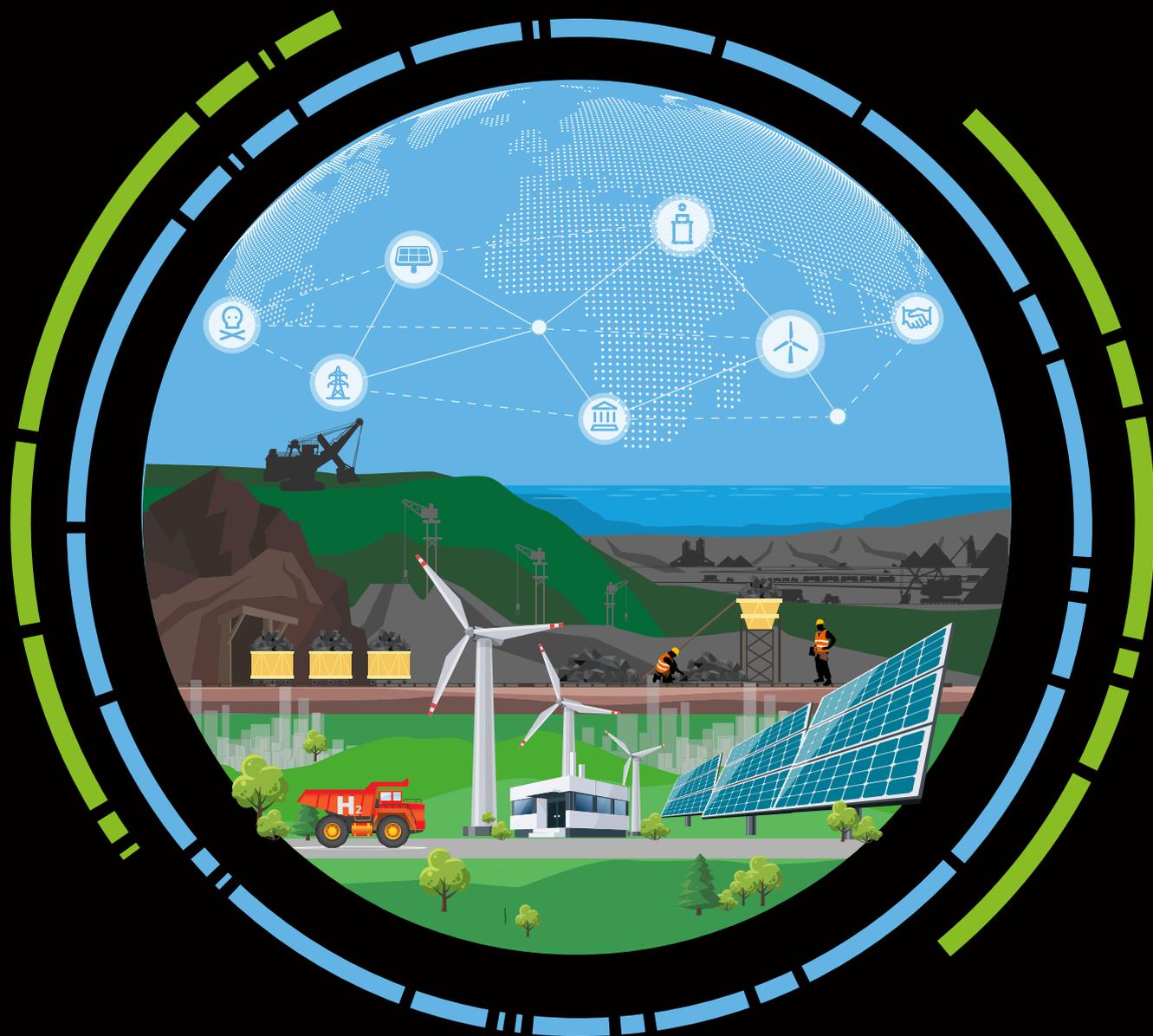


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Extracting value from decarbonisation

2020

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Decarbonisation in context



Decarbonisation is the reducing or eliminating of carbon dioxide from energy sources to achieve zero net emissions of carbon dioxide (CO₂), as well as the stabilizing of emissions of short-lived greenhouse gases (GHGs).

Climate change poses a significant threat to our planet and way of life and we are already seeing the effects of a rapidly warming planet, including mass loss of biodiversity, volatile weather related disasters, stress on food production and water scarcity. According to the Intergovernmental Panel on Climate Change (IPCC), we have until 2030 to reduce carbon emissions to limit temperature increases below 2°C, in line with the Paris Agreement. In order to meet the ambitions of the Paris Agreement, CO₂ emissions will need to fall to net zero by 2050.

There is growing acceptance of the scientific data linking the release of greenhouse gases (GHG) such as carbon dioxide with global warming. This has put carbon-producing or emitting industries, such as mining, under greater pressure to reduce GHG emissions.¹

South Africa is ranked among the top 15 largest emitters of greenhouse gases, primarily due to its heavy reliance on coal.² Large economies, such as China, the United States and India, are the highest ranked in terms of GHG emissions, contributing to almost half of the world's emissions. By comparison, South Africa accounts for 1.3% of global emissions.³ For South Africa, where GDP growth has slowed and reliance on fossil fuels persists, climate resilience strategies need to be established to support carbon reduction to meet Paris Agreement targets.

With the need for strict compliance to regulatory requirements, there is increasing pressure from stakeholders and regulators on the mining industry to create shared value, deliver more concrete benefits to society and ensure environmental and social sustainability in the long-term.⁴

The shift towards a low-carbon economy has seen an adjustment in most corporate strategies due to the enhanced focus on technological innovation, as well as more stringent environmental standards. Regulatory frameworks are placing further accountability requirements on the mining sector both in an effort to ensure sustainable shared value and inclusive growth (of both the sector and the respective economy) and also to drive responsible behaviour with good corporate citizenship.⁵ While the path ahead will not be easy, the commitment is necessary if miners are to contribute to the mitigation of risks associated with climate change and create collective value for customers, investors, governments, communities, and employees.

Key drivers

Driven by pressure from stakeholders and the strengthening business case for decarbonisation, mining companies are taking steps to reduce their greenhouse gas emissions in order to reach the GHG reduction targets set under the Paris Agreement. Strong commitment is necessary if miners are to contribute to the mitigation of risks associated with climate change and deliver the value promise for key stakeholders.

Regulatory pressure

The mining sector is a vital source of wealth, prosperity, and social value for South Africa. The country has an abundance of mineral resources, accounting for a significant proportion of world production and reserves, worth an estimated US\$2.5 trillion. Mining does however take a toll on the environment and significantly impacts surrounding communities.

Regulators around the world are setting carbon reduction targets, not only at national levels, but also geared towards key industries, in an effort to meet the emissions reduction goals set out in the Paris Agreement on climate change⁶. Many countries are placing the regulation of coal at the forefront of these plans and are setting targets for renewables and low emission economies and investors have welcomed recent steps by several governments to adopt net zero emissions and climate neutrality targets.

Locally, the South African government recently released the Integrated Resource Plan (IRP 2019), gazetted in October 2019, which marks a major shift in historical energy policy, through a shift away from coal, increased adoption of renewables and gas, and an end to the expansion of nuclear power.

In a broader context, the mining industry has also witnessed an evolving regulatory landscape, with the development of an integrated carbon and air quality regulatory framework, including the

implementation of the Carbon Tax Act, GHG Reporting Regulations, Carbon Offsets, Carbon budget, National Environmental Management: Air Quality Act and Climate Change Bill.

Mining sector specific regulation is also becoming increasingly complex, with the new Mining Charter (Mining Charter III, gazetted in 2018) placing increasing pressure on the sector to achieve minimum levels of compliance in order to retain their mining rights focused on key areas such as ownership, employment equity, human resource development, supplier and enterprise and community development, in conjunction with existing legislation that focuses on health and safety, environmental impact and social sustainability.

The sector also faces increased pressure on input costs as a result of the carbon tax regime, while dealing with the challenges of navigating a complex regulatory framework that is administered by various organs of state. It is commonly accepted that market forces alone are insufficient, since CO₂ emitters do not bear the full costs of their emissions and Government policy therefore plays an essential role in enabling decarbonisation both in the short- and long-term.^{7/8}

Carbon Tax is the method that the South African government has elected, to place a price on carbon and is the recommended pricing method for most countries with large emissions. Carbon Tax in South Africa is levied at a rate of \$3.5 per tonne and is set to increase by inflation plus 2% for the next two years. According to the World Bank, a carbon tax should be between \$40 to \$80 per tonne to effectively reduce emissions¹¹. South Africa's Carbon Tax is currently very low compared with other large emitting countries.

Carbon Tax is based on an emitter's direct emissions (scope 1). Most mines in South Africa have little direct emissions and the major source of emissions are indirect emissions (scope 2) due to the use of electricity. Electricity produced from fossil fuels such as coal is subject to carbon tax and is being passed on to users. Another large source of emissions for mines will be the use of diesel and petrol. Diesel and petrol are subject to carbon tax and is included as a levy in the price of diesel and petrol.

Therefore, a typical mine should not have a direct carbon tax exposure. Currently the indirect exposure is limited and is being absorbed as a normal cost in the ordinary course of business. However, in future the exposure will increase substantially if decarbonisation does not take place.

Global policy mechanisms are wide ranging including:



1. Government support for research and development (R&D): National governments spend roughly \$15 billion annually on R&D for clean energy technologies. These programs have played important roles in the development of countless technologies in recent decades.



2. Government procurement: Procurement standards that give preferences to products with the lowest embedded carbon content could drive significant changes in industrial behavior.



3. Fiscal subsidies: Decarbonising will impose costs on affected businesses. Government policies can help to reduce those costs with fiscal subsidies. These can take several forms, including tax incentives, grants, loan guarantees, feed-in-tariffs and contracts.



4. Infrastructure development: The transition to low carbon industrial heat may require new infrastructure (such as electric transmission lines or hydrogen pipelines). Governments can play a central role in facilitating the development of such infrastructure through permitting, financing and other measures.



5. Carbon prices: A price on CO₂ emissions, whether through an emissions-trading program or tax mechanism, provides emitters with an important incentive to cut emissions.



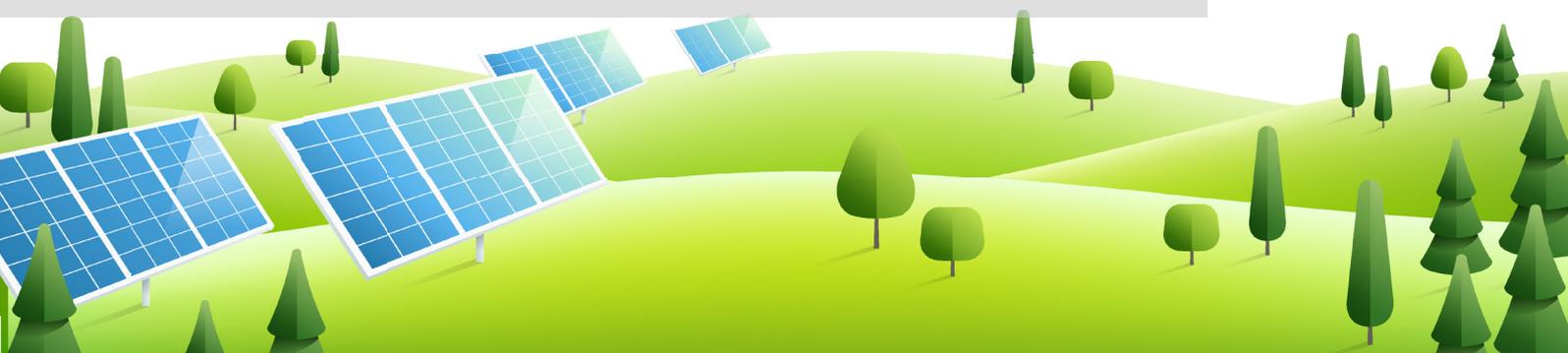
6. Mandates: Governments could prohibit the use of fossil fuels or require the use of low-carbon technologies.



7. Voluntary industry associations: Industry associations such as World Steel Association, World Petroleum Council, World Cement Association and World Business Council on Sustainable Development can help develop methods and standards for decarbonizing. They can play an important role in information-sharing on specific industrial topics.



8. Clean Energy Ministerial: The Clean Energy Ministerial is a global forum where major economies work together to share best practices and promote policies and programs that encourage and facilitate the transition to a global clean energy economy.



Cost reduction and enhancements in operational efficiency

According to findings of the New Climate Economy⁹, low-carbon growth can deliver \$26tn in economic benefits globally by 2030. More needs to be done to build on the positive progress that has already been achieved in the areas of carbon pricing, energy efficiency and uptake in adopting renewables.

Many mining companies are already taking steps to integrate decarbonisation into their company policy and strategies. These strategies not only reduce GHG emissions, but also have the potential to reduce operating costs through the use of cleaner, alternative fuel and more efficient equipment.

As a response to increased energy costs and due to aging infrastructure, the South African mining industry has actively focussed on reducing energy consumption. A mine's energy consumption is related to fixed energy-consuming infrastructure that is embedded in a mine's design, with older mines having greater energy needs. Mines need to explore the various energy-saving opportunities that exist, such as reducing energy demand or implementing energy efficient solutions¹⁰.

Although there are capital costs to setting up the infrastructure to support the generation of renewable power, the consumption costs associated with renewable energy are negligible. This price dynamic has the potential to radically alter the cost basis of mining. In traditional mining operations, energy is generally the first or second most significant spend, accounting for 15 to 40 percent of operating expenses¹¹.

For the mining industry, full decarbonisation of energy from non-renewable resources to renewable resources should be regarded as a precondition of any meaningful progress towards decarbonisation. The requirements to be placed on the global renewable energy supply chain are also noteworthy, and include substantial research and development spend to address shortcomings in energy storage and distribution technology.

Although decarbonisation timelines differ, it is clear that mining companies, must account for the implications of these impending policy decisions in their current strategic planning activities. Corporate decarbonisation roadmaps need to focus on improving energy efficiency, substitution of current energy usage towards lower-carbon energy products, and the offset or storage of emissions.

Capital Market attractiveness and investor pressure

Corporate leadership on climate change is essential in delivering a low-carbon transition at the scale and speed necessary to avoid global warming. Decarbonisation is being driven by vocal investors who are challenging mining companies to rethink their portfolios and future capital investments, and improve disclosure of their sustainability performance. This is translating into demands for companies to share clear and defensible positions with respect to their climate-related financial risks in line with the Financial Stability Board's Task Force on Climate-Related Financial Disclosures (TCFD) framework.

Financiers and insurers have begun to "green" their portfolios by adopting clean lending targets and, in some cases, denying insurance coverage to coal miners¹². This drive and the associated investor pressure has shown that private capital has an important role in tackling climate change and integrating decarbonisation into company policies and strategies.

Science Based Targets, co-led by the United Nations (UN) Global Compact, WWF, the World Resources Institute and Carbon Disclosure Project are further assisting companies in setting greenhouse gas reduction targets that are consistent with the levels of decarbonisation required to achieve the goals set out in the Paris Agreement.

These targets translate sector-wide decarbonisation pathways into company-specific pathways, exploring different scenarios, such as 2°C world or above 2°C world. Targets are considered "science-based" if they adhere to the level of decarbonisation required to keep global temperature increase below 2°C.

Many mining companies are already taking steps to integrate decarbonisation into their company policy and strategies. These strategies not only reduce GHG emissions, but also have the potential to reduce operating costs through the use of cleaner, alternative fuel and more efficient equipment.



Investors will increasingly be engaged in businesses that show upside potential by employing new technologies and are more focussed on serving societal needs by providing services required by future-oriented markets. This requires full commitment by corporates to consider decarbonisation as a key component of their business strategy, but also sends a powerful signal to stakeholders, whilst improving capital market attractiveness through:

- **Strengthening brand and reputation:**

79% of corporate executives observed strengthened brand reputation after their companies committed to set decarbonisation targets. Brand and reputation is important, as consumers are increasingly aware of the effects their choices have towards a sustainable future.

- **Increasing consumer appeal:**

80% of consumers seek socially or environmentally responsible products whenever possible and would switch brands to support a good cause. 66% of consumers confirm they feel more positive about companies that are making efforts to reduce the carbon footprint. Furthermore, most consumers expect companies to charge the results of their sustainability commitments. Boosting investor confidence: 52% of corporate executives saw increased investor confidence after their companies committed to set decarbonisation targets. Investors increasingly regard businesses' environmental policies as an indication of whether investments are future-proof.

- **Access to tax allowances or other fiscal incentives:** Companies that adopt science-based targets have the added benefit of qualifying for tax allowances (carbon tax reduction due to reduction in scope one emissions) or other fiscal incentives (contracts that require a net-zero strategy to be implemented within their business).¹³

Stakeholders have powerful levers they can pull; whether through robust dialogue with company directors; voting against directors that fail to act and/or auditors that fail to challenge management on shareholders' behalf; or publicly speaking out to demand changes to strategy. In the last couple of years, shareholders have pressed companies to take account of climate risks through ad hoc shareholder resolutions. Investors are starting to require companies to plan for their future in a net-zero carbon economy.

Societal pressure

Local communities are often directly affected by the environmental impacts of mining operations and are increasingly demanding corporate adherence to higher standards of social responsibility. Socio-economic and environmental imperatives such as skills development and environmental rehabilitation have long formed a central theme in mining regulatory frameworks.

As a result of global warming, the risks faced by the energy, food, and water sectors are beginning to overlap, creating new and intensifying hazards, risk exposures, and vulnerabilities that could affect an increasing numbers of people and regions. The Sustainable Development Goals (SDGs) of Agenda 2030 further highlights the significance of the social agenda, with the aim of addressing endemic global challenges such as poverty, inequality, peace, and justice.

A new paradigm is required and mining companies need to explore innovative strategies for decarbonisation to ensure their ongoing economic sustainability, maintain their social licence to operate, and create value beyond compliance. To move beyond compliance, there is a need to redefine the concept of "value". Value to shareholders is easily defined, because this is typically described in financial terms. Measures such as social return on investment are useful when reporting to shareholders, because they attempt to

translate social outcomes into financial terms – the language of shareholders. Financial measures are less useful when it comes to demonstrating value to other stakeholders. For example, how much has been spent is less important to community groups and local non-governmental organisations. It is important to identify and define outcomes that matter to all stakeholders, and quantify the value each stakeholder receives in these terms.¹⁴

Communities typically care about income earning opportunities, access to basic infrastructure and services, and impacts on health. In addition, many communities are heavily reliant on the environment and access to natural resources, which are more and more affected by the impacts of climate change. When companies align their purpose with doing good, they can build deeper connections with their community stakeholders and, in turn, amplify the company's relevance in their stakeholders' lives. Increasingly, businesses are harnessing the power and opportunity of aligning their purposes with societal good. In the Deloitte Global CEO's "Success Personified" report, leaders ranked societal impact as the number one way they measure annual performance – more than financial performance or customer and employee satisfaction.¹⁵

Mining companies enhance the focus of critical social issues as part their strategic decision-making process. Companies that do not prioritise the urgencies of surrounding communities may find themselves shunned by an investment community that is focused on delivering both financial and social returns, as well as jeopardise their social license to operate.

Attracting and protecting human capital

Making a company's efforts visible to the public not only improves community and investor relations, but will also help companies attract and retain a new generation of talent. In-demand employees want to work for companies that are creating a better future, not those perceived as "dirty" or dangerous. A recent study indicated that 75% of millennials expect employers to take a stand on addressing the climate crisis, and that Generation Z is demanding an equally strong stance on climate issues¹⁶. Failing to commit to these issues will influence a company's ability to the best attract talent, manage risk, and innovate for growth.

Electrification of mines, including the transition to electric vehicles can help create a safer and cleaner environment for front-line workers, including higher air quality for those working underground. Decarbonisation is required and will demand dramatic changes in the use of energy and the use of land to reduce to zero the GHG emissions. A range of other effects will accompany these reductions in GHG emissions.

The 'co-benefits' of GHG emission abatement extend to the impact on labour and communities and it is important that they are taken into account in considering the overall costs and benefits of abatement strategies. Bold action on climate change can deliver significant economic benefits, while also creating jobs and reducing premature deaths linked to air pollution.

Improving customer loyalty

Companies are increasingly being required to take a proactive approach to their supply chain in order to improve customer loyalty. This includes decarbonising, depolluting, creating a circular economy for products, sustainably and responsibly sourcing materials, becoming water and energy efficient, protecting biodiversity and the natural environment, and managing human rights and workers' rights issues.

Customers across the supply chain want access to low carbon commodities, such as "green" nickel for batteries or carbon neutral copper for electrification. Demand for green steel in the automotive space and demand for other "clean" commodities is not far off.

Customers are increasingly taking a lifecycle approach to their buying decisions, challenging both the mining and sourcing of materials, mining and production practices adopted, as well as how products are recycled at end of life. For decarbonisation to be achieved, companies across the supply chain need to adapt their strategies and operations to a zero net-emissions pathway. Companies are increasingly reliant on their suppliers to support their decarbonisation goals and this is resulting in a new form of competition.

In addition, customers are demanding sustainably produced products, leveraging clean or renewable energy, with large technology companies leading the way. Many of these organisations, especially those with a global presence, are sensitive to the demands of both their customers and countries with a strong commitment to the Paris accord.

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A call to action



There is increasing pressure for mining companies with significant emissions profiles to be transparent and disclose their pathway to decarbonisation. This focus poses both a challenge to comply, but at the same time presents an opportunity to create long-term value and business sustainability.

Directors are being held to account for articulating how their business strategy aligns with sustainability, and how it will deliver attractive long-term earnings for shareholders. Where the threat from decarbonisation is potentially existential, the need for determined leadership will be that much greater. Suppliers, regulators and customers equally need to find a new way to work together to promote and encourage decarbonisation, to ensure

meaningful progress in achieving the targets set by the Paris Agreement.

Once companies understand their emissions profiles, various decarbonisation and emissions reduction pathways can be explored. Understanding the mining sector's emissions profile can also assist governments with setting emissions reduction targets, making more informed policy decisions, and understanding socio-economic impacts.

Companies and governments should prepare for decarbonisation by facilitating the availability of resources, streamlining regulatory requirements, investing in transforming mining operations, and making targeted investments in innovation. Mining companies need to be prepared for

industry transformation and start investing in medium and long term solutions that will position them to compete in a low-carbon economy. Governments can further aid this transition by investing in research and infrastructure, as well as developing viable decarbonisation options.

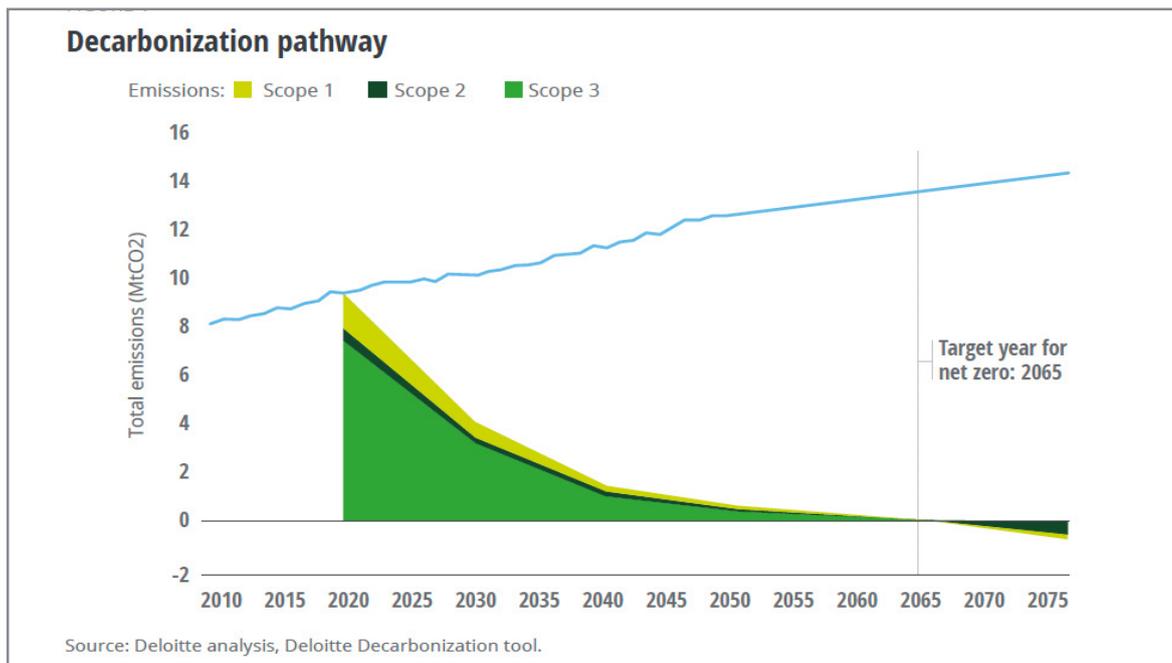
Modelling potential scenarios

Companies should adopt an integrated approach to developing credible emissions reduction targets, to better understand the lowest cost for delivering on those targets. Organisations need to explore the various emission reduction pathways and align these with the company's split of the global reductions, as forecasted by the IPCC. An integrated analysis and output is key in determining the required projects and costs for specific pathways.

In order to track emission reductions, companies require insight into their historical data to establish a baseline. Aggregating this data at an enterprise level is generally easier said than done, but it is a critical first step for companies that must forecast their anticipated emissions over the useful lives of their assets.

Mining companies then need to assess how to integrate a carbon neutral approach into their business-as-usual processes. Often at this point, companies realise that there is a gap between their emission reduction targets and their plausible decarbonisation pathways (see figure 1). To close that gap, companies need to revise their operational processes (e.g. through fuel switching), recalibrate their asset portfolios, and invest in new technologies.¹⁷

Figure 1: Decarbonisation pathway | Forecast (black), Carbon budget by emissions source (multi-colored)



It is critical to adequately explore various scenarios to make effective strategic decisions when dealing with uncertainty. This analysis should include the examination of climate change impacts, vulnerabilities, adaptation and mitigation. A portfolio management approach is critical when making abatement decisions, taking consideration of the identified decarbonisation scenarios, pathways and the results of the abatement impact analysis to inform strategic choices that will impact the medium to long term strategy of the organisation.

Finally, an empirical approach is essential in ensuring acceptable confidence in an abatement model, including the leverage of scientific information from leading research bodies and Socio-Economic / Science-Based methodologies to accurately compare forecasted emissions reductions from selected abatement projects with short, medium and longer-term aspirations and pathways.

Decarbonisation solutions

While technological advancements in the renewable sector and alternative energy sources may assist, they are not enough in tackling this complex global problem. Reliance on energy sources has largely been driven by cost-competitiveness and convenience, with environmental impacts rarely being considered. However, in the face of the global climate crisis, the mining sector needs to accept the necessity of transitioning towards a low-carbon future.

A net zero emissions target brings into focus:

- The economy-wide challenge of decarbonisation.
- The importance of policies that are acceptable, but also salient and impactful on choices by consumers and investors.
- Potential reliance on sustainable and socially acceptable methods of greenhouse gas removal.
- The potential advantages of moving towards a more coherent economy-wide policy framework.

The International Council on Mining and Metals suggests that reducing carbon footprints, engaging in dialogue with stakeholders, enhancing adaptive capacities, and integrating climate change measures into company policies and strategies can contribute to addressing the carbon challenge. Mining companies can also ensure that surrounding communities are resilient to the impacts of climate change.¹⁸

The transition will not be short-lived. There are steps that companies can take to start laying the groundwork for decarbonisation. Mining companies can begin by understanding how the various scenarios related to climate change might affect their local operations. Using advanced predictive analytics, companies can “plug in” data released by leading authorities, such as the IPCC, and track the likely effect on business. Armed with this understanding, miners can start to set targets to reduce their emissions in response to the future scenarios that are most realistic.

Various resources can assist in developing emissions targets and solutions. However, it is up to mining companies themselves to adopt, utilise and improve upon these resources in order to avoid the business-as-usual trajectory. Effective company decarbonisation pathways need to be created together with industry pathways, as companies in the mining industry will be scrutinised by how well they prepare and contribute to decarbonisation solutions.¹⁹

Various decarbonisation options exist and should be explored to understand the lowest cost for delivering on emissions reduction targets:

- **Carbon offsets:** Carbon offsets are a form of trade, typically used as a decarbonisation option where a company's own carbon reductions are impossible or include radical transformation to operations. Carbon offsets involve projects or activities that reduce, avoid or sequester emissions. This can include projects to restore forests, update power plants or increase energy and water efficiency of buildings. Projects are developed and evaluated under various methodologies and standards, which enable the issuance of carbon credits. Companies are advised to look to reducing their emissions before looking to source offsets for their emissions reductions.
- **Carbon capture and storage:** Carbon capture technologies can be used to collect CO₂ produced by fossil fuels in electricity generation and industrial processes, preventing it from entering into the atmosphere. Once the CO₂ is separated from other gases in industrial processes, it is compressed and transported via pipelines or ships to a suitable site for geological storage. There, the CO₂ is injected into deep underground rock formations, such as depleted oil and gas fields or saline aquifer formations. The CO₂ can be stored underground or alternatively used as a feedstock in other processes



- Energy efficiency:** Various practices can be adopted to increase energy efficiency, such as reducing fossil usage in industrial processes to lower CO₂ emissions. Trillions of dollars have been invested in renewable energy globally, with solar, wind, hydro and geothermal systems providing a low-cost alternative to fossil fuels. Increasing energy efficiency can economically reduce fuel consumption for energy use. Investments in energy efficiency can lead to reductions in electricity demand, as well as allow for early decommissioning of coal and fossil fuel plants. Emissions released from fossil fuels for the generation of heat can also be decreased by transitioning to boilers and furnaces that utilise zero-carbon electricity.
- Use of hydrogen:** Zero-carbon hydrogen can be used as an alternative to reduce emissions from the consumption of fossil fuels and emissions from various feedstocks. Hydrogen is a versatile energy carrier and can be produced from low-carbon electricity or from carbon-abated fossil fuels. Hydrogen gas is viewed as a promise for the low carbon economy since it can be utilised for different purposes. Hydrogen can play an important system role to capture abundant energy. It can be used as an emissions-free fuel, as a raw material, and as a source of high temperature heat. Hydrogen may be a potentially valuable complement to electrification in terms of reducing emissions.
- Use of biomass:** Biomass can be used in various forms (solid, liquid or gas) as a replacement for some fuels and feedstocks, similar to that of hydrogen. An increase in the use of biomass to create bioenergy will increase the demand for waste and lead to a circular economy, creating new opportunities for waste reduction through recycling. This means that materials can be reused and there is a shift from a make-take-waste economy to

an economy where all materials are designed in a way that they can endlessly be reused as a raw material for new products. Bioenergy also has socio-economic and environmental benefits, such as energy security, improved public health (particularly for local communities), increase in creation of green jobs, and mitigation of GHGs and air pollution.

Deloitte has worked with a number of clients to support their goal of a Net Zero future. Deloitte's Decarbonisation Solutions package includes modules relating to abatement portfolio management, decarbonisation scenarios, pathways and abatement impact analysis. The modules leverage scientific information and methodologies from leading global bodies.



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