

SM01 | 11.28.2020

Introducing SmarterMarkets | Episode 1

Robert Friedland, Chair of Ivanhoe Mines

Robert Friedland, a Renaissance man who has founded several successful mining, technology, and entertainment companies, speaks to host Erik Townsend openly about his views about the what, who, and how of the global energy transition and meeting the energy demand of future generations.

Announcer [00:00:00]

This is a special edition of Macro Voices with hedge fund manager, Erik Townsend. The premier financial podcast, targeting professional finance, high net-worth individuals, family offices, and other sophisticated investors. Now, for this special edition of Macro Voices, here's Erik Townsend.

Erik Townsend [00:00:30]

Welcome to the inaugural episode of Smarter Markets, a free weekly podcast made possible by a grant from Abaxx Technologies. I'm your host, Erik Townsend.

I was a software technologist in my first career, and quite frankly I'm appalled by how badly the finance industry has failed to embrace technology to improve the design of financial markets. Let's face it: we face a *crisis in Capitalism*. Entire generations are questioning whether socialism would be a better system to adopt. Now, I don't think socialism is the answer, but it's clear that something is broken and needs to change.

What we need are *Smarter Markets*. Markets that are designed to embrace technology to solve problems and deliver better solutions to both market participants and society as a whole.

Now, to be clear, I'm not talking about using computer technology to out-smart financial markets and game the system to create an unfair advantage for whoever can afford the fanciest computers. That's already been done, and I would go so far as to say, overdone. I'm talking about embracing technology to design and build Smarter Markets, which revitalize capitalism and bring it back into alignment with the best interests of society as a whole.

In this new podcast series I'll be talking to some of the smartest people in business and finance, exploring ideas for how we could improve the system itself, to better align the functioning of capital markets with the needs of society.

My guest for our inaugural episode will be Canadian billionaire financier Robert Friedland. An iconic figure in the mining industry, Robert built Ivanhoe mines from the ground up. So for starters, we're talking about an entrepreneur with a lifetime of experience producing essential raw materials needed to fuel economic growth, who's obviously a veteran consumer of investment capital. In recent years, Robert has become an outspoken advocate of the importance of cleaning up the environmental impacts of mining, and he's also become a venture capitalist and international financier, through his privately held Ivanhoe Capital Corporation. So Robert has serious experience on both sides of the negotiating table, as both a consumer and a supplier of investment capital to growing business ventures.

And Robert Friedland is no slouch when it comes to technology! He was one of the seed investors in Sirius XM radio. In addition to his other responsibilities, he currently serves as chairman and co-founder of iPulse, a technology startup that's commercializing a proprietary controlled energy technology that literally manipulates metals on a molecular level by blasting them with shock waves that are pulse modulated in billionths of a second at a time.

Enabling entirely new processes for shaping and assembling metals with previously unattainable degrees of precision.

Who could be better to kick off this new podcast than the Indiana Jones of mining with a healthy dose of MacGyver-style technology awareness? Add to that the vision that supply chain industries like mining need to embrace environmental and social responsibility goals, and you have today's interview guest.

My interview with billionaire financier Robert Friedland is coming up next.

Announcer [00:08:32]

And now with this week's special guest, here's your host, Erik Townsend.

Erik Townsend [00:08:38]

Robert, to christen this new podcast series, we're going to start a tradition of asking our guests to share a story from their life or career with our listeners. Now, in your case, it was recommended to me first, "Ask him about riding Hugo, the camel across the Gobi desert in Mongolia." And then they said, wait a minute. It's it's Robert. Maybe he's got a better story than that. Ask him his favorite story. Um, hard for me, Robert, not to at least take the bait. What camel are we talking about and where does playing camel polo come into this story?

Robert Friedland [00:09:11]

Wow, well, uh, I'm sitting in Singapore at one degree, North latitude and, uh, you know, our, our organization has been working all over the world for the last 40 years. And my friend, Josh Crumb at Abaxx is really in love with the pictures you've seen of my camel, Hugo. He's a large male racing camel. He's an albino, and he makes his living eating shrubbery in the Gobi desert, say 75 to a hundred kilometers North of the Chinese border. And he was presented to me as a gift by the local mayor in the Gobi desert, where we went into the Gobi desert, sort of like John the Baptist. Dressed in sackcloth and ashes, eating honey and locust is having visions, looking for a giant copper mine. And we found one in an area that looks pretty much like Mars in the Gobi desert. It's much larger than France with a population of less than 50,000 people. The local people, there are true nomadic people. They move from point A to point B every few days with their camels, their goats and their sheep and their horses and their vicious guard dogs. And you know, it's a real honor to have them give you an albino camel, because most of these camels have dark red hair.

Once in awhile, sort of a genetic freak, you get a blonde and they make a camel blankets. And since the blonde fur is less common, the camel blankets that are blonde in color traded a premium. In fact, Mongolia is a world capital of cashmere. That cashmere comes to the neck of their goats right there, underneath the chin of the goat that gives very high quality cashmere.

So yeah, I've got, I've got a camel named after a heroic geologist, Hugo Dummett. His name is Hugo and he is an extraordinarily beautiful animal. I would recommend everybody go to the Gobi and go for camel rides. There are two kinds of camels in the world. There's the Bactrian camel, which is the one I'm talking about with two humps and you get a hump in front of you and a hump behind you that you can hang onto with a lot of fat in it. That's where they store their fat. So you don't fall off. It's like you put your legs on each side, like a horse, and they have this wonderful soft gate. And you're way up high. You know, your, your eyes are probably four meters off the ground. So you get a real good view of the horizon. The horses look tiny.

The Arab camels, you got to sit on them sideways on one hump, kind of hanging off the side, like Lawrence of Arabia. So I recommend the Bactrian camels. So fantastic animals. You know, they come from outer space. They don't, they get cranky. They don't like to get up and carry a load. The Mongolians learned how to deal with them. And my camel is named Hugo, but I can't bring him to Singapore, obviously. So he's just enjoying his life up there.

Erik Townsend [00:12:14]

Is it true that you've actually played polo.... camel polo?

Robert Friedland [00:12:19]

Yeah. Well, you know, the Mongolians are polo players. They play them on these little polo horses, very tough little animals, smaller than an Arabian stallion. And it's a very rough game. I mean, they, they basically started playing polo, allegedly where the ball was a human head. I mean, this goes back to Genghis Khan and beyond. But they started playing polo with camels in the last 20, 30 years in the Gobi desert. And that is a fantastic thing to do, to see they do that in the winter. And we were lucky to have the world camel polo championship at our mining project in the Gobi. And, uh, you know, it's freezing cold. It's a very rough game and it's just an incredible thing to see. So normal polo is rough enough. You know, if you're down there in Chile or Argentina, they play a lot of polo. You fall off a horse, it can hurt, but imagine falling off a camel, you're a lot higher up. The Mongolians are very tough people they're like Hopi or Navajo. And that's one of their great sports along with wrestling and archery, is camel polo.

Erik Townsend [00:13:26]

I don't meet many people who've traveled to more places and experienced more cultures than I have, but you're clearly the exception to that rule!

Let's move on to the core subject of today's interview now. The investment landscape has been redefined by trends like green investing and ESG. But investors seldom stop and think about the implications of these trends on the raw materials supply chain. Robert, you have a strong command of these trends, and you also have a lifetime of experience understanding mining and commodities. What are the implications of current social and economic trends on the raw materials supply chain?

Robert Friedland [00:15:27]

Yeah, well, you know, this is sort of a cosmic question. We're living on a ball of iron. Primarily iron and silica. We're rotating on our axis at over a thousand miles an hour. And we're hurdling through space at about 38,000 miles per hour around the sun. And our species is living in a very thin biosphere. A remarkably fragile biological system. And now we sort of have a global consciousness perhaps exacerbated by a virus that isn't even a sentient being. And everything is now clearly connected. A bat flew out of a cave in Yunnan, maybe his name was Wilmer and he took a shit into a rice patty, somewhere in Southern China and where a pig was sitting there. And that virus from the bat got to the pig and then Mr. Wong took the pig to market in Wuhan and that virus has gone global and perhaps it's going to be responsible for evicting the president of United States from the White House. So we have a very fragile system where, when a butterfly flaps its wings, the whole world changes.

Now, the world has been addicted to hydrocarbon for about a hundred years since the birth of the automobile. The automobile was the first thing, that comes to mind about something that really, and truly went viral. When Henry Ford figured out how to mass produce a car in 93 minutes, there were hundreds of car companies that followed the Ford Motor Company. But the big winner was John D. Rockefeller, who was producing crude oil. Because he didn't have to figure out which car company would succeed or fail. Crude oil became the biggest business in the world and its derivatives: natural gas, gas stations, distribution, refining. Exxon used to be, you know, a super, super ultra giant company. And all of a sudden we've got disruption. We have through mass telecommunications, the internet broadband, wireless, everybody knows that this is going to be a strident and considered effort to get the world off of the burning of coal and off the burning of hydrocarbon. It's inevitable, and the fundamental decision has been taken sort of by our Jungian mass consciousness. There are red States and there are blue States in the United States, but the automobile industry cannot build cars just for the red States. Once California mandates electric cars and New York follows, it's just much more efficient to start making electric cars and making the transition.

So the whole supply chain is going to be dramatically disrupted and we only have one periodic table of elements to work with. So if you picture my talking to you in front of Mendeleev's table of the elements, some of those elements are going to be losers and others are going to be winners. So this is not really great for carbon or coal. And it's not great for hydrocarbon, which is CH-CH-CH-CH a long chain molecule. The longer the chain of CH-CH the heavier, the hydrocarbon, the shorter, the chain, the more it's like methane or gas. And, the transformation or the reduction in the use of hydrocarbon and coal in the way we generate and transmit energy will be the largest transition in our evolution of our species that's happened in recorded modern history.

It won't happen overnight. won't get rid of all hydrocarbon or coal overnight, but president Xi Jinping just announced that China is going to be carbon neutral by 2060. Which is really tomorrow morning, when you think about it. I remember going back 40 years, I'd already come back from years in India. So, you know, 40 years, it was just a blink of the eye in human affairs. And China will have the largest GDP in the world. They made the decision to go on solar and wind and grid-scale storage, and be a world leader in electric cars. It's a command economy and they can command it to do whatever they want.

And Europe has heading in the same direction. Europe as a construct is new, and it wants to be very green. And so we get back to the supply chain. People don't understand that an electric car is only as good as the electricity that powers it. First of all, you have to evaluate how the car was made. How consciously the metals were produced. How easy is the car to recycle? But more importantly, when you plug it in, where does the electricity come from? A Tesla in the lower 48 States is 50% of fraud because 50% of the grid is generating electricity by burning coal. So it's not green, you're just adding to electrical demand, but there are benefits anyway, because you're reducing urban air pollution.

When you burn a hydrocarbon in an internal combustion engine, you generate these tiny sub 2.5 micron particles that go in your lungs like a roach motel. They go in and they never come out. And those particles are now known to lead to dementia and heart disease and

cancer. So at least an electric car, in an urban environment, cleans the air.

Urban air pollution is a really, really dangerous and poisonous thing and major cities like London, England or New Delhi or Beijing all over the world, they need to clean the air. The secondary benefit is, you could in theory, design a more conscious supply chain top to bottom. And that's the big disruption we're talking about. It's sort of a, in dollar terms, \$50 or \$100 trillion scale opportunity in how we generate electrical energy, how we utilize it, how we store it, how we transmit it. And that's going to really crowd a few elements in the periodic table. So I'll be kind to you and tell you the winners right now, because we obsess about looking forward in time and seeing what metals are going to need to get there from here.

So, aluminum is a big winner because one trend is lightweighting. If you're going to build a car or a motorcycle or a bus or a train, and you want to push it, give a distance with a given amount of energy, you want it stronger and lighter. So aluminum is a competitive against steel. So the Ford F1 pickup truck F-150 the new one is made out of aluminum. And then you can make the aluminum a lot stronger by adding scandium. Scandium aluminum alloy is incredibly strong and light and recyclable. It makes the aluminum something like titanium. Fantastic alloy. And aircraft and cars and buses and trains. So scandium is a big winner. S-C-A-N-D-I-U-M. There's a member of the periodic table you've probably never thought about. Obviously copper is absurdly important because it conducts electrical energy better than anything in the periodic table, other than things like gold and silver, which are too expensive for all uses. So copper wins. Silver is where it is winning for solar energy, copper for electrical generation and transmission and copper in the electric car.

When I grew up as a teenager, a Ford Mustang, With a V8 engine would probably have 40 pounds of copper per car. And then they invented the Toyota Prius, a hybrid. It had about a hundred pounds of copper per car. And when you go to an all electric car, like a Tesla Model 3, that'd be 150 pounds of copper in that car. And when you have a big Mercedes S-Class electric car, you know, a big one, you're pushing 200, 250 pounds of copper. The batteries are basically nickel batteries. The word lithium battery is a misnomer. The cathode side of the battery is primarily nickel and to dampen the nickel, so it doesn't catch on fire, to prevent dendritic formation in the battery, as it's charged and discharge, you need cobalt.

So nickel, cobalt, and copper, along with the aluminum and the scandium to lighten the car body are huge winners, if you want to electrify the car. But what about generating the power? So we've got solar power, but the sun doesn't shine all the time and we've got wind power, but the wind doesn't blow all the time. And those big windmills chew up a lot of birds. You know, if you're flying North with your girlfriend, you're a Canada goose and you're just having a conversation with your girlfriend. All of a sudden, poof! She's just a big cloud of feathers, cause you flew into a windmill. There is no free lunch in mother nature. Everything we do has its downsides and those windmills make a lot of noise and chew up a lot of birds. And more importantly, the wind doesn't blow all the time. So you need to store electrical energy and I'm not talking about storing it in your iPhone or your iPad or in your PC, those are nickel batteries with a lot of cobalt. But you need to store energy at grid scale. And so one of the greatest opportunities in human history will be to try to figure out how to efficiently and safely store gigawatts scales of electrical energy. Because you take Los Angeles, the city generates a huge amount of electrical energy in the daytime on a hot day when people turn on their air conditioner. But at night when people go to sleep, there's a lot less electrical demand. So if you could just store that excess energy from the California grid at night, and call it upon you for the 48 hours when you really need it, at the peak of the day, that's a lot more efficient than building a new power plant. Especially a coal burning power plant. So the storage of electrical energy has to be revolutionized and all of these technologies start looking back at the periodic table.

And then there's the question of how we produce these metals, that the mining industry is sort of a 17th century paradigm business. Every mine is located somewhere. You know, you get on Google Earth and there it is. It sits in the culture. It sits in a host community. It sits in a host government that wants to know what's in it for them. It's on their territorial imperative, it's in their country. And so you have to worry about what is a sustainable long-term deal between international capital and the people who grew up around the mine. The same thing could apply to hydrocarbon, but this is becoming a big issue. So we've been spending about 40 years, you know, playing at the nexus of disruptive technology and the metals required to build that disruptive technology.

Erik Townsend [00:26:39]

And where do we stand in terms of the supply demand balance? If you look at the vision, which is getting clearer and clearer, and a lot of people really believe in this electric vehicle revolution, how ready is the supply chain to deliver all the metals needed to build it?

Robert Friedland [00:26:55]

It's not. Because today, to meet the ESG criteria, let's say you want to build a mine - let's pick a place like Australia - you have to make a deal with the Aboriginal people under law. You have to sit down with the Aboriginal people, understand their culture, guaranteed training employment. And if you don't get their buy-in, you can't build the mine. It's the same thing in Canada. There are Aboriginal people that are protected under Canadian law. And we realized now, as a mining industry, that it's very dangerous to build a mine wherever you have a positive water balance. You've probably never thought about this, but the positive water balance is where rainfall and snow exceeds evaporative loss. So if you go to Brazil and you see all that endless jungle, that looks like broccoli from an aircraft, it's raining more than it's evaporating. So if you build a tailings pond - that's the waste from the mining - you have to guarantee the integrity of that tailings pond in perpetuity. And that's a long time. If a tailings pond fails, those tailings, which are like wet cement, you know, gravity takes them out and you can wipe out people. And, there are two recent tailings dams failures in Brazil that killed hundreds of people.

And then the mining company has huge contingent liabilities. So the banks don't want to finance new mines, where you have a positive water balance. Think of British Columbia, Oregon, Washington, beautiful green trees. That means mining can only go to deserts where you have a negative water balance. That's where it's impossible for the tailings dam to overflow because it's evaporating more than it's raining. So the Gobi desert or the Atacama in Chile where it hasn't rained in 27,000 years or the Outback in Australia or someplace that looks like Nevada. That's where you can mine. But if you can't consciously mine in all the areas that are green, like the jungle in Panama or Indonesia, now we've automatically cut in half the space in the earth where we can go mining in the first place.

And then, you know, with the advent of the personal phone, the hand phone, every hand phone has got a very good camera. Every hand phone is an NGO. Anybody can pick up the hand, phone and photograph what a miner is doing. And people think the miners are the bad guys.

So James Cameron, he did that movie Titanic, but his better known movie was Avatar. And in that movie, the bad guys are the miners. It's off in the future, we need some metal called "unobtainium". In order to get it, they're disturbing these Aboriginal people that sit in a circle and hold hands and chant "ome". Remember all that destruction of the miners in Avatar. But actually in the future, if we're that advanced a society, we would mine a dead asteroid to get unobtainium, we don't have to disturb an Aboriginal society. But James Cameron was expressing the subliminal sort of crucifixion of the mining industry. The miners are the bad guys. When actually the miners are giving you everything you need to live a modern life. Everything, everything you touch is either the product of mining or you grew it agriculturally. And by the way, you know, the combine that harvest the food or the tractor that plants the seeds are the product of mining. Or a water well, is the product of mining. In fact, a water well is a water mine. So basically the most primal of activities is mining. When we were cave people, we went out in mined, some flint, you know, to make a primitive tool. And then we mined some, let's say, we mined some iron to make a weapon or some bronze to make a better weapon. We've been mining as a species for somebody like 40 or 50,000 years. But now mining is undergoing a revolution and we need it because if you want to stop mining hydrocarbon and coal, you're going to need a huge increase in metals prices to give the stimulus to mine properly. I mean, if you've got a very great mine and by definition, let's define mining ore [O-R-E] you've heard of gold ore, nickel ore, copper ore. Ore is rock that you can mine at a profit. Now if you have a big Delta between the cutoff grade, the break-even grade and the market price of the metal, and let's say, that the grade of the ore is three times what you need to recover the costs. You know, some people say when you live in the United States, you work for Uncle Sam for the first five or six months of the year to pay your taxes. And the rest of the year is the money you keep. Well in mining, the first 10 or 40 or 50% of the ores that you mine to recover your capital and operating costs.

You've got a great mine if you're at the bottom of the world cost curve. You can afford to build schools and hospitals and do agricultural products and employ women and train people and really benefit the local community. But you need a great mine to do that. You need a tier one world-class mine with a hundred years of life and at the bottom of the world cost curve.

The problem is that it takes our industry 10 or 15 years minimum to discover it a tier-one mine and another five years or 10 years to bring it into production. So most of the great copper mines in the world, you know, are in Chile, but they were discovered around the turn

of the century and they're extremely low grade and they're not green. They're the opposite of green because the mining industry is mining lower and lower grade copper ores, chewing up ever larger amounts of electrical energy, generating more and more global warming gas to mine that low grade iron ore.

Erik Townsend [00:32:49]

Is it possible for copper mining to be a green industry?

Robert Friedland [00:32:53]

Well it has to be, by definition. Right now in Chile, you've got a shortage of electrical energy, the Argentinians don't like the Chileanos. Argentina has a lot of electrical energy. Chile is deficient in electrical energy, but Chile has the capacity to put up a huge amount of solar power to power their mine. The problem is, again, the sun doesn't shine around the clock or they could build a nuclear power plant to desalinate seawater. They're drawing down too much of the water table and Chile, because it's so dry that the water is not really a renewable resource. It's like an oil field. When you pump water at a mine like Chuquibambilla, the world's biggest mine. There's a limited water resource. So you have to replace that with seawater. But you have to desalinate that seawater, that's energy intensive, and then you have to pump it up hill from say sea level to 10 or 11,000 feet elevation. That's incredibly energy intensive to get the copper. So on a global scale, you know, we're not only looking for the best copper, but we're looking for the most efficient copper to be mined. The lowest costs in terms of its impact on the earth. And in that sense, the highest grade copper is the greenest copper. If my copper mine is 10 times the grade of your copper mine, I'm using 1/10th of the concrete, 1/10th of the steel, 1/10th of the electrical energy, my tailings dam is 1/10th as big. So my footprint on the earth is much smaller. Someday we'll be mining Mars. You know, we'll go to another planet to do the mining, but right now we're stuck with terrestrial mining.

And if you want to electrify the world economy, the first thing I want to leave with you, with your listeners is the enormous quantum of electrical metals we're going to need to stop burning coal and to stop burning hydrocarbon. So the whole system has to be revolutionized top to bottom and Elon gave the traditional automakers a hotfoot. But when you buy a BMW or you buy a Mercedes, or you buy a GM product, you know, you used to see the sticker price there on the window. Now you'll see how much global warming gas that car produces as it moves from point A to point B, and more importantly, how much global warming gas was generated in making that car, like bringing it to you. And that goes to the metals that it goes to the raw materials in the car. And it also goes to the recyclability of that car. Recycling or urban mining will be a huge issue that, when that car, sort of ends its mine life, you want to toss it into a big system and make a new car out of it. Recycle the nickel and the copper and the cobalt. Now, the batteries are called lithium batteries. But then they're not really made out of lithium they're made out of nickel and cobalt.

So a fundamental understanding of what it takes to make this revolution is what we're talking about. Do you get where I'm coming from so far, Erik?

Erik Townsend [01:21:57]

I do. And while we're on the subject of copper mines, I should give you a chance to mention the big project Ivanhoe has going in the Democratic Republic of the Congo. From what I understand it's a really, really big mine. Will it focus on the green copper production approach we've been talking about?

Robert Friedland [01:22:15]

That's a bit independently audited to become the second largest copper mine in the world. And in the near future, some Scandinavian governments will announce that they've audited our copper production as being the greenest of the green copper. It's hard to get audited by a government, but we produce very little global warming gas because it's all hydroelectric power. It's our own captive hydroelectric power plants that we upgraded and it's extremely high grade and it's all mechanized. So the mine it doesn't exist on the exploitation of human labor. And so, yeah, it's, it's a lot of fun. You go to www.ivanhoemines.com and go to our ESG section and read about what we're doing. We're an interesting mining company. We came out of that world, but it's by no means the only thing we do. Later on, we can talk about a severe disruption in how we're going to use electric energy itself. But we'll make that a subject for another day.

Erik Townsend [00:35:54]

We talk about ESG investing and most people think about investing in companies like Tesla. Frankly, buying Tesla stock doesn't do anything to directly help the environment. What really would help achieve the goals of ESG is if Tesla and everyone else could know with certainty that they're buying their raw materials from environmentally responsible suppliers. So it seems to me like the way to truly achieve the goals of ESG would be to develop smarter markets where we know where the raw materials that Tesla and everyone else are consuming actually come from, and how they're being produced. Does that make sense?

Robert Friedland [00:38:03]

Absolutely. You know, you've touched on, a huge issue, which is, all commodities are not the same. And the mining industry by the way, is really making Herculean efforts to transform itself. Even the super giant mining companies. You may think that they're changing slowly, but they're, there's a lot of disruption going on in mining.

We used to burn hydrocarbon in the big trucks. And when you have hydrocarbon underground, the exhaust means you have to have huge fans to replace all the air underground so that people aren't breathing toxic gas. So electric trucks underground, mean that you spend less electrical energy to ventilate the mine. Electric trucks in an open pit electric motor has huge amounts of torque. So mining is itself sort of the last grade 17th century paradigm industry that is going to be profoundly disruptive.

But the cloud and blockchain present an incredible opportunity to track every commodity right back to its source. I'll give you an example, Leonardo DiCaprio, was in film called Blood Diamond and you know, some diamonds were produced by forced child labor say in the Democratic Republic of the Congo. Other diamonds are produced, you know, mechanically without any human labor at all. And other diamonds now are made synthetically without any mining at all they're made in the laboratory. So De Beers found out how to put a little microscopic trademark on the girdle of a diamond. You can't see it with a naked eye. But proving that it wasn't a blood diamond. With blockchain, you could trace every individual diamond back through its source with a certificate that comes with the diamond. So you make sure you're not buying a blood diamond. Now kids prefer a fake diamond. You know, it is a diamond, it just wasn't mined. And it can be produced at a very low cost compared to a physical mine. And maybe younger kids would prefer to have an artificial, but real diamonds. Indistinguishable, except you're a real expert for a natural diamond. So we're going to see the whole supply chain of metals revolutionized.

If you mine copper in Chile - and this has been independently audited - and you burn coal in the grid and you grind enormous volumes of rock of low grade copper ore, if your production of global warming gas is X per tonne of copper, and you compare that to going to the Congo where you have hydro electricity to produce the copper in very high grades, a copper mine we're building now has about 1/17th of the global warming gas, per unit of copper produced compared to a large, low tonnage, copper mine in Chile.

So as people realize not all copper is the same. It may all trade at the same price right now. Today, the price of copper is say \$7,100 a ton. In the future, you're going to have 40 grades of copper trading based on how much global warming gas it produces. Even now iron ore comes at different grades. You're familiar that crude oil comes in different grades. You hear about WTI and crude oil. When you hear about Brent and you're talking about light sweet, crude, or heavy sour crude. And we got used to the idea that different crudes had different prices around a reference price. And so every field of crude oil would sell its crude oil in reference to WTI or Brent.

Well, that's going to happen to metals and these metals are going to need to be tied back through NGOs and blockchain in how consciously they're produced. Independent people will audit all the ESG aspects and mining companies will have to do an annual audit and an independent audit of everything they do so that institutional investors that are interested in these issues, not only look at the financials of a company, but can rationally quantify all of the environmental, social and governance aspects. So if you go to my mining company and you read the ESG section, it's huge. We're just starting, but the whole company is designed from the ground up to provide opportunity to women as training in the labor force and try to mine as consciously as possible.

So we went looking for metals where we knew we could find hydroelectricity. So Russia has a huge amount of hydro-power. Rusal is the world's largest aluminum company and Oleg Deripaska has enormous hydroelectric dams up there. So he can produce very clean and green aluminum. Other countries can't do that because they've got to burn coal in order to make aluminum.

So I think all of these things are going to be tracked by a blockchain back to fungible electronic markets. So let's say you're a BMW or Mercedes or Daimler, and you want to convince your constituency that you're super green. All of the attributes that go into the car, how you make the rubber for the tires, what you're recycling in the liners of the seats.... are you killing cars to make the leather or is it indistinguishable synthetic leather? Are you eating, beyond beef? You know, are you eating a cow? When you go back to global warming gas, we really have to see where does it come from? So breakthrough energy ventures is Bill Gates' sort of visionary fund to try to knock the cover off the ball in disruptive tech. And he fully understands the supply chain. And you should listen to Bill Gates talk about this subject because it's fascinating.

So another industry to disrupt is cement. Just the process of making cement is another five or 10% of the world's global warming gas.

So it's not just the automobile. The automobile is, transportation is about 60% of the use of hydrocarbon. And obviously, you know, the electric car is part of that, but the whole thing has to be looked at sperm-to-germ, cradle-to-grave, womb-to-tomb, right. You have to look at the whole system and, it's all going to change as people realize it, these kinds of podcasts are going to get people to sort of grock it. It's a complete systemic change.

Erik Townsend [00:46:00]

Robert, I want to go back to what you said earlier about grading commodities. In the ESG investing world, they already talk about grading *companies* with an ESG score that measures the responsibility of the company itself. But we don't have transparency to the supply chains those companies rely upon, so we don't know how responsibly the most environmentally sensitive parts of the process are actually occurring. That seems like a huge gap between what's needed and what's in place, and a perfect opportunity to design smarter markets to close that gap.

Economics is mostly about *incentives*. If we had Smarter Markets that offered transparency so that investors could see whether the raw materials used by a company were produced responsibly, that would create an incentive for companies to source responsibly produced raw materials exclusively. It would also open the door to a new era of consumer-driven social responsibility, where you could order your new electric vehicle selecting the *option* of having it built from 100% green copper just like any other option such as heated seats or an upgraded sound system.

Are there other things we could do in designing smarter markets so that *incentives* are created to encourage more responsible behavior on the part of companies that consumer commodities?

Robert Friedland [00:48:20]

Well, this is already happening, but there's two kinds of incentive. There's a negative incentive where I come and hit you on the head with a club. So, you know, the Norwegian state pension fund or BlackRock, largest fund manager in the world just says, we're not going to invest in coal companies. We just don't want coal companies in our portfolio. That is a negative incentive, you know, and so all the major mining companies are sort of slowing off their coal division because they're punished for the mining of coal. That's sort of the first step. But the more interesting step is the positive incentive, where the technology exists to grade every source of every metal in the world.

And the same thing would apply to agricultural production and reward it for those people that are willing to pay a premium for making certain that you're not, having a heavy footprint on the environment. So obviously if you buy a car right now in Los Angeles and you just buy a little gasoline car, it costs less than the typical electric car made by Elon Musk. Elon is trying to drive the cost of say the Model 3 down to where it's comparable to an internal combustion engine. And I believe we will get there in a couple more years. An electric car will be as cheap or cheaper, especially over its lifetime, when you take the cost of driving it and you don't have to rebuild the engine and less global warming gas.

Now, governments can penalize hydrocarbon production and reward the lack of hydrocarbon production and we will be able to blockchain every metal, every commodity. So you're familiar with different grades of crude oil. You hear about Brent or WTI, and we penalize lousy crude oil that has a lot of sulfur because that high sulfur crude oil just creates more sulfur dioxide in the atmosphere. It takes more energy to refine, to high quality gasoline. That analogy is going to apply to all metals. Very soon in Singapore, we will make electronic markets where there'll be 30 grades of copper, 30 grades of nickel, 30 grades of lithium from individual mines. They'll be blockchained and graded and audited annually so that an automaker in Europe that wants to have the greenest car, they'll just say, okay, this is made with, this grade of copper, this grade of nickel, this grade of cobalt, this much energy went into making the car, the mines have been audited to split roughly half the take with their local communities over the mine life. So the whole definition of sustainability will be revolutionized. And I've seen this change coming in my own lifetime and it's profound and I would argue that actually the major mining companies are changing, very rapidly. The culture is changing very quickly and it's a combination, both of government fiat and necessity.

Now, Joe Biden just recently said, you know, if he were running the country, he would encourage the mining of copper in the United States. Previous democratic administrations weren't very favorable to mining because they had that old attitude that all mining is evil, but it is dawning on people that you're not going to electrify anything without copper metal.

So, you know, governments are very concerned about their whole supply chain. China has been worrying about this for a long time.

China has central planning. They decided to build, to be the world leader in electric cars with state planning, they said, well, we don't want to be dependent on hydrocarbon coming from the Middle East. You know, if we have a dispute with the United States, they have a better Navy. So it's in our national security interest to make electric cars and use solar and wind. So China is actually leading, the world in this green revolution. No matter what you may think about the Chinese good or bad, they have very intelligent planning.

And so they've gone out to secure their entire supply chain of copper and nickel and other critical raw materials. Just yesterday, the Chinese said they're going to make it legal for all Chinese to buy copper on the Shanghai Exchange. When they did that with rebar, that's reinforcing bar, the price exploded.

China's doing very well. Now America and Europe are also going to have to worry about their supply chain. And it's not just for consumer items like Apple computers or electric cars. It's also for the Department of Defense because the very definition of what you need is changing.

And so in our lifetime, we're going to see the electrification of everything. Cars, buses, trains, skateboards, hoverboards, motorcycles and then aircraft, and then hovercraft, drones and drone delivery. So, you know, you put a little rectifier on your back porch, the size of a dime, and you call up Amazon and them, you want to order a pizza. Well, that drone that brings it to you will have a hydrogen fuel cell and an electric motor, and then they'll have to engineer it to make it as quiet as possible. Otherwise, it'd be too many honeybees running around and it'll deliver your pizza to your back door.

But the whole system is going to have to be revolutionized and people underestimate the role of the miners. I would call this the, the revenge of the miners. You don't like crude oil. You don't like coal. You want the world to be green. Well, then we're going to, you know, we're going to see the revenge of the miners. We're going to need much higher metals prices to stimulate the exploration and production process. And if you want that process to be truly green and truly sustainable, you really want to build schools and hospitals around the people that live where the mines are. Then we're going to have to pay for it. You know, there's no free lunch.

Erik Townsend [00:56:49]

I want to ask you a little more about the monetary aspect of this, because a lot of investors are looking at what's going on right now, now in terms of the whole MMT trend and, governments, whether it be around an MMT narrative or not really being inclined toward a lot more deficit spending. A lot of people are looking at all of this and interpreting it to say, okay, gold has to be the big winner because it's not just the dollar against other fiat currencies. It's all fiat currencies devaluing in real terms. And people say, okay, gold is the winner there. So therefore gold mining stocks is the place to put my money. Now you're a multi-decade veteran of this mining business. Is it really that gold stocks are the place to be, or is copper mining actually a better benefactor. Cause you think about where all this deficit spending is going to be spent. A lot of it's going to be spent on very expensive copper to rebuild the electric grid. So does it make sense if I'm an investor and I'm concerned that, you know, AOC and company are going to print billions or trillions of dollars and it's going to debase the value of fiat currency.

Should I be buying gold mining stocks or copper mining stocks?

Robert Friedland [00:58:05]

So, this is a great subject. Thank you for asking that question to quote Richard Nixon. Look, even Mitch McConnell and the Donald have been printing trillions of dollars of deficit spending. And so the market right now is always looking for a big monetary stimulus. It just means more monetary creation and yeah, you know, the older generation are sort of, goldbugs. Gold has been money for thousands of years. But I don't know of a fundamental, disruptive technological use for gold. We used to put it in our teeth in dentistry, but now if you have gold teeth, you kind of look like a mafioso.

We have nice white enamel. That's invisible to put in your teeth. It is used in aerospace electronics. There are specialty uses of electronics for gold. But basically we can use silver. We can use tin and electronic circuits, and then we have gallium, arsenide and other metals that are very good in consumer electronics. So I would say the gold is not that useful, other than tradition to the older guys.

Kids, you know, with like, um, a blockchain product, you know, it could be a Bitcoin or it could be a different blockchain currency. What they don't understand is that they're not green. There's huge amounts of electrical energy consumed in mining Bitcoin. And it's inherently not greener than mining gold. Both of them are existentially meaningless other than you need them as a store of

value. And I think they're equally valid. I mean, Bitcoin is outperformed gold this year against the United States dollar. But gold has done well, but you know, rhodium has done better than anything. Rhodium has gone from \$500, an ounce to \$14,000 an ounce because you need it. It's rare and you need it. You need it to clean up a diesel engine. When Volkswagen got in trouble with dieseldgate, they were cheating on the measurement of the global warming gas coming out of their diesel engines. The only way to clean those diesel engines up efficiently is with rhodium metal. And since the penalty, the Volkswagen group is north of 40 billion US. You're going to bet they're trying to clean up their diesel engines. They need the rhodium. So the rhodium is a precious metal that you need. So I would argue that the metals that become more valuable are the metals that you actually need.

So there are a few elements in the periodic table that are absolutely critical to the electrification of the world economy, to the generation of electrical energy, to the transmission of that energy and the storage of that energy. So when you ban coal and you ban hydrocarbon, it's like trying to get the contents of the Hoover Dam through a garden hose. We're going to have to have much higher prices for certain critical raw materials. And as I was wanting to tell you earlier, aluminum is a big winner because it makes things lighter than steel. Specialty steels, lighter steels require higher quality iron ore specialty metallurgy to make a steel object lighter and stronger. But if you could take a ladder and aluminum ladder, if you add scandium to that ladder, you know, you use a lot less aluminum and the ladder gets a lot lighter. And aluminum is just electrical energy in solid form. It takes a huge amount of electrical energy to make aluminum. So the light-weighting theme of making trucks, buses, trains, motorcycles out of scandium aluminum alloy is revolutionary. Once you've added scandium to aluminum, you can 3D print that scandium aluminum alloy. You can Google the Airbus Lightrider. It's an eight kilowatt hour battery. It's an electric motorcycle that is 3D printed, super light, incredible motorcycle, very fast. It only weighs about 35 kilograms.

So it doesn't matter whether you're making a skateboard or a motorcycle or a car or a bus or an SUV or a drone or an aircraft you want to make it stronger and lighter, if you want to reduce the generation of global warming gas. So copper wins, silver wins, nickel wins, cobalt wins, vanadium wins, scandium wins, aluminum wins. Those are sort of. Those are the elements in this periodic table that remain relevant and will become more and more valuable against the United States dollar, given that it is an absolute good to green the world economy. And there are correlates in agriculture. You know, you still need fertilizers. So the way you produce potash or potassium may change. You needed to grow food and how you grow that food and you transmit that food. So, you know, you may grow your strawberries in Chile, in the Chilean winter, and then enjoy them in New York. But how do you move those strawberries from Chile to New York? The whole system is undergoing a new analysis.

Erik Townsend [01:04:21]

Robert, that's a perfect segue to my next and final question, which is today's podcast is sponsored by Abaxx technologies, a company, which probably almost none of our listeners have ever even heard of before in the interest of full disclosure, both you and I were angel investors in this company.

So I want to make sure that we're, we're open about that. Something I noticed when Josh Crumb, the founder of the company tweeted about the upcoming reverse merger, which is going to make the stock available for public trading, probably in the first week of December or so, was some of the initial investors were kind of chiming in and I realized there are different people who have different, totally different concepts of what this company is and what it's trying to accomplish and why it exists. And I don't think that's a bad thing. I think it's actually different things to different investors. You were one of the very first angel investors to provide the seed capital to launch this company.

Robert, what the heck is Abaxx technologies? Please introduce our listeners to it. What is this company? What does it do? And I bet we're going to find future interviews with other investors are going to tell a different version of the same story.

Robert Friedland [01:05:35]

Well, it's like the story of a blind man encountering an elephant. It's the old Sufi story, you know, is it a barn door that swings or is it a wet hose in his face or is it a tree that he's hugging or, you know, what is it that we're trying to describe here? Well, I'm an American citizen and a Canadian citizen, but I live in Singapore. It's my home. I've been here 25 years.

Singapore is a little Island of rock with no natural resources, no water, no agricultural potential to speak of and no hydrocarbon endowment. And yet it has a GDP higher than the United States and , coming from the vision of Lee Kuan Yew, it's been amazingly well-governed. Sort of has a governmental system halfway between China and the United States. And it's a very interesting society to study.

Now, Singapore wants to be the world leader in the most dynamic part of the world. We just had a trade agreement amongst all the Asian countries. And you know, if you want to get long Asia, that's where we're going to have growth, no matter what happens. A greater Asia, would go from China, Japan, Korea, down through Vietnam, Cambodia, Laos, Thailand, Singapore, down Indonesia and Australia. This is the most vibrant part of the world economy.

So metals used to be traded in the London Metals Exchange or in the COMEX, in Chicago or in New York. But a lot of the veterans in blockchain and metals trading from NYMEX formed Abaxx as a private startup to revolutionize electronic commodity markets. And they found a fertile home here in Singapore.

Singapore has a very large group of sovereign wealth funds there's Temasek and GIC. Between them, they run several hundred billion dollars. Singapore wants to be hosts to disruptive non-polluting industry. One example is James Dyson. You know, he revolutionized the vacuum cleaner and he uses very powerful batteries, which needed nickel and copper and those vacuum cleaners. He builds them here in Singapore. Now he's revolutionized the hairdryer. He's got a new hairdryer that, you know, half of humanity will want to own that super cool hairdryer. You've seen his electric fans with no blades. So people like that are coming to Singapore because, they understand the supply chain.

Nidec is the world's biggest builder of electric motors. They're here in Singapore. And when it comes to the electronic markets, Singapore already trades iron ore. Iron ore used to be an annual negotiation between the steel mills and the iron mines. Now there is a reference price for iron ore that trades right here in Singapore.

So Singapore wants to go to the next step and really revolutionize markets for virtually everything. And this is the place for it to happen. So Josh came out of Goldman Sachs. He used to trade gold and other metals he's a good friend of my son. They both went to the Colorado School of Mines, which is one of the toughest engineering schools in the world. And I got to know him because we have a lot of mutual friends and my son.

And I started listening when he created a sort of an electronic way to trade gold. Now it may, it may interest you to know that the Chinese are working on a blockchain currency that the Chinese kuai or renminbi has hardened against the US dollar about 7% this year. But what if the Chinese decided to back their blockchain money with gold, for example? That becomes a very attractive fungible currency and they would escape the control that the United States government has over China because we control electronic money. The banking system runs primarily on dollars.

I think there's going to be a lot of different currencies, not just, not just Bitcoin or Ethereum, but you're going to have commodities that really are real things. So if you need nickel copper cobalt, aluminum, scandium and you need it, why wouldn't that be a money? If a Bitcoin is money. You know, when you see a picture of Bitcoin it's ludicrous, they show you a coin, you know, with a B on it.

Well, what is that physical coin that, that sort of denotes Bitcoin in your subconscious made out of? It's sort of shiny in yellow. To make you think it's like gold, but it's not. It's just a bunch of electrons, mined with a huge amount of electrical energy, you know, and represents a very real store of value to a lot of people.

Of course it can finance the dark web and create a lot of social problems around the world. So governments are going to want to have their own, you know, blockchain currency. And I think a lot of that's going to happen right here in Singapore. I think Abaxx is the type of startup that has some real industry veterans and they're going to start in a series of verticals. So liquefied natural gas as a transition fuel. As you get away from crude oil, it's one of the world's biggest fungible markets. They can make that market and drive down the cost of LNG and make it transparent. Then they could go to gold and silver and copper and nickel and make very transparent markets for different grades of gold, silver, copper, and nickel based on how much global warming gas is associated with it. And here you have, a favorable forward looking host government that wants to make these electronic markets. Singapore is an amazing country. I've been here 25 years watching the country reinvent itself repeatedly.

Like they used to make silicon chips here. It was a world leader. And then, you know, you can make a chip factory cheaper in the Philippines or Vietnam or Taiwan. And so they lost the silicon chip industry. So they've replaced it with other industries like Mr. Dyson coming here to make hairdryers or, Josh coming here to make an electronic market in commodities. Singapore is remarkably dynamic, you know, amount of capital here involved in, in Bitcoin or in blockchain or in innovative, you know, disruptive industry is amazing. A little Island with 5 million people, are going to be a huge market. Now it started because this Island was favorably located for shipping, under the British empire. You have the Straits of Johor, if you're coming from the Indian ocean on

your way to China or Japan, mother nature made you stop in Singapore. They made a market here in everything in agricultural production, in coal and oil. And then they started storing crude oil on this Island, and now it's going to become, you know, a phenomenal electronic market.

So Abaxx has a local backing here and you know, I've gotten to know a lot of people here in Singapore and I love the vision. And yeah, I got involved as an angel investor because we'd like to have our copper certified as the greenest copper. And we'd like it to find a market driven, appropriate premium for how clean and green our copper really is.

And so, we have to make our own future and that's what Abaxx is part of. I think the depth of the management and the vision of the people is remarkable. I mean, these are real veterans out of the NYMEX, the COMEX. These kind of current incumbents in these electronic markets, but this young lad who came out of Goldman Sachs in the metals trading business has got the right idea.

So older people like me, just write him a cheque and try to help him along his way. But it's part of this whole transformation that we've been talking about for the last 45 minutes and a critical part of it.

Erik Townsend [01:13:42]

Robert, I've been trying to decide whether the stock is really going to pop when it starts trading publicly in the beginning of December, because on the one hand, you and I share a very similar vision of what this is, and it's, it's really about the transformation into Smarter Markets getting away from really a commodity trading system that was based on what you saw in the movie Trading Place. It was a bunch of screaming guys, ex-football players, you know, forcibly pushing their way to the front of the trading pit to scream, you know, I'm buying or I'm selling, we're going not only to electronic markets, but to really, I think the, the embracement of digital bearer instruments, which to my thinking is what is going to be pioneered by Abaxx.

Do you think anybody's going to get it and understand that that's what this is about? Are they going to see it just as some ex-Goldman guys starting another commodity exchange, which is going to trade one or two contracts, big deal.

Robert Friedland [01:14:43]

It only takes a tiny fraction of 1% of all the smart people in the world to get it. And the value goes up. When we first started with countries issuing cellular telephone licenses, like a Craig McCaw got in the cellular telephone business, he got it started and he sold that spectrum to AT&T. Became a billionaire.

And then Millicom got started where people are going around to third world countries like Burkina Faso or Nigeria and securing the local Soviet or telephone spectrum. And then that spectrum became very valuable, you know, a license for a certain bandwidth of radiation and now we have 5G look at the value of a 5G license, giga dollars.

So that's sort of invisible real estate. Now, we're changing the definition of what is money. It used to be just the United States dollar and you can see the United States dollar is failing against a lot of asset classes.

So blockchain is a huge revolution enabled to track, you know, electronic record right down to the source of literally anything, a bottle cap. And the definition of what is money will be closer to what you really require. If you're in the car business and you're in love with copper or lithium or, or nickel, you can choose to put your source of wealth and those elements of the periodic table. So, you know, the owner of an electronic market, there might be billions of trades driven by machine learning. And you know, the owner of the market just takes a little *bip* out of each trade. You know, a little, little bite in Spanish would call it more dita, just a little bite out of every trade. And that gives you a sustainable per perpetual revenues.

And that becomes a very valuable equity. So will it happen? Of course it's going to happen. Will people understand it? Of course they'll understand it. Cause this kind of blog lives on. This kind of podcast off it goes. And one podcast, you know, begets another and then the market starts trading.

So everything has to start somewhere. I mean, I remember when Elon was starting, you know, his first electric car wasn't that impressive. Or when Thomas Alva Edison made the first light bulb, there was no place to plug in a light bulb. So he went out and strung a line of direct current lights in New York City. It was called the New York electric light illumination company. He sold light, not light bulbs. And that company was floated at maybe 30 cents a share in the 1880s. And today it's called General Electric. So everything has to start somewhere. I think all of this is accelerating. I think, the development of a fungible market and everything that is linked back to blockchain is, is opening soon, not in a theater near you soon, but immediately.

I think it's going to happen. And of course, Singapore wants it to happen because if it doesn't happen here, it'll happen in London or New York or Beijing or Shanghai. But Singapore is in the perfect spot in the Asian time zone. It's sort of gaining face against Hong Kong. It's right smack in the middle of this new free trade zone. And it's like the hippest most interesting of governments, you know, supporting blockchain, supporting the disruption in the internet because what a great business for Singapore to have it attracts hedge funds and pension funds and money managers and money traders. It's always been an entrepot of trading and I'm hyper bullish on Singapore. I don't have enough words to tell you, how interested I am. I made a movie with our movie company called Crazy Rich Asians. It was the first major film filmed here. Time Warner was our partner. Time Warner is now AT&T. And you know, that film went viral. It was the first film with all Asian actors, but it did a pretty good job of portraying what Singapore looks like.

You told me you were here before and you love the place. A lot of expats that come here love it because we have no COVID-19. I mean zero. And all the hotels and restaurants are open and life is good because this little Island did a very good job of managing the virus. Now, maybe Moderna is going to bail us out and, you know, we're back to the races at six months, but Taiwan did a good job. South Korea did a good job. Japan did a good job.

Thailand did a phenomenal job in managing this virus. And so I think this place is intelligently run and I'm very fond of it.

Now as an American, as a Canadian. And all of the other expats I know that live here. We all love this place. So come on back and let's get this electronic market going. And I think we'll be doing the world a favor. You know, I think everything that, Josh and his team are doing an Abaxx makes tremendous innate great sense. It's funny though, that the company is taking over in a reverse takeover, an old world company.

It's an iron mining company, in Canada. It was called New Millennium Mining. And it's a reverse takeover. The company is still going to own billions of tons of iron ore for free in the company that it's taking over. It will be renamed Abaxx and then at some point will have to figure out what to do with all that iron ore. But it does underpin value, those billions of tons of iron ore have value. But the real value is the perceived value of disruptive technology. That's the coolest place, you know, you can be, you know, so all the mining companies I know are going to look to this, we're going to want to prove that we can create low carbon nickel or iron or platinum or palladium and see it get traded here.

So thank you for being part of making it happen. I didn't realize you're also an angel investor. Lucas Lundin who's from Sweden. He's a very good friend of mine. He also invested, the Lundin family are famous for the work they've done in mining and here to foreign oil and gas. They discovered oil and gas in Norway. But you know, they're thinking the same way I am.

So there's a lot of really interesting people that backed Abaxx from the beginning. It's going to be fun.

Erik Townsend [01:21:04]

Well, Robert I'll look forward to, perhaps I'll have the honor of buying the first green copper futures contract and you can sell it to me. And if I make a big enough profit on that trade, I'll take you to dinner at the Tippling Club in Singapore, which is one of my favorite restaurants.

Robert Friedland [01:21:21]

That's fantastic. I tell all my friends, you should build your new house out of copper bricks, cover that copper with gypsum wallboard so you forget it's in the walls. And 10 years from now, you'll be able to tear down that house and buy a fleet of electric Lamborghini's with your profits. It's a form of money, and we love it.

It's not that we don't like gold. We like any gold with our copper, but I think you hit it right with nickel and cobalt and copper and vanadium and these metals and finding a better way to trade and make them available to everybody on this planet. We need it.

Erik Townsend

Robert, I can already tell we're going to have to get you back in a few months to cover the many topics we didn't have time for today. Thanks for giving us a terrific interview for our inaugural episode!

Smarter Markets is made possible by a grant from Abaxx Technologies. Abaxx stock will soon begin trading on the TSX—the Toronto Stock Exchange—under ticker symbol ABXX. The stock is expected to begin trading on or about December 15th, 2020.

Please be sure to tune in again next week, when my guest will be Maryam Ayati. Maryam is a veteran of these markets, but not as a trader. She's a veteran *builder* of markets, and knows all about the challenges of introducing new products. So I'm really looking

forward to getting her reactions to some of Robert's ideas we discussed today.

Listeners, please help us put the word out about the new Smarter Markets podcast! We have some terrific big-name guests lined up in coming weeks, and our intention is to make this podcast the place where Smarter Markets that will eventually change the face of finance are conceived and brainstormed before a live podcast audience.

For the MacroVoices Podcast Network, I'm Erik Townsend. See you next week for another installment of Smarter Markets.

Announcer [01:23:30]

That concludes this week's episode of Smarter Markets. For free episode transcripts, visit smartermarketspod.com. Smarter Markets is 100% listener-driven, so please help more people discover the podcast by leaving a review on Apple Podcast or your favourite podcast platform.

Smarter Markets is presented for informational and entertainment purposes only. The information presented on Smarter Markets should NOT be construed as investment advice. Always consult a licensed investment professional before making investment decisions. The views and opinions expressed on Smarter Markets are those of the participants, and do not necessarily reflect those of the show's hosts or sponsors.

Smarter Markets, its producers, sponsors, and hosts Erik Townsend and Abaxx Technologies shall NOT be liable for losses resulting from investment decisions based on information or viewpoints presented on Smarter Markets.