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Uranium 201: Inventory

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Daren: Welcome to another episode of the Azarias Capital Management uranium podcast series. Azarias Capital specializes in identifying turnaround opportunities in the small-cap universe, and that focus often leads us to industries poised for a cyclical upturn. We believe uranium represents one of the best opportunities in the market today to experience a powerful cyclical recovery. In our first three episodes in this uranium series, we provided an overview of supply and demand and made our case for why we expect an impending supply deficit to drive the price of uranium to at least double from current levels. Every commodity has a common story: the price of the commodity goes up, incentivizing new production until there's an excess of supply and buildup of inventory, leading to a price decline which lasts until supply is back in balance with demand. Today's episode focuses on the buildup of inventory in the uranium sector, who holds it, and why we believe there's not nearly enough inventory to fill

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the gap between current production and consumption, possibly as early as next year. I'm Daren Heitman, the founder of Azarias Capital Management, and I'm joined by my colleague and partner, Chris Gillespie. So, the topic of uranium inventory is really critical to our bullish thesis because there's only three sources of supply: it either comes out of the ground, which we covered in our demand podcast; it comes from secondary supply, which we also covered in our demand podcast; or the third source, and the last source it could come from, is inventory. So, in our supply and demand podcasts we've already covered why in the current year and for the foreseeable future there's not enough uranium being produced to meet consumption. So, that implies that it has to come out of inventory, and it's been coming out of inventory since 2018. So, if you're not bullish on uranium, in our opinion it has to be because you think there's enough inventory out there [that] it's gonna meet the demand and fill that gap between supply and demand for a long time. So, we spent a lot of time on that and I should give you credit, you spent a lot of time on that and you figured out where the world stands from an inventory standpoint. So, let's dive into the details.

Chris: Okay.

Daren: What are the experts saying? So, there's two sources that the world relies on, or the market relies on, for how much inventory is out there.

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Chris: Right. Okay, so maybe it's best to start with the OECD-NEA, and those organizations together put out what's called the "Red Book" every two years. So, in their latest iteration of that in 2018 they put out an estimate of global inventory that was based on all of the uranium that's ever been mined. They subtracted from that all of the uranium that's ever been used in reactors. They came up with a number, about 1.3 billion pounds. I think that could be a little low because they don't include anything in there for, you know, what we would call recycling. It's stuff that's been used [and] they reuse it. So, that could add another 200, 250 million pounds maybe to that number. So, if you add that in you might have a 1.5-billion-pound inventory, so that's the first place to start.

Daren: That's compared to consumption of around 190 million pounds a year, but we always round up to 200 when we're trying to give a big overview. So, that was scary. When I ran across that inventory number the first time, before we made the decision on our thesis, I was like, "Well, come on. We're not going to buy into an industry that has seven years' worth of inventory." Anyway, I just wanted to inject that because it's a big number, it's scary until you really start digging in.

Chris: It is. Maybe we'll dig into that in a minute, but I

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just want to talk about the second source of estimates for inventories is Ux Consulting, which is sort of the big industry information source that a lot of people rely on, a lot of utilities rely on them for their information. So, Ux Consulting has taken three shots at inventory estimate: the first one in 2015, they said there was about 1.1 billion pounds of inventory; and then they came out in 2018 with a number of 1.8 billion pounds; and then they just recently did another estimate that came in very close again to the 1.8 billion pound figure. So, as we look at these big numbers maybe we should think about diving into what that might be comprised of.

Daren: Yeah, and why we've concluded that there's not too much inventory out there.

Chris: Yeah. Okay, so if you look at it the first, say, big piece of inventory would be—I would call them US and Russian Cold War stockpiles. Estimates for that range, you know, in the Ux Consulting piece where they estimated it to be 1.8 billion pounds, they put those two numbers together—the US at 240 million pounds, Russia at about 360, 370 million pounds. Their earlier iteration of that was closer to 400 million pounds, so somewhere in the 400 to 600 million-pound range for that. And then China has also built up substantial inventories over the last ten to fifteen years to supply their future needs, because they actually don't produce very much uranium in the country, but

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meanwhile they are in the middle of a huge buildout where, by the end of this decade, they'll be probably the largest user. We believe they will surpass the US sometime in the 2020s, so their demand is gonna go from currently maybe in the low twenty million range per year, to fifty million plus by the end of the decade. And so, they've built a stockpile up—again, it's an estimate—somewhere in the 400 to 425-million-pound range. So, you put those two together and you have somewhere between 800 and a billion pounds, and then the other big buckets would be utility inventories for consumption in existing reactors. And so, the big sources of those inventories are US, and US inventories are well-known, they're tracked by the government, and they just came out with the year-end 2019 estimate that is about 110 million pounds of US inventory. European inventory is in a similar range; 110, 120 million pounds. And then, Japanese inventories are a little bit more of a question mark, and that's probably where a lot of the question lies because of what happened with Fukushima in 2011. The estimate range there is probably in the 170, 180-million-pound range. So, when you put those three together you get another 400, let's say, a little over 400 million pounds. So, you put all that together and that's 1.3 billion pounds. So, we're accounting for a lot of this inventory, and then maybe taking a step back—I know we already talked about this a little bit but the utilities—say, the US utilities and the European utilities—like to have, you know, at least

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two years of inventory on hand. There's a process that takes a while to take it from the ground to get it into the reactor, and so they like to have at least two years, which is about where they are right now so, you know, inventory levels are not high. And then, in terms of the remainder of inventory out there, suppliers—the Camecos, the Kazatomproms of the world—usually like to keep about six months of inventory. Cameco, over the last couple years, has really sold down their inventory by a lot and they are actually below that six-month range and probably down to the three-month range as of now. Their inventories are below where they want them to be normally. And Kazatomprom's are probably at about six months, but they also might have to come down too here, as their production cuts start to kick in here due to COVID. So, supplier inventories have been coming down and are at—the two biggest suppliers are fairly tight. And then you have the element of traders, which is somewhat unknown how much they hold, and, you know, investment funds, so uranium participation and yellow cake. And, you know, those guys have been buying uranium and they probably are not gonna sell it till it goes up fairly substantially from here. So that's kind of the overview. There are some big numbers out there; you know, I would say we probably lean more towards the Red Book number of maybe 1.5 billion. You know, we don't think that there's a lot of extra inventory out there.

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Daren: No, that's a great overview of where it's being held. But it's an opaque market, so there's still ranges. I mean, people don't know for sure.

Chris: Right.

Daren: Let's talk about what might be for sale. So, we can go…do the same thing, go around the world. So, if the United States has over 200 million pounds that's held by the government, right?

Chris: Right.

Daren: And we actually have pretty good insight on what's happened historically. So, I guess that maybe before we get into it—what's held by governments is generally separate from what's available for fuel for utilities. Now there is gonna be some overlap, which we'll get into—like China, being exhibit A—but as for the United States, the United States government owns that uranium. They've owned hundreds of millions of pounds for decades, so maybe tell the listeners what's happened historically and what's happening now, and don't we think that's all gonna flood into the market?

Chris: So, the US, until recently, the Department of Energy has sold some small amounts on an annual basis into the market—something on the order of, say, five million pounds. They stopped doing that a couple years ago, you know, at the urging of the industry, because

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it wasn't helping producers to have the extra pounds being sold and it wasn't adding a lot of money to the US government coffer, so as of now the US is not a seller of those excess Cold War pounds. So, that's one piece that's not a seller.

Daren: So, we know the United States, even when they were sellers, the government was only selling five million pounds a year. If for whatever reason there's a change in administration and a change in policy, and the Department of Energy starts selling those five million pounds again, that's fine. Our model can absorb that. The structural supply deficit's more than that five million pounds.

Chris: Right.

Daren: Well, let's jump right to the US utilities. Maybe we could do it geographically. The US utilities have about 110 million pounds, and we think that's about two years' worth of supply.

Chris: Annual consumption's in the fifty million-ish pounds-a-year range, so just a little bit over two years of supply. The utilities like to have visibility into their supply, 'cause it does take a while to get the uranium from the ground and to the point where it can be put into a reactor, and so they don't like to go too far below two years. So, they're not sellers. You know, in fact their inventories have been coming

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down here over the last several years, and we think that they are now in a position where they're gonna have to be buyers. A lot of the contracts that they signed five, ten years ago are expiring and so they're going to have to be in the market to try to get new uranium supply.

Daren: Yeah. Maybe to add a little bit of color to that—so the US utilities have been taking delivery on less than what they have consumed for the last several years. This year is actually a surprise that the most recent data that you referenced early—I think everybody was a little surprised that their inventory didn't come down again this year, but—

Chris: Right.

Daren: There are nuances about it that aren't worth getting into. But if you look at it on a multi-year basis, the US utilities have been buying less than they've consumed and we think going forward, they're going to have to take delivery on at least as much as they consume because their inventory levels are getting down to about the two-year level. You know, one thing I don't think that's come up yet is the fuel cycle. The fuel cycle is around eighteen months, so if you think about it in terms of work in process, US utilities can't go much below two years. Again, I'm taking some liberties with the details of the fuel cycle, but in a steady state environment the utilities

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need two years to process the fuel and go from raw uranium to actual useable fuel, and so therefore they really can't go below two years' worth of what's referred to as inventory.

Chris: That's right. There's a whole process where you go…you mine the uranium, and then you mill it into yellow cake, and then you convert it into UF6—uranium hexafluoride—and then you enrich that, you have to spin it in centrifuges to enrich it…All these things take time, and it's about an eighteen-month plus process. So, you need to know where your uranium's coming from at least one and a half to two years out.

Daren: So, I'm not very good at leading these podcasts, we haven't done very many of them so I'm kind of jumping around, but that's as good a time as any to go back to the big picture, and let's say there's 1.4 billion pounds of inventory out there, there's 1.4 billion pounds of uranium floating around the world. Commercial consumption is 200 million pounds a year. [If] it takes two years to process, then by definition you should always have 400 million pounds of inventory. So, if everything is working perfectly, and no government had any inventory, you would always have 400 million pounds of inventory, so keeping that 1.4 billion number in mind. But, as we've discussed before, utilities need safety stock. Utilities are not going to live hand to mouth. And particularly in China, where they can't domestically supply their

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needs, their demand, they're going to hold a certain number of years of safety stock. But that's true even of the United States—or, it used to be and it probably should be. So, now it comes down to the question of where is that safety stock? Is that held by the government, in the case of China and Russia, perhaps? Or is gonna be held commercially? But regardless, there's going to be a certain number of years of safety stock. When I'm thinking about this conceptually, it doesn't necessarily answer the question of how much inventory is out there today, but if you go, "Well, there's an extra billion pounds, over and above what would be in work in process," that's still only five years' worth of safety stock.

Chris: That's right.

Daren: Which really isn't that much, before you even consider national defense issues. Anyway, like I said, that was a bit of an interjection and a little bit of a non-sequitur, but sometimes it's how I think about it.

Chris: That makes a lot of sense, and I think Japan at one time had a policy of having eight years' worth of inventory on the ground, because they import it, they don't make it, and I think that's part of the reason why China has built up 400 million pounds, because that's probably, as you look at their buildout, that's probably ten years and, again, they don't make any.

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They own some mines that are producing but they don't have a lot of production in-country. So, when you're putting [in] billions of dollars per reactor, you're gonna want to make sure you have the fuel to run these things. And then another estimate that we recently saw from UFC's newest estimate of inventory was that they say that there should be sort of five years of commercial inventory in the chain, right? And that gets to maybe what you're talking about in terms of, say, you have two years of work in process, two years of actual inventory…So that gets you up closer to a billion pounds of commercial inventory and, again, there's some question mark about what you'd call Chinese inventories right now—are they commercial? Are they government? —but that still would, again, would not leave you with a lot of extra when you just use the US and Russian strategic stockpiles.

Daren: Yeah, and I guess, maybe we could wrap up that big picture by talking about the inventory that's held by Russia and China is not for sale. I hope we've talked about it enough that the listener would understand why we'd say the 400 million pounds that are held by China just aren't for sale. Some might leak out, or might be used to supply consumption, but…

Chris: Yeah, Russia is very much of a black box. People don't really know what their centrifuges are doing, how they're operating, but it's not as if that 360 million pounds is going to flood the market.

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Daren: Right. Again, I apologize for being all over the place but, as far as Russia specifically goes, they have a national industrial policy to export their nuclear construction expertise. So, they're actually marketing their ability to build a nuclear power plant for other countries, and as part of that deal they agree to supply that nuclear power plant with fuel for the life of that plant. And so, if you look at the deals they've done over the last ten years, they actually need those 360 million pounds to meet their obligations. So, at the risk of confusing people new to the space, the main message here, talking about inventory, is that Russia doesn't have enough inventory, when they're looking out ten years, to be selling it.

Chris: Right.

Daren: They need that inventory to meet their future obligations, which is reflected in our supply and demand model.

Chris: Yeah. So, I think we've kind of looked at the industry and thought that in 2010, 2011—before Fukushima—the industry was probably in reasonably close balance. The uranium price was close to what we think the long-term incentive price should be—somewhere in the sixty-five dollar-a-pound range. And then Fukushima happened, and overnight we lost twenty-

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two to twenty-five of annual demand, and so there were various puts and takes in terms of some new mines coming on, some existing mines closing over that time period but if you look at it broadly, it was probably in the neighborhood of twenty-five million pounds a year of inventory built up for seven years. So, let's say 175 million pounds of inventory built up. You know, we went from a balance, to 175 million extra by 2017—most of that was delivered to Japan under contracts—and so the big question mark in the industry is what's going on with that? Most of the people that we talk to and most of the people in the industry think that Japan is still holding on to most of that inventory, and that it's not for sale. In our model, we assume that, say, half of it is for sale. So, let's say eighty-five, ninety million pounds is available. Now over the last two years, 2018 and 2019, we think inventory went down by about twenty million pounds a year, so that cuts that to forty-five, fifty [million pounds]. This year we thought it was gonna go down by another twenty to twenty-five million pounds but, as a result of the Coronavirus, Cameco closed its Cigar Lake mine, which is an eighteen-million pound a year mine, and Kazatomprom also announced that they were gonna be cutting production by ten million pounds a year, and both of those things were originally supposed to be till June. We haven't heard yet about any restart. News out of Kazakhstan seems to be that the virus is still pretty strong over there so we would think that might get continued and that ten

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million figure could go higher, but either way it looks like about at least twenty million additional pounds are going to be unavailable this year as a result of COVID, maybe more. So, we thought at the beginning of the year that we're forty-five to fifty million extra pounds, and now we think this year that most of those pounds are gonna be consumed by the market and that by the end of this year, if you assume that half of those extra inventories that went into Japan, that were sort of commercially available, mobile, that they're gonna be pretty well exhausted by the end of the year. And then the market, which is in a deficit and using that inventory to fill the gap between demand and supply, is gonna be trying to figure out where to get those extra twenty-five million pounds next year. So, that's why we're bullish right now, that's why we think uranium prices have to go higher soon, because we don't think there's a lot of inventory out there and it's needed next year.

Daren: Yeah, that's a great summary. Regarding Japan, I thought it was a really interesting and potentially informative data point that they entered into a supply agreement for the late 2020s with Uzbekistan, right?

Chris: Yep.

Daren: Why would they be thinking about where their uranium's gonna come from in the late 2020s if they're awash in inventory? So, I guess the point is if they

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were looking to buy in the late 2020s, that tells you they're not really sellers now. Why would they be sellers?

Chris: Right. You know, all of the anecdotal evidence and all the people we talk to say that Cameco, for example, has been trying to buy uranium for the past year and a half because they've been short, and they say that Japan is not a seller. I also was on an industry conference call the other day where one of the participants said that the mobile number of pounds that are sort of available to the market is somewhere in the neighborhood of twenty million pounds, so that's even lower than what we think, which certainly is possible. If Japan isn't selling a lot of that inventory then our number would be too high.

Daren: Right. Yeah, and I know I'm just gonna repeat what you said earlier about why are we so bullish right now? We're long-term investors so when we say "right now," we really mean in the next twelve to eighteen months but, you know, we're hopeful it starts right now. But we really are optimistic that this bullish thesis starts to play out in the next twelve months because we believe the world is out of mobile inventory, that the inventory that people are counting on to meet this supply deficit in the near-term isn't there. So, we started out talking big-picture, and I threw a lot of conceptual things out there for why we could be almost out of inventory, using the 1.4

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billion number, but when you're talking in such big numbers you could be off by quite a bit. You brought it down to: well, what happened since Fukushima? So, I just wanted to reiterate that we use the assumption that the market was pretty much in balance, there wasn't excess inventory in 2010, 2011, right before Fukushima, for two reasons: we went through a huge bull market, the price of uranium went to 140 dollars, and that doesn't happen when the world's awash in uranium and excess inventory. So, we believe that the market was tight, basically in balance, or that wouldn't have happened. And then, as you said, once we got closer to 2011, you know, it's kind of settled back down into the marginal cost of production in the sixties. So, it was really Fukushima that put the world in an excess inventory situation. Up until then you could watch production pretty much meet consumption. Production and consumption were pretty much in balance. Post-Fukushima, production exceeded consumption. So, you could look at it year by year and aggregate it, and between 2011 and 2017, according to our estimates, the world produced around 175 million too many pounds. So, there was too many pounds floating around, there was excess inventory. So, that's okay, that doesn't mean that we can't have a bull market. So, the key is to figure out when is that 175 million gonna get soaked up, which, pre-COVID we thought was gonna happen in 2021, 2022, and COVID really has pulled that forward by maybe six or twelve months depending on how much disruption there still

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will be ahead of us. So, the world will find out that that inventory isn't out there. We're talking about a market that's in a supply deficit in really as early as 2022, 2023, and in nuclear power terms, that's tomorrow. They have to know where their fuel's gonna come from for those years if not now, within the next twelve months. That's really too many words to explain why we're so bullish, but it does come down to inventory. I mean, I know that a lot of people talk about shut-in supply—that's a good reason to be bearish. Why be bullish, 'cause there's this shut-in supply? But I actually don't understand that, because that shut-in supply's not coming back on until the price is higher. Cameco has said so flat-out.

Chris: Right.

Daren: Taking those statements at face value, McArthur River and probably Cigar Lake's not coming back on until they have long-term contracts in the fifties.

Chris: Forties and fifties.

Daren: And we still think there'll be a supply deficit even after that, which we covered in a different podcast. I'm convinced the issue is how much inventory is out there? And we think it's gonna be gone. Once that excess inventory goes away, which we think is imminent, it's really off to the races.

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Chris: Yeah. Yeah, and you mentioned one thing there that's very important, is that the price of uranium did go to 140 in the last bull market in 2007. That was despite, you know, these big numbers—whatever you want to use, 1.1, 1.5, 1.8 billion pounds—that number was higher, however you want to measure it, in 2007. And the price still went to 140, which tells you that a lot of those pounds are just not available to be sold into the market and they will not be sold, so that all helps to make the number a little less scary, also.

Daren: That's a good point. That's great. Alright, well we probably forgot something, but let's leave it at that for now. I appreciate all the work you did and appreciate your thoughts on uranium inventory.

Chris: Yeah, thanks. Always good to talk.

Daren: Alright, I'll talk to you soon.

Chris: Alright.

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