

PDAC

FUTURE OF COMMODITIES IN VOLATILE MARKETS

INDUSTRY TRANSITION FOR FUTURE COMMODITIES

CATALYSING NEW CONVERSATIONS AROUND MINING AND SOCIETY.

1. ACKNOWLEDGEMENTS

PDAC Organising Committee.
Doris and the team.
Industry Colleagues and Friends.

2. OPENING REMARKS

The first thing I must say, it is a great honour to present the closing remarks for this year's PDAC event.

Doris and the team have done a great job, and I also commend her on the great line up she has assembled. I must also acknowledge my industry colleagues that were part of the CEO conversation, as it is so important for us to get our messages into public forums, while also encouraging a sharing of views and perspectives that will have different nuances in those individual positions.

As a personal call out, I'd also like to acknowledge Mark Podlasly, leader of the First Nations Major Projects Group who is also here. Mark is a great voice for Indigenous and First Nations people across Canada and the Globe, and he has been an active and much appreciated participant in a range of industry critical discussions. I can only hope we return his support for his important event a little later this year, under the banner of the First Nations Major Projects Group. As a fellow Kellogg Innovation Network partner, and Board Member of the Development Partner Institute – I count myself very lucky to be able to hear and explore his perspectives on so many social and mining issues, and from the perspective of a First Nations leader.

I would also like to call out an industry colleague that has recently passed. Jeff Whittle was a great mining innovator – bringing the world of practical mining design to the world of financial optimisation. Along with Oskar Steffen, Jeff was one of those few individuals that understood and developed practical tools to help mine practitioners deliver economically sustainable outcomes. He provided a practical framework for turning a resource with potential, to cash flow and returns on capital. In my view he was one of our top 10 mining innovators over my 47 years in the mining industry. I know I speak for many in thanking his family for the time he gifted us and the great contribution he made to mining and the world at large. In my view it would be a great touch for us to take a moment and applaud his great contribution to society.

Now, with my few words today, I am focussed on how we might catalyse new conversations around mining and its contribution to society. It is through our great pioneers and innovators that we continue to transform our work and its value to society in so many dimensions. I can only hope the torch we carry for these conversations does justice to the great contributions our leading industry innovators have made in building our evolving industry.

2. INTRODUCTION

In the last 2,500 years people have debated the role of metals and minerals in society. The Ancient Greeks got the ball rolling when they captured their thinking on mining and the use of minerals in their everyday life. The “Worldly Philosopher”, Empedocles offered a powerful insight into how people thought about the world in around 450 BC when he proposed the notion of the “Nature of Things” being:

- Air,
- Water,
- Fire,
- Earth.

As people will be aware, I’ve put a little bit of a modern slant on those words – using the intended logic to describe the Nature of Environmental sustainability in terms of:

- Air,
- Water,
- **Energy**, and
- **Minerals**.

Now, if I roll the clock forward around some 2,400 years we get to our modern “Worldly Philosophers”. The world of Quantum Physics gave us Einstein and others. In their work, they made the startling observation that energy was the likely source of all matter, but also recognising humans haven’t yet recognised how to create matter. Or to put it into simple words based on our current technical capacities – stuff can only be made from other stuff. And all that stuff comes from, or is made of, metals and minerals. While I won’t let the story get bogged down in the conversation around anti-matter – the point that we need to focus on - people really don’t understand where stuff comes from. In a recent session with PhD students focussed on environment, I was asked the question – why do we need mining and commodities? I took the question, more as a metaphor for what people don’t understand about how the world works than as a leading question on how we might change how the world works. I suspect it was meant to be a little of both and so I will come back to the question on how we change how the world works a little later.

Now, to focus on the first part of the conversation. There cannot be a real debate on whether Minerals are important to our world. Minerals are, and have always been, critical to the world and how we humans live our lives. By saying its not a real debate, my point is quite simple – there is nothing to debate.

The provision of clean water is an absolute necessity to sustain life as we know it. We need minerals to purify, pump, use and recycle water. For an industry that uses about 3% of the world's water to support everything else that happens on the planet – we are overwhelmingly a positive for global water balances. And remember, domestic use makes up 10% of global water consumption. And the health of the oceans will remain critically linked to the technologies and tools our industry provides to protect from human waste and the other products that find their way into our water courses.

On food and nutrition, without fertilisers we could only feed half the planet. Or, if we were to deal with food waste also estimated at 50%, we would need to work out how to develop farms and logistics networks to address the waste issue. In either case, mining products are an essential part of the solution.

And let's not forget buildings, urbanisation, and core infrastructure – taking up 15% of the Earth's surface, which would probably be +20% to 30% without the products of mining enabling concentration of human activities in minimised physical footprints. That is, building up and not out, is the key to minimising our physical footprints dedicated to shelter, work and entertainment environments and transportation infrastructure.

I could go on and on – and it is not without doing some simple maths that I make the argument that the mining industry has the most significantly positive environmental footprint on the face of the planet.

The facts as they stand:

- A positive water footprint.
- On physical footprints, 0.3% physical footprint for mining to free up 30% of the earth's surface for preservation of biodiversity or other nature-based imperatives, and
- We provide the materials to generate low carbon and clean energy.

We, of course, acknowledge the significant physical footprint for the communities and indigenous people in and around mines, and while we argue we have made progress it is clear we still need to work hard to nullify the negatives on local biodiversity and waste (no tailings) emissions. While being the globe's most important champion for environmental sustainability – it doesn't mean we can't do things better.

And so, when do you think Minerals, as a broad asset category, become less than critical? Or as I recently said in Brisbane, when did mining become a dirty word?

In my view, the debate around Critical Minerals provides us with an opportunity to tell our story. We have never had a better opportunity to explain why Minerals are critical to life as we know it **and** to explain why mining really does matter. The conversation around the Energy Transition, the difference we make to the world and why we need support to help the world be sustainable is the opportunity to tell our story to people that usually never give us a second thought, or if they do it's not a positive thought. And it's a story that must go beyond a few narrowly defined Critical Minerals – because our reality is those few Critical Minerals won't be enough to dig ourselves out

of the current energy hole we are in, or deal with other social and environment imperatives that we need to address.

So, let's talk about "Critical Minerals" and where we need to lead our industry and our conversations in society for the long term.

3. DISCUSSION

The Case for "Critical Minerals"

The Climate Change and energy transition conversation has captured the attention of both people and politicians across the planet. As a testament to that profile, we are now up to COP 28, where all sorts of important people are talking about how we save the planet by adopting more sustainable energy sources. As a mining leader I was part of the ICMM leadership group that adopted the Precautionary Principle, way back when Climate Deniers were still welcomed in polite society. In my Executive role at Anglo American, where we had transformed our business to 55% renewable inputs in the relatively short space of 5 years – we also reduced our associated energy costs over the same period. In my view these issues create new opportunities for our industry to improve and become a broader contributor to society, while at the same time growing our relative financial performance. And while we did write off one longer term energy contract, the lower rates we were charged more than offset that individual cost. Of course, those points were made public at the time, and we received great support for the moves we made.

However, what strikes me about the energy transition debate as I have highlighted, we have equally pressed conversations around water, food and basic human security and shelter.

In each of these confronting global issues, we need the raw materials to put in place the energy or transformation source materials to build the technical solutions we need to solve these challenges. And we need to put the supporting infrastructure in place to deliver those solutions at scale. So, for me, a conversation around Critical Minerals needs to be had in this much broader global context – because whether we like it or not, demand for our products is not simply about the energy transition.

And, if I start with our most important energy transition metal, you will immediately understand my point. Of course, copper, nickel, lithium and cobalt are Critical Minerals in the context of the energy transition – but likely no more important than steel. Yes, steel – comprising iron ore, metallurgical coal, and other important minor metals. We need steel to build the infrastructure to physically support these new energy sources and other critical infrastructures.

In my view, a direct consequence of not telling our story on these fronts, we have governments slugging steel inputs with new royalties and taxes. The problem with many governments or third party actors, they simply don't understand how the world works or where costs actually come from. And this is not simply a developing country issue – the States of NSW and Queensland in Australia have been progressively

squeezing margins and discouraging investment in quality coking coal, while clearly indicating they have no problems in opportunistically changing investment regimes when it suits a narrow political purpose.

And while new developments in clean steel making will reduce the use of metallurgical coal, the next 20 years are critical for the energy transition and Governments such as Queensland are putting those development imperatives at risk. In this same context, if you are an iron ore producer you will remain well placed in terms of underlying demand for your products. And while China may not be building as much, there is a country called India that beckons with infrastructure developments that will create a growing source of demand for both iron ore and high quality metallurgical coal. I think the key trend in iron ore will reflect more significant premiums for high quality materials, where carbon generation can be 30% lower than comparable inputs. So, how we manage a true energy transition is as much about transitioning from old technologies to new technologies – with how we transition as important to billions of people relying on these older technologies, as it is for our children demanding new technologies. We have a responsibility to everyone in society – not just those with the loudest voices or the deepest pockets.

Of course, Dr Copper remains a global key to unlock the energy transition. However, its uses in water, medical, and a whole range of industrial applications gives it a breadth of use and application that really does create a demand surge that will just not be met by current mines and planned new developments. As copper mines go deeper, grades continue to decline and approvals and support for developments become more challenging – the case for the copper price rises becomes more compelling. I'm still of the view we will see \$20,000/t, before we see a pullback in aggregate demand, as users' thrift, recycle or substitute copper for lesser cost alternates. We have seen this phenomenon in India over a long period of time, as copper was priced out of the primary energy distribution market. However, that risk is relatively small in the context of the broader market demand changes.

On nickel, the short term question will continue to be around Indonesia. I would say just as well – as we also need nickel for stainless steel, specialty alloys and a whole range of other industrial applications. Certainly, as we navigate the next 2 or 3 years there will be some pressures on nickel prices. However, I still think a long term price above \$21,000/t is necessary to support growth for our products – and the current pressures will only put upward pressure on those medium to longer price positions. I would also make the point that high quality nickel with environmental credentials around carbon, energy and broader environment footprints, will increasingly be priced to advantage in our consumer markets.

On cobalt, a mixed bag but we're still short. The key question I think about is around that application/cost point, where substitution becomes a practical and viable medium to longer term alternative.

Lithium remains one of those elements where the world has lots of low cost product in brines, but not enough to support current demand trends. I remember in my days at Greenbushes, where we mined Tantalum during the week, and we mined a 10,000t of spodumene on a Sunday!!! As the world's lowest cost producer of spodumene at the

time, we made a handsome margin on relatively low volumes. In today's world, based on known regional resources and the challenges and investments needed in downstream processing, integrated development and processing strategies are needed to allow Spodumene to be a competitive source for lithium. Life has been a lot tougher for lithium producers of late – reflecting rapid supply increases and the competitive nature of processing facilities in negotiating feed contracts. Not a surprising development and one that likely requires a year or two or three to sort out competitive mining sources and the balance of demand and supply and the arbitrages that will be in play between miners and processors. I think Mark Bristow's recent comments regarding supply discipline are well made – we do ourselves damage in these markets as we bring on projects that have not been thought through as they close as quickly as they open in shorter term, volatile markets.

And as the victims of older technologies, leaving aside fossil fuels, jockey for new markets, I have no doubt there will be new and competitive applications that will compete with those materials we talk about being in critical short supply.

Minerals and metals like PGMs – particularly Platinum and Palladium, Vanadium, Manganese, and others all have a role to play in areas we understand today. But they could also play a broader role as new technologies are developed to compete with the current primary use materials that are priced towards the top end of their utility.

As the global Middle Class grows, the demand for metals will similarly grow and place significant demands on the mineral resources sector. And the use of different materials in different applications will change how the markets price specific metals. The key question for many of the new metal entrants – do you understand these risks, and do you have a plan B?

Minerals and Sustainability – A Global View

So, after establishing the broader importance of mining to society, let's focus on how mining plays its part in creating a sustainable world. In discussing the primacy of our role in minimising physical human footprints, increasing water availability and access, and the leading role we need to play in reducing our carbon footprint – it is clear we have a significant positive impact on sustainability as things stand today.

But let's get a little more granular and be a bit tougher on ourselves. If we take the latest satellite imagery – our global physical footprint in terms of active mining at scale, we impact around 0.3% of the earth's surface. If we assume an average mine life of 20 years – that would imply over 100 years our net primary footprint would be more like 1.5%. Now, they tell me environmental rehabilitation is generally around 50% effective at a global scale, that pulls us back to around 0.75% impact. So, if I take the long view – say in 500 years those numbers start to become material.

Then, if I look at how costs increase as we mine deeper, as grades decline and as infrastructure and other investments need to become more substantial, it becomes clearer that sustainability is not simply about footprints – its also about costs. For those that remember Anglo's "FutureSmart" program we flagged a key issue that drove our long term innovation thinking. Since the year 1900, mine grades for copper

have dropped 80%, tonnes (including ore and waste) have increased 16 times to mine a unit of copper, along with energy consumption increasing also by a factor of 16. In simple terms, if we keep doing what we are doing, the cost of mining for society will rapidly become untenable. New approaches to mining must be found, along with smarter ways to access metals and materials more than once.

In the next 50 to 100 years the minimums we will have to navigate to continue our role as the primary suppliers of everything to society we must:

- Mine more precisely – that is, we need to mine the ore, and only the ore.
- Mining smarter and productively using all the new tools that are available to us – Artificial Intelligence is simply another way to access smart ideas and approaches using more powerful data processing capacities and tools.
- We need to develop new energy technologies to liberate metals from their native state – Anglo’s CPR work and other initiatives or Robert Friedland’s even more radical Pulse technologies need to be given more support. And that is certainly where we will go with Vale Base Metals.
- Recycling and our circular economy must be developed at pace. And while people are arguing about margins and returns, I think the game is rapidly changing and the issue will become how and not what, over the next 10 to 20 years. To their credit, Glencore are aggressively stepping into this space.
- Materials and other sciences will push us into thrifting of high consumption and associated cost metals – or substitution will be enabled as those sciences work out how to close efficiency gaps in using alternate materials. In that context, I have no doubt there is life after auto catalysts for palladium – its just a matter of how quickly we can get there.

So, the point I’m making is for us to keep shifting our mindsets and keep moving as the world will not wait for us to do what we must do to be competitive. You’ve likely heard the term I use, “A Materials Solutions Company”, in the belief the development of new uses for mined products would be a key driver of economic value for society and our business. That conversation was about where we had to go and how we had to frame the key activities that we believed would take us to the lead in our industry. And today, I think that imperative is clearer than it has ever been in my 47 years in the industry. It was a conversation that drove our Anglo American’s forward looking activities and helped us deliver that 50% real unit cost reduction we achieved over 9 years. And today, the Vale Base Metals Asset Review is completed, and the opportunities are as significant as we identified and delivered in previous businesses.

I also believe we are all leaving a large amount of value on the table in not thinking more about how we could find more uses for the materials we have available to us in the resources we mine. And in delivering sustainable solutions that work for the planet, we will also find pathways to internal efficiencies and potential outperformance. The journey is a massive learning opportunity and as long as you keep focus and balance, the checkpoints along the way are important milestone moments where you will need to recalibrate and go again. It’s a marathon, not sprint – but with lots of mini sprints required to push up incremental return opportunities, while building a portfolio of new uses for our products.

As we develop Vale Base Metals, we will certainly interrogate all our physical production opportunities – but our biggest opportunities could readily come from where and how we develop end uses for our products. It is in this context I think material sciences represent a great opportunity to develop cost effective substitutes in metals, to improve our costs for our customers and our margins on more accessible and better margin products.

We must always remember, its not simply about costs, its also about prices – to drive sustainable margins and returns.

Value in our industry comes in many forms and so getting the balance across the portfolio and its opportunities is how the great companies survive and prosper.

The Case for Sustainable Mining

That Global View must be then internalised to provide direction and motivation for people to buy into the vision for what the business can be. In Anglo's case we used the "Reimagine Mining conversation..." to help galvanise the conversations.

Also, we need to remember that the term "**Sustainability**" is an economic term – it is not a simplistic or narrow environmental term. The concept of delivering for today, while not stealing from the future is aligned with leaders that think in the longer term. And it is the great companies that thrive and grow when they think in terms of "now and the future". Sustainability is also not about encumbering the now for the future – its about striking a balance between the now and the future.

So, when I talk about setting targets for a business I always start with:

- **Sustainable free cash flow** – in our industry, if you are delivering +10% free cash flow after investing in resources and reserves, asset integrity and maintenance and mine development – you are likely a top 10 business performer in mining. In Vale Base Metals that must be and is our first performance milestone that we have to achieve.
- **Delivering a 15% ROCE, or better than 10% ROIC** – you are also demonstrating the ability to allocate capital sensibly. And for Vale Base Metals, the combination of these two focal points is the key to our public value proposition.
- In the great debates on ESG and other key performance indicators, it fascinates me to hear people arguing against, what I see as the 7 minimum Pillars of Sustainability:
 - **Safety and Health** – any business that is hurting people will never deliver best in class productivities or costs.
 - **Environment** – show me a business dumping crap on its community that has a sustainable business model.
 - **Social Performance** – in my experience, a mine at war with its local community has no future – or you can add 30% to its cost base if they are.

- **People and Talent** – the fairies at the end of the garden aren't the one that deliver great performance.
- **Resources, reserves, and a sustainable production base** – if you want a great mine – a good resource is also a good place to start.
- **Bottom half of the cost curve while maximising price realisations** – margins are driven at both ends of the production and marketing mix, and so it helps if you can generate positive cash through price cycles.
- **Balance Sheet** and having the stability and capacity to navigate the tough period in our business our also critical in terms of keeping an eye on the future and being flexible to circumstances.

As the **Archbishop of Canterbury** said after we had engaged Faith-Based groups in helping us develop better relationships and approaches in our local communities **“We have researched the Bible for 3 years and have not been able to find one negative reference to mining. On this basis we conclude, we can support mining if it is done responsibly”**.

As an industry, we need our employees, our customers, our business and social partners talking about how we are making a difference in their lives. We can always do a better job talking about ourselves – but it doesn't really mean anything until our key stakeholders and interested parties that see how we make a difference.

And if I go back to the point I made earlier, about that question on whether we need to mine commodities – based on the numbers today, if we recycled all the metals in use, we would still only have enough metals to develop 40% of our energy transition needs. So, while recycling, a true circular economy, smarter use of metals and better applications of metals in new forms are all part of our broader social solution mix – we will still need the mining industry as the key player in creating a sustainable world.

4. SUMMARY AND WRAP

Finally, Mark Podlasly once said to – Indigenous and First Nations people are not against development or mining. We just need to be heard and respected in the debate, and we want to be partners on a basis and with terms that are fair in our context – not just yours.

I believe in the mining industry. I believe in what we do, and I believe we can find solutions to both support that are consistent with a sustainable pathway for the future for our children.

In a world that seems to be becoming a whole lot more complex each day – there are certain things that we can do to bring us together as an industry, and by modelling those behaviours, let's hope our work and the modelling of global cooperation can be a catalyst for a new dialogue and a pathway towards a sustainable planet.

- We need to tell our story and help people understand how the world works and our specific role in creating a sustainable world.

- We need to continue to do better in our work and how we work with our partners to ensure a sustainable industry is achieved because everyone understands how they can help be part of that sustainability, and
- We need to deliver more consistent and sustainable returns to shareholders – as without their support we cannot be the catalyst to create a more sustainable planet for our children.

If we can't do it with mining, where or in what industry can we do it?

Mark Cutifani

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