

Can We Get Clean Energy Without Dirty Mines?

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Greg Dalton: This is Climate One. I'm Greg Dalton. The transition to clean energy requires mining raw materials.

Morgan Bazilian: Whether you're looking at copper, nickel, platinum, palladium, gold, silver, whatever are all part of renewable energy technology. So, we need them all. (:08)

Greg Dalton: What are the mining impacts of renewable energy?

Payal Sampat: One of our biggest concerns has been on not only the scaling up, but the scaling up without the adequate environmental and social human and rights safeguards. (:14)

Greg Dalton: And whose responsibility is it to solve these problems?

Maureen Penjueli: I think this is a real challenge and a problem for the first world. It is very clear that we cannot continue to dig our way out and into growth. We cannot continue to consume. (:13)

Greg Dalton: Can We Get Clean Energy Without Dirty Mines? Up next on Climate One.

Greg Dalton: I'm Greg Dalton. In 2021, global sales of EVs more than doubled. This year automakers are projected to make another huge gain, driven by soaring gas prices and more models with increased range. Getting away from gas-powered vehicles is essential to transition to a clean energy economy. But it's not all good news. Russia's invasion of Ukraine has disrupted global supply chains, and roiled markets for nickel and other commodities used for renewables and batteries. And the supply chain isn't the only concern. The very practice of mining and processing raw materials is a dirty business. How can the world get the materials it needs to mitigate the climate crisis without creating other ecological disasters in the process?

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Senators Joe Manchin and Lisa Murkowski recently asked President Biden to invoke the Defense Production Act or DPA to accelerate domestic mining of metals needed to make electric vehicle batteries: graphite, manganese, cobalt, nickel and lithium. On March 31st, President Biden did just that with a Presidential Determination.

I asked Morgan Bazilian, Director of the Payne Institute for Public Policy and Professor at the Colorado School of Mines, what he thought of that bipartisan DPA request.

PROGRAM PART 1

Morgan Bazilian: It's not an unexpected request. Recall that it's a tool that was started around the Korean War with President Truman and then used again in the Cold War and it primarily had been used with a focus on metals and Korea for manufacturing for steel and the Cold War after I believe aluminum and some other metal. So, it's not out of bounds. I think the requests make sense, Murkowski especially and Manchin when they were chairs of the Senate Energy Committee took a great deal of their time and policy attention on the aspects of critical minerals.

Greg Dalton: As someone who rarely sees Republican and Democratic agreement on acceleration of the energy transition. I was just on the surface of it pleased to see a Republican and a Democrat influential senators say we got to go faster on EV batteries. Sen. Ron Wyden of Oregon, which may hold the nation's largest lithium deposit, introduced a bill that would award money to the companies constructing and expanding or modernizing critical mineral facilities. California Governor Gavin Newsom has a special economic development zone he's calling you know Lithium Valley. What do you think about these government-sponsored moves into mining to accelerate?

Morgan Bazilian: Yeah, so, it's exciting. Look, the area of critical minerals has waxed and waned in political attention over many decades. So, it is not a new topic for the US politicians to dive into. Under the Trump administration when Murkowski and Manchin co-chaired the Senate Energy Committee. It was widely considered one of the only well-functioning bipartisan committees in the entire Congress.

Greg Dalton: And then Russia's war in Ukraine has increased calls here for US energy independence. You've argued that energy independence is not the right goal. Why not?

Morgan Bazilian: It all relates to what I think is the right goal which is energy security. Energy security is a rather complex idea and is not well defined. While energy independence I've called a nonsense on many occasions because I don't believe it's an actual goal that we should be aspiring to in a deeply interconnected world, but what it is, is very politically attractive and it always has been. So, it has the same sort of political attraction that other rhetoric around America first around jobs, jobs, jobs, and the kind of sort of domestic focus that voters like to see. But when we look at the energy markets of today and especially in light of all of the impacts that a war by Russia and Ukraine can have on energy markets, we see the tentacles and the connections of energy all over the world in supply chains and in markets and in governance. And so, to notionally aspire that the United States would be somehow independent of this connected system is the wrong goal. And the right goal there is some definition of energy security.

Greg Dalton: How worried are you that by reducing fossil fuel consumption and increasing renewable energy will just be trading dependence on one set of resources for another?

Morgan Bazilian: Yes. So, as usual in these things it's more complicated than that. And I've done a

lot of work on what we call the geopolitics of energy transitions. I'm using energy transition there in the plural because there are several different ongoing transitions that are happening at different scales at different pace at different geographies. And so, we're not sort of trading one for the other. What we're highlighting here is about critical minerals at one aspect of those energy transitions. And what we see is that the energy systems of tomorrow and indeed, the energy systems of today are more mineral and metal intensive than in the past. So, we can guess that the systems of the future will keep going in that direction. Now, that has been highlighted mostly for renewable energy technologies like solar photovoltaics; those are solar panels. They have all kinds of different metals and minerals in them from silver to steel to aluminum to more exotic things like cadmium and tellurium to wind turbines and LED lighting. And especially electric vehicles have been highlighted because of their dramatic demand increases in their batteries. And those battery metals and minerals, especially on the cathode side which are things like lithium and nickel and manganese are front and center in commodity markets and in the imagination of politicians right now. And those are the same ones that we're talking about adding to the Defense Production Act.

Greg Dalton: Right. you're saying that there's a lot of minerals that goes into wind turbines and solar panels, etc. they come from all over the world, which kind of challenges the notion that there'll be fewer trade tensions or we won't be less we'll be less dependent in a renewable world.

Morgan Bazilian: That's right. And that's why you know I've said already today with you that I believe the world is deeply interconnected and becoming more so not less so.

Greg Dalton: Russia is the third largest producer of nickel. Ukraine has significant lithium deposits. How have the war in Ukraine reshaped thinking on where we should source the raw materials needed for a clean energy economy nickel and lithium are both important.

Morgan Bazilian: Yeah, I think the war in Ukraine has highlighted two especially. One, is nickel as you say, and the other is steel. But the nickel market has illuminated in the past couple weeks some of the issues with these critical minerals. And as the third largest exporter of nickel Russia is obviously an important player. And what we saw two weeks ago was that the London Metals Exchange where a lot of these metals are traded ceased trading of nickel. So, they had to stop the trading of nickel because the price went so high. That trading stoppage took place over some time. In other words, it did not immediately come back. And so, what that highlights, now it's not only because of the Russian invasion and issues of price on Russian nickel but also because of some short selling squeeze that happened in the market. But what highlights is that these markets are often very thin. Let's compare them to a global oil market which is massive and liquid and has good price transparency and pretty good governance, where you and I could go on our phones right now and find the price in any of the three major traded zones in 10 seconds. That's not the same for almost any other commodity. And when we see that the governance structures and the how much we can trust the price discovery are also in question, then we have a lot of work to do as these markets become bigger and more important to fueling the economy.

Greg Dalton: Sounds like yeah, the clean energy economy is dependent on using minerals that have yeah thin markets with not a lot of buyers and sellers and with some uncertainty about what's really going on and who the buyers and sellers are and what the price is. as we're talking about these minerals and where they come from. I can't get the image out of my head of children in the Congo, hauling sacks of cobalt on their backs. I'm haunted by that. The New York Times had a series around the world on climate. Shouldn't we encourage mining in the US, Canada, Australia, where at least we have relatively decent labor and environmental regulations?

Morgan Bazilian: Yeah, that's a terrific question and those images are indeed haunting. Let's break that down a little bit. First, it came to the minds of people in the United States, largely because of

these fairly recent reporting by the New York Times of course, the issue has been going on for decades. And so, yes, it's deeply disturbing the governance and the abuses that have been happening in all extractive industries, and indeed all industries, including trade have been difficult for not for decades but for centuries of course. So, this is not a new problem. One of the complexities and the issues especially of the DRC, Democratic Republic of the Congo. It is a country in sub-Saharan Africa it has enormous resource wealth and very poor governance. That's a nice way of saying that there's an enormous amount of corruption and there's an enormous amount of poverty. And so, while the child labor issues actually relatively small in the DRC in the cobalt industry it's obviously deeply disturbing issue. That said, I can tell you that none of the parents of those children want them mining. So, it is not some sort of choice to say well, I'm gonna put my child to work for no good reason. That is essentially, the DRC is close to being a failed state; if those children were not working and bringing in income and that income from cobalt was not available, they could very well, likely be starving to death. So, along the supply chains you brought up the DRC and cobalt. We also have other complex issues of governance and the one that's been on the table and in the US House of Representatives and in legislation is the reeducation camps of the Uighurs in China in the area of Xinjiang where you have lots of the world's polysilicon as well as photovoltaic module.

Greg Dalton: They're not reeducation centers, I mean they're just like prison labor, right?

Morgan Bazilian: Yeah. I'm just using the sort of accepted diplomatic terminology. So, there are these difficult supply chains that exists that again that is not a new phenomenon and we need to address each separately and with tools that provide some access to context of the issues.

Greg Dalton: The Biden administration paused development of the twin metals mine near the Boundary Waters Canoe Area Wilderness in Minnesota. This is a prime example of the tensions between the administration desire to foster domestic mineral production and their America the Beautiful plan, which is part of the 30x30 a global movement to conserve 30% of all lands and waters by 2030. So, how do you see that tension resolving with wanting to have more domestic production, and also wanting to set aside more ecosystems that can capture carbon and other benefits?

Morgan Bazilian: Yeah, right. So, these tensions and trade-offs exist and there are sometimes where they're often difficult. And what I think is that and response to your last question as well moving to why shouldn't we just produce these things in the United States or Canada or Australia where we know that the environmental and social governance regulations are better. Well, to an extent we can move that way but what you see when you move that way is that you have different tensions and those tend to be often under the banner of social license to operate. What that means is that how these projects especially extractives projects, but even things like putting up wind turbines in rural communities have had enormous pushback by communities. And each community has a different set of values and societal pressures and so each project goes through the same processes anew; essentially there are principles and there are ways to engage that are better. One of the most important I think at the higher-level is to make the trade-offs intentions explicit.

Greg Dalton: Acknowledge what we're doing rather, because sometimes bringing things mining onshore means often people are concerned that putting it on indigenous lands or putting it in disadvantaged communities with less power and that's often done and it's not explicit. People know it's happening.

Morgan Bazilian: That's exactly right. So, as in most things the most difficult implications and impacts of projects and trade and the rest fall on the poor. And that's not just the poor in the United States of course it's the poor all over the world. So, the mine you mentioned is right near the Boundary Waters Canoe Area Wilderness in Minnesota was look for at least for copper mining. The

mining would've provided domestic source of minerals absolutely crucial for decarbonizing the economy. Copper is front and center on the metals towards electrification. If you have any motor any transmission line electricity it has copper in it, and the Biden administration canceled those two mining leases which could be seen as a victory for conservation because they propose a 20-year moratorium etc. But there's always these complex trade-offs and the minerals in those mines would've been provided increasingly vital materials to shift to renewable energy and decarbonize the economy. And it would've bolstered the administration's own goals in the America Competes Act and at you know whether you're looking at copper, nickel, platinum, palladium, gold, silver, whatever are all part of renewable energy technology. So, we need them all. And so, what I mean by making the trade-offs explicit is that the difficulties in that sort of both sides' situation need to be laid out. Yes, it would've had a lot of implications on biodiversity and ecology and other things. But these pressures and these trade-offs are only increasing, not decreasing.

Greg Dalton: According to the International Energy Agency getting to net zero carbon emissions by 2050 will require six times more mineral inputs than today. And recycling only helps once all those extra tons of minerals are extracted, processed and implemented. So, seems like we're on this path of doing a bunch of harm, and then having to clean it up and recycle it later. Will mining always be inherently damaging to landscapes and ecosystems?

Morgan Bazilian: Well, to a certain extent the process of extracting these things from the earth is damaging to things nearby. That said, there are an enormous amount of technical and sustainability efforts in the mining companies in the mining industry and the education we provide at the Colorado School of Mines that makes mining have much less of an impact on surrounding communities as well as biodiversity, as well as things like water quality. Where, you know, now you can go in and make sure that those impacts are really very small. Now, of course when you use those technologies and systems and processes that are established now and understood, sometimes, they can cost more money than doing it the "old-fashioned way." And so, that has implications for investors but yes it can be done sustainably in most cases. In fact, a lot of the issues are not gonna be coming from the impacts of mining itself, but from the processing of these ores into chemicals. And that is a key process where China absolutely dominates and where you in the United States are gonna have a very difficult time not only getting the permits but getting that sort of social license to operate from communities to have these processing plants nearby.

Greg Dalton: Yeah, there's even a case to be made that those things are to be closer to the people who are consuming those products so we understand the implications and they can't be put in some other country where we're distanced from it so we don't have to think about it. I'd like to ask you know how fast is technology, particularly battery chemistry changing. Are we overly worried about sourcing lithium and cobalt when in a few years, there'll be other battery technologies out there that are less invasive and destructive?

Morgan Bazilian: Yeah, look, there is little question that the technology development will happen, it will happen with nonlinearity and disruption. So, it's impossible to sort of say exactly; there's already quite a lot of chemistries that are looking to minimize especially cobalt in that cathode process. Will the lithium-ion structure in general stay the dominant paradigm? Who knows. But we can say that if you've ever been to a research university things don't move as quickly as the public imagination. Fundamental battery chemistries may look fairly similar for the next few decades. And so, I don't think it's a matter of so much saying well, we will just engineer out these problematic minerals if anything, they'll shift to something else. And at the demand levels we're looking at in the short term it looks like we're staying in the roughly in the paradigm we're in. And therefore, making the kind of trade-offs explicit as you just said, is one way to go. But look, I'm optimistic that we will navigate aspects of this elegantly, and aspects of this not so elegantly. And so, looking forward to chatting with you again. Thank you for having me on your program.

Greg Dalton: Thank you. Morgan Bazilian, thanks for coming on Climate One.

Greg Dalton: You're listening to a Climate One conversation about mining materials for a clean energy economy. Our podcasts typically contain extra content beyond what's heard on the radio. If you missed a previous episode, or want to hear more of Climate One's empowering conversations, subscribe to our podcast wherever you get your pods. Coming up, as we move to electrify everything, how do we avoid trading one extractive economy for another?

Payal Sampat: We're not gonna be able to build a truly robust and enduring clean energy future by replicating the mistakes of the fossil fuel economy that we're seeking to replace. (:09)

Greg Dalton: That's up next, when Climate One continues.

Greg Dalton: This is Climate One. I'm Greg Dalton

Mining for minerals - including materials needed to power clean technology - is anything but clean. Not only is mining destructive, but it's often done in poorer countries with less environmental and labor protections.

I discussed this with Payal Sampat [s-uhm-puh-t], Mining Program Director at Earthworks, an environmental organization.

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Payal Sampat: Even in the United States metals mining is the leading industrial polluter. And mining uses 10% of the world's fossil fuel energy sources, contributes 10% of energy-related greenhouse gasses, This is a sector with a significant environmental footprint and there's also been disproportionate harm that been incurred by indigenous peoples communities at the frontlines of this extraction. So, one of our biggest concerns has been on not only the scaling up, but the scaling up without the adequate environmental and social human and rights safeguards. This doesn't have to be set in stone. Our transition to a clean energy economy shouldn't be essentially replacing one form of extraction with another replacing dirty oils and fossil fuels with dirty mining. We're not gonna be able to build a truly robust and enduring clean energy future by replicating the mistakes of the fossil fuel economy that we're seeking to replace.

Greg Dalton: So, you're saying continue mining because we need these minerals for this transition. Just do it in a more clean and responsible way? You're not saying stop mining, don't dig stuff out of the ground.

Payal Sampat: How can we obtain the minerals that we need for these battery technologies and the renewable energy technologies without having to dig enormous holes in the ground? Without having the destructive activity that seems to proceed these clean energy technologies. And in order to answer that question and in order to really come to grips with some of these projections that we've been seeing for battery minerals such as cobalt, nickel, lithium. We commissioned some research by a team of researchers at the University of Technology in Sydney. And this is a group of folks who have come up with scenarios for 100% renewable planet by 2050. And those researchers found that recycling electric vehicle batteries specifically can reduce the need for new mining by between 25 and 55% depending on the mineral by 2040. So, this is a pretty short timeframe and specifically looking at recycling electric vehicle batteries not even looking at the various sources for nickel and

copper and some of these other minerals. They're eminently recyclable between 90 to 100% depending on the minerals. So, we need to be thinking not only about mining but about alternative sources for these minerals. Not only alternative sources for these minerals, but whether we need those minerals and who is benefiting from them in the long-term. So, you know, should we be investing in private EVs, a third Tesla in the garage? Should we be, you know, for some people, or do we also have the opportunity to enhance equity and access to the benefits of these minerals for more people by building low carbon public transit options for example. So, there's sort of bigger questions than just which mine am I looking at in order to get this specific amount of cobalt or lithium.

Greg Dalton: So, I understand that there's a lot of potential for recycling these batteries rather than new mining. And the World Bank does say and report that recycling or reuse will have a role in meeting future mineral demand. But primary mineral demand from mining will still be needed. Which raises the question where should mining take place where it's most economical, which probably means less developed countries or here in the US where we generally have better labor and environmental regulations in place?

Payal Sampat: I would like to propose the question should be, how should mining take place, what are the safeguards that are needed to protect communities and to protect ecosystems from the kind of environmental harm that mining is inflicting on people on the planet. even in the United States where supposedly laws are better. First of all, we have a mining law that dates back to 1872. And as a result of that mining law and the lack of environmental safeguards that 150-year-old law has, you know, metals mining is the leading industrial polluter in this country. And that is by the environmental protection agency's reports from mining companies directly. And so, this is an industry that have a significant footprint and that needs to be reined in and dramatically reduced no matter where it's occurring.

Greg Dalton: What specifically would you propose changes to that 1872 mining law. What would be updated?

Payal Sampat: I mean the thing to keep in mind is that the General Mining Law of 1872, which was signed 150 years ago by Ulysses S. Grant was really written as a settler colonialist law. It's not written in any way to deal with the kind of mining that we see today. So, there's really a myth of more responsible mining in the United States. Hard rock miners pay zero royalty on the wealth that's extracted from public lands. So, mining companies have extracted \$300 billion of minerals since 1872 without you or I or taxpayers getting a dime for that. Hard rock mining is the nation's top polluter 40% of the headwaters of Western states have been polluted by mining. And so, and also another thing to keep in mind is it's not just the 1872 mining law. There are other environmental laws that have loopholes for mining. So, mining has an exemption from the Clean Water Act for example, which allows mining companies to dump their mine wastes into natural water bodies such as lakes and streams. So, absolutely without a doubt, reforming the 1872 mining law as well as the other laws and requirements that govern mining in the US as well as parallel requirements globally are essential. And that is something that we have sort of a sense that might be might be coming. Last June, Pres. Biden signed an executive order that called for regulatory reform and he's just recently President Biden's recently published principles for mining reform. There's also been an interagency working group that was formed by the Department of Interior announced just a few weeks ago that is really gonna be looking at the myriad approaches to more responsible mineral sourcing.

Greg Dalton: What are some examples of mining that you can point to that this is the way it should be done more responsibly to help propel this clean energy transition?

Payal Sampat: Yeah, it's a complicated question really and to paraphrase, misquote, Mark Twain,

you know, "A mine is a hole in the ground built by a liar." And really if someone comes to you and says here's a perfectly benign new mining technology that will just pluck minerals out of the earth without causing any destruction, you'd probably want to think twice about the veracity of that kind of claim. But that doesn't mean that there aren't answers and there aren't ways in which to really reduce, shrink the environmental and social footprint of mining. One such example is the Initiative for Responsible Mining Assurance or IRMA. That was created by a multi-stakeholder set of actors, labor unions, NGOs, communities, mining companies and downstream buyers. And that system has a standard with 400 pages of requirements, ranging from anticorruption to how cyanide and mercury should be regulated to impact on forests and indigenous peoples and the right to free, prior and informed consent. And it really lays out a standard for more responsible mining where mining must or is already occurring.

Greg Dalton: Native Americans are resisting lithium mining on their lands. How is that playing out in this clean energy transition?

Payal Sampat: That really underscores disproportionate harm that indigenous peoples on this continent and others are facing. And this is in the US, this is in Papua New Guinea and Argentina and Chile, and even in Russia where indigenous peoples in the Arctic have been disproportionately harmed by the Nor Nickel facility mining facility and processing facility. One example is the proposed Thacker Pass mine in Nevada which is on the ancestral lands at the Fort McDermitt Paiute Shoshone people and other tribes. Another example is in Arizona where there is a proposed lithium mine on Hualapai lands. So, those are directly on the reservations of indigenous peoples. And, you know, let's not forget that the US West was on the territories of the original people of this land.

Greg Dalton: Everything in this country is essentially yeah, land that was unceded from indigenous people. Europe is ahead of the United States in the race to clean up and decarbonize its economy. It's also out front on batteries. A European proposal would establish carbon footprint rules, minimum recycled content, performance and durability criteria for EV batteries. Is Europe on the right track in your view in terms of electric mobility?

Payal Sampat: Yes, I think the European Union's battery legislation is a really good example of how and ways in which we can tilt the balance in favor of circularity and recycling and away from extraction. And it's really time for the United States to catch up with the EU and elsewhere in terms of modernizing our legislation and requirements for more responsible circular economy.

Greg Dalton: So, to sum up, if we agree that in order to address the climate crisis, we need some amount of new materials. What is the best way or at least the least bad way to get those minerals?

Payal Sampat: There's gonna be have to be a combination of circular economy, recycling and secondary sourcing which can displace up to 55% of new mining demand. And where new mining is occurring, we need far stronger regulations and laws to protect communities and the environment. One of the pillars of that should be the free, prior and informed consent of indigenous peoples which is something that's enshrined in international law but we cannot build a clean energy future on a dirty minerals supply chain.

Greg Dalton: Payal Sampat is Mining Program Director at Earthworks. Payal, thanks for sharing your insights on this transition for the new energy economy.

Payal Sampat: Thank you, Greg.

Greg Dalton: As we've mentioned, developing a domestic source of lithium will be a key part of the transition to electric vehicles. But a planned lithium mining project in Nevada has touched off a

controversy over its negative impact on the local habitat, adjacent communities, and cultural sites that native tribes consider sacred. As Aman Ahzar reports, a coalition of environmental groups, local activists, and indigenous tribes is pushing back against the multi-billion dollar project.

Aman Ahzar: At the base of Nevada's Montana mountains, underneath acres of old-growth sagebrush, lies one of the world's largest lithium deposits. Lithium Americas, the mining company, plans to develop this site into an open-pit mine to extract an estimated 66,000 tons of lithium a year—a key element for our renewable energy transition. But the plan to mine the area known as Thacker Pass has met stiff resistance from activists, tribes, ranchers and residents who see the lithium extraction as a new gold rush.

Max Wilbert: The farmers and ranchers are really concerned about water pollution, air pollution, and hundreds of semi-trucks on these rural quiet roads going through their communities. Uh, the native communities are very concerned about harm to sacred sites.

Aman Ahzar: That's Max Wilbert—an environmental activist who's leading the campaign Protect Thacker Pass.

Max Wilbert: It's an incredibly beautiful place. It's truly a wild corner of the country. And these are the types of places that are increasingly threatened by with the mining and other types of extraction, as well as green energy.

Aman Ahzar: The open pit mine will be almost 400 feet deep, more than two miles long and half a mile wide. The company anticipates the mining activity will last for nearly 50 years. Its annual carbon dioxide emissions will equal that of a small city. And it's expected to consume close to two billion gallons of water annually in a region experiencing extreme drought. After the mining permit was approved in January 2021, four environmental groups filed a lawsuit, saying the mining operation imperils precious habitat for species including pronghorn antelope, golden eagles and migratory birds.

John Hadder: Thacker Pass project was one of the most poorly drafted environmental impact statements that I've seen. The process was rushed through pretty quickly.

Aman Ahzar: John Hadder is director of the Reno-based Great Basin Resource Watch, which is a plaintiff in the lawsuit, along with three other regional environmental nonprofits. He says the Bureau of Land Management fast tracked the environmental impact study under a Trump administration order, leaving many questions unanswered.

John Hadder: It allows water pollution at the site. It affects wildlife, especially sensitive species, like sage grouse and migratory species, the eagle. There's also cultural values to the site, which are not fully explored in the EIS as well. So, we challenged many aspects of the project. There is a lot of lack of discussion on what are the effects of the mine and how are they going to be mitigated.

Aman Ahzar: Hadder said the mining activity will affect nearby communities and pollute groundwater for a very long time because of the toxic waste from lithium processing stored on site indefinitely. Lithium Americas says all processed water will be recycled for on-site use, which would also help cut down on the use of groundwater. The company also says it established a fund in 2017 to develop revegetation technologies to reclaim the impacted land. For Hadder, an antiquated law that considers mining the highest and best use of the land is also part of the problem that needs urgent fixing.

John Hadder: The 1872 mining law, just the number 1872 should be striking. That's you know,

we're talking about almost 150 years ago now. 1860s, 1870s was a very aggressive period of extraction. If there was a community that lived there, like say it was an indigenous community, they just basically push them off the land and say, Well, I have a claim here because I found gold.

Aman Ahzar: Indigenous tribes from the area have also joined in the legal fight to stop the mining from going forward, arguing it would disturb and desecrate the cultural and prayer sites that include ancestral remains. Michon Eben is a member of the Reno-Sparks Indian Colony.

Michon Eben: When there was a gold and silver rush, it annihilated and hurt our ancestors. And now that if we're going to have this new lithium rush, we need to do this appropriately and right and Native American people need to be at the table, and to understand that we have a role to play in the decision making when it comes to our traditional cultural properties.

Aman Ahzar: She says the U.S. government did not make an effort to meaningfully engage and consult the tribal governments, and rushed the project at a time when native tribes were hit hard by Covid.

Michon Eben: We joined the litigation so that we can protect this area, we can protect the sacred, we can protect our medicines, our water, our foods, and the beautiful species, all the species out there.

Aman Ahzar: Electric vehicles are expected to make up 40 to 50 percent of all auto sales in the United States by 2030, and the Biden administration has called the investment in EVs a "race for the future." But activist Max Wilbert says green energy transition will not be successful without reining in consumer culture and the extractive industries that prey on poor but resource-rich communities.

Max Wilbert: We're not going to buy our way out of this crisis. And electric cars aren't a real solution. We need to stop consuming in order to solve this crisis that we're facing. Because it's not just global warming. There's also the biodiversity collapse, the oceanic dead zones, the plastics in the ocean, the chemical pollution, a huge slew of issues all coming together.

Aman Ahzar: As the courts weigh the case, the Protect Thacker Pass campaign and People of the Red Mountain tribe are calling on Interior Secretary Deb Haaland to intervene and stop the mining project.

Max Wilbert: We're not going to give up. And ultimately that's because we love this place. We love this land and we believe that it deserves integrity. It deserves protection.

Aman Ahzar: Lithium Americas is expected to start working at the mining site within the coming months. Environmental activists and native tribes are hoping the court will decide the case before that, and hopefully, rule in favor of preserving Thacker Pass. For Climate One in Washington D.C., this is Aman Azhar.

Greg Dalton: This is Climate One. Coming up, how are equity issues being addressed in the extraction of metals and minerals?

Maureen Penjueli: The challenge for the first world is what is it that you are willing to give up in terms of comfort as opposed to how do we maintain our systems ecological systems to ensure they continue to function. (:20)

Greg Dalton: That's up next, when Climate One continues.

Greg Dalton: This is Climate One. I'm Greg Dalton. We're talking about mining raw materials for a clean energy future.

Deep in the Pacific Ocean, an area called the Clarion-Clipperton Zone contains a high concentration of metals, including nickel, manganese and cobalt, that theoretically makes it a preferential place to mine. A lot of this is concentrated in nodules that rest on the seafloor.

From a global perspective, going after these metals where they're most concentrated would seem to make sense because ideally it could mean less area disturbed. But Maureen Penjueli [Pen-ju-EL-e], coordinator for the Fiji-based Pacific Network on Globalisation, says that framing is problematic and overlooks the economic, environmental and social impacts of deep sea mining.

She spoke with Climate One's Ariana Brocious.

PROGRAM PART 3

Maureen Penjueli: Yes, indeed they are high-quality all of these minerals that as you've described in the Clarion-Clipperton Zone. But we know now that the scientific evidence around impacts is certainly quite evident that deep-sea mining will disturb ecosystems that have taken millions of years to develop and grow and we would destroy that and the damage would be irreversible. Those kinds of costs have not been factored in, so that you haven't internalized those costs into the economic argument around the benefits. And the global community still hasn't agreed on an effective way to share the economic wealth of the resources yet. So, I think right now in this particular point in time that statement is very simplistic and there's growing evidence that argues against the economic, environmental and certainly the social benefits of mining these deep-sea minerals.

Ariana Brocious: So, what is known about marine carbon sinks and how deep-sea mining could disrupt them?

Maureen Penjueli: The ocean is now considered a carbon pump and it operates in two ways. There's a biological pump which really looks at how the ocean sequesters carbon from the air through the food web or the food system and how it's deposited onto the seafloor. And then the second part of the carbon pump is the physical ocean circulation, the currents themselves. Warm water, cold water and the mixing of that. And so, the ocean today is considered one of the most stable carbon pumps. If you think about the way the ocean sequesters carbon from the atmosphere it absorbs about 9 billion tons of carbon dioxide from the atmosphere of which between 2 to 6 billion tons of that is then taken to the bottom of the ocean floor. So, understanding about the ocean as a carbon storage site is now improving. And we know from similar kinds of activities such as bottom trawling, scientists have demonstrated that very similar activities like deep-sea mining will disturb the ocean carbon storage function.

Ariana Brocious: Let's talk a bit more about the kind of mining that would happen when we're describing deep-sea mining. So, are there forms that are less destructive than others? For example, going after these polymetallic nodules that are not attached to the seafloor as opposed to scraping like you know mining the crust for a specific mineral or material?

Maureen Penjueli: Look, I think industry players have been very good at arguing that there will be less, one set of mining on the seafloor would be better than the other. So, I think there are three types of areas of interest which is seafloor massif sulfides, polymetallic nodules as you describe. And then ferromanganese crusts, right? So, the key thing to keep in mind is that the ocean doesn't recognize this kind of artificial boundaries that we as humans keep suggesting and implying based

on these three different kinds of systems. Indeed, we know now that polymetallic nodules, particularly in the Clarion-Clipperton Zone the science is improving in terms of this is not dead area where there's not many biodiversity doesn't thrive. That's absolutely not true. Secondly, the kinds of mining that industry players are talking about isn't exactly as they described it to be. It's very similar to open pit mining where the top layer will be removed. And so, you will disturb sediments on the seafloor that's gonna be transported up to the mothership where it will be treated and then sediments will be sent down which has toxins through the processing on this mothership. Now, depending on where these operators deposit sediments back it could be midwater range or down at the bottom of the seafloor. The damages that we're looking at is that it will destroy ecosystems. Ecosystem functions that are quite critical. So, I think it's quite nonsense to artificially try to separate these three types of mining and propose that one is better than the other.

Ariana Brocious: In that case, how does this compare to land-based mining. Is there a better alternative there?

Maureen Penjueli: Again, this is highly problematic to try to make comparisons between land-based mining and seabed mining. Again, industry players really propose that, you know, deep-sea mining is a lightertouch is certainly would be less damaging than land-based mining. But I think we need to really consider three-dimensional scale of impacts of deep-sea mining. We need to understand that in terms of a timescale which I think people really have to grasp with. Again, really emphasizing that these systems took millions of years to form. We know very little about many of the organisms and the ecosystems, the biodiversity, but we know that they are between tens of thousands to hundreds of thousands. One of the most vibrant systems in the world. Deep-sea mining will definitely destroy this within a blink of a human eye in terms of timescales, right. We know that sediment plumes can travel; they can remain suspended in water columns for longer periods of time. So, I think we need to really just stop this idea that we can compare land-based to deep-sea based mining and again argue that one is better than the other.

Ariana Brocious: So, you're out of Fiji and I'm wondering what have been the impacts of climate disruption that you've experienced in Fiji within your own lifetime?

Maureen Penjueli: Growing up in an island context. I mean one of the key observations that we've seen is really the increase in intensity and frequency of cyclones. Getting a Category 5 cyclone which is the most powerful of all cyclones a bit like hurricanes used to be very rare. And certainly, in the last five years we've seen the intensity and frequency. You can get 2 to 3 between Category 4 and 5 cyclones coming through in one season. And so, that's quite dramatic. We're seeing changes to rainfall patterns And we're seeing recovery because of intensity getting weaker. In many ways, countries are not coping because of the frequency and intensity of things like this. But I've also travel quite extensively in the Pacific to atoll nations which are less than 5 meters high. These are countries that are 10 mi.² in total landmass. The kinds of climate impact have been slow, likened to slow genocide. Saltwater incursion around freshwater has become quite critical and obviously super king tides affecting where people can live pushing more and more people into limited spaces within these atoll nations. So, you know, climate impact is quite real and obviously from the Pacific we are at the forefront of climate impacts.

Ariana Brocious: Right. As we look to a future less reliant on fossil fuels will need to be reducing greenhouse gas emissions and that will take more batteries. And therefore, a lot more materials and minerals that go into those batteries. So, how do you compare the threat to oceans and people's livelihoods from deep-sea mining to the threats posed by climate change itself?

Maureen Penjueli: I think it's an added level of threat. I think that we need to look at it that deep-sea mining could further destabilize the climate functions of the ocean. So, that is just another

element and dimension the impact that we need to consider in terms of these minerals. And I think presenting them as green or blue green minerals, if you like, necessary for you know transitioning into a cleaner more greener climate that's highly problematic. And as I've said before early in this piece that we need to be looking at the role that ocean place in terms of climate adaptation and mitigation. And we need to look at that as a response to climate change and addressing the climate crisis rather than adding to the many woes that oceans are currently facing and increasingly through this proposition of deep sea mining.

Ariana Brocious: We've seen over the last couple centuries powerful countries mining companies largely from the Global North who have a terrible track record of coming in and exploiting places, often without the involvement necessarily of the people who live there or to the benefit of those people. So, I'm curious when there are resources like this discovered and found to be valuable, do you think there are ways in which the local people can benefit without being exploited?

Maureen Penjueli: I think in many ways from the Global South they have no good news on the resource curse front. Yes, we are blessed in many ways to have these resources but they've turned out to be a curse for many of our people. A country like Papua New Guinea, which hosts and is home to the second largest copper mine of Papua the land of Papua, is host to numerous mines and mining interests on land. And we know from first-hand experience as our communities that they don't benefit. In fact, those who have benefited the elites are very few people, actually really benefit from that. And so, you can extrapolate if you like from our experiences on land to the ocean. And again, it's very clear that we do not stand to benefit from this proposition of deep-sea mining. Our communities are very clear that these minerals that sits on the ocean floor mining them would affect their own sets of livelihoods. They're heavily dependent on fish for protein to sell as part of subsistence agriculture. Tourism sectors are heavily dependent on clean, healthy oceans. And so, for us this proposition that we stand to benefit we know where benefit sits and the real value of the ocean sits and it's not in mining. It's in other sectors if you like, but definitely will not come from mining the ocean floor.

Ariana Brocious: So, if we were to take deep-sea mining completely off the table as an option here which I think is what you're advocating for. How then would we get the volume of the minerals that we need to support that you know green energy revolution that we're all talking about in order to avoid further impacts from the climate crisis.

Maureen Penjueli: I think this is a real challenge and a problem for the first world. It is very clear that we cannot continue to dig our way out and into growth. We certainly need to look at consumption, consumption patterns. We cannot continue to consume. We need to look at recycling. Certainly, technological innovations to allow a smoother transition but the challenge is for the first world is what is it that you are willing to give up in terms of comfort as opposed to how do we maintain our systems, ecological systems to ensure they continue to function. For us in the Pacific our message is really clear. Deep-sea minerals are off and should be off the table for consideration. And we need to do more work to address recycling, circular economies, to sustain lifestyles that we simply cannot sustain at this point.

Ariana Brocious: Maureen Penjueli is a coordinator with the Pacific Network on Globalization in Fiji. Maureen, thank you so much for joining us on Climate One.

Greg Dalton: On this Climate One... We've been talking about the impacts of mining raw materials for a clean energy future.

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Greg Dalton: Brad Marshland is our senior producer; our producers and audio editors are Ariana Brocious and Austin Colón. Our audio engineer is Arnav Gupta. Our team also includes Steve Fox and Tyler Reed. Our theme music was composed by George Young (and arranged by Matt Willcox). Gloria Duffy is CEO of The Commonwealth Club of California, the nonprofit and nonpartisan forum where our program originates. I'm Greg Dalton.