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## CRU World Copper Conference: Friedland on the new world order

**Robert Friedland**, the founder and executive co-chairman of Ivanhoe Mines (TSX: IVN; US-OTC: IVPAF) gave a keynote presentation at this year's virtual CRU World Copper Conference. Filmed from his home in Singapore on April 13, the billionaire spoke about what the electric future will look like and what needs to happen to the supply chain to get there. He also called copper a "national security issue." What follows is a transcript of his comments:

"We're here to talk about the revenge of the miners and how important it is that we sustainably mine copper metal for the new world economy. We spent about 100 years where the principal real reason for fighting wars was hydrocarbon. War! Hydrocarbon! And now we see hydrocarbon relatively less important over a period of say a generation, for a generation and a half. And so we now see the balkanization of the world economy, where Greater China has been focused on their energy security, on their own industrial transformation, their own electrification, the improvement of the environment for their own people, top to bottom, eliminating water pollution, air pollution, electric transportation. And then a fear of Europe and the United States. That they also have to secure their entire, top to bottom, supply chain, and that leaves people out, like the Japanese, or the Koreans, or the Indonesians, or the Brazilians, wondering about their supply chain. And so as each block starts worrying about the national security implications of their supply chain, this balkanization of what was a perfectly integrated world economy the last ten years, is inherently inflationary, and inherently involves the duplication of effort.

Ivanhoe Mines' Robert Friedland says copper is a national security issue at this year's CRU World Copper Conference. Credit: Ivanhoe Mines

If an American went to a Walmart store the last ten years to buy some cheap consumer goods, they were invariably made in China. And even now, America's trade deficit is super-high with China. And if that lawnmower, or that microwave oven, or that washing machine is not made in China, it's going to be a lot more expensive. And so we're seeing a lot of inflation coming up in the system, and we see the Federal Reserve Board and other monetary authorities whistling in the dark, they've been so worried about, well let's say there's a man walking over Niagara Falls, on a tightrope, balancing, and if he's going to fall off on the left, that's deflation. And that's been the big fear. So the Federal Reserve board says oh we're going to tilt towards the inflationary side. Obviously the danger is that they're going to overdo it, and fall right over the other side. We're seeing inflation in the price of good geologists. We're seeing inflation in the price of raw material input already. If you want to buy mining equipment; if you want to find the copper and mine it, as the world demands copper, and nickel, and cobalt, and aluminum and electrically conducted metals, we're going to see a lot of inflation.

So in mining, we know what to do when things are really cheap, and we know what to do when things are really, really expensive, and we're somewhere in the middle heading towards expensive. We're just in the early stages of reflating the world economy and balkanizing the world economy; and each country is very, very nervous. I'm here in Singapore, a little island 623 sq. km, no crude oil, no water, no agricultural potential worthy of mention; importing everything from their neighbours, and around the world, and they wake up and say wow, we have to reinvent ourselves. How are we going to keep these five million people on the island well-fed and secure? And every country is suddenly looking at where they fit in through all of these tensions that have been generated, starting with the United States government realizing that they should launch a trade war. Not so simple. And the implications are that everybody wants to clean their air. Everybody needs clean water. Everybody has to directly address the demands of their population, and so this industrial transformation is definitely going to create winners and it's definitely going to create losers. Vast fortunes will be made and vast fortunes will be lost. But that's the nature of the history of humanity. At least we won't bomb countries just because they have a lot of hydrocarbon anymore. The countries that are of greater interest are those that have big mineral endowments.

Just imagine if you were running an oil producer; an OPEC member. And you woke up and watched oil go negative in price, and you have to look after your population and generate employment. Imagine the degree of introspection that that triggered, thinking about a different world. So twenty, thirty years from now, we're going to see a lot less hydrocarbon in the energy mix. And we're going to see a huge change in the transportation energy [industry]. There are kids being born now that will probably never experience an internal combustion engine except maybe on a July 4 parade down a New York street, like Fifth Avenue, where they get to see antique cars on licensed gasoline.

So we know that the change is coming and we know it's been accelerated by what the world has gone through in the last year, but it takes a long time to change the entire supply chain. It takes a long time to really electrify the world economy, but it's going to happen, it's an enormous undertaking, nothing easy about it. And it will really enhance the position of a lot of the world's miners as people realize that mining is a basic industry, because it's basic, and the whole transformation will rely on the miners.

Three years ago the automobile manufacturers said: Um, we're really not worried about it, we're going to build electric cars and we'll call up Samsung or Lucky Gold Star or CATL and we'll buy the batteries, cause the batteries are the engine in the car. The electric motor itself is trivial, it's been perfected, and will last a million miles of driving easily. It's the batteries. And they said, we'll just buy the batteries. Then the battery manufacturers said to the car manufacturers, sure we'll put up a giga factory, we'll make those batteries for you, no problem. What do you expect them to say? But now that everybody is putting up these big buildings, and they're planning to build these batteries everywhere, it's readily apparent that there's going to be a shortage of certain critical metals, and the battery manufacturers are calling people like me, and they're saying, what have you got? You know, these batteries are made out of something and people are already dreaming about recycling, but we don't have anywhere near the number of batteries out there that we need to get into the recycling business. Maybe five years from now, ten years from now, we'll start to get incipiently recycling, but we're working against cross purposes. We're trying to build energy dense batteries that last five years or ten years in your vehicle. The longer they last, the longer the period of time you'll have a chance to recycle. And anyway, you take out your slide rule and you look at the scale of this transformation, we're going to basically need to triple global primary nickel production. And there are a lot of fantasies out there about where this nickel is going to come from. Just utter fantasies. False information. Disinformation.

The automobile industry is not going to nuke hundreds of thousands of acres of tropical jungle in Indonesia and dump the tailings in the ocean and try to convert ferronickel into batteries. It's just not going to happen. That's disinformation or whistling in the dark. And don't hold your breath on mining the oceans either. Humanity has done enough damage to the oceans already. It'll take a long time before we mine a 3,000 mile long zone and disturb the ocean bottom. So where these metals are going to come from is going to be a matter of fervent debate. And then how they're going to be taxed, and how they're going to be regulated is going to be an enormous issue, because it's like, trying to get the contents of the Hoover Dam through a garden hose. You shut down all that hydrocarbon production. The hydrocarbon production would be as big as the city of Singapore. The whole town here. And the mining business is as big as my hand-phone in comparison. So the disruption is just not understood. People don't really get the scale of this disruption. And it's going to be very interesting.

It's sort of like wondering what happens when an irresistible force meets an immovable object. The irresistible force is the demand of humanity to clean the environment and not monkey with the possibility that we're going to warm the entire planet with human activity. That's irresistible. The demand to make that change. And the immovable object is where is the supply going to come from to make the transformation? So the miners are going to have to be real heroes, and governments are going to have to accept mining. So the new Biden administration is saying yeah, were interested in copper mining in the United States. We realize we need it for the electrical transformation. America is very underexplored geologically because for 20 or 30 years it's wasn't cool to go mining in the United States. And that's because most people in an urban environment have no idea where things come from. I mean has anybody been guilty of walking into a room and turning on the lights? Have you ever driven in a car? Have you ever been to a hospital? How about the lights and the air conditioning in your school? Where do you think this comes from, these lights that are filming me now? It's all copper, copper, copper, copper, copper, copper, copper, copper, copper, copper, copper, copper, copper, copper, copper. When you turn on a light-switch, somewhere a generator has to kick in to generate power and send it to you. It's not stored in a grid. There's no storage of electrical energy in the grid to speak of, so the whole concept of storing electric energy in the grid is a massive concept. Grid-scale batteries. It's not just the electric car. That's trivial. It's the way we generate power, it's the way we transmit power, it's the way we store power, the final mile.

The launch of the Chang'e lunar probe at the Xichang Satellite Launch Center in southwest China's Sichuan Province, in Dec 2018. Credit: Xinhua/Jiang Hongjing.

China is light years ahead of the United States, in the thoughtful, intelligent design of their national electrical grid. Of course they had the benefit of maybe skipping a century, and catching up, and thinking about it carefully, but, the American electrical grid is a joke by comparison. It's literally a joke. The Biden administration is talking about, in this current stimulus program, spending a hundred billion dollars on the American electrical grid. That's like carrying a little bucket that big — (he brings his index and thumb together) — to the ocean, at the scale of the problem. The Paradise fires in California, the power line to that little town was 106 years old. The great state of Texas isn't even connected to the national grid. The grid is a mishmash of pieces that are all mismatched and put together with no thought, it's well over 100 years old, and it's not designed for alternative energy, it can't absorb a limitless amount of solar power or wind power or tidal power, and even if it did, it can't move that power from point A to point B. The wind is in Oklahoma, the demand for the power is on the East coast. So to upgrade that grid, people I have talked to in China who know such things, would say the national grid. You're talking about tens of billions, tens of trillions, tens of trillions of dollars of investment. You can put ten trillion in the grid to make it a true, smart, electrical grid to electrify the world economy,

but if you and I and all of our friends buy a Tesla and we go to work nine to five and come home and plug in the car at 5 p.m. we'll fry the current grid, it will just roll over and die. It won't take the shock.

So consciously designing a new electrical grid for America alone will take astronomic amounts of the right metals. And it will have to be done. The grid is getting older and older. Just take the great state of Texas, just a little bit of cold weather, a change in the jet stream and Texas was in the dark. The economic cost is incredible and the human suffering engendered. You know we all want to be green but nobody wants to go back to the Stone Age, right, when all of a sudden you're freezing in the dark and your kids are crying. And you've already got to worry about Covid-19 and the hospitals are dark too? The only way forward is to electrify the world economy with green energy. There is no other way, actually. With eight billion people that need everything, we need to provide clean electrical energy to everybody on the planet. We need to deliver it. We need to generate it, transmit it, and deliver it. It can be done, but it's going to change the definition of what's valuable and what is not.

And I have been thinking about how to explain this to a general audience and as far as I know it took hundreds of years before it was generally understood and believed that the earth is not flat. And Galileo was a great scientist and he got dragged in front of the Pope for the heresy to say that the earth went around the sun. Hundreds of years to convince people that our little planet was not the center of the universe and that we revolve around the Sun. And thirty years ago people started saying, hmm, maybe all this human activity is creating a greenhouse effect, and may exacerbate what might be a natural cycle or not, to make the whole world warmer. That might still take another thirty or forty or fifty years to really, really, really, sink in, but it's already affecting government policy.

The problem is that the politicians have no understanding of the supply chain. They think they can pass a law, they are omnipotent. They can pass a law and demand something and then it shall happen, but it's not that simple with the supply chain. You can't just demand that 280 million cars in America no longer burn hydrocarbon. It took generations to build those 280 million vehicles and the whole system of petroleum refining, distribution, that is going to take a long time to replace. So I don't think the average person has any understanding of the scale of what's being talked about here. The difficulty of what's being talked about here. And the necessity to focus on big important things.

And so the copper miners are sitting there, they're smack in Grand Central Station, thinking about it. They're right in the middle of it. Now they're not alone. The nickel miners are there, the aluminium miners are there, the elements that make aluminium a better metal [are there] like lithium, you could add manganese, you could add scandium, there are some other specialty metals, but, it's going to take probably a generation before people realize the scale of the transportation. Just transportation alone being responsible for maybe half of global warming gas. It's not just cars, it's buses, and trucks, and SUVs and skateboards, and motorcycles, and tuktuks, and semi-tractor trailer trucks, and buses, trucks, trains, and all the toys of the military, tanks, nuclear submarines, you name it. The whole thing is going to be looked at differently. So, for the short-term we've had a big rise in the price of copper, but for the medium term, copper has really become a national security issue, it's central to what we want to do with our economy.

Even before we got to ESG, the global mining industry has been starved of capital for about twenty years. Too much money went into broadband, the internet, the cloud, wireless, telecommunications, and so the mining industry was underinvested in general, mining grandad's patrimony. Old mines. Some of these mines are a 100 years old. So those mines — their grade

has been dropping, dropping, dropping, dropping, and what nobody understood was, as the grade of those mines dropped — take Escondida — as the grade dropped, they made the mine bigger in order to maintain production. Half the grade, double the throughput. But what they forgot to think about, is as they made the mines bigger, at lower and lower grade, the carbon dioxide per unit of copper was going up. This is such an important point. That mining at .4 of 1 percent is generating ten times the global warming gas than at 4%. So we already had a backdrop where there was not enough money going into exploration, or mining development in in general. And then, all of a sudden we said wait a minute, we need these metals to change the way we run the world, to electrify transportation, to clean the air, and then on top of that, everybody became worried about how much global warming gas do you generate in the very act of mining, or how your product is used downstream, Scope 3 emissions. So it's a perfect storm, because there is a whole new measurement.

Mineralized rocks at Hudbay's Copper World project in Arizona. Credit: Hudbay Minerals.

Miners are used to cut-off grade and head grade and cash flow per share, but now there's another whole parameter, which is, how are you producing that metal? Who's benefiting? Who's not benefiting? Is the benefit shared at a local level, with local people? Is it shared at a national level? Is it sustainable? What happens at the end of the mine life when you try to go away? What impact do you have on the water table? What impact do you have on training, and how sustainable is it? The whole question has been added and the mining industry, it's a rude shock. Because when you really look at this systemically, well, mining is very energy intensive. The very act of mining is energy intensive. So this affects where you're going to mine. Everybody knows that the great aluminium producers have hydroelectricity. You can't really compete in making aluminium metal with; if you're burning coal to make aluminium you can't compete with somebody who has hydro-electricity or nuclear power to make aluminium. This is going to apply to all metals.

These mines are going to have to have hydroelectric power, or nuclear power, or, well, the sun doesn't shine 24 hours a day does it, so you can't really run a mine strictly on solar unless you have big fat batteries to store the energy. So the storage of electrical energy is going to be a massive industry; just incomprehensibly vast scale. Everybody's grid needs storage. And so the ESG characteristics will probably ultimately boil down to a carbon tax. There will be a carbon dioxide tax or a methane tax on everything. Opening soon at a theatre near you. The European economic union likes the idea. The Biden administration likes the idea and that will really change everything.

You've heard of cut-off grade. Well your cut-off grade will be affected by how much global warming gas you're generating to mine. And this is a really rude shock to the incumbent miners. It's a really, really, rude shock. You know that we have Sevruga caviar, and we have Beluga caviar. Or we have sweet crude and we have sour crude. But this three dimensionality in pricing is coming as a rude shock to the mining industry. A really rude shock; that it's just not that good for Mother Earth to be grinding up enormous volumes of .3 of 1% copper.

So the first question is, well where are you getting your electricity? How much water are you using? Where are you putting these oceans of tailings, and are these oceans of tailings safe for all eternity when you put them behind a dam? What's the life of that dam? Twenty years? Fifty years? A hundred years? Ten thousand years? Will the tailings dams last as long as the Pyramids, for example? So you now have to design for eternity safety. So you want small tailings dams, because you have to live with them for a long time. That's the impact of mining.

So this is beyond a strictly economic parameter. It's a revolution in the way this is all looked at. And for national institutions; [they] are nervous about their liability. Ultimately the banks say, hey we won't lend if you have a positive water balance, because ultimately we might be liable as a lender. And so the world is populated with ten billion lawyers, right? So we're seeing a multi-dimensional reappraisal of the legacy mining industry. And as an industry we all have to get together and redesign it from the ground up. And there will be a lot of women in that process; there will be a lot of young people in that process; and there will be a lot of local people in every nation that has the mineral resources. There is just no other way. The way it was done in the past is going the way of the Dodo bird. And this discussion is part of that process. And we know because after thirty, forty years in the business we know almost everything there is to know about almost nothing. We know how tough it is to find a mine. To engineer a mine, to construct a mine and run a mine responsibly. And then what are you mining and why are you mining it. Who are you selling it to? What's the end use? The whole thing is going to be looked at systemically. So our costs are coming up. There are limited environments to do that and I think every year this discussion is going to come up at the CRU Copper convention more and more and more.

Ten years ago I was in Santiago de Chile and I had an audience of mostly Spanish-speaking people and I said, I've got news for you mates, we've discovered an ocean of 3% copper in the Democratic Republic of the Congo, so, you know, haha, and they thought I was joking, but 3% copper today is our cut-off grade, that's not our head grade. So it shouldn't surprise anybody. The Congo was always the largest producer of copper on this particular planet. Chile just caught up you know, say it was maybe in the mid-seventies, when Chile finally passed the Democratic Republic of Congo as the biggest copper producer. They're just completely different styles of animals. In Chile the evolution of these big loaves of bread – these porphyries – they are as big as a city. And Chile is a great terrain for copper porphyries. And copper in the Congo is sedimentary, it's completely different. But super giant. So the Congo has so many obvious advantages, so many obvious advantages. First of all it's flat. You don't have to deal with going up to the mountains. Second of all, there's water. You need two tonnes of water for every tonne of rock that you're grinding up. Thirdly it has grade and scale. Super giant deposits. And it has 80 or 90 million people, a lot of young kids, very eager to uplift their lives and learn a profession in mining, or geology, or mining engineering. It's a huge labour pool. And it's got hydroelectric potential. Just enormous. The world's largest individual hydroelectric site at the Inga dam, could power all of Africa or all of Europe. Forty-four gigawatts of additional capacity beyond the 8 or 10 gigawatts that can be immediately developed under the existing dams. So no ice, no snow, flat, mechanizable, warm weather, lots of water, hydroelectricity and grade.

This is mining. It's the dumbest business in the world. Mining 101. High grade is good. Low grade is bad. The higher the grade, the smaller the environmental footprint. The higher the grade, the smaller the plant; the less the electrical consumption, the smaller the labour force, the smaller the tailings pond, the less the global warming gas per unit of metal produced. High grade is good. And then flat, flat is good. Flat geology means you can put rubber tires on it. You can mechanize. You can automate. So and with hydroelectric power available nothing can match it.

So we used to mine crude oil in Pennsylvania, and then it was discovered in Azerbaijan, and then it was discovered in Indonesia, and then finally, the Ghawar oil field was discovered in the 1950s in Saudi Arabia, and Saudi Arabia became the go-to place to produce crude oil. You know the greatest place moves around from point to point with the development of geological understanding, automation and so the next great place is the Democratic Republic of the Congo. It's obvious. No one can deny it. It's as plain as the nose on my face.

Look Ivanhoe Mines is going to be an overnight success after 28 years of incredibly hard work by thousands of people in our organization. And so we think we can be looked at as a growth company, because we intend to grow our production rapidly for the next decade and beyond. And we're just scratching the surface of what we think is actually there. So we have no meaningful resource limitation to the copper resources that we think can be discovered in Katanga province. There is no meaningful resource limitation. So we're a growth equity. We're going to grow it as sustainably as we can at the right rate of speed, not too hot, not too cold. But we're also a value equity because we're at the bottom of the world's cost curve and we're mining sustainable copper. And so we're a part of the solution, we're not part of the problem. When kids all over the world want to electrify the world economy, we're the guys that are going to keep those cars running, because there's a huge amount of copper in every electrical car. There's a huge amount of copper in solar power, in wind power, in the modern grid and so this whole transformation requires us to succeed and we welcome all of you to come and join our journey."