VALE ESG WEBINAR ON CLIMATE CHANGE

Mr. Ivan Fadel: Okay, so I see that we have a lot of people already joined. We'll just wait for maybe another minute to allow everyone to get in before we start. Okay, maybe we're ready to start, so hi everyone, I hope you're all well and safe, welcome and thank you for attending Vale's ESG webinar on climate change. I am Ivan Fadel, Head of Investor Relations here at Vale. Today we have our Executives here to give you an update about how we're positioning ourselves and progressing in our climate change agenda.

So, today with us we have **Eduardo Bartolomeo, our CEO, Malu Paiva, Executive Vice President of Sustainability, Rogério Nogueira, Head of Ferrous Marketing and Mark Travers, Executive Vice President of Base Metals**. So, for the Q&A Session, Luciano Siani, our CFO will also join us. I must say we're still working remotely, so if we face any connections instability, please bear with us and we will quickly resolve it. Also, to guarantee sound quality and a good flow for our presentation you will all be on a listen-only mode. We will have about 40-minute slide presentation, followed by about 20-minute, 30-minute Q&A Session.

If you want to ask a question, please use the Q&A box below on your screen. And I also must remind you that this is a private meeting, so recording is not allowed and also the slide deck for our presentation today is available at Vale's IR website. So, we're ready to begin, I hope you all enjoy this event. I'd like to pass the floor now to Eduardo Bartolomeo for his brief introduction. Welcome, Eduardo.

Mr. Eduardo Bartolomeo: Thank you, Ivan. Good afternoon to you all. Thanks for your interest on the theme and, as Ivan mentioned, I hope you are all safe and well in these hard times. I think in past few years we have been seeing an increasing concern about climate change and obviously this is a big threat both to society and to our industry. And we're here today to show how Vale is facing this challenge and actually how we might be turning that threat into an opportunity. I think, as I'm gonna quickly remark here, we have the will and the assets to make it happen.

But before passing to Malu, to Rogério and to Mark, I want to make three quick remarks that I think are very important to you to understand what's behind Vale's mind when we talk about climate change. The first, if you could pass the slide, is that we have bold targets, very bold targets that we have been announcing, eventually some of them we adjusted in Vale Day, as you see on

the scope 1 and 2, and I believe that this path we might lead us to lead this transition to a low carbon mining.

As I mentioned, we have a strong goal to reduce 33% of scope 1 and 2. This is aligned with the Paris Agreement, to set well below two degrees. One big component of that is our energy consumption of scope 2. We have a target to immediately, now, just around the corner, in 2025, to achieve 100% renewable in Brazil and 2030 globally. We announced, we were the first ones to announce a net reduction of 15% of scope 3 emissions by 2035. And, of course, we'll do that because we have the assets and as we are gonna explore a little bit later, but we will do it through partnerships with our customers and, by the end of 2050, we will achieve net zero. So, as you can see, those are bold targets. And why do we assume those bold targets? If you can pass the next slide.

I think Vale has a unique position that allows us to be so bold. I think, first of all, as you know, we have world-class assets, both in iron ore and nickel. 90% of our iron ore is high-quality that you will see in Rogério's presentation that is key to the green industry and Mark's presentation will explore the low intensity of our nickel that is as well extremely important for the energy transition.

One thing that we don't emphasize enough, I believe, we have 90% of our matrix of electricity based on renewables. That will allow us to be bold, as I mentioned. And lastly, forest is our home. We work in Indonesia in the rainforest, we work in Amazon for more than 30 years, extremely sustainable, it's a success case. We protect in Amazon 800 thousand hectares, we always say it's 5 times the size of London, so we are able to translate that on nature-based solutions that will be needed as well to achieve our goals.

And last, the third point that I wanted to make is that we have a strong governance in place. First, our Board of Directors gives us full support and guidance and push us, by the way, to make it happen through both the Sustainability Committee and the Board of Directors itself. Second, as I would like to stress, this is everyone's agenda in Vale. It's part of our culture transformation. I have been referring to this in some of our forums, we have what we call a Low Carbon Forum, it just happened, by coincidence last Tuesday, I'm part of it. It's a way that we interact, and we create a bond among everyone in the company to achieve those ambitious goals. And as Malu will be able to talk to you and, by the way, Malu is a newcomer to the game, to focus totally in sustainability, of course climate is a big part of our sustainability agenda and she'll be able to share with you her thoughts and how we are going to meet those targets. So, again, this is everyone's agenda, and this is a part of our culture transformation.

And lastly, we are committed to make it happen, not only because it's the right thing to do, it would be, by the way, enough to be a reason to be there, but our commitment in our performance as well. As you can see, 5% of our short-term goals are related to climate change, out of ten, and just to mention another information, 60% of my goals are related to ESG. And in a long-term compensation that makes ita big part of our C-level compensation is 6% related to the 20% that are related to the ESG goals. I think, with that, in a nutshell, I would just want to express that we are committed, we want to make it happen and we have the means to make it happen. But let's hear from the source, I think it's much more interesting and much more rich. So, please, Malu, share your thoughts with us.

Mrs. Malu Paiva: Thank you, Eduardo. It's a pleasure to be here with you today. And now let's move on to our net zero mining strategy. As mentioned by Bartolomeo, Vale has a long-term commitment towards net zero by 2050. It starts with our number 1 priority, which is to continuously reduce our operational emissions scope 1 and 2 through innovation and technology. But science recognizes that, as a hard-to-abate sector, we may also rely to a limited extent on carbon offsets and removals. We will leverage on our expertise and knowhow to address sound nature-based solutions and we will also count on a high-quality and credible carbon markets, always aligned with international best practices. Next slide, please.

As I already said, we are on track to deliver the 33% scope 1 and 2 emissions reduction target. As you can see on the left-hand side, 57% of our scope 1 and 2 emissions come from our pelletizing and metallurgy processes, mainly due to fossil fuel consumptions in the furnaces. In 2020, our scope 1 and 2 emissions decreased 27% compared to 2017, that's our baseline, which is a result of our lower iron ore production levels due to Brumadinho and the pandemic.

But I want to call your attention that this does not mean that our 2030 target is easy or close to achievement. Actually, as we are increasing our production to 400 million tons per year, we will have a peek of emissions in 2023. So, if we do not implement any low-carbon initiatives, our emissions could reach up to 18 million CO2 equivalent per year. That's why our target is bold and to reach it we are relying on four main technological routes.

First one in the short-term, we are prioritizing energy efficiency and a switch to renewable energy. We will also increase the role of bioenergy as a transition fuel for our operations. And for the longer-term we will count on both electrification and innovative processes. I will give you more granular information in the next slide.

We have already announced more than 200 megawatts average of large scale solar and wind projects to power our operations, while also reducing our energy cost by US$ 85 million per year. At the same time, our Power Shift program aims to decarbonize our energy matrix throughout our whole operational process. Let's give you some examples. Among mining solutions, we are assessing the usage of conveyors to replace haul trucks for long distance. It has a potential to reduce mining emissions, which are approximately 2 million tons of CO2 equivalent per year. Still in mining operations, we also have 30 underground electric vehicles operating in our Canadian mines, which will be detailed by Mark.

And for railways, we are implementing pilots such as the electrical locomotive that's already operating in the Southeast of Brazil and this year, we will start another pilot in the North region with the same locomotive. And railways accounts for about 1.5 million tons of CO2 emissions per year. And finally, we are testing innovative technologies to reduce emissions in the process of our products, especially in the furnaces, including biocarbon pilots in our pelletizing plants. Next slide please.

In this context, we are leading the transition with a robust capital allocation commitment, with US$ 4 to 6 billion of investments by 2030. Our marginal abatement cost curve is critical to guide us on our priorities. 80% of the initiatives identified so far is already NPV positive when considering an internal carbon price of US$ 50 per ton of CO2 equivalent. As you can see in the curve, the projects to the left are already NPV positive, so they should be implemented sooner rather than later.

For example, most of our renewable electricity projects are included in this group. The projects in the middle section are competitive when we use our internal carbon price. And lastly, the projects in the right still need to deepen studies and partnerships to be competitive, such as those related to the use of some renewable fuels such as hydrogen. Which brings me, next slide please, to my final remarks.

That's our role in addressing emissions from our value chain. We were the first to announce a quantitative target for scope 3 emissions among our peers and we will deliver it based in two pillars. Pillar one, we will focus on our own initiatives that we rely mostly on our world-class portfolio, which Rogério will take us through in the next few minutes. And the second pillar, it's clear for us that the engagement is crucial, and we will lead through partnership. We are already engaging with the most relevant steel clients to foster technological development and lower carbon iron solutions and we are supporting the shipping industry decarbonization through our EcoShipping program, with a set

of pilots already implemented, such as the rotor sails. And now I will pass the floor to Rogério, our Marketing Director for the Ferrous Business, who will detail our role in the steel industry decarbonization. Rogério, the floor is yours.

Mr. Rogério Nogueira: Thank you Malu and good evening, good morning to you all. It's a pleasure to be here with you to talk about this exciting subject. So today what I would like to talk about are a few topics. First, I would like to share with you our views of the challenges ahead of the steel industry. Secondly, I would like to offer a view on the potential technology pathway towards decarbonization, so for the steel industry. Third, I would like to discuss Vale's own initiatives to support the steel industry reduce its scopes 1 and 2 and many of our scope 3. And, last but not least, discuss the impact of this decarbonization trend in our product portfolio.

So, let's start with the first topic please. So, starting with the challenges ahead of the steel industry, I just would like to give a little bit of context. The steel industry as of today contributes with about 8% of the total CO2 emissions around the world. It is also expected to increase its production volume by 33% up to 2050 and it is estimated that it will need to decrease its emissions by 50% up until 2050 as well. And, in order to do so, the industry will need to invest more than US$ 1 trillion to be able to be compliant with those CO2 emission requirements.

And why that's so important, those investments are so important and it is so difficult. First, because the current processes in the steelmaking processes in the steel industry, the two most common processes, they have their own challenges.

Talking about the first one, which is the integrated steelmaking, the one from blast furnace to the basic oxygen furnace, this production route faces the issues of aging plants, and here I'm not talking only about the blast furnaces themselves, talking about sintering plants, talking about coke ovens that will need to be revamped shortly, but not only that. On a relative basis, the integrated steelmaking process emits significantly high CO2 per ton of steel produced. We're talking in the range of 1.8 to 2 tons of CO2 emitted by every ton of steel produced.

The second route, which is the electric arc furnace route, which is one that will benefit from an ample supply of scrap, will have the challenge of quality. I mean, it's important to have in mind that the bulk of the scrap, which is going to be available in the market is going to be obsolescence scrap, one that you cannot control the quality and that will need fresh Fe units to complement the burden, so, talking about solid pig iron, talking about HBI, to complement the burdening electric arc furnace. So, having said that, the question is what is the

technology answer? What should we expect in the years to come? And with that question in mind, I'd like to offer you a little bit of a perspective on how we see this evolving. If you can, please go to the next slide.

So, the way we see it… first of all, I think the steel industry is already under transformation, you all know, we can see all the announcements and all the investments being made. By the way, we see this decarbonization journey in the steelmaking process is that it will have 3 phases. Phase one, that we call here a pathway definition is a phase in which a lot of trials will be made, a lot of new technologies will be tested, but investments in a large scale won't be made. We believe that this phase will last for about 10 years, will take us up until 2030.

The second phase that we see is a phase that we call a decarbonization run. That means technologies maybe proven up to that point. The requirements on CO2 reductions would be looming on the steel companies and they will be urged to invest decarbonized. So, we expect to see significant investments to decarbonize starting in the early thirties.

And then there will be a third phase that we call here mainstream adoption, one in which technologies are proved, some of the key ones are selected and steel companies would then escalate their implementation on a large scale. So, that's more or less how we see it, the initial 10 years, many years of trial and then, after that, we'll see a sharp increase in investments in different technologies to reduce CO2 emissions in the steelmaking process.

So, the question that we may ask ourselves, you may ask yourselves is so, what's the role of Vale, so what can Vale do and how can Vale support this reduction of scope 3 emissions? So, let's talk about it briefly. If you can please just go to the next slide.

So, as Eduardo just mentioned in the beginning and Malu also mentioned, we in Vale, we are extremely committed to scope 3 reductions. We have this goal, this target of 15% net absolute reduction in CO2 emissions in our scope 3, out of which from 15 to 25% would be driven by our own initiatives. What I'd like to highlight here are some of our key initiatives to achieve that goal. In this waterfall, on the left-hand side, the grey bar represents roughly what would be our contribution to the reduction of our scope 3 emission reductions through our own initiatives and I will highlight one by one at least 5 of the most important initiatives that we have in place.

The first of them is one that we call cold agglomeration. Here are just would like to briefly explain to you that we have been working on this technology for more than 10 years. We have invested significant amount of money, we have actually

completed lab tests, industrial tests and we have a technology which we believe is a breakthrough. Ultimately what does it do? It is the ability to agglomerate in a much simpler, less costly, less capital-intensive process to agglomerate either pellet feed or sinter feed and this product would actually replace either lumps or pellets or even sinter.

Just to give you a broad idea. Just simply by bypassing a sintering plant in the steelmaking process, we'll be able to reduce CO2 emission in the integrated steelmaking process by up to 10%, so just to give you an idea. We're very excited about it, we're not giving you a lot of information today, I know, but it will provide you more information in due time. Again, we really believe this is a breakthrough, it's a technology that we have, it is proprietary technology that we really, really want to escalate together with our clients.

The second initiative is an initiative to work on dry concentration of our run-of-mine. You might recall that a couple of years ago we bought a new technology called New Steel and over the past years we've invested a lot of money, time, resource to improve that technology and I think we're glad to say to you today that the technology has evolved to a point that it is now economically viable and we're making the initial investments on the first industrial plants to dry concentrate.

And you may ask why this is so important? It is important because we will be able to produce a very high-quality iron ore, 67%, 68% iron ore, using a technology that does not require tailing dams and we know that this high-grade iron ore will be in high demand, especially in a decarbonized world where direct reduction would be a sort of prevalent technology. And again, we can talk a little bit more in details about it at a later stage.

The third initiative that I'd like to highlight is our HBI production and here it's important to mention that we have combined a series of technologies and working with partners in this case Midrex, Kobe and Mitsui to produce a low metallization HBI, an HBI that can actually use a lower-grade iron ore to produce a material that could be fed directly into the blast furnace in the transition phase of the industry, but also at a later stage could be fed directly into a melter, a melter which could be a replacement for the electric arc furnace. We've made, again, significant progress in this direction, we're very excited about it, we believe this could be a very successful technology.

Fourth, we have been investing in biomass. We have been investing in the new carbonization technology, one which is much more effective than the current carbonization technologies that are available in the market and we believe also that with the proper business model, this could be something very significant for the industry. For an example, in the steelmaking process, using a biocarbon into

the pulverized coal injection, replacing met coal by biomass, which could bring to the steelmaking process a significant reduction of CO2 emissions.

Last, but not least, we're also progressing the development of our Tecnored technology, which is a technology to reduce iron ore and complement the production of pig iron by large blast furnaces. But more importantly, our Tecnored technology is capable of operating with biomass differently from the blast furnace, which does require the use of coke and metallurgical coal. It's also important to say here that some of those investments, especially the HBI, biomass or Tecnored, we're not going to be investing ourselves. The idea here is to form asset-lights partnerships, partnerships in which we will provide the technology, we would have the option to sell iron ore too, but again it's our contribution to the steel industry in terms of R&D, in terms of new technologies for the future. So, this is our contribution. I'd like to give you, if you can flip to the next one, please.

I will be brief, because I think I've extended my time here, but most importantly the question is, once we do it, now what is the implication for Vale and its product portfolio? I think the point that we would like to make to you is that, regardless of the technology which is going to be prevalent in this new decarbonized world, and we have actually depicted some of them on the left-hand side of this slide, the fuel costs are increasing, so reductant costs are increasing, especially when you compare to coal. And with that increase in fuel costs comes, together, the need for higher-grade ore that reduces the consumption of those higher cost fuels.

So we believe, for this reason, that our high-grade ores will be in high demand in the future and again, not only for that, but as I just mentioned in the beginning, the industry will need to have more than US$ 1 trillion in investments. And as those investments are implemented, we also believe that there will be bottlenecks in the capacity of this new technology that can actually produce with lower CO2. And with the bottlenecks would come the need for productivity, and with the need for productivity there would be the need for higher-grade ores. So, in summary, we believe that we're very well-positioned not only to help the industry reduce CO2 emissions, but also we're very well-positioned, we would beneficiate for those decarbonization trends. You can go to the next one, please.

So, in summary, some of the points that I've just mentioned and just to wrap-up here. We do believe that in this decarbonization journey, iron ore quality premium will increase, it will increase because, as I just said, because of higher fuel costs, it will increase because of the demand for high productivity as investments on new technologies are coming into place. We also see that Vale

as a leading mining company, a leading iron ore mining company, will be very well-positioned into that transition.

We have a product portfolio, as we just talked about, with the cold agglomerated products that I talked about, with the dry concentration that will help us have an increase in share of high-grade products in our portfolio and also with those new ideas that we intend to partner with other players to provide asset-lights solutions to the steel industry and provide them with the option to invest in technologies that we believe are going to be successful down the future. I think with that we in Vale believe that, again, we're very well-positioned to help the industry reduce CO2 emissions, as I just said, but also we are very well-positioned with our product portfolio. So, with that I would like to pass the floor, pass the word to Mark. I think Mark is going to share with us some exciting initiatives and some exciting ideas that we have in Base Metals, in this decarbonization journey. Thank you.

Mr. Mark Travers: Thanks, Rogério. Good afternoon, everyone, and I am very pleased to speak to you today about some of the exciting things that Rogério has just indicated and I hope I spell it out for you well. We feel that in Base Metals we have some exciting news to share about our business and where we are in our low-carbon journey. I think we hope to demonstrate, to show that we're very well-positioned with a portfolio of products we have in the base metals business, to participate in a very meaningful way in the global energy transition and still recognizing, as Malu indicated, that there's still lots to do in that journey.

If you look at this slide here, you'll see that based on the product portfolio that we have in base metals, with copper, nickel and as well as cobalt, we have the commodities that are fundamental for the global renewable energy and low-carbon transition. In respect to copper, copper is the most significant crosscutting mineral used in essentially all low-carbon technologies, from wind turbines, to solar panels, to energy storage and electrification materials in general.

We anticipate that these are the areas where you'll see growth in the copper market over the next decade and we feel that we're very well-positioned to participate in that. We have an aggressive agenda to more than double our copper production over the next decade. In terms of nickel it's also an extremely well-positioned crosscutting mineral, very well-positioned to participate in the electric vehicle revolution. We're projecting, as are others, that nickel demand for use in electric vehicles will be in the range of about 25% growth per year over the next decade and we see a lot of opportunity with our product portfolio to position ourselves as a partner of choice.

If you look at the chart on the right, it's just a summary of what I've said, with nickel, copper and cobalt we are well-positioned in terms of market growth and relevance for technologies of today and those still to mature.

Looking at this slide, I'm going to dive a little bit deeper into the electric vehicle market and its carbon footprint. If you look at the chart on the left, you can see that the batteries in the electric vehicles are the most carbon intensive component of those vehicles, whether they be cars or trucks, and obviously the more significant the size and capacity of those cars and trucks, the more significant the impact.

This is something that the battery industry is very aware of, very attentive to, not only for positioning itself as a low-carbon solution for the automotive industry, but also due to the increasing regulations, in particular across Europe and North America in respect to carbon goals, carbon markets and potentially border adjustment taxes. Initiatives such as the battery passport, from the global battery alliance and blockchain control of the carbon intensity of each commodity in the chain, while the supplier demonstrate that there's a lot of work to do, but also a lot of opportunities to reduce emissions.

And if you look over to the right-hand side, a little bit of a case study of those opportunities. If you look there you can see in the middle graph, if you look at the impact of nickel coming from NPI, nickel pig iron, fair nickel, class two nickel, you could see that the impact of that type of nickel on the carbon intensity of a passenger car is quite significant. If you take a class one product, a class one product that we produce in particular in places like, in particular from Canada, you can see that you can dramatically reduce through the nickel input and as you'll see in a minute the source of the class one itself even becomes even more important in terms of how to reduce that impact.

We're also looking in our portfolio, even looking at the conversion of our class two fair nickel products in places like Onça Puma and Brazil and potentially our products from Indonesia, where you convert that into a class one product for use in the electric vehicle industry. We're obviously working on that business model to prove it, but it also needs to make carbon sense, so that we need to execute on a low-carbon agenda to reduce those carbon footprints if we are to execute on that strategy.

Because the type of nickel is so important, as seen in the previous slide, it's really impacting how we're executing on our strategy and the actions that we're taking to demonstrate that we're a partner of choice. We're trying to be a quick mover in this development of the EV supply chains, in particular now in Europe and in the Americas.

Just some of the things that we're doing and what we're looking at right now, we've dramatically increased the sale of our class one nickel this year to the EV industry or as an input to batteries in the EV industry. We're also looking and discussing with potential partners the opportunity to repurpose our nickel to the EV industry or to find innovative ways to put our nickel into the electric vehicle battery.

For the future, recycling will become very important. It probably won't be a significant thing until 5 to 10 years out, but we're looking and studying now a potential recycling of what we call blackmass battery, battery recyclable material. In all of our flowsheet in Canada, across Canada, we see this as a potential significant source of feed for our flowsheet in North Atlantic and Canada in the future. It also has the added benefit of really contributing in necessary recycling of electric vehicle batteries.

We're also really working to verify and disclose the carbon intensity of our class one products in Canada. The Nickel Institute and other sources such a Skarn confirm that the products from Canada, our Long Harbour rounds and our pellets and powders from Ontario are among the lowest carbon intense products in the nickel industry. If you look at that chart in the middle, you can see the average Vale portfolio, how well-positioned it is, and if you look at that first quartile, it's a big quartile, and it starts to step up after a while. We're very well-positioned in our Canadian products in terms of carbon intensity.

Let me tell you a little bit more about that Long Harbour product, which starts from Voisey's Bay Mine and is processed in the Voisey's Bay Mill and then on to the refinery, all in Newfoundland and in Long Harbour. You take a look at it, it is among, as I mentioned, the lowest carbon intension, if not the lowest carbon intense product in the industry, but it comes from a mine that is fed by diesel, diesel power and that diesel use is going to increase even more with the start of the underground mine, which we just announced two weeks ago. So, it's imperative that we look to lower the carbon footprint of that Voisey's Bay ore.

So, what are we doing? We're looking at alternative energy sources, we are in advanced discussions for wind farms, to use renewable energy in Voisey's Bay. Now that can't meet all of our energy needs in Voisey's Bay, so we're putting a lot of effort into looking to put a transmission line for hydro projects in Northern Labrador, up to our sites as well as to potentially the indigenous communities of Northern Labrador.

Then if you look at Long Harbour itself, it's a very low-carbon intensive process, it's a hydrometallurgical process. Yet, we see the opportunity to reduce our emissions by 50% by replacing the fuel oil boiler with an electric boiler, which

we intend to go forward with, hopefully by 2023, which will further reduce plant emissions by 50%.

In this slide I want to talk a little bit about what we've done, what we're doing and what we intend to do, because the journey that we're on in low carbon is just the beginning and we're developing that roadmap to continue that journey. On the left-hand side, something that we announced last year was the decommissioning of the Superstack in Sudbury and the use of 2 smaller stacks with the use of much less energy. That helped us reduce carbon emissions in our smelter by 40%.

In the middle, here are some of the things what we're doing to electrify our underground mine fleet in the future. It's just the start and we have more to do. We have 30 electric vehicles underground in three of our mines in Sudbury and we'll have 41 by the end of the year. They include personnel carriers, haul trucks and drills and bolters. It's very important that we study these, and we have pilots and studies that are under way, particular for the larger trucks and loaders. We're studying those to make sure that we can broaden their implementation in years to come.

We're also very excited by something called the mechanical cutter, which is a pilot of a product in our Garson Mine, in Sudbury, in partnership with Komatsu, which has the added benefit, like a lot of these electric vehicles and other technologies, to have the benefit of reduce health and safety risk. The mechanical cutter would be an extremely beneficial way to not only increase productivity in the underground mine, to do it in a low-carbon intensive way, but also to remove the workforce from the face of the mine and lessen the risk. We continue to collaborate with a series of consortiums particularly in places like Canada, where we hope to contribute to the new standards for the industry and help accelerate developments of technologies by collaborating with our peers and with other OEMs.

Moving over to the right-hand side, this is where things really have to go to the next frontier, and we have to improve those flowsheets that we've already built to lower carbon intensity of our products. We're assessing opportunities all over the globe, Canada, Brazil and Indonesia, to capture process waste heat and reuse it. We're considering the use of biomass in our flowsheet in our processing plants. And we're even looking at the possibility of carbon storage in some of our tailings facilities. And, as I said before, we're also assessing opportunities to reduce or zero our scope 2 emissions by consuming renewable energy such as the ones such as Voisey's Bay transmission line that we're looking at.

And in terms of scope 3, we're starting, but we are looking at reductions by mapping possible partners in the value chain and suppliers' customers to work together in a plan just like presented by Rogério in the iron ore site. So, in summary, we're aware of the profound transformation ahead of us and how we imbed carbon as a key driver in our strategy, as part of our business strategy and as part of our new pact with society. As you know, we're not alone in this journey and we're very open to collaborate with you and others to accelerate this much needed transition. Thank you and I'll pass this on to Eduardo for some final comments.

Mr. Eduardo Bartolomeo: Thanks, Mark. As you can see, the world is changing and, of course, Vale is changing as well. I think how we mine is important. We understand that we have the critical minerals that are needed, the high-quality ore, the low-carbon intensive nickel, but that's not enough. It's how we mine that will make the difference and that's where the real change is happening. I think, as you saw, we have ambition, we have ambitious targets, but I would like to end with three "Ps": People, Passion and Purpose.

I think we have the people to do that, we have the passion, because in our core, in our purpose and we want to transform the future and improve life together. That's Vale's purpose and the climate change is completely aligned with that. With that I pass back to Ivan to lead through the Q&A. Thank you for your attention again.

Mr. Ivan Fadel: Okay, thank you so much Eduardo and everyone for the very good presentation. So, we've got some questions in advance and we also got some questions here in the chat, I thank you for that. I'll try to combine as much as possible into question clusters so we can answer as much as we can as well.

So, I'll start here by asking you a question, Malu, and this is about physical risks. How does Vale assess potential physical risk impact to our company's operations and what are the largest physical climate risks that our company faces and how is the discussion about physical risks and climate change in the various locations that Vale operates, here in Brazil and abroad?

Mrs. Malu Paiva: Thank you for the question, Ivan. Well, we developed what we call Vale Climate Forecast. That's the tool we use to identify and analyze any physical risk in our days. And we use the scenarios created by IPCC. This methodology allows us to identify short and long-term physical risks. When you're talking about the short-term we all talk about the impact on our operations, for instance, and our product shipment.

When I'm talking about the long-term, I am talking about to identify necessary investments in our facilities, to adapt it or to mitigate impacts due to climate

change. In our days there are two main risks that we have been facing in this sense. One is related to the sea level rise, which impacts our port terminals. And the other one is changes in precipitation that impacts our ore shipment in the North of Brazil. Those are the main two ones.

And regarding other operations, we are also taking a deep-dive now in our Canadian operations, as exposure to flooding, extreme heat, droughts or heavy winds and we are aiming to expand it to all our operations, to have everything assessed.

And if you allow me, Ivan, I think I was not clear. I can reinforce that when we are talking about scope 1 and 2, we are not talking about offsets, we are talking only about reductions. When we are talking about our target related to scope 3, as we are a hard-to-abate sector, we are considering, we are investing in the possibility of offsetting up to 20% for sure with the usage of high-integrity offsets. That's it, Ivan, thank you.

Mr. Ivan Fadel: It was a good point, Malu, I think we've got this question in the chat, so it was great how you tackled that one as well. So, just moving on, also we got a few questions about our climate change scenarios, so just get one here that encompasses the bulk of it, which is how the climate change scenarios are used by Vale in the decision-making process, including assumptions about demands and mineral prices for each scenario? And maybe, Luciano, you can address this one if you like.

Mr. Luciano Siani: Okay, we use the International Energy Agency scenarios, the current policy scenario, the stated policy scenario, the sustainable development scenario. We've translated those into demand forecasts with the help of a commodity consultant, external consultant, so we have 30-year forecasts for commodities. There's not much difference between the outlook for nickel and copper, which is very bright on the three scenarios. And therefore, that makes us be very bold on those sectors, we are already increasing our spending on R&D and exploration in copper, we intend to develop our projects in Carajás.

In the case of nickel, it's very clear that there will be a trifurcation of the markets and that there will be a premium of nickel sulfates over even the LME class 1, so we are also studying how to increase the proportion of nickel sulfates in our portfolio, there may be some investments in that. The iron ore outlook is more mixed, so it's still bright under the stated policy scenario, but obviously we're working towards the sustainable development scenarios and then you see a decline, but with an increase in the consumption of pellets, so that drives our strong focus on the high-quality portion of our portfolio, because we want to be

in the products which will increase demand, regardless of the overall trend of a declining iron ore consumption under the SDS scenario.

The outlook for thermal coal and met coal is very, very poor, and therefore this also is behind our decision to divest our coal assets in the long run, so that's the way we're thinking and how we are informed about the scenarios.

Mr. Ivan Fadel: Luciano, since we have you here for the Q&A Session, if you allow me another question we get a lot from investors, since the start of the talk about our MAC curve and Malu touched on a few items, but you can elaborate further how we see the total estimated cost for Vale to achieve all its goals by 2030 based on that curve we present.

Mr. Luciano Siani: Okay, so around 2 billion of the 4 to 6 that we said has already been incorporated in our forecast, it's the investment on renewables that we announced last year. Very accretive investments, Malu mentioned, US$ 85 million energy bill reductions, so that one shouldn't concern anyone. The middle section of the abatement curve also, it's commercial technologies that we dominate, for example, the replacement of trucks for conveyor belts, these are capital intensive investments, so we should spend another 2 billion on those, but again, these are bread and butter, very accretive, we are already doing a part of it.

The last leg you have some technologies that have a lot of potential to reduce significant amounts of CO2 emissions with low Capex, so although they require a carbon price in order to be NPV positive, their investment is low, mostly the biofuels, so, because I think there's a question in the chat as well. We will not take area from food production, we would rather use residues from sugar cane industry, for example, in order to provide the biofuels to feed our pelletizing plants, for example. So the investments in that case are very, very low and the outlook, the outcome in terms of CO2 emissions is very positive.

The last unproven early stage technologies, which are costly, these are the ones which we hope to avoid and find our way throughout the decade in order to avoid spending that last billion, so to speak, and stay in the range of 4-5 in order to achieve our goals.

Mr. Ivan Fadel: Perfect, thank you so much, Luciano. Since we touched on some of the initiatives here, I would like to ask you, Rogério, and we get this question a lot, we got it here also in the chat, but if you can elaborate further on Vale's initiatives on green steel? I know you touched on a few of them during your presentation and how do they connect with the most prominent technologies in that regard? And how are technological advances to replace coal in the steel industry operations and I will combine this with another

question we've got here in the chat that says what are these new technologies in steel production and if you can provide some examples? Thank you.

Mr. Rogério Nogueira: Yeah, I guess this would require a long answer, but I think I've covered during the presentation some of our initiatives and they are connected to the new technologies. Just to give you one example, the cold agglomeration initiative that I've just mentioned in the beginning, which is the breakthrough, it would be naturally the feed for, for example, for a blast furnace in the transition process, but it is also the natural feed to direct reduction iron, being it, actually, being it using the reductant natural gas or hydrogen, so it is a product that actually is very much aligned with the transition phase, but also with the long-term trend of direct reduced iron with H2, with hydrogen.

The dry concentration that we've talked about, it is going to be the basis for high-grade material, either pellets or cold agglomerates, to feed the direct reduction furnaces as well, which they will need. When we talked about biocarbon, for example, biocarbon it is a way for you to extend the life of the blast furnaces in the transition period and allow them to reduce CO2 emissions For example, think about China, where the age of the blast furnaces, or the integrated steel mills, is still very young. They will do whatever they can to extend the asset life. Therefore, this is one way for them to reduce CO2 and extend their asset life. So, in summary, I think everything we're doing is connected one way or another with the new technologies which are coming on board.

Mr. Ivan Fadel: Okay, thank you, Rogério. So, moving on to the Base Metals' space here, Mark, we've got a few questions, I will combine a few of them here to you, basically, generally speaking, what is our plan to grow in the battery markets? And also, a question here in the chat says that today there are competing technologies for electric motors, making batteries, hydrogen fuel cells and others. Which one is the best for Vale's products?

Mr. Mark Travers: Okay, nice Ivan. Yes, so the plan, I would break it down into certain short and then medium and long-term. Clearly in the short-term we have the opportunity to sell directly into the market and repurpose some of our class one products and sell to OEMs and battery makers and we've started to do that and we signed a significant multi-year offtake agreement for the powders that we produce in Sudbury and Clydach, Wales, for doing that, so that's something we could do and we can do that too and we can continue to grow that in the shorter term respecting the needs of our high-end customers.

Then the next part is really to contribute to the future by looking for opportunities to work with partners and even government to establish new supply chains through the accretion of the electric vehicle supply chains currently in America,

as well as Europe and so there are opportunities that we're looking at with obviously some models around risk sharing, where potentially we can produce nickel sulfate, we can open up new mines, we've talked before about new mines in Thompson, Manitoba, which could be use for additional supply. These supply chains are really rapidly being built now, there's a lot of discussion about where this nickel is going to come from and we feel like we're one of the first movers in the ability to supply that nickel right now and then build. So that's how I would put it. And that market share is currently about 5% of our class 1 that is sold, that could grow to 30 to 40% in coming years, for example.

In terms of competing technologies for batteries, there is the LFP, lithium ferrous phosphate battery, there is the nickel-rich battery and then you just start to get into the batteries or the sources of energy for the future. Well, what we see is that clearly there is a place for the LFP battery, which does not use nickel, but then we feel that there's a strong position for nickel-rich batteries, because of the energy density and the range in performance that it provides, which is significantly demonstrably better than the other battery options right now.

And so you are seeing the nickel-rich batteries increase in size and putting more nickel into those batteries, and we expect that to continue, and we expect nickel to remain a very, very strong option in the battery space to at least 2035. Did I pick up everything in that question, Ivan?

Mr. Ivan Fadel: Yeah you did. Thank you so much. So maybe back to Rogério, here more about the green steel topic. Rogério, since you've touched on China, the question here we got was related to if we've seen much change from Chinese customers, for example, the steel producers there, following the recent government pledge of going carbon neutral by 2060? And, in relation to this, how do you see the iron ore versus scrap dynamics for iron ore sources in the steel market?

Mr. Rogério Nogueira: Yeah, Ivan, to the first point. We see lots of interest from the Chinese clients in engaging, understanding this topic of decarbonization. Like as I said, their assets are younger or newer, but they are very much interested. Just to give you an example of two key clients, large, large players in China. Baowu, we have an excellent relationship with, is currently investing on a DRI plant in South of China, in the province of Zhejiang. They're going to do this initially with natural gas as a trial, as a test, but with the plan to add scale, to escalate that later.

Hebei Steel, which is the second largest steel player in China is also together with Tenova is building a direct reduction plant as well, 1.2 million tons directly and doing a lot of research on hydrogen. I think those leading companies in

China, if you will, they are investing time, energy and money to define a pathway in China towards decarbonization. So Baowu and Hebei are just two examples, but we see the movement from other companies in China as well.

In relation to scrap, I think we all know that scrap is going to be bigger in China, especially if we think about the lifecycle of scrap usage. A growth in China started in the early 2000's. If we do apply some lifecycle assumptions, we can estimate that the years of 2030 onwards are years in which there will be ample supply of scrap. But important to say that, as I mentioned in the presentation, this scrap is going to be obsolete scrap, scrap from obsolescence and thus quality is going to play a very important role. Well you cannot only produce with obsolescence scrap, you need, as I said, fresh Fe units to complement your burden, so we believe that there will be space for the increased usage of scrap and, you know, more units of Fe content, more high-grade iron ore to be fed and to complete the burden mix.

Mr. Ivan Fadel: Ok, Rogério, thank you so much. We're very close to the end. I'll squeeze in just one more question here and it's related to coal business for Vale, so maybe Luciano can answer this one. It's how does the exit from the coal business impact Vale's emission reduction targets, Luciano?

Mr. Luciano Siani: Okay today, not today, 2017 the baseline on emissions from coal were about 7% of the total. And they would grow substantially given the business plan to reach 22 million tons, which is still on the cards. So, by selling the coal business, probably, we are going to remove it from the baseline, we will continue to target emissions comply with the Paris agreement with that, so the 33% will have to apply to a different baseline. But and then you're going to say, "well, but what are the others going to do with that?" Most likely… Mozambique perhaps will not reach the 22 million tons, will stay below that and hopefully in some other, hence still there's going to be a reduction compared to our initial forecast on the business-as-usual scenario but, in a nutshell, I was very lengthy, we will adjust the baseline and the target accordingly.

Mr. Ivan Fadel: Okay, so thank you Luciano. I think we are about on time now. I would like to thank all the participants for your time, interest on this subject and on our company and also our team here of Executives for their excellent presentation and answers in the Q&A Session. We will follow-up by email on the questions we haven't been able to address here today and, just before you leave, please scan the QR code that you see on the screen and leave your feedback about our event, so we can improve further for the next one, because this is very important for us and with that thank you so much for your participation.