The end of net-zero targets

written by Anthony Milewski | January 14, 2025

We expect significant investment across the electric battery and electric vehicle sectors, as well as nuclear energy and some of renewable energy sectors (in particular solar, less so wind energy). Demand for critical minerals to build out the renewable energy sector will therefore continue to grow, but there will be new dynamics including longer-term horizons, splitting of supply chains between the US and China, and new priority demands from industries such as data centers. However, a combination of urgent, massive demand for new energy supply to power AI, just as costs are rising across the renewable sector – as well as general living costs across the world – mean governments, companies and voters have other increasingly urgent priorities.

American Clean Resources Group's Tawana Bain on Smart Mining and Waste-to-Energy Technologies

written by InvestorNews | January 14, 2025

June 5, 2024 – In a recent interview with InvestorNews host Pat Bolland, Tawana Bain, CEO, and Director of American Clean Resources Group, Inc. (OTC: ACRG), discussed the importance of ACRG's newly established Environmental Sustainability Board, which consists of experts in mining, renewable energy, and

finance. “I hope that the board’s collective expertise will play a crucial role in how we shape up the strategic direction for the organization,” Bain stated, indicating her reliance on their guidance to advance smart mining and waste-to-energy technologies.

Bain also elaborated on the company’s recent well water purchase agreement with Road and Highway Builders LLC in Nevada, which supports their highway project. This initiative not only demonstrates ACRG’s capability to mobilize resources but also underscores their commitment to sustainability. By using well water, the project can reduce reliance on municipal water supplies and maintain surrounding ecosystems. Bain remarked, “It aligns perfectly with the narrative around our mantra of cleaning up America while building America.” Additionally, Bain discussed the innovative approach of transferring federal tax credits to individual investors to enhance the financial viability of renewable energy projects, describing it as a strategy to accelerate project timelines and boost investor confidence.

Furthermore, Bain touched on ACRG’s acquisition of Swiss Community, an organization focused on water quality improvement technologies. This acquisition aligns with ACRG’s long-term vision for environmental sustainability and aims to deploy these technologies across their operations. Bain expressed her enthusiasm for the potential of these technologies to address water security issues and improve community engagement. Looking ahead, she mentioned the company’s focus on exploring new projects and partnerships in the renewable energy sector, particularly in solar energy expansion and green retrofitting of facilities, reflecting ACRG’s ongoing commitment to ecological and social responsibility.

To access the complete interview, click here

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About American Clean Resources Group, Inc.

American Clean Resources Group (OTC: ACRG), an environmentally sustainable development platform, is at the forefront of renewable and environmental development in the United States, through comprehensive Resource Management and processing of precious minerals and metals in a carbon-neutral and environmentally safe manner. Dedicated to revolutionizing the new American Supply Chain by aiming to deliver goods with a net-zero environmental impact, ACRG is committed to advancing climate change reduction, strengthening the American Supply Chain, and aiming to lead one of the largest renewable energy projects in the U.S. ACRG leverages existing assets and pursues strategic acquisitions across air, water, and land domains to benefit both public and private properties within the United States.

To learn more about American Clean Resources Group, Inc., click here

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Tawana Bain and ACRG's Drive for a Sustainable American Supply Chain through Net-Zero Mineral Production

written by InvestorNews | January 14, 2025

In a recent Investor.Coffee interview conducted by Jack Lifton, Tawana Bain, the CEO of American Clean Resources Group, Inc. (OTC: ACRG), shared insights into the company's innovative approach to contributing to the American supply chain through the production of net-zero minerals and metals. Bain highlighted the company's focus on utilizing tailings, which significantly reduces energy consumption by 90% compared to traditional mining processes. The venture is set to power its operations entirely off-grid, leveraging renewable energy platforms developed on their property located in Tonopah, NV, a community nicknamed the **Queen of the Silver Camps** for its mining-rich history.

Bain discussed the strategic position of their property near the developing lithium industry hub, emphasizing the potential for neighboring facilities to benefit from the excess power generated by American Clean Resources Group. Addressing potential roadblocks such as permitting and tribal disputes,

Bain expressed confidence in overcoming these challenges through the support of a robust advisory group and strategic alliances with relevant agencies.

Reflecting on her background, Bain shared her extensive experience in environmental consulting, strategy, and community outreach, marking her public debut in a leadership role with this project. Lifton praised Bain for identifying a critical need in energy production and for her efforts to educate the investing public on the benefits of the company's model, beyond political considerations. To access the complete interview, click here

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About American Clean Resources Group, Inc.

American Clean Resources Group, Inc. (ACRG) is poised to be a trailblazer in renewable and environmental development within the United States. Committed to strengthening the American Supply Chain and advancing Climate Change Reduction through comprehensive Resource Management, ACRG aims to spearhead the largest renewable energy project in the U.S. located in Nevada's Big Smokey Valley of Esmeralda County, near Tonopah. Our strategic advantage lies in controlling the largest renewable energy site in the country, holding water rights, and possessing vital infrastructure. Over the past 15 years, we've retained ownership despite lucrative offers, aligning with our strategic vision to construct the United States' largest renewable energy park focused on processing Gold and Silver.

Our strategy involves leveraging existing assets and pursuing

strategic acquisitions across air, water, and land domains, aligning both vertically and horizontally. Additionally, we aim to lead in reprocessing mineral waste and providing toll, specialty, and custom milling services for precious and rare earth metals.

To learn more about American Clean Resources Group, Inc., click here

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Technology Metals Week-in-Review: US Tax Rules Impacts

EV Market, $3Bn Raise for ARA Partners & Appian's $230M into USSM

written by Tracy Hughes | January 14, 2025

This week's **Technology Metals Week in Review** captures the multifaceted nature of the critical minerals sector, highlighting key financial deals, policy developments, international trade dynamics, and strategic initiatives that are shaping the global economic and environmental landscape over the last week. Special thanks to the Critical Minerals Institute (CMI) Directors that source these stories for review for both the CMI and InvestorNews audience.

Stricter Federal Tax Credit Rules in 2024 May Limit Electric Vehicle Choice: December 16, 2023 (Source) – In 2024, the eligibility for federal tax credits on electric vehicles will tighten, potentially excluding popular models like Tesla Model 3 and Ford Mustang Mach-E due to more stringent sourcing requirements. The Biden administration's new rules, part of the Inflation Reduction Act, aim to promote North American manufacturing and reduce dependence on China for batteries and essential materials. This change marks a significant shift in the electric vehicle market, which has seen increased sales partly due to these credits. While electric vehicles are a rapidly growing segment, the new restrictions could impact the affordability and availability of certain models, creating a challenge for both consumers and manufacturers. *Referral, CMI Co-Chairman Jack Lifton*

Appian's Major Financing for US Strategic Metals: December 18, 2023 (Source) – Appian Capital Advisory LLP has made a significant move in the battery metals sector by providing a

$230-million financing package to US Strategic Metals (USSM). This financial support aims to boost the development of USSM's cobalt/nickel mine and establish a hydrometallurgical battery metals recycling facility in Fredericktown, Missouri. The package includes a $120-million secured term loan, a $70-million royalty financing arrangement, and warrants. USSM's project focuses on mining and processing critical minerals like cobalt, nickel, lithium, and copper. This initiative will not only aid in recycling but also in the production of battery metals for the electric vehicle (EV) supply chain in the United States, marking a significant stride in the domestic production and recycling of essential battery materials. *Referral, CMI Director Russell Fryer*

Canada's 2035 Zero Emissions Vehicle Mandate: December 17, 2023 (Source) – In a landmark move for environmental policy, the Canadian government will announce regulations mandating all new cars to be zero emissions by 2035. This initiative, termed the Electric Vehicle Availability Standard, aims to address the long wait times for EVs, which have been a major barrier to their uptake. The regulation will gradually increase the required proportion of zero emissions vehicles (ZEVs), including battery electric, hydrogen, and plug-in hybrid vehicles, in new car sales – reaching 20% by 2026, 60% by 2030, and 100% by 2035. This move is complemented by incentives for companies to sell EVs and build public fast chargers, alongside the government's commitment to build 84,500 chargers by 2029. The mandate has faced pushback from auto manufacturers but is seen as crucial in addressing rising carbon emissions and the inefficiency of the current vehicle fleet in Canada. *Referral, CMI Co-Chairman Jack Lifton*

Vital Metals' Rare Earths Deal with China: December 17, 2023 (Source) – Vital Metals Limited (ASX: VML), operating in Canada's Northwest Territories, has struck a significant deal

with Chinese company Shenghe Resources. All the material mined so far at the Nechalacho mine will be sold to Shenghe, which now holds a 9.9% stake in Vital Metals, potentially rising to over 18%. This decision represents a shift in strategy for Vital Metals, which previously aimed to contribute to breaking China's dominance in rare earths supply. The deal will provide Vital with crucial funding for its operations and future developments, including the exploration of the larger Tardiff deposit and lithium-related projects. However, the deal has raised questions regarding national security and the influence of foreign investments in critical mineral sectors. *Referral, CMI Co-Chairman Jack Lifton*

CMI Summit III: Achieving Critical Minerals Mastery in Today's Markets: December 14, 2023 (Source) – The Critical Minerals Institute (CMI) has announced the CMI Summit III, scheduled for August 21st and 22nd, 2024, at The National Club in Toronto, Canada. This event, themed "Achieving Critical Minerals Mastery in Today's Markets," will gather industry leaders, investors, and experts to discuss critical mineral topics such as investment opportunities, the impact of specialist companies, global market trends, and African market dynamics. The summit will address challenges and opportunities in the critical minerals sector, focusing on geopolitical influences and strategies for thriving in a dynamic market. Industry leaders like Mark Chalmers from Energy Fuels Inc. (NYSE American: UUUU | TSX: EFR), Tuan Tran from Ara Partners, Dan Blondal from Nano One Materials Corp. (TSX: NANO), and Pat Ryan from Ucore Rare Metals Inc. (TSXV: UCU | OTCQX: UURAF) will contribute to the high-level discussions and expert-led panels. *Referral, CMI Managing Director Tracy Weslosky*

Advanced Magnet Lab's Commercial Manufacturing Plan in the U.S.: December 15, 2023 (Source) – Advanced Magnet Lab, Inc. (AML) announced its plan for high-rate commercial manufacturing of

non-sintered permanent magnets in the U.S. Utilizing its PM-Wire™ technology, AML focuses on producing magnets for various applications, including electric motors. The company's collaboration with Oak Ridge National Laboratory (ORNL) in developing an electric vehicle motor is a notable example of its innovative approach. AML plans to co-locate manufacturing with customers or supply chain partners, with potential site locations being discussed in several U.S. jurisdictions. This initiative represents a significant advancement in the domestic production of critical magnet technologies, essential for various industries, including aerospace, defense, and automotive. *Referral, CMI Director, Alastair Neill*

China's Increased Rare Earth Quotas for 2023: December 16, 2023 (Source) – China, the world's largest producer and consumer of rare earths, has issued its third batch of rare earth mining quotas for 2023, totaling 15,000 tonnes, and smelting and separation quotas of 13,850 tonnes. These quotas are closely monitored as they are critical indicators of global rare earth supply. The increase in quotas indicates a response to higher demand needs, highlighting China's significant role in the rare earth industry. This year, the total rare earth mining and smelting quotas have increased by 21.4% and 20.7%, respectively, compared to last year. The rise in rare earth imports in China also underscores the growing global demand for these essential materials. *Referral, CMI Director, Alastair Neill*

Ara Partners Closes Over $3 Billion of New Capital Commitments: December 13, 2023 (Source) – Ara Partners, a leading private equity and infrastructure investment firm specializing in industrial decarbonization, has closed over $3 billion of new capital commitments. Fund III, focused on buyout and growth investments in the decarbonization sector, exceeded its initial target, closing on $2.8 billion. Ara's strategy aims to reduce carbon emissions in industries, including industrial and

manufacturing, chemicals, energy efficiency, and agriculture. The fund has already made significant investments, demonstrating Ara's commitment to environmentally impactful and high-growth companies globally. *Referral, CMI Managing Director Tracy Weslosky*

China's Interest in US-Vietnam Rare Earths Plan: December 16, 2023 (Source) – Following President Xi Jinping's visit to Hanoi, China has expressed interest in Vietnam's rare earths, suggesting Vietnam should send its rare earth deposits to China for processing. This comes amid US efforts to encourage Vietnam to directly export its rare earths to counter China's dominance. Vietnam, with substantial rare earth reserves, is seen as a key player in diversifying the global supply away from China. Beijing's offer to assist in building a railway through Vietnam's rare-earth heartland further underscores the strategic importance of these minerals and the geopolitical complexities involved. *Referral, CMI Director Russell Fryer*

This week's Technology Metals Week in Review serves as a testament to the dynamic and critical role of technology metals in our contemporary global economy and environmental strategies. For more information, visit www.CriticalMineralsInstitute.com

InvestorNews Critical Minerals Media Coverage:

- December 14, 2023 – The Critical Minerals Institute Announces the CMI Summit III: A 2-Day Event Led by Prominent Industry Leaders Themed "Achieving Critical Minerals Mastery in Today's Markets" https://bit.ly/41oV1x7
- December 13, 2023 – Top 3 best valued lithium juniors, as lithium prices near a bottom https://bit.ly/48fMKOd

InvestorNews Critical Minerals Videos:

- December 15, 2023 – CMI Masterclass: Securing North America's Future, A Conversation on the Critical Minerals Supply Chains with Jack Lifton https://youtu.be/UgOu0xKlHuw
- December 12, 2023 – CMI Masterclass: Flow Through and Critical Minerals https://youtu.be/SLvpYVCnbTA

Critical Minerals News Releases

- December 15, 2023 – F3 Announces Stock Option and RSU Grant https://bit.ly/48oIkF4
- December 14, 2023 – First Phosphate Announces Intention to Complete $2,000,000 Non-Brokered Private Placement https://bit.ly/3NsoikK
- December 14, 2023 – Continued Exceptional Drilling Results at Halleck Creek https://bit.ly/3tgDbjg
- December 13, 2023 – Elcora Announces Approval of Stock Option Plan and Restricted Share Unit Plan by Shareholders https://bit.ly/48j8OI2
- December 12, 2023 – Western Uranium & Vanadium Corp. Closes Fully Subscribed Brokered LIFE Financing of $7.25 Million https://bit.ly/3Ro3Wu2
- December 12, 2023 – Louisiana Governor Executes Ucore's SMC Industrial Tax Exemption Contract https://bit.ly/4ak1GN6
- December 12, 2023 – Appia Announces Scandium and Cobalt Discovery at Its New Buriti Target at the PCH Project, Brazil; Reverse Circulation Drill Hole Returns 24 Metres of Mineralization Averaging 128 ppm Scandium Oxide, 272 ppm Total Cobalt Oxides and 2,106 ppm Total Rare Earth Oxides from Surface https://bit.ly/3GCCW5h
- December 11, 2023 – Power Nickel Files Complaint on Widespread Potential Illegal Short Selling of its Shares https://bit.ly/41mQziC

- December 11, 2023 – First Phosphate and Ultion Technologies Enter MOU for Purchase of LFP / LFMP Commercial Production Technology and Offtake of 6,000 annual Tonnes of LFP Cathode Active Material for Specialty Products https://bit.ly/3tbBNyj
- December 11, 2023 – Panther Metals PLC: Substantial Holding Released From Escrow https://bit.ly/3t4DPR1
- December 11, 2023 – Appia Announces Closing of PCH Project Acquisition https://bit.ly/3GDc3Ov

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Net Zero Carbon – "Your Country Needs You!" aka "The Constancy of Purpose"

written by InvestorNews | January 14, 2025

That's right. Your country needs you! Because it is every one of you (us) that needs to contribute to the goal of Net Zero Carbon if there is to be any chance of reaching the goal. Note here that it doesn't really matter if you believe (or I believe) that the goal is attainable. What does matter is that if the goal is to be reached then the discussion below is how it can be achieved.

Since this is Article 6 in my series and I am expecting it to be the last, I wanted to do something catchy, hence Uncle Sam. But what I really want to highlight is almost the name of the next James Bond or Mission Impossible film – "The Constancy of Purpose". The most important aspect of the whole approach. I'll

get back to that.

So, your mission, should you choose to accept, is to be part of the solutions that need to be achieved for the goal of Net Zero Carbon to be attained. This message will not self-destruct after 30 seconds, so you don't have to hurry. You can re-read before you commit. And when I say to be part of, I mean actively engaged. It's your part of "The Constancy of Purpose".

1. Nuclear power. Any new additional power requirements of any size are to be provided by nuclear power. Any replacement power following a fossil-fuelled power station shutting down must be provided by nuclear power. Why? As previously demonstrated there will simply be not enough Critical Minerals developed to supply our power needs from the renewables sector. There will also not be enough STEM graduates to fulfill the resources required. So, you have to be actively engaged in the development or expansion of the nuclear power solution.
2. Solar power. You have to accept that large scale remotely located solar power is a waste of the limited resources highlighted. There is not enough lithium to make enough solar panels. The need to co-develop long transmission systems and battery back-ups is an inefficient use of resources. Rooftop solar is fine as it fits into existing infrastructure, but a solar farm in the center of Australia with 1,000 kms of new high voltage power lines. Methinks not. And using the power to produce hydrogen! Well, let's get it straight. No government subsidies are allowed anywhere in this discussion. If it isn't self-sufficient economically, it isn't a solution. It's part of the problem.
3. Wind power. Another huge waste of limited resources for the same reasons as above. Magnets are better utilized

elsewhere. End of story.

4. Electric cars. The symbol of inner city wokeism. I'll only browse here. Just imagine the upgrade to your district's electricity network needed to charge even 20% of electric cars. Just imagine who is going to pay for the upgrade of the apartment block's electrical system to accommodate a significant increase in demand. Many thousands of dollars per apartment! Is it an efficient use of resources to span our countries with additional electricity transmission infrastructure? Resources are short remember! So, stick to your guns (oops, cars). OK. I'll let you have a hybrid!
5. Human Resources. Once we have the issues above well planned and in train, we can then define the STEM needs to achieve the goal. All levels of our education systems need to change. And you have to be part of that. Whether as a parent or grandparent, or maybe just a concerned voter influencing our governments, we have to fix this. You have to encourage your children, you have to lobby the governments. The volume of STEM graduates needs to dramatically expand and be focussed. "The Constancy of Purpose" again.

Now sure, everyone has their part to play, but tokenism is not healthy. As reported in The Australian Newspaper, Sunday, February 12, 2023, by Robyn Ironside, is having the "greenest" airline really that important? When the solution requires orders of magnitude more production of "sustainable", but still carbon dioxide emitting fuel at increased costs?

These "solutions" are wokeisms in play. Change the definition of sustainability and it becomes OK. Well, that is not acceptable. Net Zero Carbon is a real goal and is not to be fudged. I get pretty enraged when I read that EU power stations are burning purposely grown "wood waste" instead of coal and claiming zero

carbon emissions. This is fixing the books, not fixing the problem.

“The Constancy of Purpose”

“The Constancy of Purpose”. Who does this apply to? Well, if the world is going to achieve the Net Zero goal, well then, the world needs to have “The Constancy of Purpose”. LOL sorry, couldn’t help it. The developed world and the developing world are streets apart here. Only the developed world is chasing the goal. The developed world wants the developing world to also chase the Net Zero goal. But how can they? In a resource-constrained world, do you really think that the developed world will allow those limited resources to be deployed in developing countries?

Maybe they should if the overall balance to Net Zero indicates that is the most resource-effective answer. Methinks not going to happen. Our political classes are too focused on their own political survival (and ideological orientation) to let valuable resources out of their grasp. That got me thinking about how to determine resource utilization effectiveness on a global scale. Another time, another series. But it will come to that distribution question. Why? Because there will come a time when the developing countries will see that they are being starved of resources by the developed world to attempt to meet their own Net Zero goals. And sorry developing world, you can’t have any! Not a pleasant thought.

So, what chance Net Zero? An article from The Australian newspaper, also on Sunday, February 12, 2023, by well-acknowledged editor, Greg Sheridan, seems to present the argument that is most often proffered.

Net Zero Carbon?

Again. Very negative. My views on Net Zero Carbon? The Critical Minerals developments needed can be addressed. Will take a major shift in Government approvals timing though. The choice of power technology to be nuclear focussed is again achievable but will take some guts from some governments. The Human Resources issue is again achievable, but it would mean the end of the woke revolution in our education system. Achievable yes, in practice – No!

Net Zero Carbon by 2050 on a global scale? No chance! The emissions from the developing world will continue to grow. They will not have access to the resources needed. Well, how about on a local scale, by Country say? In the US or Australia, or the EU? "The Constancy of Purpose" test gives me no confidence. Twenty-five years of focussed efforts to achieve a goal that not even a majority of the population understands, acknowledges, or prioritizes? Methinks not.

We will just have to advance at a pace that results from ignoring the requirements that could move toward the answers. No wonder the Cheshire Cat has such a wide grin!

However, if you still want to do your bit in the Net Zero challenge, remember. "The Constancy of Purpose" may be coming to a theatre near you. So, thanks to movie-world for the license and to Forrest for the end quote: "Well, that's all I have to say about that."

Decision Time: The Cheshire Cat Method or STEM for a Net Zero Carbon Future?

written by InvestorNews | January 14, 2025

This is now Article 5 of the **Net Zero Carbon** series. In Articles 1 through 4 ("Net Zero Carbon and Other "Planning Dilemmas" starting with Rare Earths – Part 1", "Net Zero Carbon and other "planning dilemmas" – Part 2", "An ESG Armageddon, Net Zero Carbon and other "planning dilemmas" – Part 3", and "Is it an ESG Armageddon or are you The Survivor? – Part 4"), we have progressed the first two planning dilemmas facing a 2050 target of Net Zero Carbon, those being: Physical Resources and ESG Concerns. We now have to deal with Technology, Power Requirements, and Human Resources.

And, as I sit here thinking about the last three planning dilemmas to face and the order in which I will discuss them, I find my mind revolving in a circle. My thoughts keep jumping from one to the other to the other as the linkages become more clear. Perhaps that is it, they are linked. The resolution to the Human Resources planning dilemma depends unequivocally upon which Technology is utilized and which Power Requirement wins out. Follow the thinking. I'm starting with Human Resources.

As I discussed in the articles on Physical Resources, there needs to be an across-the-board explosion of new Critical Minerals developments to meet the source materials needed to achieve any Net Zero Carbon timeline targets (irrespective of the technology and the timeline of 2050) through the renewables route. Never mind the creation of Western capacity to refine the metals, configure the alloys, produce the componentry and install them within manufactured products. Where are the Human

Resources going to appear from? In Australia, I look at our Universities churning out non-STEM (Science, Technology, Engineering, Mathematics) graduates and question: Are these the non-STEM people needed to get through the Human Resources dilemma? I think not.

I look at our High Schools and find it impossible to picture these young environmentalists taking up STEM after graduation. I look at our Primary Schools and see what? Kids having days off to attend protest rallies to “Save the Planet”. I see nothing to encourage me that our education systems are geared, gearing up to, or, preparing for the STEM Human Resources challenge that awaits us to achieve the Net Zero goals that everyone seems to desire. Scary huh! Seems to me that THEY will do it! Not me! THEY.

But do not despair. There are examples. The Chinese did it! It took a couple of generations. I’ll come back later to that solution. The West achieved an unimaginable increase in its manufacturing efforts during WWII, so we’ve done it before. JFK also achieved a similar STEM focussed, an unimaginably large project, by putting a man on the moon. BTW would love to read a book on the planning dilemmas involved in developing such a space program. What a valuable reference. Would be a University classic must-read! That is if it was allowed on the syllabus. Can’t offend the Flat Earthers!

So, Physical Resources coupled with ESG Concerns and Human Resources to achieve Net Zero Carbon by 2050? Not to that timeline with renewables only, methinks! Oh, the Chinese solution. Relocate your impoverished poor to government-built accommodation. Educate them to meet the industrial revolution you are creating. Promise lifetime jobs. Could this occur in the US? My answer later.

You are all aware of how China has successfully taken over the industrial world, so I will not re-iterate that history here. But what I will relate to you, is a program I was a minor part of in the mid-’80s. As a large-scale iron ore company, we, like all others, wanted to export more. China was the target, although then, just a minnow!

“Let’s use Western knowledge to help them manufacture stuff out of our iron ore and we can buy that stuff back. Good for us, good for them. So let’s start making cast iron grinding balls in China”.

Result: early failures! Head Office response: *“these guys will never succeed”*. At the same time, an engineering friend of mine was researching the production of military helicopters. The objective was to pour molten aluminum into a cast for the helicopter frame in a single process with no joints (and no cracks on cooling). Why? Secrecy and flying radar blind. All that space race stuff. But never mind. Despite many attempts, they were not succeeding. I mentioned that the Chinese had been casting life-size bronze elephants with a 5 mm thin skin, meeting the same cooling parameters he was attempting to achieve with his helicopters for the last 1,500 years. The point? The point is that the Chinese knew how to cast. But they had yet to develop the industrialization skills needed to do it at scale. Boy, did they catch up in a hurry.

I have mentioned in articles and comments my exposure to the Chinese industrial technology degree process. This was China’s answer to accelerating STEM graduate numbers. All employees in rare earth value-add factories are University students. They are learning the practical side of the technology while studying the science side. Their tutors/lecturers are their supervisors and managers. And here’s the magic part. Each business has a University certified “Professor-ranked” scientist. He mentors,

assesses, and grants qualifications to the employees when they reach the required level of competence. How's that for setting up your resources for the future. Again, however, I cannot quite see this occurring in the Western world.

So where I am going with this, is simple to say but comprises an immensely challenging set of tasks to do. Unless we totally overhaul our entire school system, educational processes, and universities, we will not be able to deliver enough STEM graduates to do all the things that are needed to create, design, install and operate those technologies that can take us through to Net Zero Carbon by 2050. A short-term answer to part of that issue is Cadetship and Mentoring whichever way we go. All of us old engineers are available (never quite retired) and I'll be willing to help young graduates develop the skills and experience as we transition to the new wave of STEM-focused education.

There is obviously a significant gap opening up in our capabilities to achieve Net Zero. We have to become resources efficient in all aspects. So we must now look at the technologies we have focussed on to bring us here and perhaps think again.

Remember this is a journey where we think about a target and how to get there. I am working on thoughts about the balances required to achieve our 2050 goal.

Reference: Lewis Carroll. Alice's Adventures in Wonderland. The scene where Alice meets the Cheshire Cat sitting in the tree at the fork in the road. I'll paraphrase.

Alice: *which way should I go?*

Cheshire Cat: *depends on what you are looking for*

Alice: *I don’t know what I’m looking for*

Cheshire Cat: *well, doesn’t matter which way you go*

Well, it does matter if you go the wrong way and deliberately do not look back and review your decisions. I want to go back in time. Back in time to some fork-in-the-road moments and how those decisions changed mankind. I’ll keep it short and simple. I’ll abbreviate!

Firstly, man discovered fire. Probably in a painful way. But saw its value and started cooking meat. The brain grows and intelligence expands. Burning wood was a good decision. It gave mankind the intellectual boost to discover and utilize coal – steam engines and stuff. Industry. Commerce. The discovery of the concentrated energy of coal and its utilization was another good fork in the road call. STEM was in its heyday. The Industrial Revolution allowed our intellect to discover oil and gas. Note here that each transition of one energy form to the next expands our intellect and allows the expansion of mankind’s capability.

It is now that we get into trouble. The decision to go nuclear was the next key fork in the road moment. Some countries went right and others went left. Let’s see where the left fork has taken us. With no nuclear, baseload power is significantly produced from fossil fuels. Sure hydro works, and of late solar and wind are getting a foothold. But go back to the Resources articles. There is not enough Critical Minerals development for this journey to succeed on a world basis. Tax incentives aren’t the answer. Carbon credits aren’t the answer. We need to go back to that key fork in the road and ask that question again. Should we go nuclear and replace fossil fuels? Knowing what we know now (but some refuse to accept) is that solar and wind cannot supply the majority of our base load needs. We are still in transition

getting out of fossil fuels (where appropriate) and getting into nuclear. Sure renewables have a part to play but only in a niche way where their use is truly beneficial and economic (another article).

So, if we still want to get to Net Zero Carbon by 2050 we have some serious questions to answer. Some ideologies need to be challenged. And since the resources are limited and geographically dispersed across countries, ideologies, and cultures, my next article where I will provide the roadmap should be compelling reading. Left or right time with the Cheshire Cat!!

By the way, I am approaching the key (by market capitalization) Critical Minerals Australian-based people on the Australian Stock Exchange to present to us their ESG credentials. Critical Minerals covered include those mentioned in the 2022 Critical Minerals Strategy, March 2022 developed by the Australian Government.

The Critical Minerals referenced include Lithium, Rare Earths, Vanadium, and Cobalt.

Hopefully, the Australian companies will provide us with their ESG credentials and this can give them an additional means of communicating their ESG efforts. InvestorIntel publication can then supplement their normal communication processes. An example of which is Arafura Rare Earths Limited (ASX: ARU) *Greenhouse Gas Emissions Reduction Pathway* published recently to the Australian Stock Exchange.

In the next article, you, yes you, will have some Cheshire Cat opportunities.

Net Zero Carbon and other “planning dilemmas” Part 2

written by InvestorNews | January 14, 2025

In Part 1 of this series, I introduced the concept of going to the plan’s end result and working backwards through the planning process. I recommend this for some of the more difficult planning tasks, as it eases the mental burden. By that I mean, when faced with the challenge of planning for the world to meet a net zero carbon by 2050, the mental challenge is enormous. So, let’s break it down.

A world that is meeting a net zero carbon target by 2050 will have to have achieved many linked but somewhat individual tasks and schedules. There are simply too many individual tasks to list, so I’m going to try and sub-group so that we can at least get a conceptualized overview of the challenges ahead.

1. Physical Resources.
2. Technology.
3. ESG Concerns.
4. Power Requirements.
5. Human Resources.

I’ll try and cover each sub-group and provide linkages as we develop our thoughts. FYI. I have heeded my own advice here and started the process from the end and worked backwards. What you’ll see are my thoughts and impressions formulated over many years in Critical Materials, ESG management, and planning, coming together hopefully with each article to get us all on

board and with a clearer, more transparent, an honest view of the Net Zero Carbon issue, a Net Zero future and its requirements.

OK. Let’s start with Physical Resources. You will have all been made aware by various reports that the amount of Physical Resources required for electric cars, wind turbines, solar power farms etc. is enormous. If not gigantic. It is certainly numbers of orders of magnitude bigger than current production levels. It is staggering to try to imagine 10 times (for example) the production of lithium, copper, chromium, rare earths, etc not to mention the steel and aluminum required for associated infrastructure. But let’s put the issue of scale aside for the moment. I want to first dispel the notion that recycling will be the answer. I am not going to say that recycling is not important and should not be avidly pursued, but what I am saying is that recycling is not the “big-ticket” answer to the Physical Resources requirements. I’ll demonstrate with a mathematical exercise.

Let’s look at the current level of batteries (as an example). We need an assumptions list. We need a current output level, let’s use a starting point of 100 units. Each battery will last 10 years. The growth in the need for batteries is positive 10% per year. These absolute numbers are not really important in this discussion. It is the understanding of where they take us that’s important. OK. Question one – how much recycling can you do in year 1? Answer – None. There are no batteries to be recycled. They last for ten years! So not until year 11 are batteries available for recycle and these are the now “dead” year 1 units. 100 of them only. Then 110 in year 12. 121 in year 13.

I know I have simplified the situation but as I will repeat throughout this series of articles, it’s the overall impact that needs to be understood, not the detail as such. Look at the

following table of units needed to meet demand, the resources needed versus the effectiveness of recycling capacity.

Year	Batteries Demand	Additional Capacity to supply	Recycle Available	Cumulative Additional Capacity	Utilize Recycle to get new Capacity
1	100	0	0	0	0
2	110	10	0	10	10
3	121	21	0	31	31
4	133	33	0	64	64
5	146	46	0	110	110
6	161	61	0	171	171
7	177	77	0	248	248
8	194	94	0	352	352
9	213	113	0	465	465
10	234	134	0	599	599
11	258	158	10	757	747

So, it’s not until year 11 that recycled batteries have any effect. The battery demand and the resources required will have increased between 6 and 8 times by then. In fact, it won’t be until at least year 15 that any noticeable effect of recycling will be noticed. So, recycling may be a small part of an eventual solution, but it is not the saviour. Only increased output is. And increases in mining, processing, refining and manufacturing of this scale is to say the least challenging. And to meet the time challenge of 2050?

Well, let’s muddy the waters of our planning process a little more and introduce the complication of co-dependence. And by that I want you to think about the example of making electric cars. To make one car you need enough of the various components

to do that. Obviously! But what happens if you do not have any of component X? (Think of the current microchips issue for example). The whole schedule stalls until the production level of component X meets the needs for that volume of production. Now think back over the last ten years at the junior rare earths space. Why haven't they developed the capacity to meet the predicted needs? Well, the end user, the car companies in this example, didn't expand as fast as first thought (or is that hoped?) and the explorer couldn't get market contracts to justify getting the development capital. So, the co-dependence of the car company and the junior explorer, stalled the junior's development. In fact, it shut down many of the juniors. Those that managed to stay alive are now facing more years to get back up and the co-dependence will again surface as the slow ramp up of rare earths output will directly impact the growth of the output of electric cars! What is the impact of this co-dependence of mining development for the rare earths in the magnets needed for electric car output requirements in 2050? It will take some planning. Especially when you throw in the mix the co-dependence of all the other resources required, particularly those critical materials with a long timeline to development.

Another term I use is cross-dependence. Again, in the electric car example, the vertical supply chain for each element or assembly, or whatever, can be influenced by a separate although essential vertical supply chain. Let me explain. If you need as an example to create a vertical supply chain for each of three new components, say, the magnets (from rare earths), the batteries (from lithium) and microchips (from silica), will the planning process allow for the indefinite delay in one or more of the components? That is to say, can the rare earths development timeline needed for the magnets be affected by an extensive delay in the creation of a process, or development of

the resource, for say, lithium? Or silica? Of course, it can. The justification for the planned development of one is impacted by the achieved development timeline of the others. The car needs a number of successful developments in critical minerals in separate supply chains (and other components) to reach the final stage, producing the required number of vehicles by the timeline stated. And they have to have matching timelines otherwise the imbalance will cause a market condition where the component being developed the fastest may be stalled by the delay in the component being developed the slowest. Although co-dependence is taught in most Economics courses, as it is standard supply chain logic, cross-dependence has become much more odious today as the need for new components comes to light. And this is only the Physical Resources. Can you see this isn't a simple "Supply Chain" issue. Its not one component we are looking at here. It's many. It's a "Supply Array" issue!

Now we are getting started! Now consider the implications of the Republicans' defeat at the last USA elections. Did that have implications for the 2050 target? You betcha! As will the EU response to the looming energy crisis across Europe this winter. I'll call this dependence Geopolitical or GP-Dependence. So, we now have added another dimension to the planning process. The planning dilemma has to deal with a "Supply Matrix"! Wasn't in my Economics 101.

Now, that's just for electric cars! You now have to throw in co-dependence, cross-dependence and GP-dependence with all those other required developments that together meet the 2050 target, some of which it has been stated that the technology does not yet exist! And remember, all of these developments are competing for the same resources! The Critical Minerals at least. This "Planning Dilemma" is on a scale probably never seen in the Western World. Well, not since World War II.

I think that’s enough on the Physical Resources issue. There have been many articles, reports etc on this topic from others, but don’t forget the reasoning behind the issues of recycling, co-dependence, cross-dependence and GP-dependence. It will come back later.

I’m looking forward to reviewing the Battle of the ESG Titans online debate as ESG is a passion of mine. Since the Battle was live at 3am Thursday morning 15th December in my part of Australia, I will change the order of the 5 sub-groups listed above for discussion. I’ll discuss ESG concerns next (article 3), to incorporate thoughts from The Battle, and discuss Technology in article 4.

I’m thinking: have a great time over the holidays, stay safe and see you next time.

Net Zero Carbon and Other “Planning Dilemmas” starting with Rare Earths

written by InvestorNews | January 14, 2025

In the last 5 years since I last wrote for InvestorIntel, as they say, there’s been a lot of water under the bridge. But 5 years ago, could you have predicted the actual water flow? Could you have had a target? Where is Macca’s head space at? Well as usual I’ll get there. So the last 5 years have been part of my “eco-retreat” project taking our property to almost pristine Australian forest, complete with all the native wildlife that

goes with that. Achieved – yes! To plan – pretty much. Took longer but a few un-planned for health issues slowed me down, but overall happy. So a good plan? Well yes, but why was that? I'll get back.

So the majority of Western nations are planning for some sort of climate change management by targeting "net zero carbon". Is that a plan? Is that an inspiration? Is that a target? Well, a personal anecdote may help to answer that. Twenty odd years ago I was asked if I could develop a plan to mine and process the resources of an island. "What is the time horizon", I asked. "That's part of your plan", was the response. OK! Background necessary to consider. The island is currently a National Park and has been granted First Nations custodianship. The resource is conventional and processing is not difficult. So what is the plan going to allow for? First point to learn here is do not start at the beginning and progress forwards, i.e. resource definition and all the normal stuff. That will consume a lot of time if you can't get a plan that has any chance of working. Start at the end and work backwards. What must have happened to allow such a controversial project to develop? Remember, this is First Nations and National Park. Was the request by the MD for a plan? A verification of his dreams? A realisation into practice through a lofty target? What is akin to "net zero" when there is no detail, no costs, no resources? In fact, it is worse than that since it has been stated that net zero will need "as yet unachieved technology" to get there.

Let's look at rare earths for a while. Circa one hundred years ago, some enterprising alchemist discovered the rare earths group (I am not going to write a history paper). He dabbled and found out that a mixed rare earth alloy could be used as a flint generator. Misch metal was born. Did he have a dream to produce magnets for electric cars? Not yet! A couple of decades later when catalytic converters were developed for motor vehicles, the

use of lanthanum oxide powders was big news. Poor cerium prices went through the floor. Electric cars the dream yet? Not yet. Not until the development of computer chips and the need for cerium polishing powders, did the rare earths scene buzz again. Electric car dreams? Not yet. Then came magnets in the 90's and the boom really starts. Boom goes neodymium-praseodymium (Nd-Pr) for magnets, boom goes Yttrium (Yt) for lighting, then boom goes Samarium (Sm), Gadolinium (Gd) and (Dysprosium) Dy for better magnets. Then boom for electric cars? Not yet? Why not after 100 years of technical development hasn't the dream/plan/target of electric cars (and net zero?) occurred? It needed the western world to commit to the target of net zero with the goal of saving the planet. So, could have the dream of electric cars been planned for 100 years ago and if so what would it have looked like? A series of as yet unknown new technologies with an unknown timescale and an unknown cost? Sound familiar with net zero planning?

Back on rare earths today. We are finally seeing traction on some of the junior explorers of the early 2000's. Take Arafura Rare Earths Limited (ASX: ARU) as an example. For many years the resource was known, the technology was defined, the way forward was clear, but what were the "planned" construction dates? Three – five years post Bankable Feasibility Study. That was over 10 years ago! What was wrong with the planning? Nothing! The caveats of financing and marketing achievement and timing were not met. Not met until this year when the motor companies finally saw their electric car future (a future they were perhaps forced to see) which led to financiers being amenable to the funds. I want you to see a process here, that is the planning process broken down into individual steps and timelines. Did the mining company meet its resource definition target? Yes. Did they reach their process definition target? Yes. Did they meet their BFS target? Yes. Did they meet their

marketing and finance targets? Yes, but it took an extra 10 years. What do you see here? Some targets met as planned, other targets met but later than originally planned. What is jumping out? Hopefully, you can see that Arafura met the plans that were under its direct control – the resource, the process, the engineering, the costing. The marketing and finance however were not under their control. They could perhaps influence the market and the financier, but they could not control. Hence the delay. So what's the lesson to be learned here? Yes you have to be good at the resource part, the chemistry and the engineering but you have to have the toughness, the hanging-in there, and the ability to stay alive until those uncontrollables that are part of your plan align and the main wheel starts to turn again. You can influence but you cannot control. What has this got to do with net zero planning? I will come to that in my next piece but I know you are waiting to find out about the plan to mine a resource on a First Nations National Park.

Imagine an island. A paradise. A National Park that has had its custodianship legislated to the First Nations people. It has a resource, a very valuable resource that you have been tasked to define a plan for its development. So what did I do. I started at the end. Asked the question: "What are the conditions that would need to be satisfied to achieve the goal". (Keep the net zero in the back of your mind. All will be revealed.)

Condition 1. The First Nations custodians must be happy. Condition 2. The Governments and their bureaucracies must be happy. Condition 3. The multitude of ESG focused groups must be happy.

I'll stretch the word happy and settle for appeased. What would appease these groups? Well my first thoughts were around a serious military conflict justifying a Commonwealth takeover of all resources and territory, but I thought that was stretching

the justification too far out of my tasked planning horizon. So a few examples. Doesn’t matter how real you think they are, they are just possibilities. The important bit comes after.

1. An animal of world significance is on the island and is looking at extinction unless some serious and expensive actions are taken. Or.
2. A similar situation with the whole ecosystem. Or.
3. First Nations heritage is under severe threat.

All issues require significant funding, but there is no money available. Only the development of the resource and the satisfactory rehabilitation will provide the funds to continue. Never mind the reality part, that’s out of my control. But what is in my control is why should the government select my company to be trusted to do the development. These are the things that you can control. These are the things that you can do now and in the future that will develop your toughness and increase your chances – while hanging-in there, and staying alive until those uncontrollables that are part of your plan align and the wheel starts to turn again.

How much water did I plan for to go under my bridge, in my retreat rainfall, catchment and erosion plan? The 1 in 100 year rain event was my guide. But got 2 such events in 2 months. An event out of my control. I am still recovering/upgrading and yes, changing my plan. See you next time for more on the “Net Zero” planning process.

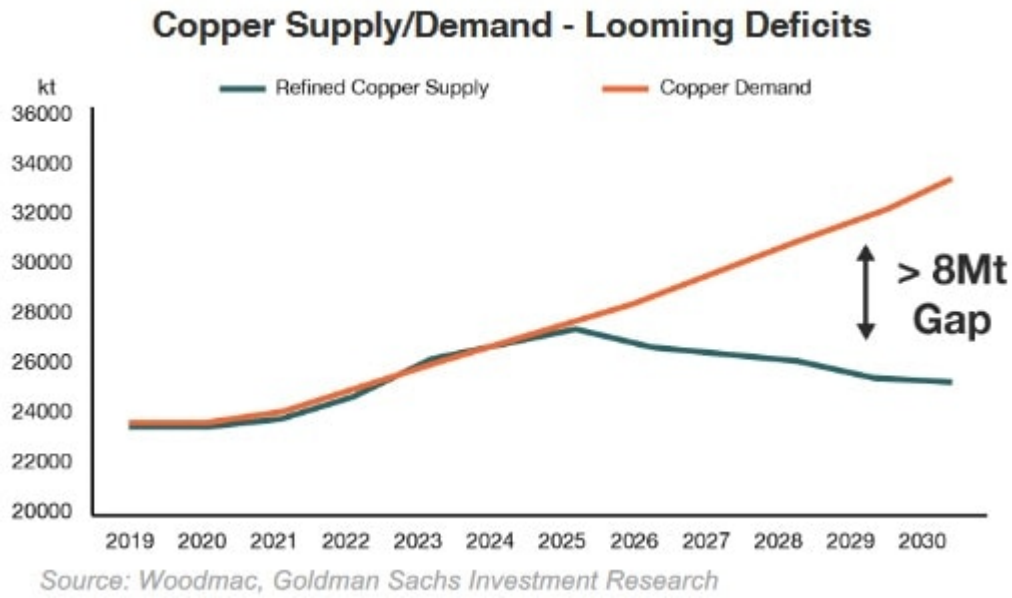
Kodiak Copper continues to have great success with the drill bit at their MPD copper-gold porphyry Project in BC

written by Tracy Hughes | January 14, 2025

Copper is the ultimate green energy metal as it is used in just about everything you can think of related to solar, wind, EVs, EV charging, and ultimately electricity transmission. Copper really is essential to our modern living. Perhaps that is why Goldman Sachs ("GS") calls copper 'the new oil'.

GS state: "Without serious advancements in carbon capture and storage technology in the coming years, the entire path to net zero emissions will have to come from abatement – electrification and renewable energy. As the most cost-effective conductive material, copper sits at the heart of capturing, storing and transporting these new sources of energy."

Wood Mackenzie forecast a growing copper deficit from 2025 to 2030



Source: [Kodiak Copper company presentation courtesy of Wood Mackenzie & Goldman Sachs]

Now that we have established the key importance and huge demand wave ahead for copper the next thing to consider is what copper company to buy. Clearly, its copper project should be in a safe country and have the potential to grow the resource and grow production. Ideally, the Company would have more than one promising copper project and a low market cap to maximize upside if the company succeeds in its growth plans.

Today's company has all of the above. Not one, but two, promising copper projects in North America.

[Kodiak Copper Corp]. (TSXV: KDK | OTCQB: KDKCF) ("Kodiak") 100% owns the **Man, Prime, Dillard ("MPD") copper-gold porphyry project** in British Columbia, Canada and the **Mohave Copper-Molybdenum-Silver Porphyry Project** in Arizona USA.

Kodiak's projects are still in the exploration stage with drilling ongoing.

Man, Prime, Dillard ("MPD") copper-gold

porphyry Project

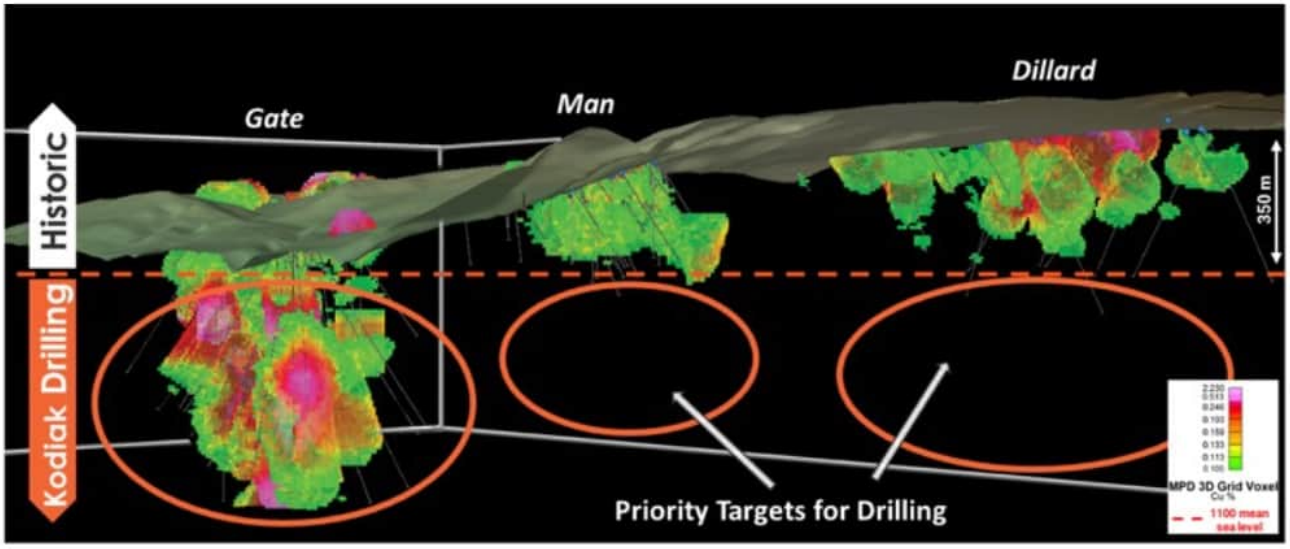
At the MPD Project, Kodiak plans to drill up to 25,000 metres in 2022 as well as complete 3D IP surveying and soil geochemical sampling. Kodiak is fully funded for the company's 2022 exploration program.

In some very exciting news announced on September 29, 2022, the Company reported: "Kodiak drills 1.03% CuEq over 117 m, within 0.34% CuEq over 735.4 m at Gate Zone, and discovers new trend at Prime Zone." The grades may just be average but the drill lengths are 'exceptional' and typical of huge copper porphyry discoveries. Kodiak President and CEO, Claudia Tornquist, stated: "The Gate Zone has delivered further impressive drill intercepts as we continue to increase the size of mineralized envelope which now extends to a kilometer in north-south direction and a depth of 900 metres…….This new mineralized trend crystalizes further size potential and validates our model of a large multi-centric porphyry system at MPD."

The size of the MPD porphyry looks to be very large, obviously with further drilling required to gain further confirmation. For now, we know that the high-grade Gate Zone discovery at MPD shows significant size potential with mineralization over 1 km strike x 350m width x 900m depth. Added to this are the emerging Man and Dillard Zones, as well as the potential for more discoveries elsewhere on the 147 km2 property.

Next steps in 2022 at the MPD Project will include further drilling to test high priority targets in the Dillard area and the exploration program to continue evaluating additional copper-gold drill targets across the MPD property.

Grade shell image of the MPD Project showing mineralized zones and priority targets for further drilling



- **Deeper testing** of historically drilled targets, **strong potential for higher grade mineralization**
- Same **systematic approach** that led to Gate Zone discovery
- **2022 drill program of ca. 25,000m** at multiple targets well underway; **large drill program planned for 2023**
- **Funded well into 2023**, steady flow of news

Source: Kodiak Copper company presentation

Kodiak Copper trades on a market cap of only C$55 million. The Board and management are top tier with a track record of success, especially Chairman Christopher Taylor with his success at Great Bear Resources Ltd. Kodiak Copper is well worth a look for those with some patience and seeking a high risk/high reward copper junior miner.

Power Australia: A flawed but welcome new law to fight climate change Down Under

written by Melissa (Mel) Sanderson | January 14, 2025

Australia has a new environmental law of the land. It may not be

perfect but it is consequential. Keep in mind that eight years ago, the previous Government repealed the nation's environmental law which included a carbon pricing scheme.

Subsequent drastic climate events, including a punishing heat wave, huge fires which made international news and unprecedented strains on the power grid lent a sense of urgency to developing a new national environmental policy. Just as was the case in the United States, political change has turned a nation's policy from climate denier to climate change combatant. Furthermore, and not coincidentally, the new law, officially called the Climate Change Bill 2022 but known as 'Power Australia', has been promulgated by Labor (loosely speaking, read Democrats in the US), with help from the Greens, and isn't popular with Conservatives (read Republicans). But just as the Inflation Reduction Act miraculously passed both Houses in the US, so too did the Power Australia bill become law.

What does the Australian law do? Well, it aims to achieve a 43% reduction in emissions below 2005 levels by 2030, and net-zero by 2050, partially by mandating that 82% of Australia's electricity will be provided by a pantheon of renewables. It requires "climate benefits" to be measured annually but does not include stipulations for conducting such measurements. Nonetheless, the key objectives are broadly in line with other global commitments and the law puts Australia firmly back in the climate game.

According to press reports, "The law was broadly welcomed by business groups and the environmental movement." Climate Change Minister Chris Bowen said "Legislating these targets gives certainty to investors and participants in the energy market and will help stabilize our energy system."

No law is ever perfect, of course, and therefore this one has

its critics. The main complaint about the law is that it doesn't include a "carbon count" mechanism. What does this mean? It refers to two important aspects not codified in the law, the first of which, as mentioned above, would be a version of a carbon credit scheme encouraging companies to offset their carbon discharge. These are in place in the US and Canadian climate laws, and play an important role in encouraging the energy industry in particular to invest in renewables to avoid gradually increasing "carbon fines" on their operations.

Perhaps more importantly, the law doesn't deal with the so-called social cost of carbon emissions. This refers to a cost-benefit analysis conducted on proposed projects in which, if a project is deemed to result in increased carbon emissions, the social cost of carbon multiplied by the expected emissions is added to the cost of the project, while conversely, if the project reduces carbon emissions, the calculated carbon savings are deducted from the project cost. Particularly in public-private projects, this savings makes the project more attractive and reinforces carbon reduction market decisions.

In both the US and Canada, federally-funded infrastructure projects are required to perform the social carbon cost calculation, while in the US, 14 States, including California and New York, also use this measure. At the State level in California, the law also requires all privately funded infrastructure projects – including proposed mining activities – to apply the social calculus. The Biden Administration has set the social figure at $76/ton, applicable to all federal projects. A new study conducted by researchers at the University of California Berkeley and the NGO Resources For The Future, published in 'Nature" this month, sets that cost at $185/ton.

So what makes up the "social cost" of carbon? The short answer, according to Stanford University: the main components are what

happens to the climate and how these changes affect economic outcomes, including changes in agricultural productivity, damage caused by sea level rise, and declines in human health and labor productivity. Although already hard enough to quantify, many economists and social activists argue that this doesn't go far enough but should also include social justice factors – for instance, the human damage done by building highways through the heart of cities and isolating or destroying entire communities. The $185/ton cited in the 'Nature' study attempts to include these factors, as well as (inter alia) risks to insurance companies resulting from sea level rise and persistent flooding.

So, back to Australia, where environmentalists hope that the social cost of carbon will be included in the implementing legislation setting the standards for measuring carbon reduction progress or lack thereof. Reportedly the national Infrastructure and Transportation plan already incorporates social cost considerations and could serve as a template for a national measurement standard.

In any event, this is a strong step for Australia in the fight to save the planet.