

Anglo American: Towards Sustainable and Circular Mining

A Sustainability Management Case Study



AngloAmerican

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Introduction:

Historically, mining has been viewed as one of the most environmentally degrading and socially exploitative anthropogenic activities. As the world's population has exponentially increased throughout the 20th century, so has material consumption. Mining is thus an essential activity that contributes to economic development, globally. Today, the world faces the existential crisis of climate change, and many economies and markets are combatting this by transitioning to a “net-zero” economy. Net-zero is defined as an economy that has net-zero greenhouse gas emissions, so that current emissions are reduced and remaining emissions are “zeroed” through the usage of carbon offsets. In order to achieve this transition, the world is increasingly relying on various minerals and metals that differ from traditional raw material inputs such as nickel, cobalt, lithium, sand aggregate, copper, and rare earth elements (REEs).

These raw materials are crucial inputs for electronic goods and renewable energy infrastructure, but are unequally distributed throughout the earth's crust. Therefore, securing these materials is of interest to private firms and governments alike to ensure access to necessary material for economic growth and national security.

Mineral ores are also becoming harder to find and ore-values are decreasing. Therefore, it will become increasingly important to ensure that these materials are recycled as much as possible in order to avoid degradation to crucial habitat needed to maintain and increase biodiversity, and to ensure that we have enough materials to successfully transition all nations and people to a net-zero economy. Therefore, Anglo American is reimagining the mining industry, taking an innovative approach and transitioning into a material company, instead of a mining company focused exclusively on primary extraction. As a material company, they become responsible for providing material through heavier recycling and reuse rather than just primary extraction, which will intrinsically change the way material commodity markets work.

I. Background:

Anglo American plc is British listed multinational company, headquartered in London, England and Johannesburg, South Africa, and is considered to be one of the ten largest mining companies in the world. Founded in 1917, Anglo American is one of the most experienced firms in the mining industry. They produce 40 percent of the world's platinum, and are a major producer of copper, nickel, iron ore, diamonds, and metallurgical and thermal coal.

In 2020, Anglo American had 64,000 employees globally, which is down from 105,000 employees in 2012 (Statista, 2020). While employment has decreased, revenue has generally increased since 2014. In 2020, Anglo American generated \$32.3 billion USD, which is 6th greatest globally (Statista, 2021). In comparison, Glencore, another British multinational mining company, generated \$142 billion USD in revenue in 2021. However, Glencore is the obvious frontrunner, and other companies with similar revenue include: Zijin Mining Company, \$28.4 billion USD, Yanzhou Coal Mining, \$31.1 billion USD, and Rio Tinto, \$44.6 billion USD (Statista, 2021). While Anglo American generates \$32.3 billion USD, they're profit is \$2.09 billion USD, which ranks 8th in the global mining industry (Statista, 2021). Generally, the mining industries' largest expenses are operating costs, with the 40 largest mining companies spending \$482 billion USD in 2020 (Statista, 2021). Anglo American has already reported \$47.43 billion USD in operating costs in the first fiscal semester of 2021 (Trading Economics, 2021). Most of these expenses go towards payroll, insurance, and funds for equipment as mining is an extremely capital intensive process, which is one of the largest barriers for entry to the industry.

Annually, Anglo American has consistently emitted between 20 to 16 million metric tons of carbon dioxide equivalence from 2010 to 2020. There have been improvements in water withdrawal as 339 million cubic meters of water were withdrawn in 2015; however, in 2020 only 209 million cubic meters of water were withdrawn, showing a drastic improvement in just five years. Energy consumption has also decreased with 108 million gigajoules used in 2014, and 81 million gigajoules used in 2020 (Statista, 2021).

As a multinational company, Anglo American operates in Africa, Asia, Australia, Europe, North America, and South America, and believes that metals are essential for modern day life, and for the transition to a greener future. As such, they are working to combine smart innovation and technology to fuel future needs, mainly through their “FutureSmart Mining” program as explained in “The Future of Sustainability in the Organization” section below.

II. Leadership:

According to Anglo American, their six core values provide a guide for their behaviors in their business endeavors, including safety, care and respect, integrity, accountability, collaboration, and innovation. These values are a direct reflection of leadership’s belief of guidance in the mining industry as a whole.

The CEO of Anglo American, Mark Cutifani, has long been known to be a progressive in the mining industry, constantly pushing the bounds on social benefits, which has transformed into more all-encompassing sustainability today.

According to executive leadership, Anglo American defines a sustainable business as one that has an enduring purpose in society and consistently considers the value that can be delivered to stakeholders and the natural environment in all decisions made (ANGLO AMERICAN REINFORCES SUSTAINABILITY INTEGRATION AND PROGRESS, 2021). Anglo American has begun planning for their FutureSmart Mine program, which will re-imagine mining to improve people’s lives. According to Mark Cutifani, improving people’s lives comes not just from direct value created in terms of employment, economic, and social contributions, but also from the metals and minerals provided which are fundamental to decarbonize the global economy while meeting demand for everyday products.

In an article written for EuropeanCEO, Cutifani states that effective partnerships and clear social purpose are essential if mining is to have a positive impact on local communities and society (Cutifani, 2019). In this article, written in 2019, Cutifani claims that mining sits at a crossroad as society’s expectation of businesses grows. He continues to write that mining companies are the custodians of many of the world’s resources, and that Anglo American must lead the industry to be trailblazers in social and community development because “sustainability is not merely a luxury – it is a business imperative” (Cutifani, 2019).

As of November 3rd, 2021, Anglo American announced the appointment of Duncan Wanblad as the new Chief Executive Officer of Anglo American plc, effective April 19th, 2022 (Kenyon, 2021). He began his career at Anglo American in 2008 as head of the copper division. In being appointed, Wanblad states:

“Having started my career underground as a junior engineer, I have never lost sight of what it takes to produce the metals and minerals that are ever more vital to support our life on this planet. Our responsibility to do so safely and sustainably, including meeting our employees’ and stakeholders’ expectations of us, has never been greater. Through the way we work, the technologies we are

deploying to drive us towards our sustainability goals, and the breadth of opportunities I can see, we are determined to live up to that promise” (Kenyon, 2021).

However, there are still issues that leadership has identified as well namely that women, have been under-represented in the mining industry and challenges still remain around hiring qualified women into senior roles because significant engineering experience is required (People, 2021).

Furthermore, Casilda Malagón, material stewardship specialist, is currently leading how circular economy principles can be implemented at Anglo America. In an interview with Malagon, she stated that senior leadership has the utmost dedication to transforming Anglo American into the most sustainable mining company in the world (Malagon, 2021). One that produces the least waste, uses the least energy and water, and one that genuinely cares for its host communities to ensure that they benefit from the mining that is taking place.

Within Anglo America, there are 13 career areas, of which sustainability is included, instead of being housed internally in one of their other areas. In this department, there are many employees focused on integration of sustainability with the company at large. They are also in charge of creating the bi-annual sustainability report and are a key component of the FutureSmart Mine program. Matthew Chadwick is one of the main leads in the sustainability department as the former Head of Sustainability, Corporate Affairs, and is currently serving as the Head of Socio-Economic Development and Partnerships at Anglo American (LinkedIn, 2021). The sustainability team is not in charge of making direct business decisions, but as one of the key career areas, they still have significant stance in the Anglo American hierarchy.

III. Strategy and Metrics

Anglo American considers sustainable mining to be of the utmost importance to their future successes in the industry, which is broadly defined by re-imagining mining to improve people’s lives as a way to pioneer the way mining is performed globally. They also have the loftiest emissions reduction goal of any mining company to reach net-zero emissions by 2040, ten years earlier than Paris Climate Accord targets. Mark Cutifani, Chief Executive of Anglo American proclaims:

“Tackling climate change could not be more urgent. For the emissions that we control in our business, we have come a long way, delivering our 2020 target to reduce GHG emissions by 22 percent a year early. Our securing of 100 percent renewable electricity supply across our operations in Brazil, Chile and Peru marks another major step, cutting CO₂ emissions from those operations by approximately 70 percent. And our development of a hydrogen powered mine haul truck has the potential to remove another major emission source from our business” (ANGLO AMERICAN REINFORCES SUSTAINABILITY INTEGRATION AND PROGRESS, 2021).

While emissions reduction and environmental sustainability are a crucial component, Anglo American also takes social sustainability into consideration. Specifically, they believe that their mining operations should help develop host communities because of stakeholder demands and social pressures to do so (Sustainability Report 2020, 2020).

This is carried out through their latest Social Way 3.0 program, which is a rigorous management system that will create consistent better outcomes for host communities, launched in January 2020. Through this program, clear minimum standards are set for engaging with affected and interested stakeholders, avoiding, preventing and, where appropriate, mitigating and

remediate adverse socio-economic impact, and maximizing development opportunities (Sustainability Report 2020, 2020).

Anglo American's latest strategy and hopeful outcomes are outlined in Anglo American's 2021 Sustainable Mining Plan, where three main pillars are outlined: Environment (Healthy Environment), Social (Thriving Communities), and Governance (Trusted Corporate Leader) (Sustainable Mining Plan 2021, 2021). Under these three pillars there are three additional goals.

1. Environment: Climate Change, Biodiversity, Water usage.
2. Social: Education, Health and wellbeing, and livelihoods.
3. Governance: Accountability, Policy advocacy, and Ethical value chains.

The plan outlines multiple timelines to achieve these goals, and their 2021 interim results present how they have achieved these goals thus far.

However, this latest mining plan lacks metrics, but an extensive number of metrics are included in their full 2020 sustainability report, listed as sustainability performance. The principles behind these performance indicators are combining smart innovation with the utmost consideration for people, communities, customers, and the world at large in order to better connect resources in the ground with people who need them. They are split into four categories: Safety and Health, Environment, Socio-political, and People.

First, metrics under safety and health include work-related fatal injuries, of which there were two in 2020, four in 2019, and a target of 0 for the future (Sustainability Report 2020, 2020). Total recordable case frequency was 2.14 percent in 2020, 2.21 percent in 2019, and a final target of year-on-year reduction for which they are accomplishing. In response to COVID-19, one of their newer targets are new cases of occupational diseases for which there were 30 in 2020, 39 in 2019, and a final target of year-on-year reduction for which they are achieving.

Second, metrics under environment include energy consumption saving for which they had five percent in 2019, eight percent in 2020, and a final target of eight percent saving by 2020 against business-as-usual projection which was accomplished (Sustainability Report 2020, 2020). Greenhouse gas emissions savings, which was 34 percent in 2019, 34 percent in 2020, and a final target of 22 percent saving by 2020 as compared to business-as-usual projection, which was accomplished. Water withdrawals saving, which 2019 data is unavailable for, ten percent in 2020 with a final target of 20 percent saving by 2020 of which they fell ten percent short of. Lastly, there are 4-5 environmental incidents for which they had zero of in 2019 and 2020, fully achieving their target goal of zero.

Third, under socio-political metrics include Social Way 3.0 implementation, which is currently in progress with a final goal of achieving 80 percent of annual targets by end of 2022 (Sustainability Report 2020, 2020). Jobs supported by enterprise development initiatives is also currently in progress, but Anglo American supported the development of 132,082 jobs in 2019, 137,777 jobs in 2020, and don't list a specific target. Other metrics without targets include local procurement spend, which was \$10 billion USD in 2020, and taxes borne, which was \$2.8 billion in 2020.

Lastly, people metrics include women in senior management, which was 24 percent in 2019, 27 percent in 2020, with an ongoing goal of reaching 33 percent by 2023. Women in the workforce is another metric, but has no target, and was 21 percent in 2019, and 23 percent in 2020. Lastly, voluntary labor turnover also has no target, but was 2.3 percent in 2019 and 1.5 percent in 2020.

Anglo American’s approach to employee relations and engagement are carried out through their Global Workforce Advisory Panel, which was established in 2019 and is made up of employee representatives from each country, where there is significant Anglo American presence (Sustainability Report 2020, 2020). The panel is chaired by Byron Grote and is in line with recommendations from the UK Corporate Governance Code. Their work focuses on human rights policy, approaches to employee representation, and responsible sourcing standard as to not use child labor, combat all forms of slavery, oppose unfair or inhumane treatment, allow freedom of association, maintain, and promote an inclusive workspace.

In 2019, Anglo American carried out a global employee engagement survey with 39,000 participants, 66 percent of the entire workforce. Questions were based around culture, values, safety, strategy, purpose, leadership, inclusion, and diversity. 84 percent reported they are proud to work for Anglo American, and 82 percent said they would recommend the company as a good place to work (People, 2021). Overall, the employee engagement score was scored at 83 percent, leading to the Group Management Committee’s agreement for initiatives to improve psychological safety, empower engaging leaders, and evolve the focus on purpose, values, and underlying behavior.

There is no indication within Anglo American that sustainability performance changes compensation, but there are minimum criteria for compensation requirements. Anglo American has also pursued many third-party verifications on sustainability related matters, including for the Initiative for Responsible Mining Assurance (IRMA), which sets a comprehensive set of standards for mined metals (Sustainability Report 2020, 2020). As outlined in their ethical value chains plan, by 2021 they hope to have half of all mining operations undergo a third-party audit against recognized responsible mine certifications systems, and have all operations undergo this process by 2025 (Sustainability Report 2020, 2020).

IV. Importance of Sustainability:

As dictated by senior leadership, sustainability is an integral part of Anglo American and their future plans. That being said, mining inherently is detrimental to the earth’s surface and thus to habitat. Specifically, large scale mining contributes to environmental deforestation, water pollution, turbidity, local air pollution, and loss of biodiversity as well as socially increased crime and prostitution (Upadhyay et al., 2021). Restoration efforts, even with heavy money invested, will never fully restore the land to the vibrant ecosystems that once existed because the topsoils are completely removed. Sustainability is also integral because of increased investor support and social engagement in the mining industry as a whole. There are still technological limits, that if achieved, can make mining a much more sustainable practice as outlined in the FutureSmart Mine program in “The future of sustainability in the organization.”

Approximately 70 percent of Anglo American’s permanent workforce is represented by worker organizations that cover collective bargaining agreements (Sustainability Report 2020, 2020). In 2020, there were no reoccurring incidents of action from these organizations lasting longer than one week, showing that corporate and laborers see sustainability as integral to their employee rights.

A study completed in 2021 by Upadhyay et al. analyzed the frequency of terms such as recycle and circular (as in circular economy) were used in sustainability reports from three of some of the world’s largest mining companies, including Anglo American, Rio Tinto, and BHP. The results found that Anglo American used the term once in 2016, and twice in their 2018

report, whereas Rio Tinto used it once in 2018, and BHP has never included it. Furthermore, Anglo American used the term “recycle” 73 times from 2014-2018, whereas Rio Tinto used “recycle” 67 times, and BHP only 35.

Why does Anglo American score better than other top mining companies in sustainability performance? According to Casilda Malagon, who leads circular economy at Anglo American, it has to do with engagement from executive leadership who firmly believe that will lead to their success in the future (Malagon, 2021). To learn more about this, Päivi Kinnunen, Research Team Lead of Metals and Material Recovery at VTT Technical Research Centre of Finland, the biggest research center in Northern Europe, was interviewed. Kinnunen claims that logistics of mining valorization is the biggest issue because the cost of re-mining low grade ore from rock waste, which is hard to make profitable when far away from their customers (Kinnunen, 2021). She also claims that there are many policy barriers in mining waste rock that are inhibiting mining companies from becoming more sustainable. Potential drivers are collaboration between mining companies and research institutions in order to create technologies such as bioleaching, acid-leaching, and other metallurgical processes more profitable.

V. The Future of Sustainability in the Organization:

Anglo American has already taken significant steps to improve sustainability within the organization, both internally and externally. One of their new key performance indicators is to create the P101 Performance Program. The P101 Performance Program is designed to set new industry standards for equipment and processes that matter most.

As already described, Anglo American believes that the future of mining lies within sustainability. As such, they have created a comprehensive plan to re-imagine mining to improve people’s lives known as FutureSmart Mining. This will completely transform the nature of mining from how minerals are sourced, mining itself, the markets, and how stakeholders experience this business. Through this model, their environmental footprint will be reduced through precision mining techniques and data analytics, which will help regional economic development. At the heart of this plan is a pathway to help create sustainable and thriving communities. There are four concepts that underpin this new way of mining: Concentrating the mine, intelligent mine, modern mine, and water-less mine (FutureSmart Mining™, 2021).

Concentrating the mine will make mining a much more efficient process, cutting down energy, water, and capital needed with a goal of 30 percent reduction in all these areas. This will help Anglo American achieve their net zero goals by 2040. Specifically, this will be achieved through new technology developed by Anglo American, including coarse particle recovery, bulk sorting, and ultrafine recovery.

Coarse particle recovery crushes particles to a size that is 2.5 times larger than normal. In turn, this reduces energy consumption and mill time, leading to a 20 percent increase in throughput and 85 percent water recovery. Bulk sorting eliminates waste earlier in the mining process, leading to a 5-7 percent increase in head grade. Ultrafine recovery is being tested to increase mineral particle recovery by 4 percent. Currently, about 10-15 percent of mineral recovery is lost because the mineral particles are too small.

The Intelligent Mine is one where vast quantities of data are transformed for predictive purposes, which will create a safer, fully integrated system, self-learning system. If achieved, this will remove much of the uncertainties in mining markets and value chains that are faced today. This will be accomplished by building out a digital ecosystem where operations are digitized

through sensors. Artificial intelligence will also be used to streamline other processes, starting with ore body characterization, which is the most important step in determining if a mine will be profitable or not.

The Intelligent Mine will be accomplished by investing heavily in transforming Anglo American into a data driven organization through their newest technology platform: Voxel (FutureSmart Mining™, 2021). This is crucial in creating an end-to-end solution that brings together the entire mining process, from mineral exploration and discovery, mining process, the final product, and logistics of delivery to customers. This data transformation will also be used to meet business performance targets as well as improving safety, health, sustainability, and efficiency. Successes of this program have already been seen in Barro Alto, Mogalakwena, and Amandelbult through maintenance models which have already detected failures before they occur, reducing unplanned downtime, and thereby increasing throughputs. Similarly, Anglo American's Advanced Process Control system is reducing process variability and enabling added throughput efficiencies. At Los Bronces mine, Anglo American has achieved an eight percent absolute energy reduction across their three semi-autogenous grinding mills, and a 12 percent reduction in specific energy consumption.

The Modern Mine is one that is built around safety, ensuring that all employees go home every day unharmed (FutureSmart Mining™, 2021). To accomplish this, Anglo American is developing a new generation of engineered controls that reduce exposure of controls to people by building out more electro-hydraulic drills and removing scraper winches. Automated and continuous cutting vehicles are also being invested in, which will safely extract ore without the need for explosive blasting. Furthermore, this technology will make it possible to mine lower grade ores and bring down operating costs. Remotely operated swarm robotics will also be built out for the next generation of machinery, which will ultimately remove people from risk exposure and upskill employees to operate technology instead.

Lastly, the Water-less Mine will be used to minimize water usage as 75 percent of Anglo American assets are located in water constrained areas. Water is always needed, but through this program, Anglo American can help their mines achieve a more circular recycled water system. As mentioned earlier, coarse particle recovery is used to recovery finer minerals, but this process also allows water to be released from much coarser particles, improving water savings and energy efficiency by 30 percent. When combined with low-cost additives, it becomes possible to produce dry stack tailings, which are far less dangerous to local community health and ecological health than wet stack tailings. Dry stack tailings also enables the future prospect of re-mining those tailings for other minerals as technology advances. Often, the largest water usage is in tailings facilitation, so creating a technological solution to eliminate water usage from this process is of the utmost importance. Heavy water usage is essential in mineral recovery, with a current 40-60 percent water recovery. Using Novel Leaching technology, Anglo American could significantly enhance recovery up to 80-90 percent.

Conclusion:

This comprehensive plan is unlike any plan other mining companies have set to achieve environmental or social sustainability worldwide. That being said, Anglo American has a good key foundation to continue growth in all areas sustainability related, but one of the key elements lacking is a timeline. While they've set a clear, and ambitious, timeline to achieve net-zero by 2040, they don't have a clear timeline when all the projects for their FutureSmart Mine program

will be finished or implemented. This may be partly due to the infancy of the program, the “trail-blazing” nature of the program, and the developments that still need to occur for them to be proven cost effective, reliable, and profitable. Their plan is thorough, but like any plan, it will be important for Anglo American to allow room for adjustments as mineral and metal markets shift and dictate profitable business during the net-zero transition.

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