



## North America Site Visit Montreal Presentation: Q&A

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### Q&A

**Tom Gallop:** Thank you, Jérôme. So there's a couple of roving mics in the room. I just ask, before you ask your question, make sure you've got a microphone. Please announce your name and your organisation. And if we could just limit it to one question and one follow up, that would be great. Jason, we can start with you.

**Jason Fairclough (Bank of America):** Thanks so much for the presentation. Just in terms of these targets around increased EBITDA margin and increased ROCE. Over the years, we see quite a few of these from lots of different companies, and they tend to just sort of disappear with inflation. So I guess my question to you is are these real numbers? Should I actually be looking at permanently increasing long run margins in this business, or is it going to disappear in inflation?

**Jérôme Péresse:** These are real solid numbers on average over the cycle. Meaning can we guarantee this number if LME collapses for a year? Probably not, because there are downturns in the market that we will need to weather. Average number of the cycle, it's solid, it's presented to the Board, and there are a set of actions on the numerator and the denominator that we strongly believe in. So they are not going to disappear. I'm not going to come in one year and tell you, by the way, we're not going to deliver them.

**Jason Fairclough:** The increases in ROCE. Can you break down how much of that is a numerator effect and how much of a denominator effect?

**Jérôme Péresse:** Maybe Ulric? Maybe you can answer that. You may answer and then I'll build up, Ulric.

**Ulric Adom:** The bulk of our efforts obviously are on the numerator. So that's really driving the EBITDA margin uplift that we have said. And that's really what will drive most of the effort.

I think on the numerator, we are trying to be opportunistic and deliberate. So opportunistic is I explained what we're doing on trade working capital. I think we are also always looking at our asset base. Do we need those assets or not, and can we be opportunistic in the way we think about our asset base. But then that's really the discipline part, which is investing at the right level.

So we know our asset base is going to increase for a certain number of reasons that I have explained, reinvesting in our hydroelectricity, we have some investment coming on ELYSIS. So we need to target our capital intensity, being very disciplined. Then you maintain this base level on your denominator and then you

drive the efficiency on your numerator. And that's what really - that's what makes us confident that this is not something that is disappearing because you're driving hard your numerator.

**Jérôme Péresse:** Exactly. And just to complement what you said, we feel really good about this. And we spent some time on our strategy. We feel really good on the action on the numerator side. We think we have a strong plan on trade working capital. Then for the rest of the denominator, it's about what Ulric says, how do we balance the CAPEX need for an asset base, which is large. And you will see tomorrow in Saguenay-Lac-Saint-Jean that it's not only about smelter, it's refineries, hydropower, electrical lines, trains.

So some of the assets will need investment. Some of the assets will have to be more tactical and opportunistic. We don't need all of this, we have a number of what we call non-controlled operations, which are minority participation. So I think there are trade-offs that we need to make at the denominator level.

**Dominic O'Kane (JP Morgan):** So a similar question. So on the margins, can you maybe give us a sense of what percentage of your portfolio today doesn't generate a 20% EBITDA margin? And within that, can you maybe give us a sense of the geographic split across the portfolio?

**Jérôme Péresse:** Alumina refineries.

**Ulric Adom:** So I think the first is the alumina refineries. And you have seen on the curve, and we don't expect those to reach the 20% margin. I think Amy has explained that we are thinking about this as a tolling business, but we are very clear that they need to generate sufficient returns to justify the level of investment and this precise aspect.

So I would say that's pretty clear on the alumina refineries. I think on the smelters you have seen, it was mainly a backup play. And as you know, for a long time, our smelters in the Pacific have benefited from cheap coal. And I think Jonathon alluded to that. This has reversed. So that's why it's so important now to drive the competitive decarbonisation. So those assets will continue to be challenged over the next three, four, five years as we come to the end of those contracts. And then when the repowering kicks in, that's when you drive those aspects.

I think we still need to weather the next couple of years for those assets that will continue to be challenged because of their energy contract. But as we move forward - and for example, that's what we did for NZAS but now it's even more competitive.

And then as BSL will enter and obviously we need to work on Tomago and see what's possible here.

**Jérôme Péresse:** I would say our bauxite mines and probably two thirds - more than two thirds of our 14 smelters, controlled or non-controlled, are above that mark. Ulric, you would disagree?

**Ulric Adom:** Yeah. No, I don't.

**Dominic O'Kane:** And if we fast forward to 2030, should we assume, given the plan, 100% of [higher margin operations].

**Ulric Adom:** Yes, all the - I would say apart from the refineries, all the others will be in this ballpark, that we are very determined. And that's how we want to manage this business.

**Jérôme Péresse:** And any new investments that we will do would have to have value creation that allows them to be above that metric as well.

**Dominic O'Kane:** And maybe one follow up. Could you maybe give us a sense about how - if it's possible, what the step change in ROCE is for ELYSIS? If you're - so if we're talking about a replacement smelter is - where does the ROCE come from? Where should it go to?

**Jérôme Péresse:** I think you should expect ELYSIS to become industrial and commercial at scale not before 2030. I've been - in my previous life, I've been developing technologies like large offshore wind turbines. I'm convinced that the best way to make them fail is to go too fast. So we are going to - we are committed to ELYSIS. We are going to develop it step by step. And we have two big steps, which is this pilot in Saguenay that Sébastien discussed, and also another pilot to do it at 450,000 amperes.

ELYSIS is going to be an investment, and hence a return on capital employed drain up to 2030 before it gets deployed.

**Paul Young (Goldman Sachs):** Can you talk a little bit about the strategy here in Canada. I know we're seeing Arvida in, I think tomorrow. But if I just wind the clock back a little bit, say five or six years ago, Rio outlined potential growth at Alma and Arvida, I think was 400,000 tonnes per annum. And the view back then was that you wouldn't commit to any capital in Canada unless the aluminium prices were about US\$2500 a tonne, right, or thereabouts.

But since then I guess we've seen demand stagnate a little bit in aluminium, but we're actually starting to see some supply side discipline from China and from major producers globally. It looks to me as though primary aluminium supply is not really growing. Secondary is. And it's really now all about supply side discipline and trying to expand your margins. But specifically on Arvida, it's a big capital investment, the \$1.1 billion. How do we think about the economics of this investment specifically, considering extending the life of production here. Anything you can share with us with respect to breakeven aluminium price or what's the return you're looking at from this investment? How do we think about the returns on this \$1.1 billion investment?

**Jérôme Péresse:** So Sébastien maybe is going to help me here. But we think about it as maintaining the level of volumes post Arvida. We think about doing it with half the carbon footprint and probably reducing our overall air emissions by 90%, which will deserve a premium in the market. And we think about a cost improvement. Sébastien will need to help me quantify because I don't have it right in mind.

**Sébastien Ross:** I think our AP60 was important. Nigel mentioned it. Our current AP60 site was a former demo site. We have only 38 pots, so it was not big enough to have, let's say, a competitive price. With that addition of 96 pots, it will be comparable to an AP40 site we have elsewhere and it will replace Arvida. And then I'm looking at the productivity. There is a big productivity uplift given by the technology also because we have 550 people, contractors plus RT employees on Arvida, and we'll have an additional 110 on AP60. So it's both targeting CO2 emission productivity, reducing the costs and improving productivity for sure. And then it will be comparable to the other smelters we have in the area in terms of costs.

**Paul Young:** Yeah, I mean that's sort of helpful. But with specifically with the investment decision. Like what did you sign off on that investment decision? So what did the economics look like? Was it - were your goal seeking for a return, licence to operate? Like what do the economics look like?

**Ulric Adom:** Maybe I'll take this one. So I think there's a couple of aspects. So directly to your question first, the investment in AP60 and our overall replacement programme on Arvida is value accretive, so it fits within the Rio Tinto allocation framework for capital. We are way above our cost of capital, so this is a positive.

I mean, you can look at it the same way we look at our investment across. So I think it's quite important. So that's probably the first element to your question. The second element to answer your question is also. So the way to think about it, you are - we were producing 170 kiloton at Arvida. We are - with the AP60 expansion, we are replacing about 160 kiloton of AP60, and we are adding 30 kiloton of recycling capacity. So you actually have a small growth play.

And then on your baseline of AP60, you're just more productive and more competitive than the old smelter. And I think Sébastien alluded to the fact that it's a technology where we can still drive amperage creep. And so we have margin to further improve this moving forward.

So if I summarise the investment in AP60, yes, there's a social licence aspect. There's a transition aspect. We had to close this asset. But the investment squarely fits into the capital allocation framework of Rio, was approved by the investment committee based on those elements of returns.

And then you add the component of small growth plus much more efficient technology and productivity. And you have a play that is a value play. So I think it's the same way when you think about - when we talk about decarbonisation. We think about our social licence and what does it mean from a community standpoint. But we think about how does that improve the competitiveness of our business.

**Jérôme Péresse:** And last - I mean, as of today, I mean probably 30% progress, we are in line with the CAPEX forecast. So there is no overspend on AP60. So the economic case stands. I mean, when you look at it, the economic case was approved on the basis of value creation instead of the basis of the CAPEX spend - of the CAPEX we planned to spend and the current market assumptions.

And we can spend more time tomorrow. And pointing to Greg our project leader for Rio Tinto Aluminium, we can give a bit more background on project execution tomorrow.

**Richard Hatch (Berenberg):** A couple of questions. The first one just for Will. You've talked about increasing aluminium intensity. But I just wonder if you can talk about substitution demand destruction and such. Like, if you do see prices increase, do you start to see users of aluminium begin to thrift or substitute with other forms of input commodities? Thanks. First one.

**Will Millsteed:** Look, that's an interesting question, because normally we get the question the other way around. Like I get a from a copper analyst, or I get worried about people substituting out of copper and into aluminium, because over the last few decades, we've actually seen about a 1% per annum taken off the copper growth rate, if you like, by substituting into aluminium. Now, that only adds about 0.2% tailwind to aluminium that substitution into.

Look, I probably have to take that question on notice as to substitution out of aluminium, because most of what we're hearing is actually about more substitution into, like the transmission and distribution lines in China, for example, there's more penetration of aluminium going on away from copper. And so there's a few things like that. But no, look, I don't have too many concerns on the aluminium coming out. Perhaps we can

grab you at lunch or in the break, and I'll grab my bigger brain on aluminium sitting over here at another table and we'll talk about it.

**Richard Hatch:** The copper question was the second one on my list, but I'll save that one for later. Just on Amrun, you talked about increasing production. I'm just trying to look at my numbers there. I think it was slated at running at 23 million tons but runs at like 36. You know, if you're talking about taking Amrun up to 50, can you just talk about what that can take your bauxite numbers up to? And I guess there'll be a bit of maybe mine depletion to take off for that. And then what the cost of getting yourself up to that level would - could be? And I guess it would be a long-dated FID.

**Jérôme Péresse:** So the balance is - the balance on bauxite is as we - as you know, our Gove mine is basically coming to end of life in a few years. So to replace this tonnage, we will need to extend Amrun, which is not yet approved, but we think there is a strong case.

If we expand Amrun, as we plan to do it, it will be with a view to maintain our total bauxite tonnage to close to where they are today. Maybe not exactly the full 56, but not too far from it. So that's the plan. And we think we can expand Amrun, again not approved. We are working through the economic case, but we think there is a value creative case to expand Amrun, to replace Gove and maintain the tonnage not too far from what they are today.

I mean, I don't know if we disclose that yet. Turning to Tom. It is part of our CAPEX plan, but not yet approved.

**Tom Gallop:** No, we haven't put any numbers out on that yet. But that's obviously something at the right time we'll provide that detail to the market.

**Alan Spence (BNP Paribas Exane):** Just in terms of the split between value added products and the remelt, looking at the 2030, it looks like the kind of value added, just looking at primaries, only a slight majority of the mixed, whereas actually it was pretty much balanced in '21 and '22. What are the limitations to not going further to increase in that mix even more?

**Amy Abraham:** So the current mix globally prior to the Matalco joint venture was about 50-50. Okay? A little bit more weighted to value-added products in North America versus Asia Pacific. With Matalco, we're moving into kind of that 60% range of VAPs globally and a higher percentage in North America. So what was the next part of your question?

**Alan Spence:** But just on the primary side, what are the limitations to not growing that primary value added product mix more?

**Amy Abraham:** So right now, in everything that we've announced, we're fixed in terms of the amount of products that we're going to produce. And so then it's really with the exception of productivity improvements that you heard it, Arvida, et cetera. So really it's then about shifting between remelt and value added products.

And right now we have a bias for value added products because we are seeing, you know, greater price performance and interest in the market. And that's definitely where the short is right now and is capturing additional value for us.

**Alan Spence:** I'm sorry, maybe speaking of circles, but the target for 2030 is just a kind of small majority being value added. Why not go more aggressive?

**Amy Abraham:** I think that's a good question. Why not more?

**Ulric Adom:** I think if I can just compliment your - if you look at the number this year and when we flex and the years were on the primary, we are slightly below the 40%. It's market driven. I think we - I talk under the control of Sébastien here. But our current primary casthouses are operating around 70% currently based on the - on what we see on the billets.

So as those market dynamics improve, our first aspect is, yes, you want to fully utilize 100% of these tools. So that will provide you, I will say north of 50%, and then Matalco comes on top of that. So I think do we want to increase capacity at this moment? We don't know. What we for sure know is that we'd be able to capture the opportunity to fully utilize our network of primary casthouses. And then on top of that, add the optionality that Matalco is providing to us.

**Jérôme Péresse:** And I'm not sure I heard all of your question, but we don't rule out targeted, value created investment in some expansion of our portfolio for value added. For example, I mean, we announced yesterday in Saguenay that we are going on in our projects to add a billet production line in the Alma smelter, which you will see tomorrow. So there might be some targeted niche investments in value added capacity to make the case and the mix better.

**Sébastien Ross:** Maybe I can provide a more technical answer to the question. Most of our casthouses are connected directly to our pot room. So there is constraint we need to manage. So having, let's say, 100% of value added production connected to our pot room may create some disturbance in the pot room, which is more than 80% of our EBITDA. So we're trying to keep optionality. But we need some sites being able to take the flex, so there is a limit to it. We're not saying there is not additional potential, but I don't think it's realistic to be 100 though.

**Alan Spence:** Sure. Thank you.

**Kate McCutcheon (Citi):** The capital outlook that you gave, you mentioned that some of your Canadian smelters were getting long in the tooth. You've announced the \$165m in June I think at Grande Baie I think it was. Can we get a sense of what's upcoming? You've given that outlook. What's upcoming in terms of refurbishment for the smelters? And then just clarify the Canadian dams as well. Is Rio responsible for any of that upkeep there?

**Jérôme Péresse:** So, I mean, it's hard to be specific to the level of what we disclosed. But when you Ulric says that we plan to have our CAPEX coming back to depreciation, this includes what we need to refurbish our smelters. And I would say our smelter operations are generally, I mean, well maintained. And there is not something like huge coming, as well as maintaining our hydro operation in Quebec, for example, we have one of our big powerhouses in Isle-Maligne, which is going to undergo a very significant overhaul programmes. So that's part of what we need to do.

And when we say we'll get CAPEX to 100% of depreciation, that includes the sustenance that we think we need. And that includes as well, investing in our impeccable ESG framework on a number of fronts.

Then again, when I think about our hydro dams, looking at what we have here in Canada, out of all our seven dams, there are seven powerhouses. There is one in Quebec which needs a significant upgrade and the one in Kitimat will need continued refurbishment. The other ones have been invested and are good to go for the next decade without anything major. Sébastien, you would agree with that?

**Sébastien Ross:** Yeah, I totally agree. Isle-Maligne and Kemano in BC, this is the one going through a massive, let's say, refurbishment. The others, we have a regular programme on the standard on the civil works to take care of. But this is an important part of our, let's say, sustaining CAPEX. But it's well covered in our capital envelope.

**Jérôme Péresse:** And the other guidance I can give you, looking forward. And when you look at our industrial assets, probably the bulk of the CAPEX is going to be expanding some of our bauxite mines, reinvesting in some of our alumina processing facilities, including to decarbonise, versus a major overhaul of any smelter.

**Sébastien Ross:** I see the only two exceptions on which we have two big sustaining capital programme, this is the alumina conveyor, which is in execution in Kitimat, and the anode baking furnace in UGB. But besides these two one and the electrical dam, the rest, let's say it's regular CAPEX.

**Jérôme Péresse:** It's more the upstream of the value chain than the smelters that needs investment.

**Kate McCutcheon:** Okay. That's helpful. And then maybe one follow-up just on the Matalco acquisition. I think in 1Q you did about 140,000 tons on 100% basis, and you called out weak operating conditions. In last quarter, you mentioned weak operating conditions for the Matalco production, for the acquisition that you did. Are those weak market conditions persisting? Or is there anything you can say? I'm just trying to reconcile last quarter versus the outlook that you've presented today.

**Jérôme Péresse:** I think on Matalco, I mean, we said we are all and particularly myself, who just joined at the time it was closed, absolutely convinced about the strategic logic. I think we are suffering from two things on Matalco today in terms of the quarterly performance. One thing is a low market in terms of the extrusion market in the US, which is primarily driven by the state of the construction industry. So there are hopes that this will get better after the election and when the interest rates getting lower. But we are not waiting - sitting and waiting for that. I think we are working on the cost of Matalco, on the fixed cost plant by plant, to get to a better structure.

The second thing that Matalco is suffering from is more expensive access to scrap. And here I think there is a game that we can play in the next few quarters, which is help them to get access to more pre-consumer and post-consumer scrapping. We have access to a number of consumers down the value chain so we can help them unlock access to some of the pre-consumer scrap with technology - and Nigel can say a word on that later on - we can allow them to process post-consumer scrap, which is a different level of purity.

So on one side, at some stage the market will get better, but we are working on the cost quarter after quarter to improve the performance and we start to see some benefits on it in the second half of the year, and then we have to help them get more options for scrap sourcing, which is more medium term, but something that we are convinced we can play a difference.

**Andrew Byrne (Wellington Management):** Hi. Andrew Byrne here from Wellington. Quick question. You've got a slide on page 31 showing Pac Al moving from the fourth quartile to about the middle of the cost curve. Sorry if I'm not being too sharp here, but exactly what is it that's driving that cost change in the base there?

**Jérôme Péresse:** It is the blended cost. I mean, Australia is blessed with very competitive solar and wind resource. So what's driving that for Boyne in particular is the blended cost of our solar and wind and battery resource that will secure the PPA with the additional benefits of being able to play a bit of the energy trading game during the day, as Jonathon explained, and providing demand response service to the network, which gets to a net electricity cost, which is much better than we have today on our current supply contracts.

**Andrew Byrne:** Okay, that makes sense how it improves today. Last time I checked, though, China's pretty good at building aluminium smelters, renewables, and has a very strong power demand drive. So what changed? What - why can't the second half of the cost curve that's predominantly China follow that route and then you have a flattening of the curve.

**Jonathon McCarthy:** It's the most important question for the future of the aluminium curve, which is where do you see evolution of people being able to access energy markets to do that. And so exactly the recipe that we're talking about to use at Boyne, can that be deployed elsewhere. And you need a few conditions. You need open market energy - open energy markets where you can, as we described, procure low-cost renewables, but also sell back a bit during the day. And so parts of the Chinese market don't create that dynamic. They end up being a price taker to energy. We can play on the other side. It's the same here, some of the regulated markets in North America, you have to be a price taker on the customer side. So the Australian energy market dynamics actually give us a bit of that opportunity.

Now they can change over time. But also if you look at where is the production located. And we'll show the chart that it's been moving, but it's been moving at a rate that we can see, that we can forecast. We have good connections into that industry and all of our analysis at the moment - there's another slide in here I'll try and find you the number - but our analysis is telling us that we think that the aluminium curve will actually steepen over the transition before it gets back out to fully paid down energy grids and flattens off well into the future. And then you get your competitive advantage for this business from different angles where we've been ahead of that curve. But we also have things like ELYSIS and access to different markets that not every smelter can access.

But when we talk about that transition period, I'm describing a 20-year period, not five. And so I think as I open, it is the right question. But our best analysis tells us that the aluminium curve and what we're seeing globally is that energy prices are actually going up for industrial consumers. We think the period where they might come down on masses is well into the future.

**Andrew Byrne:** Can I just ask one question on tariffs? How do you guys think about the risk of tariffs in a Trump regime? Is that a zero-sum risk for you guys, or how are you thinking about the impact on your business?

**Jérôme Péresse:** I think the reality is, as Amy explained earlier, there is very limited US based production aluminium capacity today and even less so low carbon aluminium production capacity in the US, one.



Second, so if the tariff were to increase, then the alternatives for Canada supply would probably be supply coming from elsewhere and Canada into the US, which already undergoes today significant tariff and may undergo even more tariff in a more fragmented world. So until the best way I can say it, and Amy please tell me if you disagree. Until there is ample local supply in the US of low carbon aluminium, I don't think a tariff increase is a major short-term risk to our business.

**Amy Abraham:** No. I think the US, which is the biggest consumer of aluminium in North America is very dependent on the supply coming in from Canada. I don't think we want to mess with that. So as I said before in my presentation, there are only four remaining smelters in the United States, and there's very little announced or I don't believe there will be any primary production really being built. So I think that level of reliance on Canada is going to continue supporting the tariff scheme in place.

**Grant Sporre (Bloomberg Intelligence):** It's a follow up to Andrew's question. I'm just trying to think through the practicality of playing the power arbitrage game. Do you envisage somebody making the decision that, what, 16:00 in the afternoon and sort of saying, well, we're going to make more money producing aluminium or power and then turning down the amperage? And then the second part of the question is if you actually turn down the amperage in a pot, it does create sort of operational instability. So how are you going to factor that in?

**Jérôme Péresse:** So just to be clear, first, we can't stop the smelter like that and reopen it as you well know. So there are some extreme situations and it's public in New Zealand, for example, a few months ago as part of the new contract for NZAS. We have a provision where the grid operator, the utility can ask us with notice to shut down some pots because there is very low water in the dam and we are doing it.

So in New Zealand, our contract provides with the right notice, the ability to bring down production to cover basically the lack of water in the dam, which creates a potential shortage and get paid for it. So that's the kind of the extreme. But - and that takes a few weeks to come down and a few weeks to come up. So we cannot do it like that. Otherwise we need to operate our pot on a continuous basis.

This being said, I mean, as Jonathon explained, we have the ability technically by managing what we call flex power, coming down 10% for one hour, 20 - on amperage, 20% for two hours, maybe over time, 30% for three hours. So we can - with R&D and with deep knowledge on how we operate, we can get that.

And then you get into something which is quite meaningful in terms of allowing the grid to manage the peaks. And here also you get paid for it. So a big part of the R&D that we are doing is flexible management for our operations to get compensated for that without affecting the stability of the pots, nor the aluminium production. And that's what I say.

Well, we have to realise. I mean, we - my team will correct me, in New Zealand, I think our smelter is 30% or 40% of the electricity demand of the South Island. In eastern Australia, I think we are around 12% of the electricity demand for eastern Australia. So we are a big part of the energy system where we operate, and the ability to provide this service is going to be important. That when I say we are in an aluminium game, we are in an energy game. And it's also going to be when we have a fully repowered Boyne, how do we manage during the day, the daily arbitrage between the way we operate the smelter, the battery and the renewable source?

And that's a source of upside. We need to get smarter and smarter on this. But we can't stop the smelter like that.

**Grant Sporre:** Okay. So just to follow up. So I mean, today, do you have the technical capability to do that, or is that still something that you need to develop?

**Jérôme Péresse:** We are - we have it and we are trying to test the limit of it. We can - today, we can do - I mean, Nigel, maybe we want to take it. We can do.

**Nigel Steward:** We do have the technical capability to do it. For example, that modulation between day and night. We've done this before in Alcan, in our smelters in Brazil, where we had high power costs during the day and low power costs at night. So we used to cycle and it used to be plus or minus 5% to 7%. And so that standard practice.

We can shut down a smelter. And we do this in Quebec, like for example, our Alouette smelter. In our power contract, we can shut down for about two hours completely and then restart without a problem. So we offer those sorts of services during the winter here in Quebec.

And the other things that we do. If you're on a power grid, one of the most critical things is when the frequency of the grid starts to drop because of high demand on the grid. The grid needs a sudden injection of power, and that's absolutely critical. If the grid frequency drops, the whole grid collapses. And that's what a smelter can do.

We literally switch off the smelter for five seconds to inject the power. So there's those sorts of offerings in the power system as well. So - but like Jérôme said, what we're trying to do is when I talked about that plus or minus 5% to 7%, the experiments that we're doing now in our research facilities in France is to push that even further, more extreme.

**Jonathon McCarthy:** Hi Grant. Perhaps, if I can just add, because your point is well made around in the short term, these are - we're talking numbers 5%, 7% reaching to 10s, 20s. The core of what we're doing right now in Queensland is a slightly longer energy position.

So if you think about the megawatts, we're taking up 1.1 [GW] of solar, 1.1 gigawatt of wind. This is a smelter that when we get it back to full pot line capacity, is 960-megawatt nameplate. So if the wind is blowing perfectly in that spot and the sun is shining, we'll have double the amount of megawatts at that moment. And as everyone in the room knows, it's variable throughout the forecast. But by having that portfolio together with the batteries we're looking to contract, we have a slightly different edge to everyone else in the power market, because in the middle of the day, all you can do if you're an energy operator is charge your batteries or sell at a low cost, and we can turn it into a product that holds its value, sits on a stockpile, and we get it out to our customers.

So by having a slightly longer energy position than we have had before, we now have that ability to properly arbitrage within our energy portfolio back to the grid, to the smelter or into the batteries and all of our back test, and fore tests on that - in that market tells us that we can make some margin there, and it changes this.

When you add on that technical capability, you really supercharge that capability. But for right now, it's using our endowed asset base, which is an ability to take cheap energy into a stored product that no one else in that market has.

And the final point I'll make for you is what do we really want? And as Jérôme and I have described today, we are playing somewhat an energy game. That's always been the case in aluminium. We're just harnessing that in the future. We also have an extremely strong ability to get these assets into the grid at a cheap cost. So a PPA backed by Rio Tinto for 20 years can attract significantly strong finance. And we're such an important part of the grid, we can help to get that placed into the right part of the queue to get built into the right part of the transmission network to reach us and into the right part of our business and the region. You add those factors together, we're bringing online wind and solar that has structural advantages in where it's positioned, how it was financed. And so you're hitting those electrons into the grid at a cheap cost to our benefit.

So you're starting off at a nice advantage. You're a little bit long so that you can play that. And then you put technical capability on top in the next decade. Those steps actually mean that we're playing energy quite differently to a price taker that we've been for 20 years in that market.

**Jérôme Péresse:** And it's not only an Australia and New Zealand topic. I mean, here in Quebec, as I said, I mean, we are self-sufficient for 90% of our needs, which means at times we pull power from Hydro-Québec. At other times when there is a peak, Hydro-Québec asks us to help and we modulate our production to help Hydro-Québec. So it's a reality for the smelters everywhere we operate.

**Sébastien Ross:** And what's interesting in Quebec, we can do it with the smelters, but with the power dams also. So we're doing both.

**Grant Sporre:** No, I think I didn't quite appreciate if you - to play the game, you need to be probably slightly long.

**Jérôme Péresse:** And if you go to the end and then at the end when you have solar, wind and batteries, you need to have an ultimate resource in terms of firming. When you have no wind, no solar and your battery is empty, you still need to run the smelter. So you need a backup. And the cost of the backup is the last piece of the economic equation.

**Austin Yun (Macquarie).** Just in the presentation, you mentioned that you want to see more growth coming out of North America. And I can see that to create a successful recycling business is one of your key priorities. Just wondering, what's the ideal split between your primary and recycled product offering? Are you there yet?

**Jérôme Péresse:** So today we have 3.3 million tons of production and capacity of primary. We have 900,000 tons of capacity in Matalco. I mean, I wish we'd probably be a little more balanced with more secondary over time just because secondary growing more. I think one, everywhere we have primary, we should have a secondary business. So for example, in Australia, we are looking at options. The constraint in Australia is most of the scrap gets exported to China. So there is an overriding issue around developing secondary in many places, which is at some stage we need to have less scrap going to China and more scrap processed locally. But if you ask me, I probably wish it would be two thirds, one third.

**Austin Yun:** Just quick follow up. Would that come from the current joint venture or would you expand to outside of the JV?

**Jérôme Péresse:** In North America, it will come through the current joint venture because first it's the legal agreement we have. And second, it does make sense. And one of the beauties of being in secondary is it's like - I mean, you have this map of a cast house and then you can try to figure out particularly when the market is going to get better, where do I have access to a pile of scrap, either because of our Matalco partner or because of our customers? Where do we have customers for secondary aluminium? So where do I need to build the next cast house?

One of the beauties with secondary is when you invest in primary, you start discussing a few billion investment. When you invest in secondary, it's much smaller investment and you can try to fill them up with much smaller investments where it makes sense. So, part of the development for Matalco going forward, when markets are better, is how can we expand our network of secondary cast houses in the US where it makes sense and it's cheaper, lower capital.

**Glyn Lawcock (Barrenjoey):** You've talked about the cap in China, but they're investing now heavily in Indonesia, Guinea. CBAM may not apply to those countries. They may not want to play. If that's the case, how does that change your view of the cost curve? You talked about a step up in the cost curve. But if we continue to see investment elsewhere, how does that change?

**Jérôme Péresse:** I mean, actually, there was a slide that Jonathon showed, we're showing the cost curve and also the CO2 curve, because now we tend to look at the two in parallel. Today, we see investment in aluminium smelting, as Amy said, I mean primarily high carbon, primarily India and in Indonesia. We think most of this will go and capture the growth in what we call the Global South, because that's where it's competitive rather than being competing with us in our core North America, Japanese, Korean markets.

So we kind of see a bit. We don't see it being heavily competitive in our most established market by the combination of trade barriers into the US and high carbon content.

**Ulric Adom:** We talk about the cap in China at 45 million tonnes. We actually believe that the demand within China will continue and will be above this. So when you think about Indonesia and what they are doing for Indonesia and the capacity here, we think about that as a principal feed into the need of China from a primary standpoint, notably because of the cap. So that's some of the market dynamics also that are at play here.

**Jérôme Péresse:** In summary, we see China demand being covered by China production and probably some Russian imports into China more and more. And we see most of the capacity in India, Indonesia going into global - into the global south. Amy?

**Amy Abraham:** China's going to be a net importer, right? So they're still growing. They want to support their semi exports around the world. And with the 45 million tonne cap, they're now starting to add recycling capacity. So the 45 million cap continues to supply their semi fabrication needs. But they're going to need more primary. So they're starting to set up integrated supply chains that you just referenced. So they're going to continue to be a net importer for primary.

They typically want to take primary products and turn them into semi-fabricated products. The government has put again a tax on exports really influencing them, similar to what Indonesia has done to focus on improving the quality and the value of the products before they're exported. So they've got like a 12% to 13% export cap and don't think that's going to be removed either.

So, again, all markets are short. Outside of China, there's new capacity going into India. It's Indonesia. Those markets are long. And so they're going to find additional homes. They're going to find homes typically in Europe and in the southeast of Asia.

**Jonathon McCarthy:** Glyn, I might just add one thought - you made a good point about CBAM's ability to get across all of these markets. But one thing that's very new, and we're watching closely, and some of you might be also is the expansion of the emissions trading scheme in China. And so China's expanding scope, and the way they're ratcheting up ETS over the coming years for industry is worth watching and plays into this narrative because it puts them inside of the - you know, China's production in this market goes inside of the tent of where does carbon matter as opposed to sitting on the outside as you describe. So it's certainly happening now as we're all working to understand where it will land.

**Glyn Lawcock:** Thanks. And just a follow up. Just you talked - I know we're talking about aluminium, but there was a slide you talked about premiums for iron ore for high grade. With Simandou coming on 120 million tons of 67%, how does that play out into your thesis of better premiums for high grade?

**Will Millsteed:** Look, I think - as I described, I think there's two things that are going to happen in the iron ore market over the next 20 years. Existentially, the iron ore market can't exist without a big breakthrough on an electric melter, and that will inevitably happen. It's not a question of if it will, it's when. But in the meantime, as I mentioned, there's only one proven route really DRI EAF for decarbonisation of the existing steelmaking that we do, and that's probably going to dominate for the next ten years.

I think there's easily enough high grade demand, if you like, to soak up Simandou, to soak up the existing high grade ores that are out there in the market, as well as IOC.

Look, that - yeah, that's it. I think the only thing that sort of dents that would change that outlook, Glyn, is if you believe that carbon pricing was going to come on somehow slower than we do, or some sort of structural change in profitability of steel mills, more profitability equals higher grade premiums. No profits equals lower grade - sorry, lower high grade premiums.

**Matt Greene (Goldman Sachs):** Just on Nuton. There's a lot of different catalytic additives out there, Jeti, but can you just talk on what it is you're adding in there? Because, I mean, I get the sense that there's a bit of pyrite, arsenopyrite, but is there something else in the mix here? Because, I mean, are you reliant on a concentrator to help feed into the agglomeration circuit there as well as additives?

And then just if you could touch on the cycle time to get that 85% and kind of the heat management for the bacteria?

**Nigel Steward:** Well, the cycle time is 200 days. And the additives, I won't divulge those, but some of them are actually naturally occurring in the rock, and you just need to know what they are. So I'll leave it at that.

But really, the only additive that is purposefully added is the bacteria. And the bacteria that we use aren't synthetic biology-related cultures, monocultures. They're broader bacteria biomes that you naturally find associated with copper ore bodies as well. So we cultivate those and we find them to be - that's why we spent 30 years looking at this.

We find them to be more robust and tolerant to changes in their environment, whereas the monocultures, they actually die. You need a complete support system of different types of bacteria to enable the whole biome to survive.

**Matt Greene:** And then just on ELYSIS. You mentioned the extra power needed per ton of aluminium. Can you confirm that ELYSIS doesn't consume more power than the current technology?

**Nigel Steward:** No, we're aiming to achieve the same. In fact, that was one of the key decisions for us to move from our single cell to the ten cells that we announced and that Jérôme and Sébastien spoke about. That was one of the key KPIs that it needed to meet.

**Jason Fairclough:** A question for Sophie. So on your bridge to improved return on capital, a pretty big part of that is production. So I guess the question is how do you think about achieving better return on capital without achieving lower return on capital through lower prices?

**Sophie Bergeron:** Same question as aluminium more or less. Look, for us, the base of production is very important as we have quite an important footprint. We've been through a couple of challenging years, as I mentioned, through PSM [Process Safety Management] incidents. So that definitely didn't help as we had to deploy additional capital to rebuild.

But when we are very strong, stable and we operate with discipline, that definitely shows up in our EBITDA margin. So that's also recovering the full co-products that we were producing is also very value added for our business. So the price question is difficult to answer because the market is not moving the same way. Volume and price are not definitely aligned in our market, if that makes sense.

So when the volumes are decreasing, we don't necessarily see a decrease right away in the price. So there are some lags.

**Jason Fairclough:** Okay. And just a follow up question. Could you give us an update on the security situation in South Africa?

**Sophie Bergeron:** Yeah, absolutely. I mean it's known that we had a murder in 2021, which also didn't help as we were on force majeure for a long period in 2021. We've not only worked on our community engagement, government engagement, communication. So we've had like a really strong programme to reinforce our position, support from stakeholders in the country.

And we've also reinforced our security in the country. So we have currently a very good position and we have strong support overall. So that's why we are refreshing our study on Zulti South as we feel that we've never been in such good position.

**Paul Young:** Mike, you're right by saying with your overview on IOC that a few times we've heard about the potential of IOC and trying to achieve nameplate. You outlined a pretty compelling case to, I guess, take advantage of that latent capacity. But you also highlighted that strip ratios are going up, and a lot of the

equipment needs a bit of a workover and reinvestment. So - but you've shown some good progress so far. To get to the 23 [million tonnes per annum], do you have any idea of what it's going to cost as far as CAPEX is concerned, noting that CAPEX actually has stepped up a fair bit at IOC already in the last two years?

**Mike McCann:** Yeah, it's going to be fairly minimal. It's really around best practices. When we look at some of the investment that we have included to 23 million, it's about \$160 million for our pellet plant expansion, and that would give us an increase in our weight yield. And that's about it. The rest is really around - our sustaining CAPEX stays the same. Yes, we got some more additional strip ratio, but that's all built into it in terms of just our incremental expansion. But the big one-off would be our pellet plant expansion, getting additional weight yield and give us flexibility to increase our pellet production.

**Paul Young:** Thank you. And maybe just switching to Nigel, another question on analysis. And one of the big advantages I can see is the fact that your anodes at the moment. Correct me if I'm wrong. You have to replace them each month. And I think the life of your inert anodes, I think, are 30 times the life of a carbon anode. So ultimately, if you're not changing out your carbon anodes and taking your pots down, you're getting an automatic production increase from that smelter from the same size cells. So it seems pretty compelling. It must be a reasonably large number. Can you talk through potentially the - any production uplift we might see from ELYSIS?

**Nigel Steward:** Well, when we look at ELYSIS, we should be getting production uplift. So say for the larger cells, today we operate - let's say, like our AP40 is at about 416 ka. And with ELYSIS, we'll operate that same - we retrofit into that same cell area, we're up to 450. So we get an amperage increase. And that's largely due to that the fact that we can bring the electrodes closer together.

We should also get probably a current efficiency type increase as well, because you're disturbing the cell less when you change the anodes. So there'll be an uplift there. But all of that is really - that's the reason why we need to go through these industrial demonstrations with multiple cells in a cell room to demonstrate all of that, and to understand fully what the impact will be.

**Jason Fairclough:** Just on Richards Bay, without Zulti South, the production profile, like you talk about going up to 1.5 million tons, I think, which is still obviously well below capacity. What's the gap between achieving the full capacity across those operations? Is it resource constrained? Is it a processing constraint? And also without Zulti South, what does the production profile for Richards Bay look like? How many years? Because I think you said 15 year reserve life left in Africa. But I assume that includes QMM, etc.. So the life options around Richards Bay if you don't have Zulti South as a getting through the study phase?

**Sophie Bergeron:** So Zulti North, we're starting to see some decrease in production in early 2030, so '31, '32. That's why we are, as I said, entertaining other options. So we could get - if Zulti South, should it be delayed again, we could get another feed for RBM.

**Jason Fairclough:** And also just - obviously the improvement in returns is driven by the increase in capacity, but it's not like you're increasing capacity to fully utilise the asset. Is that just a market constraint?

**Sophie Bergeron:** You mean the market constraint on -

**Jason Fairclough:** You said capacity is over 2 million tons, but you're only talking about taking up to 1.5 million tons by 2030. So why not full capacity utilisation?

**Sophie Bergeron:** Actually, Richards Bay is not at full capacity. And that's one of the reasons. I mean, we're conscious that the depletion of the ore body is going quite fast. So we're looking definitely at other options to bring that feed. And Sorel has much more capacity to increase rapidly production than Richards Bay. So the capacity is there. And should we have the feed? And as I said, we have options. We entertain Mutamba, Kamiesberg currently. So there's options for Richards Bay to bring some feed, but the capacity is definitely there, not fully used as we speak for the reasons I explained.

**Dominic O'Kane:** Nigel, you mentioned \$400 million I think you said was the R&D spend. Where has that come from and where is it going to, this \$400 million? Is that the number we should think about for the next few years?

**Nigel Steward:** Well, when does it come from? It comes from each of the product groups and corporate. So that's the way it's funded. And roughly 70% is funded by the product groups, and it's more targeted towards more shorter term commercial and operational needs. And then the remaining 20%, 30% is on the more strategic things. So these are things like Nuton, ELYSIS, etc.

And the way it's split, there was a pie chart actually on there. If you think about impeccable ESG, best operator and excel in development, about half of the spend is on impeccable ESG. And most of that is the decarbonisation work. We've got about - I think it's about, if my memory is correct, about 18%, 20% on best operator and supporting that activity, and the rest is on our growth. So excel in development.

**Dominic O'Kane:** So when I said, breakout - I mean, was it \$400 million three years ago and is \$400 million the number we should think on a recurring basis?

**Nigel Steward:** \$400 million on a recurring basis. And when we really relaunched technology and R&D in the company, and we talked about that in Capital Markets Day back in London two years ago, that's when we really relaunched it, and we actually doubled our spend. And that's what we aim to spend on a continuous basis.

**Grant Sporre:** Just a question for Nigel. Just you talked about the the configuration of the anodes and how that solved one problem. Without obviously giving away, what progress did you make in terms of the composition of the anode in terms of what material? So it doesn't dissolve in the cryolite bath? And does the chemistry in the bath actually have to change at all?

**Nigel Steward:** You do need to modify the chemistry of the bath, the electrolyte. So that's part of it. The material - we've really honed in on a material both for the anode and the cathode. The cathode wasn't so much a challenge, whereas the anode was. The key thing for us going forward now is that when you think about the industry today, we have a supply chain network to supply us. And that's now because we're moving from a carbon anode and a carbon cathode to these new materials, we need to build the supply chains for those.

And so the best way to think of this, is about the supply chain that we have today for our cathodes, where we have independent cathode producers that produce our cathodes. And the cathodes will last in the cell for the lifetime of the cell. We're now going to have to do the same thing for these new cathode materials, but also for the anodes. So that's the supply chain that we've now got to start to build. And it's one of the key things that will influence the rate at which LSS evolves. The supply chains need to follow us as well.



**Richard Hatch:** Sophie, a question for you on the TiO<sub>2</sub> business. I've asked this question to your management team before. You know, there's a few producers of TiO<sub>2</sub> ilmenite trading on the open market, maybe 1, 2 times EBITDA. Is there a point in which you have to look for undervalued juniors in the TiO<sub>2</sub> space to buy, ilmenite, for example, like a Kenmare?

And then just on the other hand of that, if I look at the carbon footprint of rutile versus ilmenite, say, or TiO<sub>2</sub> slag, it's significantly lower. So do you think that 1.5 million tonnes of production in TiO<sub>2</sub> could see some slag displacement with rutile?

**Sophie Bergeron:** Look, it's a long question. In terms of rutile, it's not a huge part of the market. And we're seeing some depletion of rutile, and that's one of the reasons why we also secured the position in Sovereign in Malawi. We have also our UGS product, which is as good as rutile in the market. And as we are decarbonising our processes, we will get to a point that in terms of carbon footprint, we can compete on both sides on the TiO<sub>2</sub> content as well as the carbon footprint.

So look, it depends on the customers because I could answer the questions for some of our customers have different situation and some others are also - their needs are all different. So we see they will use mix. They don't use necessarily like one feedstock as you know. When it's lower market, we see more ilmenite flowing obviously direct. When market is improving, so they prefer what we call sweetening with slag and rutile and UGS is also very popular. There is not enough rutile in the market to provide the feedstock that the world needs.

**Richard Hatch:** And just on looking at M&A to give you the feedstock that you might need for RBM.

**Sophie Bergeron:** I mean we have good options in the portfolio already. So there's no reason why we wouldn't explore our options internally before.

**Richard Hatch:** Okay. Thanks. And then just one for Mike. Mike, if I look at my numbers, IOC used to have an operating cost base of about \$1 billion, and it's now about 1.5, 1.6. So by your 20% reduction, are we right in saying that we should reduce our OPEX over time by about 300 million. And just does that - does that include - is there any adjustment for royalties in that? And then CAPEX, about \$350 million long term. Is that the right number? Because that's what you've basically spent the last three years.

**Mike McCann:** Yeah, \$350 million is about right. But also in terms of our unit costs, we're taking \$100 million out in cost savings approaches just for next year on a Canadian basis. So we're looking at our contractor spend, contractor management as well as looking at our organisational structure and our headcount associated with that. So working it from both fronts. Our biggest lever for sure is production. But we're also looking on the cost front.

**Jason Fairclough:** Just a question for the Chief Scientist. So Nuton, have you guys done any benchmarking against some of the other novel leach technologies that seem to be floating around against Jetti, against the Copper Chlor Tetc?

**Nigel Steward:** Yes, we have.

**Jason Fairclough:** And anything you could share?

**Nigel Steward:** Well, what our conclusion is we come up with a lower sort of operating cost technology and we have the highest recoveries as well. That seems to be the key theme. And the reason why our operating costs are so much lower is because the bacteria do a lot of the heavy lifting. We're not adding other reagents to the system, and that's really the key driver of it. So that's what we're concluding so far. And that's what's given us the confidence to, as you saw on the slide to do that first industrial demonstration. So we're going to be doing this in Arizona. We're building a 3 million tonne heap. And that's in construction at the moment. And we should be extracting our first metal middle of next year.

**Jason Fairclough:** And in terms of ore bodies, can Nuton be used on any ore body? So I mean, is it good for Escondida. Is it good for Kennecott?

**Nigel Steward:** No. We've trialled many different ore bodies. So we know pretty much the characteristics that we need. The last test that we did, large test that we did, which was pilot scale, was at Kennecott with the 70,000 tonne heap. So we know that works at Kennecott, for example. We're confident from the ore samples that we have from Escondida that it could work there as well.

**Jason Fairclough:** Okay. Thank you.

**Glyn Lawcock:** Firstly, Nigel, is there anything you can put from a numbers perspective. You keep talking about its lower cost versus peers, lower capital intensity. Can you quantify that at all or is it still too early? For both ELYSIS and Nuton. You're not throwing any numbers at us. I mean, like, what are we talking about in terms of -

**Nigel Steward:** It's early days yet, Glyn? We do have numbers that we've done for the benchmark for Nuton. I just don't have them at the top of my head. So maybe we can get back to you on that. ELYSIS, it's still early days.

If you think about ELYSIS, with the cell that we have that we've developed so far, if you think about it, we've got the engine of the car, but we don't have the car. You have to build the potline, the buildings, all of the peripheral equipment, the scrubber systems, all of those sorts of things. You need to put all of those things in. So that's the reason we're doing this ten part cell demonstration to start building that knowledge and starting to estimate that. So that's just where we are in the process at the moment on ELYSIS. It's just too premature.

But what we're doing and what we're targeting is our KPIs. If you remember, like we have those stage gate process, the KPIs that we're looking for, we're aiming to really generate the same sort of returns that we have for normal smelting technology. And certainly looking at CapEx costs, around the \$7,000, \$8,000 per tonne mark.

**Tom Gallop:** Just on Nuton, Glyn. So what we've said, it's around 40% lower from a capital intensity perspective. And also if you look at, say, CO2 60% lower and water consumption 80% more efficient.

**Glyn Lawcock:** At 40% lower, because that 40% below a large company CAPEX or a small company CAPEX for a copper business?

**Tom Gallop:** Reasonable peer benchmarks, Glyn.

**Glyn Lawcock:** All right. And then, Sophie, just a quick question. Sorry. You made a comment about China. The industry pivoted to China pigment and you weren't there to take advantage. It took you two years to catch up. So now you're using China as your customer base. But now the tariffs, switch it back to Europe and the Western world. How quickly can you shift your business now if the whole pigment industry now shifts ex-China because of the tariffs as well?

**Sophie Bergeron:** Look there's definitely some movements right now based on the tariffs that will be applied in November. However, we don't see it as just a temporary situation when the tariffs will be enforced. So we will see other movements. So our Western customers will definitely get probably some market back. But everything's going to shift at the end of the day. So for us it's all about like what each customer needs and how we can supply them with the best mix we have in our portfolio.

So China is still importing ilmenite. They're still importing feedstock. So at the end of the day they will provide other people elsewhere. Asia is a big consumer, actually. India is a big consumer of pigment.

**Glyn Lawcock:** And just finally, your timeline for Zulti South. You're doing the study. When should we expect that to be complete and when would you think you go to FID on it?

**Sophie Bergeron:** Look, it's a refresh of feasibility study. So it's not that long to do. We expect that by next year it's done, the refresh.

**Glyn Lawcock:** And then it needs to go ahead then. Or you can delay it further?

**Sophie Bergeron:** We're starting small work there this fall. But for the big version of Zulti South, we were waiting for to see how it goes. And we will be ready with feasibility study ready to go.

**Tom Gallop:** But Glyn, just to clarify a lot that would need to go through the Board for sanction effectively at that point once your study is complete.

**Paul Young:** Hi. So I have a question on the market. Just mineral sands more broadly. Two parts to the question. First one, just near-term, we've seen a bit of a bouncy year for mineral sands, particularly titanium dioxide feedstock. We had pigment markets sort of recovering in the June quarter or during the June quarter. Now sort of soften it a little bit. But then you made the comment that you see actually the market has an upward trend. So I'm just curious about what you're seeing near term? And any commentary you can throw into the mix on zircon just on near-term as well?

And then on the medium term, I'm a little bit confused because on slide 21, in the pack you've got a supply and demand chart, and it actually shows the market's in a little bit of a surplus for the next two years. I'm talking titanium dioxide feedstock. Yet you're saying the market showed ilmenite. I'm just trying to square all of that away because, I mean, I think it sounds as though you're pretty positive on the medium term, but maybe the charts don't suggest that.

**Sophie Bergeron:** So first off, after COVID, as you can see on the charts, we've seen like a big peak of demand, 2022 was a peak year. That's no doubt. After that - and it was really everyone started to renovate their houses. Big construction boom. China was okay at that time. Now it's - after that we've seen like a kind of a plateau, quieter time after the 2022 peak. And there's always a cycle of restocking and destocking and

we are seeing that cycle of restocking so slowly. We - as we're always in communication with our customers, the pigment customers, we see that it's restarting, especially in the West.

China is not at the level of recovering that much, but the rest - and India is recovering quite well. India is very active, so we see some movements.

In terms of ilmenite, there's definitely some feed. And we've seen when the market was booming, especially after COVID, China was importing a lot of feed from Mozambique, from even Madagascar. So we've seen movements of quite low quality type of ilmenite. So that's where we think our products can displace some of also the lower quality feed for better value in use. So that's the way we're looking at the market. And also some of the deposits are depleting. So that's the big mining that happened just after COVID was not necessarily sustainable everywhere.

**Paul Young:** And just to follow up, I know it's a small commodity for you. But just on zircon I mean, how do you look? How do you see zircon relative to TiO<sub>2</sub> as far as supply demand is concerned over the medium term? Or do you just collectively look at them together?

**Sophie Bergeron:** Zircon is another one that is linked to construction. So real estate market. It goes mainly in ceramic and consumables glass CV. So look, we see zircon currently, it's not - we're not a huge producer, by the way.

**Paul Young:** You're still top three, though.

**Sophie Bergeron:** I mean, but compared to others, we're not the top one. The market is, I would say, okay, slightly recovering as well with the movement of real estate market. And depending where you place the product as well, it's like the market is different. Again China is not back there.

**Paul Young:** Yeah. Can I ask one more to Nigel, Tom? Squeeze it in? Nigel, another question on Nuton. I think first of all, an observation is that the only copper mine that you own or have a share in that has spare capacity is Escondida. And we were talking about this earlier. So that's probably the biggest opportunity. So I'm just wondering if you could elaborate a little bit more on where - what the potential pathways on primary sulphides at Escondida.

And then second opportunity could be either at Bingham. I'm sure it's got heaps of low-grade primary sulphides. And then the third one could be the fact that your technology seems to be - has pulled ahead, if I could call that. Lots of other companies have lots of spare cathode capacity. So it's early days, I know, but what's the - I guess, the grand vision for Nuton as far as creating value for Rio Tinto?

**Nigel Steward:** Well, I would like to think as all of the above, right? So - but it's early stages. And I come - I've had a background in the company of providing technology to the world, right, of selling and commercialising technology. And you can't really convince someone to buy a technology until you can show them the industrial demonstration. So that's really the key step, the key next step for us. And that's what we're building at the moment in Arizona with a partner there. So once that's up and running and we can bring potential customers and internal customers as well as our JV partners at Escondida. And we can show them that, it's - I think that's really the key next step for us. And that's where we're focusing.

**Richard Hatch:** Nigel, just one quick clarification on the BlueSmelting. Are you currently on stage two in terms of pilot, or are you just at stage one at this point? Sorry, just point of clarification.

**Nigel Steward:** We're doing the stage two work. So we've converted to hydrogen as the reducing gas. And - but we're not doing the hydrogen recycling loop yet that I spoke of. But we're doing the pre-reduction. So we're doing with hydrogen exactly what we did with carbon monoxide. So what we're doing is we're pre-reducing the ore. So we're taking an  $\text{Fe}_2\text{O}_3$  and removing some of the oxygen, but not all of it. So we're reducing it to  $\text{FeO}$ . And the  $\text{FeO}$  is then going into the conventional smelter.

But ultimately what we will do is go - once you master that recycling loop for the hydrogen, you can take that iron to the  $\text{Fe}_2\text{O}_3$ , to  $\text{Fe}$ , to the iron and do the full reduction. And then we'll just feed it into the what's the smelter today. Just as the melting process to separate the  $\text{TiO}_2$  slag from the metal itself.

**Richard Hatch:** Okay. So do you think you could almost go ahead with stage one first and then wait for perhaps the technology to catch up and then.

**Nigel Steward:** That's right. It's a phased approach.

**Richard Hatch:** Cool. And then potentially if it all goes to plan, your ability to bring that in - so commercially what's the timeframe on that? What could it be?

**Nigel Steward:** It's like I say, we're at pilot stage now. We do the pilot, we meet the KPIs, and then we'll think about the demonstration phase. So the thing that's going through our mind in the demonstration phase is, do we use the existing pre-production unit and just run it like an operation, and that becomes our demonstration? Or do we actually design a slightly bigger one to match the size of the furnaces? So that's the reflection we're going through. That's maybe a question for the team on Friday.

**Jason Fairclough:** I might just pick up on a comment you made earlier about smelting iron in one of these furnaces. How does that tie into the work that you're doing jointly with BHP on the ESF down in Australia?

**Nigel Steward:** It's complementary because when you think about the hydrogen reduction of iron ore, so that pre-reducing unit that we're trialling at Sorel could actually be that reduction unit that produces iron ultimately. And for example POSCO, they're converting their fluidized bed process called FINEX that runs on natural gas. They're converting it to what they call HyREX that runs on hydrogen. So it's kind of the equivalent of that, and it's equivalent to the HYFOR process, for example, that Primetals are generating as well that will run on hydrogen. So there's that.

That's the way you use fines, iron ore fines to make to reduce to iron. And then the same thing with the Mike was talking about H2 Green Steel where we're making pellets and they're reducing those in a shaft furnace. That's the type of furnace that you normally use for natural gas at the moment. But you can convert that to run on hydrogen as well. So that's what H2 Green Steel is doing. But the output products from that are pure iron. And pure iron melts at a really high temperature above 1535 degrees C. So you need to have a melter to then melt and recover the metal. And you need to actually add carbon because steel is an iron carbon alloy, and when you add the carbon, you also bring the temperature down as well.

So you need to have this electric furnace to do that. So the BHP work and the partnership there is complementary to this - to all of those green iron reduction processes.

**Austin Yun:** Maybe one question for Mike please. You have this target to increase your shipping performance by 31%. A big chunk of that is on the rail performance. I'm wondering if you could just provide a bit of a timeline of how you're going to get there. How long would that take? And also, would you try to prioritise your own uptime first before allocating the capacity to the companies sharing the service? Thank you.

**Mike McCann:** So in terms of getting our rail operation up and going?

**Austin Yun:** Yes.

**Mike McCann:** So that has been progressing. We're getting very, very close to where we need to be. One avenue we're working on right now is our cycle time. And we have a team on that. We see probably by the end of Q1 next year, having some certain performance uplifts from that.

In terms of our third party, we try to balance everything about even. We do have contractual commitments with them. So you won't see IOC or being at 80% in our third party at 20%, it doesn't work that way.

**Tom Gallop:** We've reached time. Sorry, Glyn. Thanks, everyone, for the questions and the discussion today. I hope you really got a greater insight around the quality of the business here in North America. We are the largest metals and mining company in North America. Not everyone actually realises that. And it's actually 25% of our copper equivalent production.

But if you think about the quality of the assets, the quality of the renewable assets, the diversity of the business and the markets that we're facing, we think it's something that's a bit misunderstood from the market around the quality and the value that can be unlocked. So hopefully through the discussions today and over the next few days, that understanding can be built a little further. But thank you all for the discussion today.

Thanks from myself on behalf of the wider team, just for your time today and the discussion, we've really enjoyed it.