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Summer Playlist | Episode 4

Robert Friedland, Founder & Executive Co-Chairman, Ivanhoe Mines

We're ending the hottest week of the year with a splash of cold water! Join host David Greely for an unforgettable interview with icon of industry, Robert Friedland, examining the commodities, resource and geopolitical requirements for the energy transition.

In under an hour, we tackle the startling projections from S&P's Future of Copper report, the threat of losing touch with where things actually come from, and the staggering infrastructure prerequisites to achieve the renewable energy scale required to green the global economy.

Robert Friedland (00s):

I think we have to go from the innocence stage of like children demanding a candy bar to a much more sober and grounded view of what it takes to actually transform the way we generate electrical energy, transmit electrical energy, and utilize electrical energy in a circular economy that is truly sustainable for your kids and your grandkids and it takes intelligent, rational discussion and if you look at, you know, the American political discourse, it's like two tribes at each other's throats, and you really need to get beyond that to try to start seeing what the real situation is.

Announcer (44s):

Welcome to Smarter Markets, a weekly podcast, featuring the icons and entrepreneurs of technology, commodities and finance ranting on the inadequacies of our systems and riffing on ideas for how to solve them. Together we examine the questions are we facing a crisis of information or a crisis of trust and will building smarter markets be the antidote?

David Greely (01m 09s):

Welcome back to our Smarter Markets summer playlist, where we're sitting down with our special guests midway through this momentous year in markets to talk about where we are and where we might be, and need to be heading next it's beach reading in a podcast. I'm Dave Greeley, chief economist at Abaxx Technologies. Our guest today is Robert Friedland, Founder and Executive Co-Chairman of Ivanhoe Mines. We'll be discussing the massive amount of minerals and metals that will be needed to reach net zero and what that means for the energy transition. Hello, Robert, welcome back to Smarter Markets.

Robert Friedland (01m 41s):

It's a pleasure to be back David.

David Greely (01m 43s):

Well, it is really great to have you back and I wanted to talk with you today about what the realities of the mining industry mean for our plans, for the energy transition to a net zero economy. I was fortunate enough to hear your keynote address at the FT Global Commodity Summit earlier this year, where you made the convincing argument that we all need to take a very serious look at the massive amount of minerals and metals that are plans for an energy transition require and I was hoping for those who weren't able to hear you then, can you start us off today by explaining for our listeners what the energy transition means for the demand for minerals and metals and for copper in particular,

Robert Friedland (02m 22s):

First of all, we have to define the term of energy transition. We've built the modern world on coal and hydrocarbon, virtually everything you've touched, we've either reminded or we grew it agriculturally and the energy to do all of that came from carbon in the form of hydrocarbon and the transition means that we're going to stop burning carbon and releasing carbon dioxide and other global warming gasses like methane into the atmosphere and while only God knows for sure, we're strangely having this recording while I'm sitting in London on the hottest day ever recorded in the history of great Britain, not the hottest day on this particular day, the hottest day ever recorded period full stop. That doesn't really prove anything. Absolutely, but we've all had anecdotal experiences of a, you know, rapidly warming planet. Now, for those of us that can afford it, we can buy air conditioning.

Robert Friedland (03m 24s):

You know, we can get through it. I hear ice cream sales are up a lot in London today, but if you live in India and the monsoon fails and you don't get snowpack in Himalayas from those monsoon rains, there's a billion people that wouldn't be able to eat because they're dependent on those rivers flowing from the Himalayas and so I think it would be reasoned to say that we cannot afford to take the risk that we are actually causing anthropomorphic global warming. In other words, we are responsible if we're not responsible and it's something like solar flares or some other exogenous scientific explanation, we'd have to get into some kind of engineering to try to reflect that heat from our little spaceship you know, we're traveling around the senate and astronomically high rate of speed on a little spaceship. Our planet is primarily made of iron and silica, and we're moving really, really, really fast.

Robert Friedland (04m 30s):

We're rotating around the equator at over a thousand kilometers an hour, but we're hurdling through space at about 22,000 kilometers an hour and then our solar system is screaming through our galaxy at a couple hundred thousand kilometers per hour. The whole solar system it's only been in recent generation, that humanity looks back at the earth as a spaceship with a population of seven or 8 billion, and started thinking about the potential for human beings to be affecting the global climate and, you know, by no means, do we have a universal consensus. People argued for several hundred years, whether the earth was flat, but what happens when you get into it a day, like last night when I couldn't land in the Luton airport in England, because the runway had melted, you start thinking about, well, can we really afford to take the risk at 5 or 10 or 15 or 20 years from now We wake up with plunging, agricultural production and maybe war over the, you know, as an implication from all the disruption.

Robert Friedland (05m 38s):

So when we talk about an energy transformation, I don't think we're talking about freezing in the dark and having no energy at all. Those of us who have been to a hospital or flew in an airplane or a bus or visited mom by driving a car you know, we live in the modern world and we don't really want to condemn everybody in the developing world to never have the lifestyle of an American, but how do we get, a planet with a caring capacity of 8 billion people and maybe 9 billion to give everybody a decent human life and clearly we need a better way to do this and everything is gonna have to be rethought and this gets us to this new sort of mystical concept of the supply chain, where does stuff actually come from?

Robert Friedland (06:27):

And I think that the profound problem is that people that live in urban environments who thereby become quite divorced from mother nature, have lost touch with where things actually come from in a complex, highly industrialized, just in time integrated world economy. So, you know, we've been saying, no, Alice, a ham sandwich does not come from your refrigerator. It comes from 10 or 20 million pigs per month being slaughtered in a river of blood outside Chicago and there's a huge amount of awful in that process and so that's always like saying, you don't want to know how the sausage gets made, but it ain't pretty. So the whole world economy is a very complicated and delegated and complex thing and in recent months we've seen that Japanese restaurants can't find Sriracha sauce to make spicy tuna rolls and mothers can't get baby food and Ford motor company, can't find Silicon chips to build F-150 pickup trucks.

Robert Friedland (07m 33s):

And we're seeing these little tremors or these warning shocks in the supply chain and without talking about the supply chain, we can't talk about the energy transformation because we used to have this concept until I think 2008 of an integrated and increasingly just in time world economy, we actually got along quite well between the United States and China. For example, Bill Clinton went over there as kind of a hero in China. Everybody loved him. He placed a saxophone and you know, everything that you bought at Wal-Mart, if you took a magnified glass out, whether it was a microwave oven or a washing machine or a motorcycle it's said made in China and so we had an integrated rapidly integrating economy, all of your Apple products, for example, made in China, maybe 3 million young ladies working for Foxcon making your iPad, your iPhone. And we had this strangely integrated world economy.

Robert Friedland (08m 30s):

We, you, we were calling it just in time, just in time integrated world economy. Since 2008, the world economy has been breaking down that integration. We're getting balkanized and now it's just in case economy, I better get my stuff from my friends, just in case things, don't go, right. We're seeing the balkanization of the world economy. The Chinese are very worried about their 1.4 billion population, which I would do. If I was Chinese, I'd be worried about feeding my people, clothing, my people, giving them a better life that makes the Japanese and the Koreans nervous. They have to worry about themselves. The Europeans are constantly worried about their own benefit. The Americans are sort of on their own now with a few allies, maybe the Australians and, and so this balkanization of the world economy is very inflationary and presents really serious issues to the supply chain.

Robert Friedland (09m 35s):

At the same time, strangely that we have a global problem, which is that maybe great Britain or the United States stops burning coal or stops using oil. But if the Chinese keep doing it, the net climate benefit is lost. So, you know, it's sort of a challenge where we're all in it all or nothing and yet at the same time, we're going in the other direction when, and it really, it really sped up under the Trump administration when tariffs were put on Chinese goods, which made everything more expensive for Americans and these tariffs and this breakdown of the integrator world economies, insanely inflationary. You know, the, the US government is telling us that inflation is running at 8%, but you don't have to be a genius to realize that that's a false number. If you look at what an average American actually needs to live, which is rent and food, medical care, I'm sure when you're living at the margins, inflation is at least 30%.

Robert Friedland (10m 35s):

We've seen explosion in the prices of things we need to make real things and so the supply chain issues are very closely related to energy issues because there is implicit energy in everything we touch. There is only two categories of things we touch. As I'm looking at you, David you're wearing headphones and a microphone. You get a microphone in front of you. Well, we mind those headphones and we mind that microphone. We mind your glasses. If you had a hamburger or a ham sandwich for lunch, that we grew agriculturally, but even what we, even, what we grow agriculturally is dependent on tractors, fertilizers, which we mine and so ultimately mining is the most basic of all human endeavors and as you look, look around your house, everything is basically the product of mining. Maybe you have a wooden chair and we grew that tree, but the saw blade that cut it down and the truck that brought it to you was mine it's made out of metal.

Robert Friedland (11m 39s):

For the last 20 years a lot of capital has gone into the internet and broadband disruptive technological revolution that enables us to have an internet driven call like Zencaster and have this interview. That's all great, but the internet is not green. That's a complete illusion. There's really nothing green about it. If you have eight or 9 billion people on this planet, all wanting a broadband internet connection and all wanting to draw down on the sum total of human knowledge and the sum total of all digital content, the server farms would be so vast and chew up so much electrical energy as to be insane and don't even get me started on Bitcoin and other, you know, crypto, it's all very, very energy intensive. Most people think when they do a Google search, it's green or free, but it's not a Google search is very energy intensive.

Robert Friedland (12m 39s):

It's not much, it's like running a hundred watt bulb for about 10 or 15 seconds. Every time you do a Google search, but there are trillions of Google searches and it adds up to a huge demand on the grid of the American electrical grid is literally like 110 year old, little old lady laying in bed, waiting to die. If everybody bought a Tesla and plugged it in at 5:00 pm, the grid would just immediately die. That'd be the end of it. We'd be sitting in the dark and the power line to Paradise California. You may recall that community in Northern California that burnt down that power line was 106 years old. A lot of my friends didn't know that we have power lines in America that have been there over a hundred years, but the American electrical grid, it's literally a joke. It's been pieced together with chewing gum and bailing wire for a hundred years.

Robert Friedland (13m 36s):

It's not designed for electric cars or electrification. It just ain't. The whole thing has to be replaced that Texas went dark just because there was a little cold wave in Texas and you know, the Texas grid is not connected to the American grid and we're looking at a expenditure to replace the American grid and make it green to absorb solar or wind or grid scale energy storage is \$25 trillion investment. At least the Chinese grid by comparison to the American grid is much better, much more robust thousand KVA lines from province to province and they're thinking about incorporating wind power and solar power on a scale, we haven't even begun to contemplate. So when we talk about this mystery of electrical energy, everything about how we generate electrical energy and transmit electrical energy and utilize electrical energy has to be completely thought through again from first principles, if we are to reduce global warming gas.

Robert Friedland (14m 46s):

But as I said, it's fruitless to do it only in the United States. If everybody else doesn't do it, and you could see how monumental the miscalculations have been Angela Merkel who should have known better. She had a degree in physics, nuclear physics, she shut down all the nuclear power plants in Germany trying to be green and now the Germans are burning really low quality coal to get through the winter because they're literally financing Vladimir Putin's invasion of Ukraine. So they're really in danger of freezing in the darkness, winter in Germany, and most of Europe, we're seeing proposals that the maximum temperature that you're gonna be allowed to heat

your house in Germany this year and this number may come down is 66 degrees Fahrenheit, 19 degrees centigrade. And they're talking that down and they're gonna slow down. You know, maybe you can, speed limit might be 50, 60 kilometers an hour.

Robert Friedland (15m 51s):

Like the old days, we won't be able to drive fast and these kinds of things make people very cranky. They want somebody to blame. And the problem is that it took 30 or 40 or 50 years to dig ourselves into this hole and it'll take a very long time to change the entire way we generate electrical energy and transmitted and ain't any of that gonna happen without mining the raw materials, you need have to be mined somewhere somehow and then if we're mining in a way that makes the problem even worse, let's say we're burning an ocean of diesel to run the mining equipment. Then it's like a snake swallowing its own tail will never get to the solution and so the, the lack of under the stupidity and the lack of intelligence that comes outta a lot of people's mouths about the energy transition is ludicrous.

Robert Friedland (16m 44s):

Like only 3% of the energy generated on this planet today is solar or wind. And we're bumping up against the limits. You know, Dave, let's say, you and I are flying north. I'm flying north with my girlfriend. I'm a Canadian goose and we're heading, we're heading north and I look at it all of a sudden, it's just a big puff of feathers because we flew into a windmill. The tip velocity of those big windmills is so high. The birds don't see them and we've got a problem. You can just Google it that American, bald Eagles, which are endangered species are flying into windmills and it's against the law to kill an endangered species. So it's not that great if you have to maneuver through thousands of windmills. And you're a lot of people that are rich, that just don't like windmills around where they live because they go whoop, whoop, whoop.

Robert Friedland (17m 41s):

They make a sound, you know, so in Hawaii or parts of Montana, the locals, they don't want windmills and then, then solar panels, the energy density is so low. You've got to pay your entire state with solar panels to get five hours of electricity a day, but you need storage for that electricity for when the sun's not shining and that's what's happening in England right now, we have this heat wave, but with no wind bad combination, you know, because huge air conditioning demand and no wind. So the true scale of the energy transformation is so vast is so far beyond the limits of the average urban person's limited comprehension. They say all kinds of stuff, but they don't really know what they're talking about and the net of it is it leads to the revenge of the minors. You know, that widely castigate cast of human beings that are alleged to be the earth raps and the destroyers of the planet without those minors, both male and female, I might add, we ain't gonna have an energy transformation and we're gonna keep on setting higher and higher temperature records here in London or anywhere else.

David Greely (19m 00s):

Right and I was reading the number of reports that have been coming out. One was the international energy agency where they talk about those offshore windmills that you are speaking of and they require something like seven times, the amount of copper that a natural gas fired turbine would take for the same number of megawatts of electricity. And as we switch to electric cars and hopefully we don't all plug them into the same time because the grid won't handle it. You know, I think they take something like two and a half times the amount of copper of like conventional car much

Robert Friedland (19:33):

No more, more.

David Greely (19m 40s):

Even more.

Robert Friedland (19m 41s):

Much more the bigger the car, the more the copper, by the way.

David Greely (19m 44s)

So electric trucks will be quite a, quite.

Robert Friedland (19m 47s):

No, I'll give you the numbers. When, when I grew up a Ford Mustang had about the 35 or 40 pounds of copper, and then we invented the Toyota Prius, which was a hybrid, that's about 110 pounds of copper for a little Toyota Prius and when you get to like a big

Mercedes S class electric, all electric car, yeah. With a big battery in the 500 kilometers of range, you're talking 200 to 400 pounds of copper. You're a factor of 10, 10 times more copper per car. And then that's just to drive it. That's not for the charging because you need a charger, right and you go to get the power. You, you don't have little, you don't have little wires like you do to plug in your cell phone. You got one inch, two inch thick copper cables to move those electrons to charge that car. So the requirement for electrically conductive metals is crazy and it's nickel and it's copper, it's palladium is platinum and cobalt. These metals have to be mined and not only be mined, they have to be refined and then they have to be transported and then they have to be turned into batteries and then the batteries don't last forever, you know, the batteries have a limited life and then they have to be recycled or not and the whole thing is far more challenging than the cartoons people are reading about and hearing about.

David Greely (21m 11s):

Yeah and I was hoping you could educate us, you know I count myself among those urban dwellers who needs to understand more about the mining industry And I know, you know, you're a, Kamoakamoa-Kakula mining complex began production last year. I believe it's projected to expand, to become the second largest copper complex in the world and you started working on that about 25 years ago. Is that correct?

Robert Friedland (21m 37s):

Yeah. About 28 years ago. I think we're very confident about being number three and we are talking about becoming number two and we're way too superstitious to talk about being number one. We'd rather be Avis than Hertz, but it's not the size. It's the what one of the new one would be how much global warming gas is produced per unit of copper, for example, in your life and mind, we just think, what is the price of copper, and we say \$4 a pound or \$3 a pound and any pound of copper, no matter where it came from was priced exactly the same, but now an automaker like Mercedes or BMW or General Motors, they want to show you how much global warming gas was entailed in building that car and so obviously metal that could be produced with lower global warming gas has to attract a premium and copper that is dirty, or let's say you're burning coal to make the copper that copper should attract a discount.

Robert Friedland (22m 40s):

Hence we need smarter markets where we can have Ethereum or blockchain related technology to prove where everything comes from, absent blockchain. It's very hard to prove whether my copper came from hydroelectricity or your copper came from burning coal from example and so the whole supply chain is coming under scrutiny because every one of these headphones is an NGO and there are all these very well meaning young people who worry about how the world works and click, they take the picture of a mine and it can get on the cover of the New York Times. There's nothing easy about mining and there's all kinds of problems with it and so I think it's very, very important that people begin to understand the fundamental importance of mining and how it's trying to transform itself into a fundamental and responsible element of the solution as opposed to part of the problem.

Robert Friedland (23m 38s):

But what we're seeing is a global scramble for these metals on national strategic or national security grounds, the Chinese government, Chinese people were more prescient. They were looking ahead at electrification before anybody else they thought, well, it doesn't make sense to build 1.4 billion internal combustion engines in China for everybody in China, because they don't have much oil and gas in China. So they started thinking about solar and wind well ahead of anybody. And they went out to acquire copper nickel cobalt and the metals. So allow electrification or rare earths, which are not rare and not earths by the way. But, and now we see that the Western world is very far behind China in having the raw materials needed for electrification. They're basically a generation ahead and so Anglo Merkel, you know, didn't succeed very much in Germany when she shut down those nuclear power plants, coal today is \$600 a ton.

Robert Friedland (24m 42s):

It's crazy. The coal miners are mining it for 10 bucks and selling it for 600. That's the wrong price signal. The dirtiest fuel of all is making people rich and that she should have left the nuclear power plants on. Then coal would be cheaper. Nobody actually likes to freeze in the dark. You know, everything you touch somebody minded and some of the biggest hypocrites are the electronics companies. When you bought your early version, like an Apple 3 phone, you know, this is an Apple 12, there's a 14 coming out. So this is a 12. So the Apple 2 or the Apple 3 had about 30 elements in the periodic table in that phone, this one's getting up to about 85 elements in this phone. So, you know, you, you need to go mine, all this stuff, tantalum and all, all kinds of rare metals coming from all kinds of funky places, right.

Robert Friedland (25m 43s):

Complex supply chain and without it, you, you're not on FaceTime. You're not on Instagram, right. Your app won't work, right. So the whole system of all this hyper addictive technology is resting on our little industry and the mining industry today as a fraction of the

SMP 500 in terms of valuation is the lowest ever. I think if you take all the mining companies, they're only worth about 1% of the value of the SMP 500, like things like Netflix or Facebook have astronomic valuations because people see them on Bloomberg TV or CNBC and, you know, they watch those shares. Now you've seen Facebook drop 25% in a day. You've seen Netflix drop 30% in a day and we may be seeing some of the first warning strokes where people start worrying about their food and their physical security and staying warm in the winter.

David Greely (26m 46s):

That's a great point. Cause I remember when I saw you earlier this year you were a bit of a voice in the wilderness raising these issues about, you know, the physical realities and supply chains and the need for investment. But I think you're starting to hear others listening. I know Daniel Yergin at S&P Global just published a report, which he called the future of copper will be the looming supply gap, short circuit, the energy transition and maybe I should make a spoiler alert before going on. But their first key finding was that unless a massive new supply comes online in a timely way. So massive supply in a short amount of time, the goal of net zero emissions by 2050 will be short circuited and remain out of reach. That's a big statement. I mean, nobody knows the energy markets better than Daniel Yergin and I was curious, what do you think of their findings and how big a supply problem are we talking here?

Robert Friedland (27m 42s):

Well, you know, the mining industry was deeply involved because Daniel Yergin is one of the world's most famous experts on energy in general. I'm just making sure that my computer remains plugged in here, but you know, he wrote the prize. He got a Pulitzer for that book on history of the oil and gas industry. He's a very senior advisor to most of the energy ministers at OpEx. I don't think you could find a more credible person to look at the studies and the studies are stunning and they back up exactly. You know what I've been saying, there will be no greening of the world economy without a radical increase in copper production. It just won't happen. You know, we only have one known periodic table to work with and the best conductors of electrical energy are gold and silver and copper, but gold and silver are just too expensive. So copper is the metal that best conducts electrical energy and we can debate whether it's even remotely plausible, but we're looking for an, we need an 82% increase in copper production between now and 2035, which is tomorrow morning by mining standards. Like, and, and you mentioned Kamoakakula when we grow to number two or number three in the world, they're talking about needing two or three of those mines coming on every year between now and 2035. That's nearly.

David Greely (29m 09s):

Two or three every year,

Robert Friedland (29m 11s):

Every year.

David Greely (29m 11s):

And that was 28 years in the making.

Robert Friedland (29m 14s):

Yeah, that's right. It's that's right, we say a mine is like a woman having a hundred kilogram baby. It's very painful. You could say, it'd be like a man having a hundred kilogram kidney stone. That's called male childbirth. So there's nothing easy about the process. So we're saying that just ignore base load for copper demand for modern life. As we know it today, just forget about modern life as it is. We'll talk about transforming it. The energy transformation that would require 21 million tons of copper demand every year, which is about the same amount as we mine on planet earth. In other it's pretty much, we have to double copper production in order to have an energy transformation. It's a step change in the grid, infrastructure, solar, PV, wind battery technologies. So we were talking about, we need to mine more copper in the next 25 years, creating that study that was mine in, in the entirety of human history.

Robert Friedland (30m 17s):

And that that's a really stunning statement. You know, that's like, that's a OMG. This is standard and poorest. This isn't like some flaky junior or mining company telling you this. These are the real numbers. So what's the plan Stan, what's the plan. It took us 25 to 28 years to find Kamoakakula and build it and so it's a lot of work because there are geopolitical impacts. They're permitting there's native title. There are ESG components. I'll give you an example that 40% of the copper in the world comes from just two countries, Chile and Peru and that's equal, that's all of OpEx is about 40% of the oil production. So just two countries, the concentration there, and both of those countries have extreme left wing anti-business regimes now, and capital is fleeing from the two largest copper producing countries in the world. Perhaps they'll improve, you know, for a nation that wants foreign investment. They catch more flies with honey

than with vinegar, but they're spreading vinegar over all the services, scaring all the money away in Chile and Peru right now. So if you take the Chile and Peru out of the equation and you still need to double global copper production, it gets even harder. So it's, it's gonna be a very bumpy ride in the best case.

David Greely (31:39):

Yeah, I mean, my experience has been not to bet against engineers given time and money, but we don't have much time and we're not giving the engineers much money. So in a world where energy security is becoming metal security, do you think this is a problem that we can solve with the time and technology that we have, if we're willing to make a big enough capital investment, like, are we even in the, the zone of this being feasible at this point?

Robert Friedland (32m 06s):

No, it's gonna be like in the movies, it's gonna be like Indiana Jones and the Temple Doom with the walls coming, squeezing in, and those great big rocks rolling down. It's gonna be very difficult. It's going to require a lot of international cooperation that might not exist. It's gonna be very, very challenging to say the least. I think the mining industry is going to have to get an enormous amount of capital. If you look at how big the oil and gas industry is let's say it's the size of Chicago the mining industry is the size of your bedroom. So you want to close down all that oil and gas production and at the same time, replace it with the mining of new metals and the entire new supply chain. It's basically the world has to build in 25 years, rebuild everything it built in the last hundred years.

Robert Friedland (32m 52s):

And that's because we don't have any storage in the electrical grid. People don't understand when you turn a light on, if you've ever been guilty of walking into a dark room and turning on a light switch somewhere, a generator has to kick on and send you that electrical energy. There's no storage in our grid. So this is the problem with instantaneous demand. For energy, you plug in your car, it needs in somewhere, a generator has to kick on and send those electrons into your battery so that this transformation is just going to be enormous. That's why you see Elon going around saying, I want all my friends to go out and mine, lithium or nickel go out, you know, mine, these metals, but he's really underplaying it, you know, because he's alone in building electric cars, but wait till all the cars are electric, GM, Ford, Hyundai you name them and everybody is gonna be looking for the same metals and everybody's gonna be plugging in their cars more or less at five 30, they knock off where it at 5:00 pm, they get home and plug in the car and poop. There goes the grid. You know, the grid just can't take that instantaneous demand for electrons. Just, yeah, it's just the, the wires are too thin literally

David Greely (34m 10s):

You're, you're reminding me of a line. I think it was Wellington said about the battle of Waterloo, that it was a closely run thing and it sounds like the energy transition at best is, is gonna be a closely run thing and, you know, it's been an odd experience for me this past year because there's been so much written and so much discussion on the energy transition, the energy transformation, and yet seemingly so little of connecting the dots through to the relatively simple arithmetic of, do we have the metal supply to meet the demand, I mean, it's a glaring imbalance. It's not like, you know, my old commodity forecasting days where if the, you know, supply and demand were out of whack by a percent or two, that was a big deal. You know, at the current rates of copper production, we have maybe 60% of what's projected that will need and even in S&P's kind of more optimistic case for really ramping up. I think we get to about 80% of the copper that would be required. So it's, it's pretty powerful imbalances yet. You know, all these serious companies are making plans to go ahead and build electric vehicles, even though it doesn't seem like the, the metal will be there. Why do you think that, you know, this imbalance so far has received so little attention and discussion

Robert Friedland (35m 29s):

The automakers that I've been in touch with, and I'm very close to a number of them three or four years ago, there were a lot like ostrich with their head in the sand and now they're starting to look at the numbers that I can assure you they're in a state of panic, they're truly in a state of panic. Only the Chinese automobile industry has really addressed its requirement for raw materials, like Ganfeng is the biggest lithium company in the world it's Chinese, you know, and they're very good at it. They've been around, you know, they went out there and bought a piece of Chilean production and so on. So actually the Western automakers are Johnny-come-lately to the energy revolution. Elon gave everybody a hot foot, you know, they weren't gonna build electric cars until he came along and stuck a match in the soul of their shoe and lit it.

Robert Friedland (36m 20s):

Right and then, so it's sort of like me too and what happens is we have blue states, we have red states in America, but when a state like California says, you got to build electric cars as you can't drive and then New York says, yeah, me too, or say, Connecticut, you know, the car makers can't make one car for the red states and another car for the blue states and by the way, even for the Republicans, if you see this new GM Hummer, you know, it's like £9,000, but it goes 0 to 60, in 2.5. It's awesome. It's electric, you know, it's got four wheel steering, just Google, new GM Hummer. Like it's an incredible vehicle, right. You heaven forbid you're driving a smart car and that thing hits you, because it weighs a lot. But the automobile industry is gonna make incredibly beautiful electric products.

Robert Friedland (37m 13s):

You know, they're gonna be amazing products. You know, every kid is gonna want one, see these hot electric cars, but we are going to end up with an absolute panic for these metals and strangely we have a conflict between the financial markets right now and the physical markets, the physical inventory of metals are really very low. Some of the lowest we've seen in decades, but the prices are down because we're worried about the fed raising rates and the US going into recession. So we're getting the wrong pricing signal. When the copper price goes down, you're less likely to go out and build a copper mine. But what we really need the metal 3, 4, 5, 6, 7, 8, 9, 10 years from now, but today the copper price is down. So that's suppressing future production. That's why governments exist. It's the smoothest kind of stuff out, you know actually you should be building these things.

Robert Friedland (38 m09s):

When the copper price is cheaper, you want to make the copper wire and build out the new infrastructure. You, you want to replace America's electrical grid while the copper is affordable, but governments never get anything, right. A politician is somebody who bribes you with your own money. They don't really know anything. It's very easy to pass a law that says in the state of California, after 2030, no diesel truck can enter the state. It must be an electrical truck or something like that but then what happens is everybody just has no food because the law is written by an idiot who doesn't understand the supply chain it's the minor that has to go provide the metal so that you can build the stuff that makes it possible. And so it's a combination of the wrong kind of thinking for a very long period of time. The miners are the evil people, for example, and no understanding or they're destroying the earth for example, well, what is really destroying their earth.

Robert Friedland (39m 10s):

Well what is it destroying, the rise in temperature? Is it the rise in carbon dioxide or methane and what do you actually do about that and how you want to build a nuclear power plant. That's being re-perceived as maybe part of the answer you got, you know, base load supply of electricity to supplement solar and wind, but you need all these metals to build the nuclear power plants. You need uranium, or you need to go to a thorium cycle and you need nickel and cobalt and specialty niobium, tantalum, sophisticated steels for the containment vessel and huge amounts of copper for the generators and the transmitters. So there's the solar option, but you know, the sun only shines four or five hours a day. That's not gonna work like it's so blatantly obvious that the sun doesn't shine all the time and it's blatantly obvious that the wind doesn't blow all the time. So you need to build storage into the grid. It's that basic, like how are you going to store the energy in the grid and we're talking about ridiculously large amounts of storage. If you take Elon's Gigafactory in Nevada, that factory has to run for 500 years to store one day of America's electrical demand one day. So, you know, the physics are outta whack here when you really start dreaming about dramatically reducing the planet in terms of methane and carbon dioxide generation.

David Greely (40:51):

Yeah and it seems like, you know, Plan A that's out there has been this widespread low carbon electrification powered by renewables. That seems to be the, the vision that most people have in their minds. So solar wind electric vehicles, and it sounds like Plan A really isn't feasible given what you've said and what we're hearing from folks like standard and pores in the time that we have. So it seems like we need to move to a Plan B and I was curious some of your ideas on what that Plan B is, it sounds like nuclear is part of plan B, but please tell me we have a plan B Robert,

Robert Friedland (41m 28s):

I would never argue that anything is impossible. Only God knows what's possible and she might change her mind, but we need government support. You'd say for the United States of America, you want nickel, you want copper, you want cobalt, you want platinum palladium. You want these metals to enable an energy transformation. That government should be lending money at zero interest rates to the mining companies and helping them get permitted. The Chinese do that. If you're a Chinese state-owned company, you get financing from China development bank or China EXIM bank and if you're Japanese, let's say you're Mitsubishi, Marubeni and

Mitsui. You get funding from Japan Bank for International Cooperation or you know, one of the policy banks, but the American Banks do not support mining. They're concerned about contingent liability or if the telling stamp fails, you know, not in my backyard build absolutely nothing anywhere near, near anybody.

Robert Friedland (42m 32s):

It takes you 20. It can take you 10 years or 20 years to get a permit, to even build a mine and so the whole system is structured against even making it possible. Then you have to go somewhere else. Well, there's so much instability in the world today. We can't go mining in Russia or Ukraine for obvious reasons and we've had high profile Tilley stamp failures where it rains too much in Brazil where wherever it rains more than it evaporates, the Tilley Pond is in danger of failing and causing an environmental issue. So mining is best suited to desert environments like Nevada or the Australian Outback or Chile or Saudi Arabia somewhere where you can see the rocks and you can't create water pollution, but there's smaller and smaller parts of this planet's surface where we can get a social license to mine and of course, Elon is talking about going to Mars in doing the mining, but that's too, because it just takes too much work to get those medals from Mars, back to earth. Some people are dreaming about mining asteroids or the moon, but it's not practical with current known technology. We're stuck with mother earth and I do think there are solutions, but we're gonna need a lot more podcasts like this by a lot of really intelligent people, really looking at it realistically and coming to grips to what it's actually going to take to get there from here. Not just a little bit of noise, you know, as you know, American electric cars have been primarily subsidized by the US government for rich people. So maybe you're an investment.

Robert Friedland (44m 19s):

I think you said you were at Goldman Sachs or maybe you were at Stanley Morgan and you know, you're making 600 grand a year as a banker and your wife buys a big fat Tesla and you know, you get a big subsidy from the us government, from the taxpayer and you feel like you're being green, but you're not because can't everybody have that same car. It's just not possible, you can't have everybody plug in that same car. It's just not possible and so I think we have to go from the innocence stage of like children demanding a candy bar to a much more sober and grounded view of what it takes to actually transform the way we generate electrical energy, transmit electrical energy, and utilize electrical energy in a circular economy that is truly sustainable for your kids and your grandkids and it takes intelligent, rational discussion and if you look at, you know, the American political discourse, it's like two tribes in each other's throats. You know, you, you really need to get beyond that to try to start seeing what the real situation is.

David Greely (45m 41s): I want to second that call for the serious adult conversations we need about these things, but at the same time, I feel myself reaching out for that candy bar. And the last time you were with us on Smarter Markets, you also discussed a number of promising avenues on the technology side, particularly in, in nuclear and geothermal. And while we're trying to figure out what's feasible and what we can do both in terms of what can be mined in an environmentally responsible way in terms of what we can build out in terms of where we can do it. Have there been developments on the technological side since you were last here that you're believe are worth watching and worth pursuing as part of this new Plan B?

Robert Friedland (46m 27s):

Yes, I, think, you know, it's amazing that it's sort of a war between it's like Star Trek or Star Wars between the forces of dark and evil and goodness, because there are incredible technological developments going on all the time that don't get in the news or there's accretion of lots of technological advances that can get us to a new place disruptively. I still hold the view that mother earth is a nuclear reactor and very few people realize that the temperature of the earth that this the core of the earth is the same as the temperature is the sun say about 12,000 degrees Fahrenheit. So the answer is right under our feet. If we can tap geothermal heat or energy and convert it to electrical energy, we could in theory, provide this planet with 24 hour a day, electrical energy completely and utterly and totally free of global warming gas.

Robert Friedland (47m 32s):

Now we need special drilling equipment, special technology, a lot of metal to build the generators and would still need to transmit that electrical energy, but at least on the generation side, instead of drilling for oil, we could drill for heat and with that heat, we could generate steam. You know, it all started with Thomas Alva, Edison. He burned coal with the steam engine and the steam engine made steam and the steam made the engine turn. And that's what powered his generator to make direct current. That's where it all started. It was just steam. If you have steam, you made direct current and then when you were a kid and you had a bunch of lights, Christmas tree lights on your Christmas tree, if you remember, one of those lights went out, the whole string of lights, oh, yeah went out. That was direct current and then Nicola Tesla and George Westinghouse came along and said, that's not gonna work.

Robert Friedland (48m 15s):

You know, you go to alternating currents. So you can push that electricity down a wire so that those electrons can go a thousand miles. You got to alternate that current and there was a huge fight between Nicola Tesla and George Westinghouse on the one side and Thomas Alva Edison on the other, it's called the war of the currents and Tesla and Westinghouse won that battle. The world is 97% running on alternate current. Now we are working on false power, which is only used for strategic weaponry and military applications and it's a yet more efficient way to use electrical energy and there are huge potentials for technological breakthroughs in pulse power in daily life. So there are all manner of technological revolutions that are out there. I don't believe it will be fusion due to the erosion and the fusion reactor. That's always been a great idea 30 years from now.

Robert Friedland (49m 17s):

And I think it'll stay that way based on what I'm hearing from my plasma physicist friends, but geothermal energy could be a revolutionary answer. Grid, scale storage technologies may come up to may be store the energy from wind and solar and we need to find better ways to, to split dihydrogen monoxide, commonly known as water. You know, if we went to the average person in urban environment, and you said, what do you think about a chemical called dihydrogen monoxide they would bad, you know, it's bad, but we're made out of water, your brain in my brain's 98% water where a water based organism splitting the hydrogen from the oxygen could give us, you know, a hydrogen economy need a lot of platinum for the proton exchange membrane to make electrical energy, but I think that the glass is always, there's always hope for humanity, but we'll only get there in response to a crisis.

Robert Friedland (50m 19s):

We will only leap as a species when we're pushed right to the edge. We will get there when we realize that this is when it gets even hotter in London. And you know I mean, no one remembers ever getting north of 40 degrees centigrade in London, it's news. I don't remember hearing of a runway melting in London, never heard of that before. It was kind of surprising last night. It could be purely anecdotal. It could be just like a weird random thing, but actually in my life, I don't know about you. I have been experiencing an awful lot of hot weather. I travel all over the world and I have had some really memorable, hot weather. So we're going to have to find a systemic solution. And hopefully as a species, we come to some kind of accommodation with the other, you know, so Vladimir Putin likes high hydrocarbon prices because he runs a big gas station right.

Robert Friedland (51m 25s):

People want to get off that expensive fuel. They need metals for some green solution. You either are gonna buy his natural gas at ever higher prices or you're gonna go green. You know, if you're gonna go green, you're gonna need these metals and in order to get these metals, we need smarter markets. We need, we need capital to be allocated to people that are doing it right and so I suppose a podcast is all about the generation of a virus. There must have been very few initial COVID cases, but they eventually went global and you start with a few podcasters talking about the problem and 20,000 smart people hear about it, talk to their friends and you gradually change human consciousness to the point where very stupid governments come around to a more rational view you know, Joe Biden actually was recorded saying you wanted the army Navy and air force to be global warming, gas, neutral. He wanted all the tanks and how serves and ships all, you know, fighter jets to be carbon neutral. What a breathtaking statement we might get there by the 37th century in Star Wars. You know, but like, I mean, my God, the man's in his late 70s and doesn't he understand other world works like how are you gonna do that, like, what's your plan, Stan, so politicians, it's very disconcerting how little they actually know about how the world works. It's like that's the guy we elected president, you know.

David Greely (53m 00s):

Well, thanks for helping all of us understand a little bit more about how the world works. You know, you set us on this path to have these podcasts and discuss some of these big issues and really appreciate every time you come back to help us further the conversation, especially

Robert Friedland (53m 19s):

I'm gonna show you this. I wanna show you this book. I'm reading a book by Vaclav Smil called *How the World Really Works: The Science Behind How We Got Here and Where We're Going*. I'm just getting into it, it looks like it's well written. I think you're going to get to where we study on how the world really works and welcome to another session of the revenge of the minors and the molecules shortage. I violently agree with Jeff Currie and I violently agree with Dan Yergin and that means that we'll beat up anybody that disagrees with us and in the meantime, it's a lot of fun to talk to you.

David Greely (53m 53s):

Yeah, absolutely and it looks like you and Jeff Currie have the same book on your reading list. So I think for anyone who hasn't picked up their copy yet, that is a must read for this summer. So thank you very much for sharing your reading list. Thanks for being on. I hope you have some place to go to be not out in 106 degree Fahrenheit London and thanks so much for making the time for us today.

Robert Friedland (54m 18s):

Peace, thank you very much more later to be continued, adios.

David Greely (54m 23s):

Thanks again to Robert Friedland, Founder and Executive Co-chairman of Ivanhoe Mines. We hope you enjoyed the episode. Join us next week. As we continue our summer playlist on Smarter Markets with our next special guest, we hope you will join us.

Announcer (54m 36s)

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Announcer (55m 16s)

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