position it as a viable partner for scaling extraction, processing, and potentially refining activity in the Americas, an outcome that would diversify global supply chains currently concentrated in a few countries, notably in China. The United States is seeking a stable, diversified, and secure supply of critical minerals and increasingly more processing and value-added activity in partner countries.

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From Brazil, the US is looking for predictable investment frameworks and supply chain resilience through long-term offtake agreements. To discuss this growing economic and geopolitical issue, I'm joined by three very distinguished speakers. I'll introduce them in the order that they're going to be speaking. First, we have Bruna Santos, who is the Director of the Brazil Program at the Inter-American Dialogue. Welcome, Bruna. It's a pleasure to have you. Thank you. We also have Cullen Hendrix, who is a Senior Fellow at the Peterson Institute for International Economics. Cullen has written extensively on critical minerals and was recently on

Policy for the Planet, which is a podcast produced by PIIE and hosted by me, speaking precisely about the growing geopolitical and economic importance of critical minerals. Welcome, Cullen, it's great to have you. Always a pleasure. And finally, Pedro Guerra, who is the Chief of Staff to the Vice President and Minister of Development, Industry, and Commerce of Brazil. Welcome, Pedro, it's also great to have you. So let's just jump right in, and I'm just— I'm going to hand over to Bruna, who's going to start us off with her remarks, followed by Colin, followed by Pedro. Thank you, and I'm looking forward to a great discussion.

[00:03:52.23] - Bruna Santos

Thanks, Monica. Thank you, everyone. Good morning. Good morning, Pedro, Cullen. It's such a pleasure to be here, um, such a timely conversation, right? So I have a couple of messages to help us position this conversation, the Brazil-US relationship, Brazil and its critical minerals in a broader geopolitical debate. So first thing I would like to say is this discussion sits within a moment of managed uncertainty in the Brazil-US relations. It's a moment in which I'd say the two nations exist in a state of friction that is being carefully controlled And I do not foresee any type of rupture, but also no, no alignment ahead. We are in a moment of managing volatility, and in that context, I think practical cooperation on critical minerals remains possible, perhaps more than in any other areas, because as we will see, the, this, the interests still converge. But it is harder, I think, than once it was. And I— part of the challenge is credibility. It's the fact that every friend of the United States, every ally in the region is right now pricing the US political risk into their long-term calculations. That's one reality I have to put up front.

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And this is happening in a moment when we've seen the weaponization of economic interdependence happening. It has become a normal instrument of statecraft through tariffs, sanctions, export controls. Brazil suffered with 50% tariffs last year, as we all know. So that matters for Brazil because Brazil is a, is a classic middle power in this, in this story. And as a middle power, it will fiercely protect its strategic autonomy and its tradition of non-alignment, and will— it will not abandon, uh, its relationship with Beijing. Beijing, China is a non-substitutable pillar of Brazil's economic stability as a main buyer of Brazil's commodity. So I, I— the way I see forward is that the most realistic path forward is not obviously a broad geopolitical alignment between Brazil and the United States, but a selective, practical cooperation of projects and investments that are useful to both sides without requiring necessarily Brazil to sign up to someone else's larger strategic script. So in this context, Critical Minerals are fundamentally a story about power unfolding through industrial policy across a map that's drawn by geology. And as you said in your opening remarks, Monica, the politics of critical minerals have now moved well beyond the conversation about energy transition.

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It's a— in the decarbonization story, it's now embedded in a harder geopolitical logic where we see states increasingly seeing control over mineral supply as a source of strategic leverage. So these materials, they, as you said, they matter not only for the energy transition, but for defense production, digital infrastructure, advanced manufacture, And with China's willingness to restrict exports in key inputs such as the rare earths have reinforced that point. So for countries that are resource-rich and middle powers such as Brazil, such as Indonesia, India, the critical minerals create not, not only an export revenue, but also a bargaining power in this sense. So we see also at the same time that once the supply chains are framed as national security imperative, we see that our governments are more aggressive intervening in using industrial policy. So China did that, and I think other, the other countries in the world are now following path, including obviously the United States. So another point I want to make is about how the United States is now moving in this similar direction, but not necessarily as coherently. It's using public financing, it's using target tariffs, stockpiling, pricing support, price support, and other forms of intervention, but not necessarily as coherently as we could expect.

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So I think we— it's really difficult for us to see easy substitution of China in this place. We all know that mining projects and processing are very— are capital intensive. They are vulnerable to price volatility. So, um, competing with China in that space in Brazil means making the alternative supply chains investable. And Brazil has the geology, it has the reserves, it doesn't have the products. And the mineral— obviously the mineral deposits are fixed territorially, so it gives obviously these countries some strategic relevance, but the geology alone does not define who holds the power in the supply chains. So as you said, Monica, the bottleneck is in the mid and downstream. Is it related to processing, to refining, to the separation of materials? And toward the broader industrial ecosystem that's around them. So why does Brazil matter in this context? Not only because it has minerals, it has the, the reserves, but because it is one of the few countries that's large enough to matter, that has diversified enough to be relevant across supply chains, and is politically autonomous to, to negotiate. So Brazil has, as you said, the reserves, but it can also— it also has a power grid that's nearly 90% renewable.

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So Brazil could— can offer to the US or Europe a highly desirable green premium for any processed material. Any energy-intensive material refining can be done in Brazil with a fraction of the carbon footprint of the Chinese coal-powered refining. And there's another point that I

always make, which is I think often underestimated, which is Brazil is, is more resilient than many assume. Brazil has water, has food capacity, has energy potential, has a continental scale, and more importantly, has no major external military threat in its neighborhood. So that does not remove, obviously, the internal bottlenecks that need to be addressed. Uh, but it does mean that Brazil enters this more fragmented global moment with, um, deeper structural buffers than many other countries that are now being discussed as strategic partners for the United States. So the resilience matters because Brazil has more room to maneuver in this in this space, and as a middle power even more. Right now, all middle powers I think can benefit of the fact that the current system is not yet a clean bipolar order. You don't have— you have neither United States or China can fully organize the rest of the world into stable spheres of influence.

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And that leaves countries like Brazil, like India, Indonesia, able with the flexibility to hedge and to extract benefits from multiple relationships at once. But obviously that does not translate into leverage without doing the— making the system, the domestic system, capable of absorbing the opportunity. I'm sure Pedro will speak some about some of the measures Brazil is already taking around addressing those several bottlenecks that Brazil has to capture that opportunity. But whatever Brazil does internally, it has to manage a couple risks. One is obviously the— if it drifts too far into China-centered value chain on terms that Brazil cannot control, the problem is the structural dependence remaining concentrated in extraction while China retains the control over processing. The second, which is I think very important, is overestimating the stability of a US-led alternative. That this challenge for Western critical minerals is not simply about resources or financing. It's a matter of credibility. And right now, when whoever you talk in the region, especially in Brazil, I get the feeling that they're being asked They see themselves as being asked to absorb higher short-term costs while they are still pricing what is the US political volatility upfront.

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And the third great, I think, challenge in the region, not only in Brazil, is the secondary exposure to the US-China competition. So if Brazil's, for example, mineral economy is too tightly linked to the Chinese investment or China process, uh, processing chains, it becomes more vulnerable to measures taken by Washington to counter Beijing dominance in the region. Obviously, it does not mean that Brazil would automatically be targeted, uh, but it does increase the risk of being drawn into a more coercive environment shaped by tariffs, by export controls, and, uh, supply chain block politics. I always say that Brazil is a country that thrives in the in-between. So I think obviously the answer for that is, is being, is diversifying without dependence. But, um, the way I see is that Brazil is enters the, the critical minerals conversation in a way that's not as a junior

partner. It has leverage, and it may have more than it's often assumed. But this is less a story about geology and reserves and more about institutional competence. And Brazil's leverage only matters if it can solve its bottlenecks. Otherwise, we will waste the moment. And I will stop here and turn to my colleagues to hear their views on Brazil and the US.

[00:14:40.13] - Monica de Bolle

Thank you, Bruna, for those very cogent points and for, you know, making very clear what the opportunities and the challenges are when it comes to Brazil in this perspective of critical minerals with the challenges facing the region. Cullen, over to you.

[00:14:57.14] - Cullen S. Hendrix

Well, goodness, that is one heck of an act to try and follow. So as the lone American, or I should say United States, on the webinar, I'm going to be providing a U.S. perspective, not the U.S. perspective, but I'm going to be drilling down a little bit into the drivers of evolving U.S. critical mineral policy and its strategy, and then some of the tools and the levers that are being pulled in order to try and build resilient ex-China supply chains for a variety of these minerals. So I wanna start actually by not just jumping into the content, but I want you to think for a moment about the images that you were seeing coming out of the Persian Gulf over the last month. I think what is most striking about the images of this war are the things that you don't see. In fact, you don't see infantry. You don't see tank columns. What you are seeing are drones and cruise missiles and fifth-generation fighter aircraft. What you're looking at in a very real sense are bundles of critical minerals— rare earths, titanium, gallium, germanium— plus less exotic materials like aluminum and copper. And you're seeing them in very kinetic form.

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To a great degree, modern warfare is becoming a competition in applied materials science. Now, this war is unfolding against a backdrop of rapid AI and data center rollout and green energy transitions, which may be slowing somewhat in the United States, but are rolling ahead in virtually every other part of the world. And both of those evolutions in our energy systems and in computing are pulling on the same materials base as warmaking. And obviously, uh, conflict dynamics are not isolated to the Gulf. Um, we have had our attention drawn away from the situation in Russia and Ukraine, but it has not gone away. Um, so if you take these three different drivers of demand, we're in a moment where there's kind of a perfect storm for critical mineral demand in a context where existing supply chains are largely dominated by China, especially at the processing stage where ore is turned into usable industrial inputs. And that realization is reshaping US defense and industrial policy in ways that I think are

underappreciated. And it's doing so kind of along three dimensions that I want to walk through quickly before turning to what I think it means for Brazil.

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Take what I have to say about what it means for Brazil with a large grain of salt. So what's critical and what's mission critical? So critical has a technical definition that Monica alluded to based around US import dependence and also single points of failure in domestic supply chains. That formal list has 60 minerals and, and some non-minerals designated by the US Geological Survey, and it still includes all of the energy transition minerals we were talking about extensively a few years back, like lithium and graphite and nickel. But the policy emphasis has clearly shifted. Policy energy is increasingly concentrated on materials with direct military and semiconductor applications. Rare earths and heavy rare earths, gallium, germanium, tungsten, I could go on. The Pentagon's deal with Mountain Pass or MP Materials, an equity stake, a price floor, and a long-term offtake agreement tells you where these priorities are developing and emerging. This is not really an energy transition strategy cosplaying soldier. It's defense policy, full stop. Now, how is the US trying to go about it? What the administration has assembled is, I think, a set of related mechanisms designed to subvert the normal functioning of global commodity markets.

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Deliberately, and I would argue strategically. Now, normal is in air quotes here because for many of the most strategic critical minerals, there is no normally functioning market. China has become essentially a monopoly provider of many of these processed materials and has been willing to use export restrictions as a political tool now for several decades. So if we think about specific policy interventions, one of the more interesting ones is Project Volt, which is attempts to create a government-backed demand anchor that gives fixed-price access to stockpiled materials to US firms in times of supply disruption. They're also using equity stakes in mining companies, making the US government a partial price setter and an obvious backstop, making these companies maybe not too big, but too strategically important to fail. And the Project Forge, which is the successor to the Mineral Security Partnership, I think is explicitly designed to create a preferential trading zone with price floors enforced through adjustable tariffs, which would amount essentially to a buyer's cartel among allied nations. So taken together, those tools would not just hedge against Chinese supply disruption. They're kind of an attempt to restructure the market itself. Now, of course, and I suspect the discussion is going to revolve heavily around this, this assumes stable alliances and US commitments thereto.

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And I think that that's an increasingly tenuous assumption. I won't say more about that for the moment because I think we'll get into that in greater detail later. Now, the U.S. is not attempting to go this alone. And for as unilateralist an administration as the United States has seen in the post-World War II era, in the second Trump administration, I think that this is genuinely surprising. You've got 11 new bilateral frameworks signed at that February ministerial in a single day. 54 countries were in the room. Another 17 frameworks are reportedly being negotiated but not yet public. So take that maybe with a grain of salt. This is a type of conditional multilateralism. So if you participate, you get access to US financing, long-term offtake agreements, and so long-term demand signals and market support if you're sort of inside the tent. And if you're willing to, you know, potentially exclude Chinese investment from your strategic assets or future Chinese investment in your strategic assets and accept the Western pricing architecture, which as Bruna alluded to, is asking, you know, these countries to pay higher costs for these resources than they would get from China for kind of the, I think, tenuous promise of resilience down the road provided by this US-anchored alliance.

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And it's also, I mean, I think it's important to say too that this is not really elective multilateralism as Bruna Bruna also alluded to geology, not politics, this determines where the ore exists. And much of it is outside the United States. And the US actually seems willing to promote development of processing capacity. I think that's the critical supply chain choke point dominated by China outside of the US as well. And that's useful because it moves these countries in further into these downstream activities where there's higher value added, there are more opportunities for industrial employment, which can have knock-on effects for all sorts of industries that feed into to this growing industrial base. So this is looking less like, I think, the Cold War era US moonshot for a made-in-America critical mineral supply chain, which was a metaphor that Biden used during his administration. And it's looking actually more like an in-development International Space Station, a multilateral initiative. Now, what does this all mean for Brazil? I think Brazil sits at a very interesting intersection. It has the rare earths, it has graphite, it has many other materials as well. It's home to one of the world's true mining majors.

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It has a domestic industrial base with significant expertise in mining. And as Bruno alluded to, all of the renewable energy you could possibly want for low-carbon processing. It signed on to the February framework and it's sort of, it's in the Western Hemisphere, which means it's naturally protected from some forms of geopolitical risk. So this all looks good on paper from a US perspective. But Brazil is also integrated into Chinese processing relationships that it can't simply unwind. And I— and Lula's government has shown no appetite for the kind of explicit

alignment that the Donrow Doctrine logic of the 2025 National Security Strategy implicitly demands. That is excluding non-hemispheric competitors from strategic assets. And I agree that this ambiguity is a potential leverage point for Brasília. The US fundamentally needs Brazil more than Brazil needs the US. And Brazil is not Venezuela. It is not Cuba. Terms cannot be dictated to it. How Brazil makes this play and whether it's able to get real concessions on processing infrastructure and value-added capacity, I think, is a question that's much better answered by my co-panelists.

[00:23:44.27] - Monica de Bolle

So thank you. Thank you, Colin, for those great, very informative remarks. I do want to mention one thing, which is, you know, related to what both Bruna and you were talking about. The fact that Brazil, you know, has the ability to— yes, it is between kind of this vice, you know, US on the one hand, China on the other, but it has the ability, given everything that the two of you have said, it has the ability to look to other places as well. And we've just seen, you know, the EU-Mercosur agreement coming to light. And we know that there's a specific chapter in the EU-Mercosur agreement on specifically critical minerals. So Brazil is positioned to kind of exploit these different demands and needs that are coming from different places. And to, you know, try to see how it can, it can manage its own situation given the opportunities it has, the endowments it has, but also the challenges. So with that in mind, I'll pass it on to you, Pedro. Thank you very much for being with us today and for giving us some of your time, which I imagine is incredibly busy at the moment.

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Thank you. Over to you.

[00:25:02.26] - Pedro Guerra

Good morning, everyone. I'd like to thank the Peterson Institute for International Economics through Professor Monica de Boer, my friend Bruna Santos, and Colin Hendricks for the opportunity to speak to such a distinguished audience. I prepared a small material here, and in my remarks I will focus on Brazil's position regarding critical minerals, I divided this presentation in 3 brief parts. In the first, I highlight Brazil's position in the mining industry. In the second, I explore Brazil's attributes of power and positioning itself globally. And finally, I summarize how the country's characteristics, both in its industry and its history of international relations, as discussed in the first and second parts are being considered in the formulation of domestic policies by federal government. I think that many of the subjects that I'm gonna touch were already treated by you, but I, I'm gonna sort of systematize the way we have been seeing all

the— this very— this different aspects of the discussion. So Brazil has long been a mining powerhouse, as you might know, as we learned in school books. It was during the so-called gold cycle in the 18th and 19th centuries that Brazil began to urbanize and expand inland.

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Gold, by the way, continues to be mined in several Brazilian states such as Mato Grosso, Mato Grosso, and Pará. However, since the mid-20th century, iron has taken the center stage in Brazilian mining. Iron accounts for more than 72.8% of our mineral production, driven by companies such as Vale, which ranks among the largest mining companies in the world in terms of revenue and market capitalization. In 2025, iron was the third most important item in Brazil's export basket. For the first time, we exported more than 400 million tons of iron, and copper did very well as well. We exported more than 1.4 million tons, another record. Nevertheless, we still have enormous untapped potential. According to 2025 data from Bloomberg that I retrieved, Brazil ranks among the, the largest holders of reserves of several key critical and strategic minerals. We hold 95% of world's niobium reserves, 25% of graphite 28% of rare earth elements, 18% of iron, 14% of manganese, 12% of nickel, to name just a few. These mining figures are even more remarkable when we consider that geological mapping in Brazil covers less than 30% of our territory. As noted by IBRAM, our institute devoted to represent mining industry.

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In other words, our mineral potential is far greater. This natural endowment, combined with certain political characteristics, positions Brazil as a reliable and strategic actor in the global agenda to strengthen critical mineral supply chains. First, we have rigorous labor standards that are internationally recognized for their concern with working conditions. Second, Brazil has the cleanest energy matrix in the world and a firm commitment to decarbonization. More than 85%, as noted by you, uh, of Brazil's electricity is generated from renewable compared to a global average of just 30%. This matters for two reasons, I think. First, mining is energy intensive, as you know. Second, if the so-called new mining aims to produce equipment essential for other purpose, for the energy transition, it will be a paradox for the mining process itself itself to generate large volumes of greenhouse gas emissions, thereby offsetting the expected benefits. Third, Brazil is a peaceful country with dense and respectful relations with the world's major centers of power. China is our largest trade— trading partner and a major buyer of iron. The United States, on the other hand, is the largest buyer of our manufactured goods, such as electric motors. And the European Union maintains deep economic and cultural ties with us, further strengthened by the recent conclusion of a trade agreement with Mercosur after 25 years of negotiations.

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In my view, all these aspects are being taken into account by the government in shaping its agenda to boost mining in Brazil. There is no universal definition of, of critical and strategic minerals. However, the National Research Council, in its methodology, considers two variables: the risk of supply disruption and the impact of such a disruption in assessing the criticality of minerals for the United States. Criticality Criticality therefore exists in degrees. The United States lists, uh, 50 minerals as critical, the same number as European Union. Brazil lists 21, while China lists 20, and Peru in turn lists only 1. When we cross-reference the lists of United States, China, and European Union, we identify materials such as copper, graphite, nickel, lithium, and rare earths, and Brazil is well positioned to extract all of them. Indeed, significant projects are already being implemented in Brazil in states such as Amazonas, Goiás, Pará, and Minas Gerais by companies from countries such as Australia, the United States, and Canada. The first questions we must address in this regard, in my opinion, is what we should do to avoid hindering projects already underway while at the same time creating a business environment that encourages productive investment in Brazil.

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Bill number 278, currently under consideration in the National Congress and closely monitored by the government, seeks to address What are some of these challenges? The bill authored by Congressman Zanetto and reported by Congressman Arnaldo Jardim, one of Brazil's most experienced, experienced legislators in my opinion, is structured around 3 main pillars: taxonomy, governance, and finance. Taxonomy refers to concepts such as critical and strategic minerals urban mining, which is closely related to recycling, and junior mining companies. Governance involves the management structure of the policy in an integrated manner with the productive sector, including transparent targets and indicators. Finally, financing mechanisms involve the mobilization of funds, incentives, and public policies to meet the concrete needs of the sector's development. Moreover, the creation of new financial instruments, such as we did with real estate and agribusiness sectors in our recent past. The objective is to address gaps such as collateral constraints, excessive reliance on offtake agreements, and high price volatility. As noted here. Critical minerals mining differs in important ways from large-scale mining. The applications of critical minerals are not yet fully known, which makes the behavior of the supply and demand curves quite distinct. Moreover, historically, these minerals have been byproducts of large-scale mining.

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Cobalt, for instance, was a byproduct of copper mining for a long time. In other words, the so-called loca— loca— locational rigidity of mining, that is, the extraction can only occur where reserves are identified, is addressed through a set of incentive mechanisms. Overall, I understand that this bill has 5 major strengths. First, it draws on international best practice, and this assessment was expressed by the Inter-American Development Bank during Congressman Arnaldo's mission to Washington and his meeting with President Ilhan Goldfein. Second, it does not pick winners. The goal is not to arbitrarily select a champion metal, to put it this way, or a specific segment of the value chain. From extraction to refining to support, downstream, midstream, upstream, and recycling are all activities that will have room to operate. Third, it respects Brazil's fiscal space and does not aim to replace private initiative. Fifth— sorry, fourth, it encourages competition in markets with the participation of new companies, with new mining companies. And finally, it creates a robust balance between duties and rights, reflecting what I would describe as the application of a sort of smart power to mining. As we learned from Professor Joseph Nye, hard power refers to the use of coercive force, typically military or economic, to achieve national objectives.

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This form of power contrasts with soft power, namely the mechanisms, mechanisms of persuasion such as culture and reputation that a country may use to achieve its goals. We live, however, in complex times, as Bruna put it. Instruments of hard power must be calibrated intelligently. This is what we call smart power. In this context, this bill balances incentives and obligations. It will be possible to access support mechanisms and seek tax benefits by leveraging the country's comparative advantages. Such as its clean energy metrics. However, it will also be necessary to comply with obligations such as— obligations and conditionalities such as supporting workforce development, adding value within Brazil, and ensuring that communities share in the benefits generated by mining activities. Thank you.

[00:37:07.08] - Monica de Bolle

Thank you, Pedro, for your remarks and for underscoring the efforts that are currently ongoing in Brazil to think about this issue and to position the country and importantly to design the rules, the ground rules, the regulations, the frameworks that will work better in order for the country to be able to realize the potential that it has that all of you have touched upon. Before we move to— if we have any— we had a question from the audience, but it's disappeared from my screen. So until it appears again, I'm going to just jump right in and ask of you my own question, which is to do precisely with this different strategic positioning, which obviously reflects and reverberates on economic implications. Of the US vis-à-vis China. So as Cullen has highlighted on many occasions, including in this, in this, in this discussion, in this panel, the US has

changed tack, and the US is now more focused on national security and other types of other similar types of strategic interests when it comes to critical minerals and when it comes to its policies for creating resilience in these in these supply chains. It has shifted radically from, you know, the climate change and energy adaptation and, you know, transformational strategies, whereas China still does seem to be mainly focused on the energy aspect of things, although obviously China also has other interests in mind.

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So my question to all of you, or the main question to all of you, because some of you have already touched on how critical minerals are not a single mineral, not a single list. Different countries in different regions have different perspectives on what minerals are actually critical, what minerals are actually strategic. So let me move away from that and just ask you specifically, how does this different take on critical minerals by the US and China, how do they reflect on the incentives to provide investments not only for extraction, which we all know is not the main choke point in the supply chains, but on the ones that all of you highlighted, which is really processing and refining. Are these incentives changed in any way by the sort of approach that's taken? And what is the possibility— Cullen, you touched on this— what is the potential that, you know, the US and/or China would be willing to be partners in the processing and refining capabilities to be created in a country like Brazil?

[00:39:58.25] - Cullen S. Hendrix

Thank you. Sure. I mean, I can, I can jump in with, with an initial observation on that, and that is that China manifestly has been willing to play ball on this, especially when addressing middle powers that have significant kind of size and geopolitical heft, even if it's not necessarily militarily speaking. And I'm speaking specifically about Indonesia. So Indonesia sought to create more value added in its nickel sector by instituting an export ban in 2020. And many of the Chinese firms that were processing Indonesian nickel in China relocated their processing facilities to Indonesia to move in behind that kind of export ban wall. And then move more of the processing to the areas in which extraction is occurring. Now, that's come with a large environmental footprint, but it is indicative of the fact that China has been willing to negotiate and also kind of meet the ore producers where they are, conditional on them, you know, being a large country with a large home market and a diversified export structure. But all of those kind of structural characteristics I just described minus, say, proximity to the home market in China, Brazil has in spades as well.

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And so I think that this really kind of highlights the point that Bruna was making earlier, that when we talk about Brazil as a mineral exporter, it's very different from the way that we might talk about, I don't know, Guinea as a bauxite exporter, or just a small developing country that is very concentrated and has limited potential to move up the value chain. Brazil has a lot of this kind of potential. So I think that it's going to be hard for— well, it is in a good position to extract these kind of concessions. Now, whether or not it's willing to use an export ban to do that remains to be seen. But I think that there are probably much more, I would say, diplomatically soft-edged ways in which that might be achieved.

[00:42:03.11] - Monica de Bolle

I'll stop there. Thanks, Colin. Bruna or Pedro, if you want to jump in, just please do.

[00:42:12.02] - Bruna Santos

Yeah, so on the classification thing, I think the— obviously this— the switch, like the turn to count minerals that are essential to defense, AI, industrial resilience, I think creates creates opportunities in terms of the incentives for Brazil. And I think the most important one is on the financing aspect of it. We see— I think if you— if the US is serious about resilience in those aspects, I think the focus obviously will go for investing in countries like Brazil, which is close to the United States. And democratic, has rule of law and refining separation and so and so forth, because that's where much of the value is. So I think one step, one opportunity that it opens is to move from isolated projects, as it has been doing, the US has been doing through the DFC, the Development Finance Corporation, to a more systematic financing pipeline between our institutions our— not only the DFC, but then involving the BNDES, and I'd say that, uh, or other banks, you know, to make those projects less exposed to market volatility. Um, but also, uh, one thing I think Brazil should pursue, uh, financing not only through DFC, but maybe in a wider mix of partners with countries like Japan, like Canada, Australia, European actors.

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And I think there space for, for that to create the, this, this poll, uh, this mini-lateralism of, um, looking towards the, the critical minerals. One thing that I note is, um, I think there are swings, right? I don't think the, the market for electric vehicles is gonna, is gonna go anywhere. I think it's still increasing in Brazil, and it The American competitors are worried about it as they cannot compete with the Chinese electric cars. So I think that demand is also not necessarily going anywhere, even though it may be treated as a, as a hype, but it's not. So we know that this might come back. It's only a matter about, as I said before, how you manage the risk, the political risk, of the mood swings in the United States.

[00:44:52.01] - Cullen S. Hendrix

Thank you. I just want to come back in with one point. So I mean, the degree to which green transitions have stopped in the United States, I think, is a little bit overblown. I mean, if you look at last year in terms of new installs of power generation, 90% of it was on the renewable side. And so there has been a de-emphasis on electric vehicles for certain, and there are headwinds for a lot of these renewable projects. But even in in the United States, if you look below the fold on the newspaper, you will find that there is continued rollout and continued demand for the transition minerals side of the equation.

[00:45:31.08] - Monica de Bolle

Thank you. Pedro, unless you want to remark on this particular question, and if you do, please go ahead, but we do have a question from the audience which I was planning on directing to you. So in case you want to jump in, please do. Otherwise, I'm going to move on to this question.

[00:45:49.05] - Pedro Guerra

Let's move on. Okay.

[00:45:51.22] - Monica de Bolle

So the question is, how can Brazil resist the pressure to become a mere exporter of critical minerals as commodities, i.e., without the local processing and refining? This seems to be a concern from the IDB for the whole region, and as it is offering financing in this regard. And then, um, this person also is asking, also, can the U.S. be allowed to bypass the federal government and sign deals with, with states like Minas Gerais, or in the case of Goiás, which was really what happened with, with the governor of Goiás?

[00:46:29.12] - Bruna Santos

So, Pedro, over to you.

[00:46:31.27] - Pedro Guerra

Well, first of all, just to wrap up the discussion a little bit, I think that the main point, and I always highlight that after start studying the mining sector, is that time is key. So time is the real scarce resource. When you look to the abundance, when you look to the variety of resource that we

have, not only in Brazil not only in Brazil but in the whole world, what you have to take into account is actually how— if it's worth extracting and producing what is being discussed. So we have gigantic reserves, for instance, of some elements in the Amazon region. Well, when you take into account the importance of the mineral, okay, it's absolutely necessary for Brazilian purpose, for instance, for our agribusiness. But when you, you make your, your account, you don't have a good, a good result. You don't have infrastructure, you don't have access to water, you don't have access to energy, and so forth. So, uh, in Brazil's case, I, I think that we have, uh, domestically two great inputs. First is the commitment to decarbonization, and we have many regulations and many laws approved in the last years to incentivize that.

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The last one I would emphasize is the production of wind power offshore, which will require, require for sure the production of of equipment that are basically based on this critical materials, based on lithium, on copper, and so far. Secondly, the commitment of the government to create some degree of digital sovereignty. When you talk about digital sovereignty, we're basically talking about digital infrastructure And when you talk about digital infrastructure, we are talking basically on data centers. After we have some trouble in approving the law regarding this topic, we start— we restarted actually to discuss two new bills that are in the Congress, and we expect to approve them this year. So I think that these are the two main driving forces, and I completely agree with Bruna when she says that we need more predictability. We need a pipeline that gives market signals to understand well what is being more incentivized by official agencies. I agree at the same time that project-oriented is a smarter strategy. So you have to calibrate these market signals with the necessity to not disconsider what, what could be very worth but ignored at a starting point. So in Brazil, we, we have witnessed Many projects in Minas Gerais in the production of rare earth elements, in Amazonas more recently, and in Goiás.

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I think that the subnational government's involvement with this agenda is not a problem. Actually, we need the regional and more than this local government's involvement, because many of the licenses, many of the approvals involve other spheres of government. What we cannot follow is the idea that, well, each state of the country will have its own way to dealing with a wealth that is by constitutional by the text of the Constitution, a federal competence, a federal jurisdiction. But I believe that this cooperation, this partnership with other levels of government are absolutely necessary and welcome. Thank you.

[00:51:09.08] - Monica de Bolle

Thank you, Pedro. We have another question from the audience, a very good one. Given that some US-backed investments— and this is from Jonathan Zanamri— given that some US-backed backed investments in the critical minerals space are beginning to raise concerns around counterparties' ability to execute and deliver on their commitments. What mechanisms should be in place to ensure stronger partner selection, accountability, and performance reliability in long-term supply chain partnerships with countries like Brazil? Anyone?

[00:51:44.15] - Pedro Guerra

Well, Let me just start with a point that I had the privilege to witness this sort of reflection when we started to set up the industrial policy of this government. I think that the starting point is to take profit of the installed capacities, what already exists in the country and what could what could be improved with the entrance of these new partners. So we have fantastic companies in the country, both domestic and international companies. Some of them are inclusive— inclusively entering into agreement to produce new equipments, either the BaaS, which is that big battery use it for safeguarding the electrical grid, either in the production of solar panels or wind power equipment. So I think that taking profit of the installed capacities is key. Secondly, I think that the government also have an important role to play. Both in terms of monitoring and transparency, but also creating the, the financial incentives through official agencies, through special spaces. And I have in my mind, for instance, the creation of technical parks, technological parks specialized in some specific equipments and products. I always quote the experience of France in its industrial policy, creating the École de la Batterie, which is a sort of think tank focused in studying batteries and trying to, to, to, uh, capacitate labor force for this specific market.

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And finally, specific processing zones which could be devoted either to export or to internal production.

[00:54:05.27] - Monica de Bolle

Thank you, Pedro. Um, we're about at time, so Bruna and Cullen, if you have anything to add or anything else you want to say, now is the time before we wrap.

[00:54:21.01] - Cullen S. Hendrix

Helen, over to you too. Sure. I mean, that's a really great question. And ultimately, a lot of the challenges here come down to project financing. And I think that one of the, you know, when you talk about partner reliability, because there's so much policy interest in this space, that's

basically running a flag up the flagpole that says the US government defense industrial base is open for business. And this is attractive. This is like blood in the water and it's attracting sharks. And many of them are in the kind of the startup stage. I think the problem is, is that for startup culture, the returns that are going to come from being able to provide rock-solid, mission-critical, national security application-specific critical mineral supply chains are going to be very low because the risk associated with them is going to have to be very low. Now, in China's case, it's able to subsidize those kind of costs across the economy so that the Chinese heavy rare earth industry for instance, is very, very heavily subsidized. The Western approach, or the US kind of led approach, seems to presume that you can induce private capital markets to move into these kind of spaces.

[00:55:31.07]

Private capital markets, I mean, even with all of the headwinds coming from the war in Iran, the US equities are still performing very, very well. They're down currently, but I mean, it's still a strong investment environment. And in that environment, drawing capital away from other sectors in which they could invest to invest in what essentially, if it's operating operating correctly, operates like a regulated public utility, is going to eventually weed out a lot of these kind of firms. And I think it's going to wind up revolving around many of the more established players, either through this winnowing process or through mergers and acquisitions.

[00:56:10.08] - Monica de Bolle

Thanks, Collin. Bruna, any final thoughts?

[00:56:13.14] - Bruna Santos

I think there are ways to manage the risk, but the risk needs to be taken if this is so critical, as they say. I think there are, there are players that can join in this. Um, I think the national banks are important partners, and I think, um, well, I think that— I think, I think if we— they are really clearly competing with China. With one of the advantages that China has is to shut down everything that's not working, right? You take the risk, but then you have the ability to shut down what's not, what's not delivering. So I think if If you want to— we want to compete on the same grounds, the West with the East, we have to start taking the— making sure we have mechanisms to take the risks.

[00:56:59.08] - Monica de Bolle

Well, thank you to all of you. I think this was a very rich conversation. Unfortunately, we are out of time. I would spend another hour here talking with you about this because it's fascinating to

me, and it was fascinating to hear you. So thank you, Bruna. Colin, and thank you very much, Pedro, for taking the time off your very busy agenda to talk to us today. And thank you to our audience for the great questions and the great engagement. So with that, thank you. Thank you.