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Uranium 101: Overview

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Daren: Welcome to the first edition of the Azarias Capital Management uranium podcast series. Azarias Capital specializes in turnaround opportunities in the small cap value universe, and that turnaround focus often leads us to industries we believe are poised for a cyclical upturn. That certainly explains our interest in the uranium industry, and today we want to present an overview of the uranium market and our bullish thesis. I'm Daren Heitman, the founder of Azarias Capital and today I'm joined by my colleague and partner, Chris Gillespie.

Daren: Hey, Chris. How are you doing today?

Chris: Good, how are you?

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Daren: Pretty good. Thanks for doing this on a holiday weekend. My thought was that we could have a conversation really introducing uranium to someone who has an investment background but doesn't have any familiarity with uranium as an investment opportunity. And so, just kind of have a big picture conversation. So, my first question would be: why should anyone be interested in uranium from an investment perspective? We're bullish on uranium because we think the price of uranium is going to go from the current level of around thirty-three, thirty-four dollars to something in the sixties. It'll have a positive impact on the stocks of the companies that produce uranium.

Chris: Yeah.

Daren: So, let's start with the basics. What is uranium even used for?

Chris: The vast majority of uranium is used in nuclear power plants, and that's used to create energy. So, almost all of the uranium that is consumed today is used to generate electricity around the world. So, nuclear power is about eleven or twelve percent of global power and twenty percent of the power in the US, so it's a very significant portion of US power.

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Daren: Are there any other uses? I mean, we all have this image of nuclear bombs exploding but that's not really significant…

Chris: Yeah, that's a small…you know, right now that's hardly anything. There are a couple million pounds a year that get used to fuel nuclear submarines and nuclear aircraft carriers, but that's pretty small in terms of the overall supply and demand.

Daren: Right. Okay, so it's used as fuel in nuclear reactors around the world, and you said that those nuclear reactors supply around eleven percent of all electricity globally. How many nuclear reactors are there, that are operating today?

Chris: Right now, there are about four hundred and thirty reactors in operation around the world, and in addition to that there are about fifty-five new reactors that are currently under construction.

Daren: So, that implies that it's actually a growth industry, because I know here in the US people have the impression that nuclear power is shrinking, that the demand for uranium is probably shrinking. So, what's our take on that?

Chris: Yeah, that does seem to be a common misperception, that nuclear power is a shrinking industry, I guess to the extent that people think that that works to our advantage here as investors. But it's definitely a growing industry, you know, with the fifty-five new reactors under construction around the world, we believe that the growth of new reactors is gonna be in the range of one-and-a-half to two percent a year over the next six or seven years, so that's a pretty solid growth trajectory in an uncertain environment. And once these plants, once they start building them, they're big, they take a number of years to build, they cost billions of dollars, so it's very likely that they will be completed and operated once they're under construction. So, it's somewhat unique in terms of commodities in that we have a pretty good sightline on future demand.

Daren: Right, it's not economically sensitive either, so let's talk about the role of nuclear power plants as baseload electricity generators.

Chris: Yeah, so nuclear power [plants], like I just said, they're expensive to build but once you build them, they're very cheap to operate relative to other sources of fuel. So, they're cheaper to operate than coal, and cheaper to operate than natural gas, and so if there is a decline in demand for electricity, that gets taken out of the more expensive sources first. So, even right now during this pandemic we are seeing a decline in energy demand, but it’s coming out of coal, primarily out of coal so far. Because nuclear is sort of down in the stack in terms of cost, it will be the last to cut, or one of the last sources to be cut.

Daren: Right, okay. Well, we wanted to keep this pretty high-level. We’ll do a deeper dive on demand and go into more detail, but that’s a great overview. So, demand is very visible, it’s not economically sensitive, it’s driven by the operation of nuclear power plants and once those nuclear power plants are built, they run. And so, demand is just extremely steady, and there’s no substitute for the fuel that they use, they use uranium to run. One thing we haven’t got to yet, which maybe we can wrap up our demand side by quantifying the global demand picture. So, we have around four hundred and thirty nuclear reactors operating today, and it’s gonna grow closer to four hundred and eighty over the next several years, so what does that mean in terms of global annual consumption, Chris?

Chris: Well, that means we have annual uranium consumption

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right now, is in the two hundred-million-pound range, and again we see that growing by one-and-a-half to two percent a year for the foreseeable future, so two hundred million pounds growing to maybe two hundred and thirty million pounds over the next ten years. Something like that.

Daren: Yeah, okay. Great. So, let's turn to the supply side. So, we are bullish on uranium because we believe—and the market is telling us—that the current price of uranium doesn't justify expansion. It doesn't justify production. So, if the world needs two hundred million pounds, the price needs to be much higher for the mining industry to be economically incentivized to produce two hundred million pounds, which is probably a lot more words than are necessary. The current price is thirty-four dollars, we think the marginal cost of production is closer to the mid-sixties, and therefore this is a supply story. Supply has been coming off, and it's currently an under-supplied situation. So, with that as context, how much uranium do we expect to be produced in 2020 and where does it come from, Chris?

Chris: Going into the year, before the coronavirus shut down some production, we thought that there would be about a hundred and thirty-five million pounds of uranium that would come out of mines, but as a result of the coronavirus we've seen a number of production cut-backs, and so that number could fall into the hundred and ten, hundred and fifteen million pound range. And, again, this is versus a demand of two hundred million pounds. Then there's also another source of supply, it's called secondary supply. It's supply that does not come directly out of mines, it's mostly out of I guess what you would call inventory, really, and so that source is about thirty-five million pounds and is also in decline. So, you know, in terms of overall supply, probably somewhere in the neighborhood of a hundred and fifty million pounds a year versus demand of two hundred million pounds.

Daren: Yeah, that's a good backdrop. So, whatever excess supply was out there is being rapidly worked down, and according to our estimates it's like fifty million pounds just in this year. One of the things that I think we could—I mean, again, we want to keep this high-level for people who are new to this investment thesis in this industry—you referred to secondary supply as inventory, which I think is a little bit misleading. At least in our work we've separated what we consider secondary supply from true inventory reductions, and when I think about secondary supply in our model it's really a byproduct of the processing of

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raw material, raw uranium, into a useable fuel. And that consistently, year after year, will produce incremental supply over and above what's brought out of the ground, and that probably deserves its own thirty-minute explanation, but for now I consider that a byproduct and we consider that a steady source of supply but it's going to shrink from thirty-five million to something closer to fifteen million. Is that a fair summary of our view of that?

Chris: Yeah, probably fifteen to twenty million, and I apologize for calling it inventory. I was just, as you said, trying to keep it simple. Yeah, that is a fairly consistent source of supply that is likely to be shrinking from thirty-five million to somewhere in the neighborhood of twenty million, I should say. So, yeah.

Daren: Well, the reason I wanted to make that distinction is because I wanted to segue into: what got us into this over-supplied situation to begin with? So, I mean every commodity cycle has the same generic story. There's overproduction and then oversupply, and that drives the price of that commodity down usually below the incremental cost of production, and so supply shrinks and then the excess production and inventory is worked off and price recovers—the cure for low prices is low prices—and then it all plays out in the opposite way and you go through that over and over again. So, uranium found itself in an excess-supplied situation, and it's probably worth walking through; how did we get here, for someone who's not familiar with what happened.

Chris: Yeah, sure. So, in 2011 we think that supply and demand of uranium were pretty well-balanced, and the price of uranium was in the mid-sixty-dollar range, sixty dollars a pound, and then a tsunami hit the Fukushima reactor in Japan and caused an outage there, and as a result of that Japan closed down all of its nuclear reactors, and they had about forty-five reactors operating at that time. And so that was an immediate decline in demand of about twenty million pounds a year of uranium, so it was a very big hit to the uranium demand and so as a result the industry was geared up to supply those reactors, so there was twenty million pounds a year of extra supply so it took a lot of time for that supply to close down and so the price went from sixty-five and over the next five years went down to I think around seventeen dollars in 2016 because there was too much supply. And so, as a result of that price decline, a fair amount of supply has been closed. Thirty-eight million pounds of production has been closed over the past several

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years as a result of the big decrease in the price. So that's how we got to where we are, and over that time period inventory built up because the supply was there, and the demand went away overnight. But we think now, as a result of all the closures and as a result of increased demand because of new uranium reactors that have come online in the last several years, demand is now back to where it was in 2011 and supply is below that level, so that inventory now is in the process of coming down, and as mentioned earlier, we think that as result of events this year most of the excess inventory that built up from 2011 to 2017 will be gone by the end of this year.

Daren: That's a really good point, and I probably should have led off at the very beginning of why people should care—investors should care theoretically because we expect this bull market, but also why now. And I think that comes back to what you just said. We've done that inventory analysis and determined that maybe a hundred and fifty million pounds of excess inventory had accumulated during this bear market for uranium when there's overproduction, but that flipped to underproduction in 2017, roughly, and like you just said, by the end of this year all that excess inventory will be washed away and worked off, and should set us up for an under-supplied market starting next year.

Chris: Right.

Daren: Now, one of the questions I get on a regular basis when I'm first introducing this to potential investors is: why is there any production? If we're saying that the current price of uranium is below the marginal cost of production, why is anybody producing? Why hasn't this market already cleared?

Chris: Yeah. Well, two reasons for that. First is that the way this market operates is under long-term contracts, so when the price was sixty dollars back in 2011, the buyers of nuclear fuel were willing to sign contracts with uranium miners to pay them sixty dollars a pound, seventy dollars a pound, out for five to ten years to supply them. So, a lot of the uranium miners have been able to still operate at a profit. Even though the stock price would not allow them to do that, they have contracts that do allow them to do that. Now, like I said, those contracts are probably an average of six years or something like that, so most of those have expired or are expiring in the near term, and so as that happens, we are seeing supply continuing to come off. So that's one reason, and then the second reason

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is, you know, there's a cost curve, so the marginal supplier has costs in the sixty-dollars-plus pound range, but there are a number of producers that can produce in the thirty dollar pound range, and so the price right now is thirty-four—it's been in the twenties for a while, but some of these mines have been able to produce at near-breakeven level or slight profitability levels even at this low price.

Daren: Right, even if they're selling into the spot market, but that's a very small amount of industry volume that actually gets cleared in the spot market, and I hope to do a follow-up conversation and podcast where we discuss long-term contracts in more detail, but for my purposes when I'm introducing uranium to someone new I just summarize it by saying: uranium is just not a spot market. The price is not discovered in the spot market, not really. Ninety percent of the volume is transacted under what we've referred to as long-term contracts, and you could think about those long-term contracts as that they're really privately negotiated forward futures contracts. So, if I'm a utility and I need to have a million pounds to consume as fuel in 2026, I'm actually going to start talking to the miners, the suppliers of uranium, now and start negotiating delivery for a million pounds of uranium in 2026, and I'll strike a price with the supplier.

And that's actually how the market clears, and that has its own cycle, for now I think we'll leave it at that. We just wanted to introduce some of these concepts to the person who's new to the space, but that's an important concept to come back to later and explain in more detail.

Chris: Yeah, definitely.

Daren: But it's definitely one of the reasons there's still been production. I mean, the spot price sixteen or seventeen dollars in 2016 but the pounds that were consumed that year were delivered under long-term contracts, so the miners actually realized the price is in the forties, fifties, in some cases seventies, so they were able to keep their doors open. Maybe one other concept on the supply side—we could go a few different ways here—but there is shut-in capacity right now. So, you mentioned earlier that thirty-five million years of production had been taken offline during these last few years and in this bear market, and that will help clear the market. What's our view on, once pricing gets back to a normal level, how fast production can come back online, and will that negate or at least truncate a really strong multi-year bull market?

Chris: So, the biggest part of the shutdown capacity is: Cameco has shut down a very large—the largest, and one of the lowest-cost mines in the world at McArthur River, so that definitely will come back but they think that it will take them at least a year to wrap up full production, and they have said that they will not reopen that mine until prices are at least into the forties with escalators beyond that. So, they're not gonna reopen it until they get contracts that have base prices probably in the mid-to-high forties that escalate beyond that in the out years. And then the other mines that closed have higher costs than that. And so, we do believe that a fair amount of that production will come back, probably thirty million pounds of it will come back, but it won't come back until prices are probably in the fifties, and it's our belief that the market is going to need that production because, as we talked about earlier, we're already short right now somewhere around fifty million pounds this year. If you assume that the production that's shut down due to the coronavirus comes back next year, then you're still structurally short thirty, thirty-five million pounds a year, so even if all that production comes back you still have demand that's greater than supply.

Daren: Yeah, that is definitely a key part of why we're so

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bullish, is because the shut-in capacity won't meet consumption needs in the mid-2020s, according to our estimates. But we do know that there are some mines under development; will they be enough to meet demand going forward?

Chris: We don't think that the mines that will be developed will cause a supply-demand imbalance either. As you look out, say over the next ten years, there are some big projects—NexGen's Arrow project, which is a twenty-five-million- pound-a-year project, that's probably going to be the first big project that would come online. On the other hand, Cameco has a large mine, Cigar Lake, that produces about eighteen million pounds a year that is set to expire in the back half of the 2020s. So, there certainly are projects that could come on, but as you look at the overall supply and demand picture, when you look at supply you have Cigar Lake—eighteen million pounds coming off—you have a couple other projects in Africa that are set to close down here over the next couple years that produce six or seven million pounds a year, and then you also just have natural depletion of mines. The general rule of thumb is that mines deplete by a couple percent a year, but we'll just use one percent a year. That would mean another thirteen million pounds goes away over the next ten years, just for

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example. So, we think that there are certainly projects that will be developed over the next ten years, but it doesn't appear to us in our analysis that those projects will overwhelm the market. As we said, we're short structurally by, let's say, thirty million pounds right now and demand is going up by another thirty million pounds, so we need the shut-in capacity to restart and we need new mines to be developed. And when you think about there are definitely smaller projects, a-million-pound-a-year-type projects, that can be developed without a huge up-front expense—maybe thirty-five million dollars or something like that. But when you are talking about the bigger mines that might produce eight, ten, fifteen million pounds a year, those all cost upwards of a billion dollars and that's a big up-front investment, so people want to be pretty sure that they're going to be able to earn a return on that investment. So those things are gonna take high prices.

Daren: And contracts. We've heard consistently in our work and listening to company executives say that to get financing they're gonna need contracts in place, and obviously those contracts will have attractive economics, and then they can get financing. It sounds like it goes hand-in-hand.

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Chris: Yeah. Yeah, that's right.

Daren: So, we could go on—I mean, there's plenty to cover, it's a fascinating industry, but I think that that's a pretty good overview for somebody who's new to the space. I mean, it's really a straightforward supply and demand analysis, it's very easy to forecast demand. Now, we could be wrong on the number of nuclear reactors that are operating, but without a disaster we shouldn't be off by a significant amount and we know how many pounds a year that those reactors consume as fuel. So, demand is very, very visible and not economically sensitive. Same on the supply side. I mean, there's a little more opaqueness on the supply side but, if you're looking at a multi-year period, that's also very visible and our supply numbers are unlikely to be off by large amounts, enough to disrupt the supply deficit that we see. I mean, that's the difference in this commodity versus others that we've looked at in the past. The supply deficit in the out years is bigger than ten percent, and without increased production it's an obscene amount of shortfall, like thirty percent, which we think can't happen. I mean, these countries' nuclear plants and the importance of nuclear generating capacity is a national security issue for China, even for the United

States, really [for] every country that has a nuclear program it's a national security issue. So, they're not likely to allow a lack of uranium to disrupt their plans and so the price will very likely go up to a level that stimulates production.

Chris: These plants need to run.

Daren: So, I guess maybe to recap: we think the price of uranium's going to at least double from here; we think that the equities that have exposure to that could potentially have more upside than that, they have a bait of significantly greater than one in some cases. And so, we're extremely bullish on miners of uranium and believe that the supply and demand outlook is extremely favorable. And I guess most importantly, we believe that that supply deficit is going to be obvious in the next twelve to eighteen months and result in our thesis really starting to play out in the markets. Do you have anything else to add there, Chris?

Chris: No, no, I think that's a very good introduction to the fascinating world of uranium.

Daren: All right. Well, we'll end it at that, and we'll

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plan on doing deeper dives in each of these topics at a later date. So, thanks for your time, Chris.

Chris: Okay. Yeah, thank you, Daren.

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