

Real Mining. Real People. Real Difference.

## CLIMATE CHANGE: OUR PLANS, POLICIES AND PROGRESS

## CONTENTS

Foreword	4
Executive summary	6
Ensuring resilience to climate change: a critical strategic issue	8
Our scenarios for possible future worlds	10
Anglo American: Resilience of our portfolio to climate change impacts	17
Climate change: Anglo American's long-term position	19
Our policy, engagement, governance and systems on climate change	21
Conclusion	24
Annex	25
Forward-looking statements	27

## **ABOUT THIS REPORT**

This report describes how Anglo American is positioned to approach the challenges and opportunities presented by climate change. It follows on from our 2017 publication, 'Climate change: our plans, policies and progress'. This new report presents our view on Anglo American's resilience to climate change, based on quantitative scenario analysis.

This is part of our continued efforts to improve the transparency of our approach to climate change to ensure consistency with the expectations of initiatives such as the "Aiming for A" coalition and the recommendations of the Financial Stability Board's Task Force on climate-related Financial Disclosure.

In future years we intend to integrate climate-related disclosure into our Integrated Annual Report and related materiality processes.

Unless otherwise stated, data included in this report accounts for relevant factors for the business wholly owned and managed by Anglo American or De Beers. A full list of our businesses in our reporting scope is available on page 84 of Anglo American's 2018 Sustainability Report.

### Legal Disclaimer on Forward-Looking Statements

This document includes forward-looking statements. For information regarding forward-looking statements please refer to the inside back cover of this document.

### FOREWORD

Anglo American's Purpose, to re-imagine mining to improve people's lives, is at the heart of everything we do as a business. Combined with our values and guiding our strategy, it is the context against which we consider the defining challenges of our era, including climate change. It is how we start to answer the question of what our contribution could (and should) be in the the transition to a low carbon world and how Anglo American can thrive through and beyond that transition. This report sets out our thinking. We shouldn't underestimate the challenge. The 2015 Paris Agreement was a significant achievement, bringing 195 countries to a consensus on the steps needed to tackle climate change.

Katowice in 2018 took that agreement one step further. But since 2015, global emissions have increased by around 1% per year and show few signs of slowing down. Looking to 2050, as we did in developing the scenarios we are presenting in this report, the challenge is even greater. The world's population is likely to grow by two billion people, to nine billion in total, and global GDP is expected to increase threefold. That growth will see huge positive benefits for developing countries around the world, but to achieve that development and realise the associated poverty alleviation whilst limiting global temperature rise, requires a fundamental shift in the resource intensity of the global economy. What does this mean for mining and what does this mean for Anglo American? The transition to a low carbon economy cannot happen without the products of mining. The metals and minerals that we produce form the essential base components for all our modern lives from the platinum group metals that clean vehicle emissions or enable hydrogen energy, to the copper needed to produce wind and solar energy.

We believe that mining has an important long term role to play to 2050 and far beyond. But as economies develop and societal trends evolve, demand patterns for different metals and minerals will also change. In the face of these shifts, we need to ensure our business is both resilient and agile. Anglo American today is a fundamentally different business to just a few years ago, in terms of its quality, performance and prospects.

The foundations we have built position us well to grow and prosper and to do so sustainably. Our portfolio of world-class assets producing the right metals and minerals of the right quality to power a cleaner future, coupled with our approach to both technology and sustainability in its full sense, set us apart. Mining cannot continue its long path of simply scaling up to supply what the world needs. We need to do things dramatically differently if we are to transform our footprint and be valued by all our stakeholders. Our first responsibility is to reduce our energy and water usage, and our emissions – and we are committed to doing exactly that. We're on track to achieve our 2020 targets and are confident that our FutureSmart Mining<sup>™</sup> technologies will be a key driver of our emissions reductions to 2030 and of driving our operations towards carbon neutrality.

We are often asked how our role as a producer of thermal coal is consistent with our commitment to being part of the solution to climate change. I do not believe that there is any inconsistency. We have halved our thermal coal production in the last five years and, as renewable power generation continues to take hold, we will continue that transition. But it will take time. In the meantime, I am proud of our thermal coal business and our people that operate it to the highest standards of safety and sustainability, for the benefit of the communities and the countries where they are situated and the millions who benefit from affordable energy.

Anglo American's Purpose, to re-imagine mining to improve people's lives, is at the heart of everything we do as a business. Combined with our values and guiding our strategy, it is the context against which we consider the defining challenges of our era, including climate change.



Mark Cutifani Chief Executive, Anglo American

## **EXECUTIVE SUMMARY**

Climate change is one of the defining challenges of our time. Understanding the global impacts and the implications for our business are critical strategic issues for us:

- Containing global temperature increase to less than 2°C would require at least a 50% reduction of global GHG emissions by 2050 in a world where GDP could triple and population could grow by more than two billion.
- Achieving a 50% reduction in global GHG emissions would have profound implications on the intensity of material use and would require the replacement of existing products and technologies and therefore demand for primary materials.

Global efforts to reduce emissions are almost certain to accelerate, but there is significant uncertainty around the nature and timing of these efforts. There is a range of possible scenarios

- Progress to tackle emissions has been variable since the Paris Agreement. Emissions have increased by c.1% p.a. on average since 2015.
- As the need to reduce emissions becomes more urgent and effective emissions-reduction technologies become more economically competitive, we expect abatement efforts to accelerate.
- Various scenarios could emerge through 2050 driven by the extent to which new technology is implemented. The breadth and depth of global coordination and regulatory intervention will also likely play an important role in the speed and direction of change.

We believe mining will remain a relevant industry across the scenarios considered, however, the mix of products it supplies could shift away from bulk minerals towards base and other metals

- Emissions reductions are possible through the deployment of technology in key end sectors including power, transport, steel and buildings. Renewable power generation and the various forms of electric transport are obvious examples of critical abatement technologies.
- There is likely to be demand growth for copper and nickel, a potential reduction for thermal and metallurgical coal and iron ore. Demand for PGMs could grow significantly if the hydrogen economy develops along with other metals that have specific physical characteristics that support the application of new science and technologies.
- Overall, the mining industry profit pool should be robust across most scenarios, driven by GDP growth and the continuing need for commodities, albeit likely different to the current supply mix, to support new technology applications.



### We are confident that our high quality asset portfolio and our ability to adapt to evolving markets ensure our resilience across the scenarios we have tested:

- Our high quality, low operating cost asset portfolio ensures we are positioned to generate free cash flow through the commodity price cycle and in the face of evolving industry dynamics.
- Our future growth potential is skewed towards commodities that can thrive as abatement accelerates, particularly copper, nickel and PGMs.
- We monitor the most relevant signposts to ensure we align our investment and development priorities to a changing world.

We continue to reduce our scope 1 and 2 emissions, work on our understanding of the potential physical impacts of climate change on our operations and our host communities to ensure we mitigate risks where we can:

- We will deliver against our 2030 stretch goals on emissions and we have a stated ambition to operate carbon neutral operations.
- Risk impact, mitigation and tracking elements are embedded in our operating model to help us understand what we need to put in place to achieve our targets.

### Our management systems, structures, governance and engagement processes ensure that climate change is a consideration in all our business decisions:

- Anglo American's work on climate change dates back more than 15 years to when we launched our first climate change action plan.
- We have strong Governance on climate change, with our Group Management Committee (GMC) and Board fully engaged.
- We have engaged consistently and constructively with investors and other stakeholders on climate change.
- Achievement of our emissions reductions and energy efficiency targets forms a part of the long term incentive plan for our senior executives.

We believe that being resilient is not enough. We are actively working to be part of the solution and will continue to take targeted and meaningful steps to do so through delivering on our business objectives:

- Our diverse product mix uniquely enables us to supply many of the essential raw materials required for climate change abatement – copper, nickel and PGMs being good examples. Our asset profiles are naturally weighted towards these base and other metals.
- We have halved our position in thermal coal through the sale of our South African Eskom-tied domestic coal operations and the Drayton, Dartbrook and Callide operations in Australia. We do not intend to acquire any additional thermal coal assets. Over time, we expect to continue to reduce our thermal coal footprint.
- Going forward, we will take into account a carbon price for all our pricing and forecasting.
- We continue to invest in the development of the hydrogen economy through our membership of the Hydrogen Council and the spin-off of Anglo Platinum Ventures (APV), which targets growth of early stage hydrogen enablers. We also support the development of carbon reduction and removal technologies.
- We are founding sponsors of the World Bank's Climate Smart Mining Facility which will launch in May 2019.

## ENSURING RESILIENCE TO CLIMATE CHANGE: A CRITICAL STRATEGIC ISSUE

Climate change is one of the defining challenges of our era. In living Anglo American's Purpose to re-imagine mining to improve people's lives, we recognise the role we have to play in being part of the global response to climate change.

The challenge is significant. The Paris Agreement calls for a global temperature increase of 'well below 2°C'. Achieving this would require at least a 50% reduction in global greenhouse gas (GHG) emissions by 2050, whilst global GDP could triple and population could grow by more than 2 billion. Performance so far has been mixed, with global emissions increasing c.1% per year since 2015 (see Figure 1).

Mining is already forming the basis of the transition to a low carbon economy. At the same time, we expect climate change to fundamentally reshape the mining industry. It will require us to run more resilient, carbon neutral operations, to target more precisely our extraction methods in order to minimise wider environmental impacts, and to adapt our businesses in response to society's changing expectations.

Anglo American is a leading global mining business with interests in diamonds (through De Beers), platinum group metals (PGMs), copper, nickel and manganese, iron ore, thermal coal and metallurgical coal. Understanding how climate change may affect our operations and the key end markets for our products is critical to our strategic decisions and to give us confidence in the resilience of the sector and our business.



Figure 1: Estimated Global GHG emissions (CO<sub>2</sub>e)



## **OUR SCENARIOS FOR POSSIBLE FUTURE WORLDS**

Scenarios are not forecasts, nor do they represent Anglo American policy or preferences. Rather, they help us imagine how the world might develop in response to different assumed conditions.

It is not possible to know exactly how climate change will evolve and what its implications will be. However, for mining we expect the impacts in two broad areas:

- Physical: The potential impact on our operations and neighbouring communities from floods, droughts, and other extreme weather events
- Demand for mined products: The regulatory and technological implications of the transition to a low carbon economy and how this might impact demand for different products

To anticipate these impacts and formulate strategic responses to them, we have developed scenarios for possible future worlds that represent combinations of a potential set of outcomes. To build these scenarios we drew on global best practice, including among others, the UK Met. Office's view on physical impacts and the International Energy Agency's (IEA) perspectives on market demand impacts, supplemented with our own views on issues materially relevant to Anglo American. We then assessed how sectors of key significance to mining in general, and Anglo American in particular, may evolve in those worlds. By combining these analyses with knowledge of our own operations, we have tested how our business might be affected.

![](_page_9_Picture_6.jpeg)

## Our approach to developing climate change scenarios

Our assessment identified two key drivers of the low carbon transition:

- Technological development and deployment
- Global coordination coupled with regulatory intervention

This has enabled us to quantify the impact of key indicators on the markets for our products, and then to distil the implications for our products and businesses. Our thinking is based on the following approach:

- Define focus end sectors: We identified key indicators (developments in policy, economics and technology) to define our baseline outlook for the highest emitting end sectors (power generation, transport, steel and buildings)
- Prioritise emission abatement levers: Building on the existing understanding of abatement levers, we prioritised technologies fulfilling either economic and technical feasibility criteria or emissions reduction potential for each end sector, depending on the scenario
- Define end sector demand implications: Based on the likely abatement levers we developed a view of key demand trends
- Derive market implications for our portfolio: Using the end sector demand implications, we updated our proprietary view of the outlook for our portfolio of products, across the scenarios considered
- Define signposts to monitor: We identified a key set of signposts to monitor by end sector

This work helps form the basis of our ongoing thinking on climate change. We will continue to test our scenarios as new signposts emerge and develop and test new sensitivities to outline potential alternative pathways. This will enable us to develop further our understanding of the likely outcomes for the industry profit pool and for our business.

### Pathways to a low carbon world

In line with guidance from the Financial Stability Board's Task Force for Climate Related Financial Disclosure (TCFD), the IEA's three scenarios – Current Policies, New Policies, and Sustainable Development<sup>1</sup> – formed the baseline against which we have developed our scenarios<sup>2</sup>.

IEA's Current Policies scenario considers only the impact of policies and measures that are firmly established in legislation as of mid-2018, leading to increasing strains on almost all aspects of energy security and a major additional rise in energy-related CO2 emissions.

New Policies Scenario (NPS) includes policies and targets that governments have announced but not yet enacted. This scenario results in slower emissions growth than Current Policies, but emissions in 2040 would still be higher than today. NPS is not compatible with Paris Agreement objectives and would result in a global temperature rise of greater than 2°C by 2100.

Sustainable Development assumes that accelerated clean energy transitions will mean there is a reasonable probability of restricting global temperature rises to no more than 2°C above pre-industrial levels by 2100, while delivering clean air and universal access to modern energy.

The transition to a lower carbon world is already happening, so we based our scenario development on New Policies and Sustainable Development. We call the scenarios we have developed: NPS+ and 2°C. NPS+: Under NPS+, we assume that the global economy will have undergone major changes by 2050, in particular in the power generation/energy, transport and steel sectors: the global power mix will have shifted significantly, with renewables delivering more than 50% of that power, and various electric vehicle technologies will have become the norm in most markets for light vehicles.

![](_page_10_Figure_7.jpeg)

### NPS+ (Est. Global CO2 emitted)

<sup>1</sup>https://www.iea.org/topics/climatechange/scenarios/ <sup>2</sup>While the IEA Scenarios forecast out to 2040, we have used their baseline to develop a view out to 2050 2°C: Derived from IEA's 'Sustainable Development' scenario, this scenario tracks a transition pathway in which global temperature would, with reasonable probability, increase by less than 2°C by 2100. In addition to abatement levers contained in NPS+, 2°C assumes a higher share of renewables in the energy mix, the phasing out of coal power, and extensive deployment of low carbon technologies such as carbon capture and storage (CCS), by 2050. It also assumes focused and productive global cooperation, as well as radically altered consumer and business behaviour resulting, in part, from widespread adoption of the circular (reduce and reuse) economy.

![](_page_11_Figure_1.jpeg)

![](_page_11_Figure_2.jpeg)

Power	Transport	Steel	Buildings
Growth of renewable generation	Down-sizing and efficiency increases of Internal Combustion Engines	Feed / raw materials substitutions (e.g., scrap recycling)	District heating / CHP in urban spaces
Nuclear new builds	Improving efficiency of auto catalysts	Shift to EAF (scrap-based)	Growth of electric heating (replacement of oil and gas)
Gas replaces coal as backup	Growth of battery vehicles	Shift to EAF (DRI)	Demand-side management and higher efficiency appliances
Storage and grid expansion for system integration	Fuel cell applications (across modes of transportation)	Biomass based pig iron production	
Power-to-Gas for renewable backup	Mobility as a service	Change of application areas	
Carbon Capture and Storage (CCS)		Carbon Capture Use and Storage (CCUS)	

Figure 3: Selection of most economic / feasible end sector trends for climate change abatement

### **Power Generation**

NPS+ projects that global power demand will double by 2050. Renewable power generation would increase significantly in most regions as renewable costs continue to fall. As a result, coal's share of the power mix would decline substantially by 2050, but the absolute amount of coal power generated would fall only slightly. Developed economies would move away from coal, but coal generation would grow significantly in India and South East Asia. Carbon capture and storage (CCS) for coal and gas power generation would not be economic in this scenario, based on IEA's carbon price assumptions, even assuming significant declines in the cost of the technology.

2°C sees an increase of two-thirds in global power demand from today, compared with a doubling of demand in NPS+. The key driver of lower power demand in 2°C is higher energy efficiency in industry and buildings. Fossil fuel generation falls rapidly, with coal almost entirely phased out by 2050. CCS becomes economic due to higher carbon prices and is applied to some coal and gas capacity. Renewables account for the majority of power generation by 2050 and nuclear slightly increases its share (see Figure 4).

In both scenarios, increased wind and solar power generation would increase demand for copper, as these technologies are much more copper intensive than fossil fuel power generation.

### Transport

Although the global annual sales share of electric vehicles –both battery electric vehicles (BEVs) and fuel cell electric vehicles (FCEVs) – is less than 5% today, both the NPS+ and 2°C forecast this to increase to more than 50% for both light-duty vehicles and heavy-duty vehicles by 2050. This growth would be driven by government incentives in the short-term, with further technological advances and large-scale infrastructure deployment over the next 10-15 years delivering sustainable lower total cost of ownership. Figure 5 shows the expected global evolution of sales of light-duty vehicles by drivetrain in the 2°C scenario.

One key difference between our two main scenarios involves the level of overall demand for both lightduty vehicles and heavy-duty vehicles.

![](_page_12_Figure_7.jpeg)

Figure 4: Share of primary energy source for global power generation in a 2°C Scenario

![](_page_12_Figure_9.jpeg)

Figure 5: Share of powertrain type for global lightduty vehicle sales in 2°C Scenario Although the long-term outlook for the automotive sector is positive, demand for vehicles could be lower in 2°C than in NPS+, owing to accelerated shared mobility and autonomous vehicles trends.

The emergence and adoption of various electric powertrain technologies would likely affect demand for several of our products. The uptake of electric vehicles is positive for both copper and nickel. BEVs contain four times the copper and twelve times the nickel of an internal combustion engine (ICE) vehicle. The positive impact is more pronounced in NPS+ than in 2°C because the latter assumes a lower number of vehicles overall. The effects on demand for PGMs is less clear. The emergence of BEVs as a major alternative drivetrain in the long term would reduce demand for auto catalysts and thus have a negative impact on PGMs demand. However, across both scenarios, hybrids would maintain a share of sales in the next decade, thus ensuring a level of continued demand from autocatalysts. We expect FCEVs, which today rely on PGMs-based fuel cells, to contribute to the electrified drivetrain for vehicles, especially in the heavy duty segment of the market.

### Steel

Our scenarios assume a significant transition for the steel industry, which would reduce its CO2 emissions through a combination of:

- A shift towards lower-emission production processes
- The application of Carbon Capture Use and Storage (CCUS) on remaining high-emission plants and
- Development of a more circular economy

Likely broad adoption of carbon prices would shift the global mix of steel production towards lower-emission production processes. The integrated blast furnace/ basic oxygen furnace (BF/BOF) process dominates today's steel production mix, but we expect the loweremission electric arc furnace (EAF) process to occupy a greater share in the future. Pig iron, the main iron source for BF/BOF, requires both metallurgical coal and iron ore. EAF steel can be made mainly using:

- Direct reduction iron (Gas-based DRI), which would reduce demand for metallurgical coal; or
- Scrap steel, which would lower the demand for both metallurgical coal and iron ore.

Figure 6 shows the expected evolution of the iron source in steel making in the 2°C Scenario. The change in production method mix is less pronounced in NPS+, owing to lower carbon prices.

The 2°C Scenario assumes the installation of CCUS capacity to reduce the carbon footprint of remaining BF/BOF production plants. The NPS+ scenario assumes that CCUS will not be economically viable and that governments will not agree on a coordinated regulatory strategy to support it.

Implicit in the 2°C Scenario is greater efficiency of use (and hence lower steel consumption per unit of GDP), consistent with the development of the circular economy. In NPS+, however, the circular economy's impact is expected to be limited to steel recycling, with a continuation of or slight improvement on today's already high steel scrap recovery rates.

In the 2°C Scenario, higher production from EAF, combined with lower steel production demand, could lead to a decrease in demand for metallurgical coal and – to a lesser extent – iron ore by 2050. In NPS+, the growing demand for steel could counterbalance the economically driven relative shift from BF/BOF to EAF, resulting in relatively stable demand for both metallurgical coal and iron ore.

![](_page_13_Figure_14.jpeg)

production in the 2°C Scenario

### **Buildings**

Global building floor space is expected to increase by c.55% in total by 2050 (relative to 2018), driven by both population growth and increasing wealth.

In NPS+, national building standards, regulation and incentives would promote greener construction and renovation of buildings. By 2050, the average building would require c.25% less energy and emit c.50% less CO2 per square metre than today. Key energy reduction and emissions abatement levers will include:

- Improving the building envelope to minimise energy demand for space heating and cooling (e.g. triple glazed windows, better insulation, reflective roofing)
- Improving the energy efficiency of systems and equipment (e.g., low energy appliances, LED lighting with motion sensors and automatic dimmers)
- Switching to lower carbon energy sources (e.g. heat pumps, solar thermal systems)

In 2°C, stricter regulations for the construction of new buildings would result in additional energy efficiency improvements and emissions reductions than in NPS+. Higher renovation rates would deliver greater energy and emissions savings from existing buildings. Use of fossils fuels in buildings would be c.30% lower in 2050 in 2°C than in NPS+, as many regions ban their use for heating buildings. By 2050, the average building would require c.45% less energy and emit c.65% less  $CO_2$  per square metre.

## What is the impact on mining across our scenarios?

We expect the overall industry profit pool to be robust and grow under NPS+. Uptake of new technologies required to achieve a 2°C outcome could lead to an overall flat profit pool outlook post-2035.

At a product level, we expect profit pools to grow in both scenarios for copper and nickel and to reduce for

coal (thermal and metallurgical). The outlook for iron ore is positive under NPS+ and negative under 2°C and the upside outlook for PGMs is less certain, given the potential for significant growth if the hydrogen economy develops at scale. Figure 7 provides more detail.

![](_page_15_Figure_4.jpeg)

Figure 7: Outlook for mining commodity profit pools (indexed vs. current profit pools) by scenario

## ANGLO AMERICAN: RESILIENCE OF OUR PORTFOLIO TO CLIMATE CHANGE IMPACTS

To test the resilience of Anglo American we assessed the impact of the scenario outcomes on our portfolio. The framework we used tested Anglo American's resilience across key dimensions: strategic robustness, financial strength and sustainability. We assess the impact of transitioning to lower carbon worlds for our two main scenarios (NPS+ and 2°C) but there are various pathways that can lead to similar outcomes. To ensure consistency, we focused on our existing assets and organic growth opportunities. Against these tests, our business is fundamentally resilient over the medium term, across scenarios.

Over the longer term, our suite of organic growth opportunities, high quality assets and exposure to attractive products (such as copper) give us confidence in our ability to remain resilient. However, it is difficult to be precise because the future is by its nature uncertain and we have not yet fully developed/funded all our potential growth options. Financially, based on our current asset footprint and ignoring any future adjustments to the portfolio beyond the execution of our potential suite of organic growth projects or any other changes, our cashflow could grow significantly to 2030 under NPS+. Under the IEA's 2°C scenario we remain resilient, although there is greater uncertainty depending on what assumptions are made on critical levers. The range relative to our NPS+ cashflow could be between 20% higher and 10% lower in 2030.

Much of our growth is aligned with key climate change trends, driven by our well-placed position in metals such as copper, nickel and PGMs that are expected to support the acceleration of abatement efforts.

This shift is underpinned by strong optionality in our portfolio. In copper, we are currently developing Quellaveco, one of the few tier one projects in the world. Additionally, our portfolio includes Los Bronces and Collahuasi, which have reserve lives of 30 and 63 years respectively, and have some of the largest resource bases in the industry, offering further growth optionality.

In PGMs, our flagship Mogalakwena mine is not only low cost and competitive, but retains a polymetallic mix well suited to supply the metals needed in the low carbon transition for the transport sector.

![](_page_16_Figure_7.jpeg)

Note: bubble sizes represent equity size of relative volumes

### Our resillience to physical risks

Climate change and extreme weather events represent material risks to Anglo American and are reflected as such in our Principal Risk Register. Two key processes guide how we manage these risks: the Operational Risk Management programme for operations, and the Investment Development Model for projects.

To understand, assess and mitigate the physical risks of climate change and extreme weather events we have worked with global leaders in climate modelling including the UK Met Office and the South African Council for Scientific and Industrial Research (CSIR) to understand the vulnerability of our operations and our host communities. These assessments assumed unabated anthropogenic GHG emissions through to the end of the century, with associated warming of more than 3.5°C and focused on:

- Constructing local climate change models
   using the best available science
- Using our operating model process to identify vulnerability and exposure
- Integrating critical controls into operational risk management
- Providing access to model data to universities and government functions

Some of the key initiatives over the years to address physical risks are:

- In 2011 we undertook a Climate Change Time of Emergence study for all our operations and projects, to help prioritise the areas for initial focus
- In 2012, we developed best practice guidelines for our operations and new investment projects using climate scenario analysis for sites in South Africa and in Peru.
- In 2016, we undertook a high resolution modelling exercise for Los Bronces (for details, please see Figure 9)

 In 2018, our PGMs business initiated a climate modelling and adaptation exercise across all of its operations in South Africa

The way in which we manage water, for our operations and on behalf of our host communities, is a critical issue. 70% of our sites are in water stressed regions and our total water withdrawal in 2018 amounted to 227.5 million cubic metres, compared with 306.3 million cubic metres in 2017. Our catchment-based approach to water management will allow us to play a key role in defining opportunities for contributing to regional water conservation.

#### OPERATION WINTER BOOSTS AVALANCHE CONTROL AT LOS BRONCES

![](_page_17_Picture_14.jpeg)

The mountain ranges around Los Bronces mine in Chile. Los Bronces has an estimated life-of-mine of more than 20 years and is

### Anglo American has built a sophisticated system to reduce the safety risks from avalanches.

Los Bronces copper mine is located in the Chilean Andes at more than 3,500 metres above sea level. The operation gets up to 15 metres of show in winter, with temperatures dropping to minus 20°C and wind speeds reaching 160 kph. In these challenging conditions, the priority is to ensure safety at all times. One of the biggest risks is avalanches cascading down the steep slopes surrounding Los Bronces, which have the spotential for dumping thousands of tonnes of snow into the pit and the 33 kilometres of service and access roads.

The Los Bronces winter operations team runs a network of monitoring stations to report on conditions that may prompt an avalanche, including snowfall, the weight of snow, humidity, temperature, wind, rain and solar radiation. This is combined with data going back to 1982 to provide guidance on when an avalanche needs to be artificially triggered. Anglo American is working with the Swiss Institute of Snow and Avalanche Research to develop new monitoring stations to anticipate how wind speed and direction influence the accumulation of snow.

We are developing an avalanche-risk map, which includes assessing the potential energy of an avalanche based on the volume and height of the snow. In the past, a lack of data led to widespread preventative closures of roads and mining areas; the new risk map will be able to limit the area of disruption, guiding specific stoppages to where the risks actually are

\*Detailed climate information informs how we allocate people and equipment in order to maintain safety standards and operational productivity," says Andres Ellena, superintendent of Los Bronces' Operación Invierno (Operation Winter).

Los Bronces is also updating its system of triggering controlled avalanches. The current method using sound vibrations from a 106 mm cannon will be replaced by remotely controlled explosions at specific mountain sites.

Figure 9: Los Bronces modelling exercise on physical risks

# CLIMATE CHANGE: ANGLO AMERICAN'S LONG-TERM POSITION

### **Reducing our footprint**

At Anglo American we are re-imagining the future of mining. We believe that mines will be carbon neutral and we have begun detailed work to develop a pathway and timeframe to carbon neutrality, based on:

- Radically reducing energy consumption through FutureSmart Mining<sup>™</sup> methods and technology adoption
- Switching to low carbon energy sourcing, increasing renewables in our energy mix

Aligned with this approach, we have set 2030 targets to improve energy efficiency and reduce absolute GHG emissions by 30%. We are on track to achieve our 2020 targets of an 8% improvement in energy use and a 22% saving in GHG emissions, against our projected 'business as usual' (BAU) consumption. Achieving the GHG target is linked directly to executive remuneration through the Long Term Incentive Plan. We will deliver against our 2030 stretch goals and have an ambition to run carbon neutral operations.

Reducing our environmental footprint is fundamental to Anglo American being a truly sustainable business. We have built the technical capability through the Energy and CO<sub>2</sub> Management programme (ECO2MAN), launched in 2011, which has enabled us to analyse our activities and identify opportunities at operations to reduce energy consumption and GHG emissions.

In 2018, a total of 440 energy efficiency and business improvement projects saved more than 6 million GJ in energy consumption, GHG emissions savings in 2018 amounted to 6.1 million tonnes CO2 equivalent. A substantial portion of energy reduction is a result of business improvements and productivity initiatives. Amongst others, we piloted plant trials for the shock break technology that allows for savings in comminution power consumption, we expanded methane capture at our Moranbah North and Capcoal underground operations in Australia and introduced emission-related supplier authorisation criteria in our responsible sourcing standard.

Our Kumba Iron Ore subsidiary in South Africa has achieved significant energy savings through a range of emission reduction initiatives across its haulage fleet. These included improving payload management systems, expanding the implementation of its diesel energyefficiency management programme, optimising the loading of haul trucks, and adjusting haul truck engines. These measurable energy savings allowed several of our operations in South Africa to benefit from energy-related tax-deduction incentives, estimated at \$15.4 million.

![](_page_18_Figure_10.jpeg)

A large portion of our GHG-emission savings is achieved through the capture and use of coal mine methane for pipeline gas sales and power generation at our metallurgical coal operations in Australia. The Moranbah North, Capcoal and Grosvenor methane-fired power stations together generate more than 140 MW of electricity. The power stations are owned and operated by a cleanenergy provider, Energy Developments Limited. Their combined environmental benefit is a reduction in GHG emissions of 5 million tonnes of CO<sub>2</sub>e emissions a year.

### Our strategic choices

In addition to demonstrating Anglo American's resilience to the impacts of climate change, the scenario analysis also forms part of the detailed approach we have developed to building climate change into our strategic planning. By making climate change a lens through which we view all of Anglo American's strategic decision-making, including investment decisions and the financial attractiveness of our resource and reserve base, we are able to position ourselves proactively to address the impacts of climate change and capitalise on potential opportunities. Specific examples include:

- Our significant growth optionality in metals and minerals that are required for the low carbon transition. In copper this includes our existing long life Chilean assets and the development of the Quellaveco operation in Peru. Meanwhile, our flagship PGMs mine at Mogalakwena in South Africa, is well placed to provide not only a wide variety of PGMs, but also material volumes of high quality nickel
- We have reduced our thermal coal footprint by half in the last five years through a responsible divestment strategy.
   We do not intend to acquire any additional thermal coal assets. Over time, we expect to continue to reduce our thermal coal footprint but the way we transition the business will be considered and responsible
- In regions where carbon pricing is an emerging government policy, we already include carbon pricing in our budget guidance and project evaluations. Going forward, we will take into account a carbon price for our pricing and forecasting in all jurisdictions

- We have built optionality into our operational strategy, across our products and growth areas, coupled with a disciplined approach to capital allocation. This allows for targeted interventions to mitigate risk
- We are using the analysis to actively assess long term growth opportunities (e.g. expansion into other promising metals and minerals and potential adjacent growth opportunities)

### **Project Minera**

Project Minera supports our ambition to operate a carbon neutral mine. When kimberlite, the rare type of volcanic rock that contains diamonds, is brought to the Earth's surface and crushed it acts like a sponge, taking carbon dioxide out of the atmosphere and locking it into stable, nontoxic carbonate minerals. These carbonates form naturally in our processed ore, and our research is looking at ways of speeding up that process.

Together with experts from the University of British Colombia, the University of Alberta, Trent University, the University of Queensland and Bond University, we are testing different mineral carbonation technologies (carbon dioxide injection, cation exchange and biotechnology) in laboratories – and we will soon be moving to mine sites. The intention is that the technologies will operate under ambient conditions at low costs. Together with our efforts to improve energy efficiency and switch to renewable energy sources, mineral carbonation has the potential to help our mining operations become carbon neutral.

Following a highly competitive process, De Beers is a finalist for a Clean Growth Program award from the Canadian Government. All due diligence requirements have been met and we hope to be awarded \$1.15 million to support Project Minera with field trials at the Gahcho Kué mine in Canada.

## OUR POLICY, ENGAGEMENT, GOVERNANCE AND SYSTEMS ON CLIMATE CHANGE

### Policy

Anglo American's policy work related to climate change began almost twenty years ago.

In 2001, we became a founding member of the International Council on Mining and Metals (ICMM). ICMM released its first position statement on climate change in 2006, which was followed in 2011 by a set of principles for climate change policy design.

In 2015, Anglo American published its first position statement on climate change, joined the COP21 Paris Pledge for Action and welcomed the Paris Agreement. We understand that participating states will be expected to increase their ambition in reducing emissions as defined by their Nationally Determined Contributions in coming years.

Against this backdrop, Anglo American's management approach to climate change is built around five principles:

- Building internal agility and ensuring resilience to climate change
- Driving energy and carbon savings throughout our business
- Understanding and responding to the carbon lifecycle risks and opportunities of our products
- Developing and implementing collaborative solutions with our stakeholders
- Contributing our skills and knowledge to the development of responsible public policy

In 2018, we conducted an audit of the 71 industry associations of which Anglo American or its business units are a member to ensure that those associations' policy and advocacy positions were aligned with Anglo American's positions. Some differences were identified and we have engaged with the industry associations in question to ensure that there is no suggestion that Anglo American is inconsistent in its positioning on climate change. Full details of that audit can be found on www.angloamerican.com.

### Engagement

There is a growing level of awareness on climate change across society, including our key stakeholders: investors, customers, suppliers, governments, communities and the wider public. We are engaging proactively with these stakeholders and others as part of our role in the response to climate change.

We are committed to being part of a responsible supply and ethical value chain. We will, therefore, work with our suppliers and customers on how we can identify and support technologies and projects which can reduce our products' overall carbon footprint. Recognising the significance of our customers' emissions, we have invested in clean coal technology partnerships to develop CCUS with universities and associations such as the Australian Coal 21 fund.

Through our PGM Market Development activities, we are investing over US\$100M in promising new technologies which use or facilitate the use of PGMs in PGM-based catalysts as well as companies in the fuel cell, hydrogen and energy storage value chain that support or use fuel cell/clean technology. This is through our own activities as well as investment in an independent fund management business, AP Ventures LLP. We are also supporting the development of a hydrogen economy through partnerships including the global Hydrogen Council and have put in place initiatives to proactively shape the PGM market (for details, please refer to Figure 12).

We are proud to be a founding sponsor of the World Bank's Climate Smart Mining Facility which will be launched in May. The Facility aims to decarbonise and reduce the material footprint of minerals needed for the clean energy transition, particularly in resource-rich developing countries.

### Investor dialogue

We are committed to the transparent disclosure of climate related risks and opportunities for our business, and have officially expressed support for, and aligned with, the Task Force for Climate-related Financial Disclosures (TCFD) recommendations for voluntary reporting on climate related risks in 2018 (for detailed references, please see Figure 13). We maintain a dialogue with Climate Action 100+ group of investors to deepen a shared understanding on disclosure and our actions to build resilience. We also engage with the Church of England Investment Fund on the Transition Pathway Initiative's work aiming to develop a methodology to benchmark the mining sector's total GHG emissions against the 2°C scenario. Our work in 2019 to analyse our own Scope 3 emissions will help inform this.

### Governance

At Anglo American, the Sustainability Committee of the Board is responsible for addressing climate change related topics. The Committee oversees, on behalf of the Board, material policies, processes, and strategies designed to manage sustainability risks and opportunities. Matters relating to climate change and energy are included in each quarterly report to the Committee, and as stand-alone items on the agenda. Matters discussed by the Committee in 2018 are disclosed on page 18 of Anglo American's 2018 Sustainability Report. The Chair of the Sustainability Committee provides a summary of the Committee's discussions at the Board, which addresses the most material issues raised by the Committee. The Chief Executive performance scorecard and report to the Board also include performance indicators on energy and GHG emissions.

In addition to the discussions at the Sustainability Committee, the Audit Committee reviews the company's material risks, including climate change, twice a year.

The Anglo American Board has held one full strategy session on climate change and another is scheduled for later in 2019. The Group Management Committee and its sub-committees are briefed regularly on the issue and provide operational direction.

![](_page_21_Picture_6.jpeg)

Figure 12: PGMs market development

### Systems

### **Management Structure**

Climate change is a key strategic issue and falls under the management responsibility of the Group's technical director, Tony O'Neill, who is a member of the Board and the Group Management Committee. The Group Technical Director is supported by the Group Head of Safety and Sustainable Development, the Head of Environment and the Lead for Energy and Carbon Effectiveness.

The Group Director of Corporate Relations, Anik Michaud, is responsible for the public policy, social performance and engagement aspects of climate change. She is also a member of the Group Management Committee. Duncan Wanblad, Group Director for Strategy and Business Development and also a member of the Group Management Committee, ensures that climate change informs Anglo American's decision-making and strategy discussions.

The meetings of the Group Energy/Carbon Forum offer energy and environmental practitioners from across Anglo American an opportunity to share updates on performance, good-practice projects and policy developments.

### **Risk management**

Our risk-management approach, enables us to identify and manage both risks and opportunities, helping us ensure the resilience of our portfolio. The quantitative scenario analysis work has reinforced significantly this approach, forming a key input into our strategic planning processes.

Our operations are exposed to changes in weather variability and the need to comply with changes in the regulatory environment aimed at reducing the effect of climate change. Various regulatory measures aimed at reducing greenhouse gas emissions and improving energy efficiency may affect the Group's operations and customer demand for its products over time. Policy developments at an international, regional, national and sub-national level may have implications on profitability. Potential impacts from extreme weather and climate change for Group assets depend on the vulnerability and risk management at individual sites. We have further noted the increase in climate change related litigation and, while we are not party to any such litigation, we continue to monitor this.

Two key processes guide how we manage climatechange risks: the Operational Risk Management (ORM) programme for operations, and the Investment Development Model (IDM) for projects.

The ORM guides operations on how to assess risk at each level of activity, with tools to help identify priority unwanted events and the controls we need to put in place and monitor to prevent those events. By way of example, an increased frequency in extreme rainfall events will require changes in monitoring, infrastructure design and emergency preparedness.

The IDM process and evaluation criteria ensure that climate-change risks and opportunities are embedded in the investment design, including the consideration for alternative low carbon energy sourcing and the adaptation required for extreme weather and long-term climate change.

Anglo American's specialist business assurance services are responsible for the overall monitoring and assurance of the risk-management process.

## CONCLUSION

Climate change presents a fundamental challenge in the coming decades. As we live up to our purpose to re-imagine mining to improve peoples' lives it is incumbent upon us to be part of the solution.

That means demonstrating that climate change is fully integrated into our strategic planning processes, that we are financially resilient to a range of climate scenarios and that our operations are resilient to the likelihood of extreme weather events. It also means ensuring our host communities are resilient to the physical risks, using our role as a trusted corporate leader to take the action we can, and advocating for Governments and others around the world to tackle climate change and limit global warming.

## ANNEX

### Governance

Disclose the organisations governance around climate-related risks and opportunities.

a) Describe the board's oversight of climate-related risks and opportunities	Climate change: Our plans, policies and progress (2017), pages 6-7
	Climate change, Integrated Annual Report 2018, pages 83 and 90
<ul> <li>b) Describe management's role in assessing and managing c related risks and opportunities</li> </ul>	imate- Climate change: Our plans, policies and progress (2017), page 7 Our Material Matters, Integrated Annual Report 2018, page 17

### Strategy

Disclose actual and potential impacts of climate-related risks and opportunities on the organisation's business, strategy and financial planning where such information is material.

a)	Describe the climate-related risks and opportunities the organisation has identified over the short, medium and long term	CDP Climate Response 2018, question C2 Risks and opportunities
b)	Describe the impact of climate-related risks and opportunities on the organisation's businesses, strategy and financial planning.	Climate change: Our plans, policies and progress (2019), page 20 CDP Climate Response 2018, question C2 Risks and opportunities
	Describe the resilience of the organisation's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario	Climate change: Our plans, policies and progress (2019), pages 16 & 17

### **Risk Management**

Disclose how the organisation identifies, assesses, and manages climate-related risks.

a)	<ul> <li>a) Describe the organisation's processes for identifying and assessing climate-related risks.</li> </ul>	Climate change: Our plans, policies and progress, pages 4 and 7	
		CDP Climate Response 2018, questions CC2.2b, processes for identifying and assessing climate-related risks	
b)	Describe the organisation's processes for managing climate-related risks.	CDP Climate Response 2018, questions CC2.1, CC2.2, CC2.5 and CC2.6	
c)	Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organisation's overall risk management.	Climate change: Our plans, policies and progress (2017), page 7	
		CDP Climate Response 2018, questions CC2.1, CC2.2, CC2.5 and CC2.6	

### **Metrics and Targets**

Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material

a)	Disclose the metrics used by the organisation to assess climate- related risks and opportunities in line with its strategy and risk management process.	CDP Climate Response 2018, questions CC2.2b, CC2.3a and C11.3a
b)	Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.	CDP Climate Response 2018, questions CC2.2b, CC2.3a and C11.3a
c)	Describe the targets used by the organisation to manage climate- related risks and opportunities and performances against targets.	CDP Climate Response 2018, questions CC2.2b, CC2.3a and C11.3a

Figure 13: Reference to prior positions in line with TCFD recommendations

![](_page_25_Picture_0.jpeg)

## FORWARD-LOOKING STATEMENTS

This document includes forward-looking statements. All statements other than statements of historical facts included in this document, including, without limitation, those regarding Anglo American's financial position, business, acquisition and divestment strategy, dividend policy, plans and objectives of management for future operations (including development plans and objectives relating to Anglo American's products, production forecasts and reserves and resources positions), are forward-looking statements.

By their nature, such forward-looking statements involve known and unknown risks, uncertainties and other factors which may cause the actual results, performance or achievements of Anglo American, or industry results, to be materially different from any future results, performance or achievements expressed or implied by such forward-looking statements. Such forwardlooking statements are based on numerous assumptions regarding Anglo American's present and future business strategies and the environment in which Anglo American will operate in the future.

Important factors that could cause Anglo American's actual results, performance or achievements to differ materially from those in the forward-looking statements include, among others, levels of actual production during any period, levels of global demand and commodity market prices, mineral resource exploration and development capabilities, recovery rates and other operational capabilities, the availability of mining and processing equipment, the ability to produce and transport products profitably, the availability of transportation infrastructure, the impact of foreign currency be placed on forward-looking statements. These forward-looking statements speak only as of the date of this document.

Anglo American expressly disclaims any obligation or undertaking (except as required by applicable law, the City Code on Takeovers and Mergers (the "Takeover Code"), the UK Listing Rules, the Disclosure and Transparency Rules of the Financial Conduct Authority, the Listings Requirements of the securities exchange of the JSE Limited in South Africa, the SIX Swiss Exchange, the Botswana Stock Exchange and the Namibian Stock Exchange and any other applicable regulations) to release publicly any updates or revisions to any forwardlooking statement contained herein to reflect any change in Anglo American's expectations with regard thereto or any change in events, conditions or circumstances on which any such statement is based.

### MARKET AND INDUSTRY DATA

In this document, market data and industry data and forecasts were obtained and reproduced from reports prepared by amongst others, the International Energy Agency ("IEA"). Industry surveys, publications, consultant surveys and forecasts generally state that the information contained therein has been obtained from sources believed to be reliable, but that the accuracy and completeness of such information is not guaranteed. We have not independently verified any of the data from third party sources, nor have we ascertained the underlying economic assumptions relied upon therein. Similarly, industry forecasts and market research, which we believe to be reliable based upon the Group management's knowledge of the industry, have not been independently verified. Forecasts are particularly likely to be inaccurate, especially over long periods of time. In addition, we do not necessarily know what assumptions regarding general economic growth were used in preparing the forecasts we cite. We do not make any representation as to the accuracy of data from third party sources, industry forecasts and market research and we expressly disclaim any responsibility for, or liability in respect of, such third party information. We do not guarantee the accuracy or completeness of any such industry data contained in this document.

Anglo American plc 20 Carlton House Terrace, London, SW1Y 5AN, England

Tel +44 (0)20 7968 8888 Fax +44 (0)20 7968 8500

Registered number 3564138 www.angloamerican.com