

# Our approach to climate change

2019

Electric vehicles use steel from iron ore, aluminium in design and to reduce weight, and 3 - 4 times more copper than traditional cars.

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At Rio Tinto, we produce materials essential to human progress. We aim to do this in a sustainable way and be part of the solution to help address the climate change challenge.

46%  
reduction in absolute emissions since 2008

76%  
of the electricity we use is from renewable sources

29%  
reduction in emissions intensity since 2008

\$1 billion  
approximate spend on climate-related projects

**Cautionary statement about forward-looking statements**  
This document contains certain forward-looking statements, including statements relating to the operations and business of the Rio Tinto Group. These statements are forward-looking statements within the meaning of Section 27A of the US Securities Act of 1933, and Section 21E of the US Securities Exchange Act of 1934. The words “intend”, “aim”, “project”, “anticipate”, “estimate”, “plan”, “believes”, “expects”, “may”, “should”, “will”, “target”, “set to” or similar expressions, commonly identify such forward-looking statements. Examples of forward-looking statements in this report include those regarding demand for commodities, plans and objectives of the Group, potential future opportunities for the Group and projections for reduced energy use in certain activities of the Group. Forward-looking statements involve known and unknown risks, uncertainties, assumptions and other factors set forth in this document that are beyond the Group’s control. In light of these risks, uncertainties and assumptions, actual results could be materially different from projected future results expressed or implied by these forward-looking statements which speak only as to the date of this report. Except as required by applicable regulations or by law, the Group does not undertake any obligation to publicly update or revise any forward-looking statements.

# Our purpose is to produce materials essential to human progress.



**Materials such as aluminium used in electric vehicles, copper used to build wind turbines and iron ore used to create critical infrastructure.**

As the world needs more materials and energy to prosper and provide people with a better quality of life, it also needs materials that have been produced in both an economic and sustainable way, with fewer emissions and with respect for communities. We recognise both the challenge and opportunity in this and want to be part of the solution.

Our goal is to play an active role in finding climate solutions and we will do this through partnerships. Everyone, from customers to suppliers, from communities to governments, and from civil society organisations to business, needs to play a part. This is why we are looking to collaborate with partners across the value chain. We do not have all the answers yet but I believe we are asking the right questions, especially of ourselves: what more can we do to contribute to climate action across our entire business ecosystem as we provide the essential materials used to deliver human progress?

**The way we run the business**

Recognising and responding to the impact of climate change on our business and society is not new to us. Climate risks and opportunities have formed part of our strategic thinking and investment decisions for over two decades. We now have a portfolio well positioned for the transition to a low-carbon economy and we are the only major diversified company in the industry not involved in fossil fuel extraction. This means we are uniquely positioned but we, like many other businesses, still face significant challenges in meeting our climate change ambition and delivering tangible outcomes.

**Our low-carbon ambition and targets**

This year, we have set a new ambition to reach net zero emissions by 2050 across our operations. There is absolutely no doubt we will face many challenges in achieving this ambition and it is true to say we do not have a clear pathway to get there today. We will focus on reducing emissions across our operations, as we partner with others to develop new technology solutions and look for ways to improve the quality of our products, to name but three key actions.

In 2019, we looked at our operations in detail to explore emission reduction opportunities for each and develop marginal abatement cost curves. This comprehensive work informed our 2030 targets which are to reduce our emissions intensity by 30% and our absolute emissions by 15%. We believe these targets are stretching but achievable. We will, of course, strive to do more.

Overall, our growth between now and 2030 will be carbon neutral.

We have also strengthened the link between executive remuneration and our climate targets.

**Our strategy is consistent with the Paris goals**

To achieve our ambition, we will continue to pursue our strategy which is consistent with the climate goals of the Paris Agreement. We will take action in four areas:

- 1. Produce materials essential for a low-carbon future
- 2. Reduce the carbon footprint of our operations
- 3. Partner to reduce the carbon footprint across our value chain
- 4. Enhance our resilience to physical climate risks

We are committed to transparent reporting of our performance against each of these areas and this, our second climate change report, shares our progress.

**Our performance and collective action**

Let me close with a short summary of our performance. Since 2008, we have reduced the absolute emissions from our managed operations by 46% (18% when excluding divestments) and have reduced our emissions intensity by 29%.

Today, 76% of our electricity consumption at our managed operations is from renewable energy, compared with 26% of global electricity production. Most of our operations now have significantly lower carbon intensities than sector averages. And we continue to improve our understanding and management of physical risk exposures.

For me, a highlight of our performance over the years has been our ability to partner with others, including customers, governments, research and academic institutions and communities, to further mutual climate and environmental goals. In September 2019 we launched a pioneering initiative in the steel industry: we are partnering with China Baowu Steel Group and Tsinghua University to develop solutions to help address the steel industry's carbon footprint and improve its environmental performance. We aim to replicate this approach across all our key value chains, as we have in aluminium. We will share the goals and objectives of these partnerships as they develop.

**“We plan to invest around \$1 billion over five years in emissions reduction projects”**

**A challenge and opportunity for us all**

At Rio Tinto we know the best way to deliver our purpose to pioneer human progress is to run a safe, profitable and responsible business. This means we protect and care for our employees, communities and the environment while striving to generate long-term, sustainable profits that enable us to invest in the future. This is at the heart of our approach to sustainability, including climate change.

For us it is about setting a long-term ambition, and establishing stretching but achievable targets, while always striving to do better. Climate change is a global challenge and will require action across nations, across industries, and by society at large. We are fully committed to meeting that challenge.

**J-S Jacques**  
Chief executive

# A commitment to sharing our thinking and performance

We acknowledge the reality of climate change and accept that it is largely caused by human activities. Without decisive action to curb greenhouse gas (GHG) emissions, climate change has the potential to severely impact our business, our communities and the world. Indeed, we are already experiencing some of these negative impacts from extreme weather events.

We believe that feasible pathways exist to develop a successful low-carbon economy, and as producers of the materials vital to this transition, we want to be part of the solution.

In 2015, we supported the outcomes of the Paris Agreement and the long-term goal to limit global average temperature rise to well below 2°C. We note the 2018 special report by the Intergovernmental Panel on Climate Change (IPCC) on the impacts of a 1.5°C warming scenario, which reinforces the need for urgent action to address the threat of climate change and meet sustainable development goals.

We also recognise that there will be winners and losers from the transition to a low-carbon economy. To be acceptable to society as a whole, any transition must include the continued provision of secure, affordable energy.

We recognise business, government and society all have a role to play to address the challenges and opportunities of climate change. Governments have an important role in overseeing the system-wide response.

This is our second report on climate change which has been guided by the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). We are moving along the ‘implementation path’ the TCFD describes and this report covers our ambition and targets, strategy and approach, scenarios, risk management and governance, and performance.

We will continue to seek feedback from our investors and other users of this report to enhance our disclosure in the future. Please visit us at [riotinto.com](http://riotinto.com) if you would like to know more about our approach to sustainability, including environment and climate change.

# Our approach to sustainability and climate change

Rio Tinto produces materials essential to human progress. Our activities contribute to economic growth and social development around the world, and our products touch almost every aspect of daily life. Our aim is to generate long-term sustainable profits that enable us to invest in the future, safeguard the environment and to meet our responsibilities to our customers, employees, suppliers, host communities and governments.

We want to be a safe and profitable business, a responsible company and a great employer and partner. Our approach to sustainability is detailed in the framework below, and core to this is our care for the environment. This includes how we manage land, water, air and of course, climate change.

## Our sustainability framework

### Running a safe, responsible and profitable business

The foundation of our approach is to run a safe, responsible, sustainable and profitable business.

### Collaborating to enable long-term economic benefits

We collaborate with others to enable long-term benefits where we operate – working with governments at all levels and community partners to help make a difference in people’s lives.

### Pioneering materials for human progress

We are helping to pioneer a more sustainable future – through examining our own global carbon footprint, forming smart partnerships and producing materials that contribute to a low-carbon economy.

## Our approach to the United Nations’ Sustainable Development Goals (SDGs)

We continue to examine our approach to the UN SDGs in line with our integrated sustainability strategy.



Image: QIT Madagascar Minerals

# The impacts of climate change on our business

Today, 76% of the electricity consumption at our managed operations is from renewable sources. We still have operations that are highly energy-intensive and produce significant GHG emissions. The transition to a low-carbon economy will therefore have a material impact on our long-term strategy and operations. A comprehensive assessment of the full range of impacts is challenging, since it must consider the interplay of technical, social and political factors over a long period of time. We therefore incorporate climate change considerations into our strategic planning, scenario analysis and commercial frameworks, to make sure that risks and opportunities can be comprehensively addressed. We have tested the resilience of our investments against a carbon price since 1998.

We consider the impact of climate change over the short-, medium- and long-term horizons. The key uncertainties are changes in the regulatory response and the speed of development and adoption of new technologies.

- 1. **Short term (1 year):** this is the timeframe for our annual financial planning
- 2. **Medium term (2-10 years):** our annual strategic planning cycle looks ten years ahead
- 3. **Long-term (beyond 10 years):** this is the timeframe for our long term outlook and scenario planning

## Our approach to climate scenarios and carbon prices

Our Group strategy is developed from an understanding of the megatrends affecting the world and our industry. We are facing a new era of complexity, which will be shaped over the next decade by the interplay between three global dimensions: geopolitics, society and technology. We use scenario analysis to explore the uncertainty and complexity they bring, and assess the resulting threats to, and opportunities for, our business.

The transition to a low-carbon economy is critically important to our long-term strategy and operations. Over the past year we have moved away from using standalone climate change scenarios and have instead fully integrated climate change considerations into the scenarios we use as part of our Group

strategy process. We also continue to refer to the International Energy Agency Sustainable Development Scenario (IEA SDS) to test the resilience of our business against an independent and externally recognised pathway to a well below 2°C outcome, aligned with the goals of the Paris Agreement.

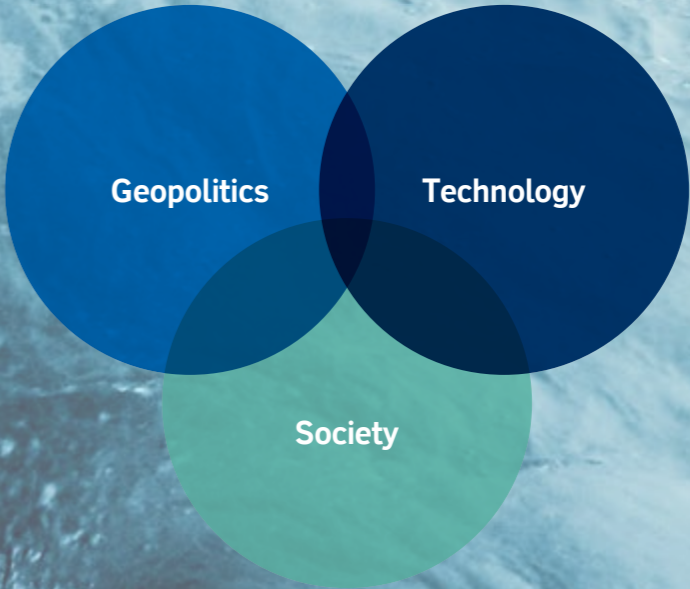
In 2019, global emissions rose by 0.6% to a record high of 36.8 billion tonnes of CO<sub>2</sub> (excluding land use change, source: CICERO). PwC's Low Carbon Economy Index suggests that, after modest improvement since 2014, progress in reducing the carbon intensity of the global economy has stalled. Despite significant increases in renewable energy and rising societal concerns about the impacts of climate change, the gap between the Paris Agreement goal and the world's current pathway continues to grow.

## Our internal use of carbon prices

One of the ways we respond to transition risks – such as the potential impact of climate change policies on our business – is through the use of an internal price on carbon.

We have distinct price forecasts for the regions and main markets in which we operate and sell our products. The carbon price assumptions used in our central case valuations rise over time and are higher than our previously used carbon price forecasts. Our approach enables us to test the future carbon costs of our businesses and investment proposals against alternative scenarios.

We use three global dimensions to develop our Group strategy scenario framework and these result in a range of possible climate change outcomes which we include in our planning.



- Political, economic and technological fragmentation
- Changing nature of US-China relationship
- Lack of global and regional coordination
- >3°C

Since the middle of the 20th century, the dynamics of geopolitics have been defined by globalisation. It has been a dominant force for human progress. China's rapid development is the culmination of this effort and is unprecedented in history in terms of scale and speed. This process of globalisation has faced new challenges in recent years, including a significant shift in the relationship between the United States and China.

In this scenario, political fragmentation, nationalism and populism provide headwinds to both the coordination of global policies and investment in new technologies. In scenarios built around those themes, global challenges such as climate change are not proactively managed, global emissions remain high and global warming reaches well above 3°C by 2100.

- Strong domestic, regional and global collaboration
- Coordinated carbon policies
- Rapidly rising and converging carbon prices
- <2°C

This scenario assumes that sustainability, including climate change, continues to rise up the international agenda. At its core, it assumes a drive towards international collaboration and inclusive growth to reduce social inequalities.

A high level of collaboration between governments, business and consumers is essential for scenarios articulating rapid low-carbon transitions – led by strong domestic and global climate policy frameworks – to keep global warming below 2°C. Such scenarios assume carbon prices reaching up to \$120 / tCO<sub>2</sub>e by 2040 in developed countries, with developing countries catching up over time, and that emissions peak in the mid-2020s, reaching net zero by around 2070. According to the World Bank, carbon pricing initiatives only cover approximately 15% of global emissions today. In about half of them, the price is less than \$10 / tCO<sub>2</sub>e, which does not provide an adequate incentive for rapid adoption of low-carbon technologies.

(World Bank, State and Trends of Carbon Pricing 2019)

- Fast-paced technology development, dispersion and execution
- Low-cost low-carbon solutions
- Slower adoption due to lack of strong GHG emissions policies
- >2°C

This scenario assumes that the transition to the fourth stage of industrialisation continues, defined by a step change in digital connectivity and intelligent systems, supported by advanced analytics and artificial intelligence. The transition is transformative in some sectors, but also creates major disruptions.

Opportunities emerge from the continued drop in the cost of low-carbon technologies. Scenarios built around a fast pace of technology change show global emissions peaking and then falling, even without strong and coordinated carbon policies. However, this is likely to take place over a longer timeframe, and therefore result in warming of more than 2°C by 2100.

The International Energy Agency Sustainable Development Scenario (IEA SDS) and pathways to 1.5°C

The IEA designed the SDS scenario as a plausible path for the global energy system that is fully aligned with the goals of the Paris Agreement, while also meeting universal energy access and cleaner air objectives. This scenario combines society and technology dimensions, to drive early adoption of multiple clean energy solutions and an immediate peak in global CO<sub>2</sub> emissions, followed by an average decline of 3.8% per year through to 2050. The SDS scenario is designed to be consistent with limiting global warming to below 1.8°C with a 66% probability, without reliance on global net-negative emissions in the longer term.

In light of the IPCC special report on the impacts of a 1.5°C warming scenario, the IEA has further expanded its thinking and, in its latest World Energy Outlook (November 2019), considers trajectories to limit global warming to 1.5°C. In this assessment, the IEA considers that the modelled pathway of the SDS scenario to 2050 would be consistent with a 1.5°C outcome, with a 50% probability if emissions were to reach net-zero by 2070 and turn negative beyond that point. This would likely require the use of bioenergy, along with carbon capture and storage (CCS) technologies in the second half of the century.

The strength of our portfolio in the low-carbon transition

Our 2018 climate change report presented a high-level summary of potential impacts for our portfolio under the IEA SDS scenario. Our methodology here is unchanged, with some small refinements to the approach and assumptions used to consider implications for the demand, industry structure and prices of our key commodities.

Our analysis continues to show that our business is robust in the transition to a low-carbon economy. The diversity of our commodity portfolio enhances the resilience of our business as climate change policies are implemented. We also expect to see structural changes across our value chains as consumers demand greener products. The potential downsides to iron ore revenues from a greater use of scrap across the steel value chain are expected to be offset by upsides for aluminium and copper – which are both essential for the electrification of the global energy system, including electric vehicles, and the deployment of low-carbon power solutions such as solar and wind.





Higher carbon prices may lift our operating cost base across the business, given our current carbon footprint and decarbonisation trajectory. However, higher carbon prices would also incentivise new abatement options, which would mitigate the longer-term cost impact on our business.

Importantly, the competitive position of our assets, both on industry cash cost and carbon intensity curves, is expected to protect the margins of our assets, even for commodities such as iron ore where we may face a negative impact on demand and price. In the case of aluminium, the attractiveness of our hydro-based assets is expected to increase relative to coal-based smelters, which would face increased carbon costs that may result in higher aluminium prices.

The impacts on our business will depend on the pace of the transition but we expect to remain profitable. We also believe that we have the financial and human capacity to manage the impact of the transition to a low-carbon economy.

The table on the following page provides a high-level summary of our portfolio resilience analysis under the IEA SDS scenario.

Portfolio resilience analysis (IEA SDS scenario)

2019 business metrics	Commodity impact	Business impact	Overall
<strong>Iron ore</strong> <ul style="list-style-type: none"><li>\$17.0bn underlying EBITDA (2019) (includes Pilbara and Iron Ore Canada)</li></ul>	<ul style="list-style-type: none"><li>Little change to underlying steel demand as not easily substitutable</li><li>Increased use of scrap in steel making process over medium-term, especially in China, displacing some iron ore</li><li>Wider iron ore product price differentials in favour of higher-grade products</li><li>Longer-term implications from development and deployment of new low-carbon steelmaking technologies</li></ul>	<ul style="list-style-type: none"><li>Moderate negative impact on margin but remains a high-margin business positioned, at the bottom of a still steep industry cost curve</li><li>Scope to accelerate decarbonisation of an already low-carbon intensity business</li><li>Resilience from limited exposure to low-grade iron ore and opportunities for Pilbara lump and hydro-based Iron Ore Company of Canada pellets</li></ul>	
<strong>Aluminium</strong> <ul style="list-style-type: none"><li>\$2.3bn underlying EBITDA (2019)</li></ul>	<ul style="list-style-type: none"><li>Demand supported by light weighting benefits in some applications, potentially offset by some substitution</li><li>Moderate increased use of scrap, but from an already relatively high base</li><li>Steeper industry cost curve with increased carbon costs for coal-fired smelters and projects in China, supporting higher prices</li></ul>	<ul style="list-style-type: none"><li>Increased attractiveness of hydro-based Canadian smelters, further consolidating position at bottom of industry cost curve</li><li>Opportunity to be leading provider of aluminium with zero-carbon smelting through ELYSIS™</li><li>Pressure to accelerate repowering of coal-based smelters in Australia</li><li>Increased carbon costs for our alumina business</li></ul>	
<strong>Copper</strong> <ul style="list-style-type: none"><li>\$1.9bn underlying EBITDA (2019) (includes 100% of evaluation projects and other costs for Copper &amp; Diamonds Product Group)</li></ul>	<ul style="list-style-type: none"><li>Demand supported by faster electrification</li><li>High copper intensity of low-carbon technologies<ul style="list-style-type: none"><li>Three to six times more copper used in each MW of solar and wind, compared to coal and gas</li><li>Three to four times more copper used in electric vehicle, compared to combustion engine car</li></ul></li><li>Higher prices required for industry to match supply with demand</li></ul>	<ul style="list-style-type: none"><li>Increased attractiveness of the overall copper sector</li><li>Opportunities to further improve low-carbon intensity of our copper business and develop new carbon-neutral mines</li><li>Pressure to develop low-carbon power options for our Oyu Tolgoi operations in Mongolia</li></ul>	
<strong>Minerals</strong> <ul style="list-style-type: none"><li>\$0.8bn underlying EBITDA (2019) (TiO<sub>2</sub> and Borates)</li></ul>	<ul style="list-style-type: none"><li>Stronger demand for battery minerals including high-purity nickel, lithium and cobalt</li><li>Little change to underlying TiO<sub>2</sub> pigment demand and limited scope for recycling</li></ul>	<ul style="list-style-type: none"><li>Opportunity to enter the lithium market through the Jadar project in Serbia</li><li>Opportunity to acquire battery minerals businesses through Rio Tinto Ventures</li><li>Pressure to develop low-carbon power options for Richards Bay Minerals in South Africa</li></ul>	

# Climate change governance and risk management

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The Board met seven times in 2019 and covered climate change on five separate occasions. At the two strategy meetings (in April and September 2019), the Board discussed the Group's long-term climate change ambition and options for operational emissions targets, having considered different abatement options and offsets. In November 2019, the Board further considered and agreed in principle the Group's long-term climate change ambition, 2030 emissions targets and the financing of our climate change initiatives.

Climate change is a topic of on-going discussion and analysis at the most senior levels of management and by the Board. The Board approves our climate policy and sets the Group's ambition and emissions targets. The Sustainability Committee of the Board is responsible for monitoring performance against the targets and ensuring operational-level resilience. The Sustainability Committee also has oversight of key sustainability risk areas that may be related to climate change, such as biodiversity and water, including the effectiveness of associated controls.

The Board also discussed industry association memberships and approved the disclosure of our review of associations' climate policy positions. In addition, members of our Board have participated in numerous discussions focusing on climate change with civil society organisations and investors.

## Strengthening the link between executive remuneration and our climate targets

Our Chief executive's performance objectives are reflected in his Short Term Incentive Plan, which includes delivery of the Group's strategy on climate consistent with the new 2030 targets. These are cascaded down into the annual objectives of relevant members of the Executive Committee and other members of senior management.

Our climate change strategy is embedded in our business strategy, and aligned with our overall approach to sustainability. Climate risks and opportunities have formed part of our strategic thinking and investment decisions for over two decades, and we now have a portfolio that is well positioned for the transition to a low-carbon economy. Some 76% of the power consumption at our managed operations already comes from renewable energy and we are the only major diversified mining company not involved in fossil fuel extraction.

See page 29 for our climate resilience analysis

## The Board sets the Group's ambition and emissions targets

Responsibility for identifying, evaluating and managing the risks associated with climate change lies with all our employees and business leaders, operating within a Group-wide risk management framework and approved limits. Our risk framework lays out a three lines of defence approach to managing risks and controls:

- **First line:** employees and business leaders own risks.
- **Second line:** our central support functions and Risk Management Committee oversee our risk framework and internal control systems.
- **Third line:** Group Internal Audit assures our internal control systems.

Rio Tinto has an enterprise-wide risk management information system where all material risks and actions, including those related to climate change, are documented and kept current for managing and reporting purposes. Our Critical Risk Assessment process is firmly founded in site-specific exposures, including those related to climate change such as wildfires, cyclones, floods, and landslides at a more regional level.

# Performance against our strategic climate change priorities

Our climate change strategy is focused on four areas



## Moving from strategy to execution

Our work on climate change involves the contribution and alignment of many parts of our business. One of our most important decisions was to move responsibility for the climate change strategy to the Corporate Strategy team, which puts the issue at the heart of our business strategy. In September, we established our Energy & Climate Change Centre of Excellence which sits within our Growth & Innovation group. It will coordinate and drive the execution of our energy and greenhouse gas reductions through our climate change network by:

- Supporting the transfer of best practices in the execution of our energy and climate change strategy across the Group.
- Tracking the progress of our emissions reductions and abatement project pipeline so that we meet our targets and ambition of net zero emissions by 2050.
- Linking operations to viable technology solutions and partners, and promoting the development of technologies that currently do not exist by partnering with external technology developers, suppliers and customers.
- Evaluating the potential use of offsets.

1

# Producing materials essential for a low-carbon future

From Australia to the Arctic Circle, from mine to market, we produce the materials used by our customers and their customers around the world to make the things that society uses every day. The materials we produce, from infinitely recyclable aluminium to copper used in electrification to our high-grade iron ore product used to build machinery, bridges, railways and buildings, all play a part in the transition to a low-carbon economy.

**We believe there are three elements relevant to our industry to consider in the transition:**

- 1. a shift away from fossil fuels and focus on higher energy efficiencies and energy storage;
- 2. increased electrification of transportation, industrial processes and domestic heating; and
- 3. increased material re-use and recycling in the circular economy

## Each of the products we produce will play a role

### Fe

**Iron ore** is used in steel, the fundamental building block of industry and infrastructure. Our higher-grade ores contribute to reducing GHG and other air emissions in China and elsewhere.

### Al

**Aluminium** is light, strong, conductive, flexible, corrosion-resistant and infinitely recyclable. Our clean, hydro-powered aluminium business in Québec, Canada supplies customers in the food, consumer goods and car industry with sustainable materials that reduce the carbon content of their products.

### Cu

**Copper** is the primary conductor in the world's electrical infrastructure contributing to electrification of transportation and smart technologies. For example, electric vehicles use three to four times more copper than traditional internal combustion engine cars.

### B

**Borates** are a vital ingredient of energy-efficient building materials and are in fertilisers which help feed the world's growing population.

### TiO<sub>2</sub>

Our **titanium dioxide** business is working on the development of low-cost metal powders for 3D printing to replace cast metal, thereby reducing energy consumption and waste in the aerospace industry and elsewhere.

### Li

We are also evaluating a world class **lithium** business which will provide a vital material for electric vehicles and battery storage, supporting renewable energy. Our Ventures team is also exploring additional partnerships and investment opportunities into other **battery minerals** critical for a low-carbon economy.

# 2 Reducing the carbon footprint of our operations

## Pathways to long-term decarbonisation

In 2019, we completed an asset-by-asset analysis of mitigation options to inform our 2030 targets and long-term decarbonisation pathways. Our Energy and Climate Change Centre of Excellence worked with our product groups to identify potential emissions reductions opportunities across our asset portfolio. We assessed around 60 projects in detail and developed marginal abatement cost curves (MACC). In doing so, we have captured a wide range of knowledge and expertise which sets us up well to explore opportunities to reduce emissions through technology application and other means, now and in the future.

### Iron ore

Emissions from our iron ore business in the Pilbara are mostly related to the natural gas used to power our system of mines and processing plants, and from the diesel consumed by our mobile fleet and rail network operations. In the medium term, our abatement opportunities come from the deployment of renewable power projects. We have a range of solar and wind solutions – supported by large-scale storage batteries – under investment proposal and planned for near-term execution.

Developing low-carbon solutions for our mobile fleet and rail is more challenging. This could be addressed in the longer term by electrifying mining equipment and progressively shifting to zero-carbon mobile fleets (whether electric or hydrogen-fuelled) including both trucks and rail. However, the low-carbon alternatives are not yet commercially and technically viable, so it will be essential for us to work in partnerships with vehicle manufacturers and others in the mining sector.

### Copper

Electricity and diesel for mobile equipment are also the main sources of emissions in our copper business. At our Kennecott copper operations in the US, we have shut down our coal power plant and purchased renewable energy certificates. This reduces the operations’ annual carbon footprint by 65% – or the equivalent of more than a million tonnes of carbon dioxide – by sourcing lower-carbon electricity in the open market. Escondida, our joint venture copper mine in Chile, has announced renewable power contracts which will replace coal-fired power generation from 2021, with the mine supplied by 100% renewable energy sources from the mid-2020s.

The Oyu Tolgoi copper and gold mine in Mongolia is currently supplied by coal-fired power and developing low-cost, low-carbon solutions will be more challenging and require negotiations with multiple stakeholders, including suppliers and governments.

### Aluminium

Our aluminium business is well positioned with a substantial proportion of electricity consumption met by hydropower. However, the Boyne and Tomago aluminium smelters in Australia are both supplied by coal-fired power generators. The development of low-carbon solutions for these assets must take into account the local economic and energy policy context.

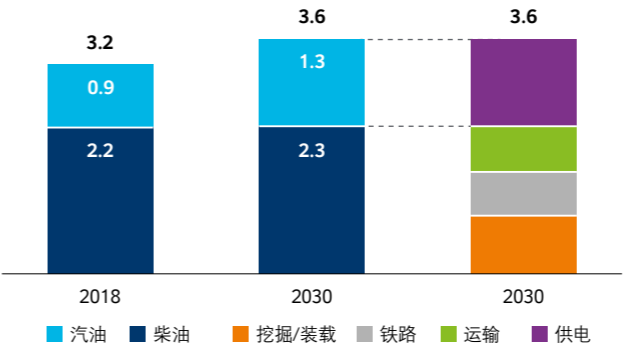
Even with 100% renewable power, the aluminium smelting process produces substantial emissions from the use and degradation of carbon anodes. The ELYSIS™ joint venture is developing inert anode technology, which has been piloted successfully and is now progressing to larger-scale development. If deployed at scale, this could reduce emissions from our aluminium smelters by over 6 million tonnes by 2050.

In the long term, our alumina business will need a low-emissions alternative to replace the coal and natural gas used in our refineries. Decarbonising industrial heat is particularly challenging. Hydrogen or renewable electricity-powered plasma technologies may play a role in this process.

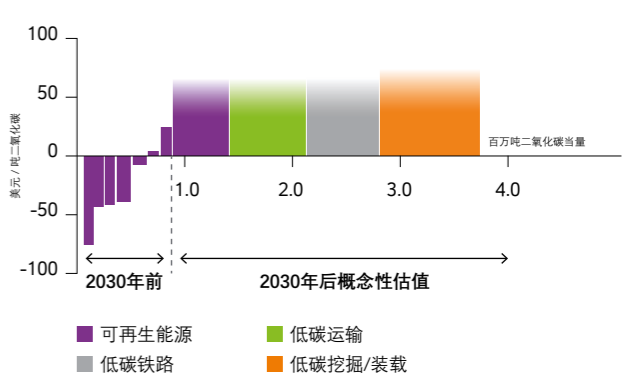
### Minerals

Similar to our aluminium operations, our titanium dioxide business sources hydropower in Canada but relies on coal-fired power at Richards Bay Minerals in South Africa, in a context where developing low-carbon solutions will also require negotiations with multiple stakeholders and a balancing of decarbonisation outcomes and local economic development priorities.

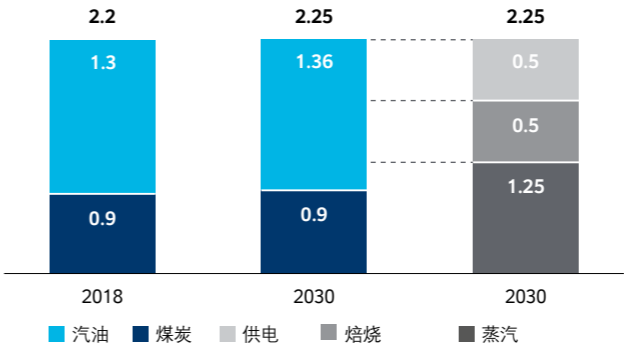
Pilbara business-as-usual emissions (Mt CO<sub>2</sub>, 100% basis)



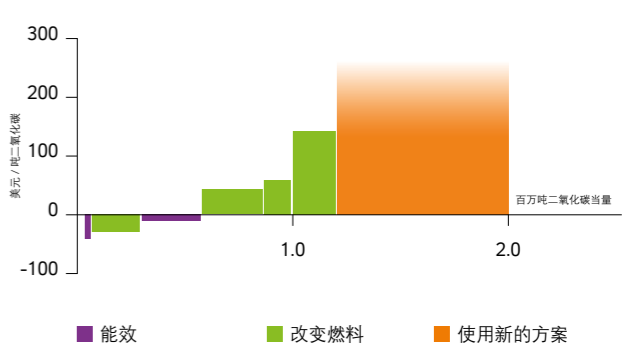
Pilbara marginal abatement cost curve (100% basis)



Yarwun business-as-usual emissions (Mt CO<sub>2</sub>, 100% basis)



Yarwun marginal abatement cost curve (100% basis)



Overall, our marginal abatement cost curves show that some emissions reduction opportunities – such as energy efficiency and renewables projects – can generate a positive return on investment, although these are typically below our usual investment thresholds. Other opportunities – such as investments in hybrid mine vehicles or plasma torches – are not readily available to deploy at scale today or would generate returns that are negative. In other words, there is currently no commercial case for investment in these types of opportunities.

Government regulation, such as carbon pricing, and other incentives is essential to encourage investment in these commercially unviable abatement options. Continued engagement with governments, customers, suppliers and technology partners is essential to develop solutions that are both technically and commercially viable.

Our 2050 ambition

This year, we have set an ambition to reach net zero emissions by 2050. There is absolutely no doubt that we will face many technical and social challenges in achieving this and we do not have a clear pathway today. All of our operational leaders and teams will focus on reducing emissions in their businesses as we partner with others to develop new technology solutions and look for ways to improve the quality of our products. We believe it is possible to achieve our ambition with coordinated government action to create the right enabling environment to incentivise investment in new technology and changes in consumer behaviour, in addition to strong and focused action by industry.

It is difficult to be precise about the long-term low-carbon transition of our business, particularly as the technical solutions are unproven and not economic in some cases. However, over the coming decades, technology will develop, regulation will change and higher carbon pricing will be implemented more widely. This will enable us to accelerate the decarbonisation of our operations. The low-carbon transition must accelerate business action, be socially inclusive and address impacts on competitiveness. In some cases, trying to reduce emissions more quickly could have the undesirable outcome of prompting plant closures and reducing employment. This would have a particularly negative impact on remote communities who often rely on mining and smelting for their livelihoods. It is therefore critical that we work with all stakeholders as we pursue the ambition of net zero by 2050.

Our 2030 targets

Based on our thorough analysis of decarbonisation pathways, our target is to reduce our emissions intensity by 30% by 2030, compared with our 2018 equity baseline (adjusted for divestments). We aim to reduce our absolute emissions by 15% (or approximately 4.8Mt CO<sub>2</sub>e) over the same timeframe. This implies a need to find carbon-neutral approaches to growth across our portfolio, which is a significant challenge as many new mining projects are in developing countries that have other national priorities, such as poverty alleviation and affordable, secure energy.

Repowering our aluminium assets and increasing the share of renewable electricity more broadly will be central to our decarbonisation strategy to 2030. In particular, we will pursue opportunities to replace natural gas with renewables to power our Pilbara operations.

We will continue to refine our analysis of emissions reduction opportunities over the short, medium and long term, and

prioritise resources and research and development to help achieve our target. We plan to invest around \$1 billion over the next five years in emissions reduction projects, research and development and enhancing the climate change resilience of our business. This compares with capital expenditure of \$5.5billion in 2019. We have identified a pipeline of GHG reduction projects that we expect to implement over the next ten years to achieve our targets. The timing and scale of these projects is dependent on a number of factors.

Projects already identified for funding in 2020 include:

- Pilbara solar and battery storage project (34MW; \$98 million)
- ELYSIS™
- Lower-carbon vehicles
- Partnership with Baowu Steel and Tsinghua University

Net zero by 2050

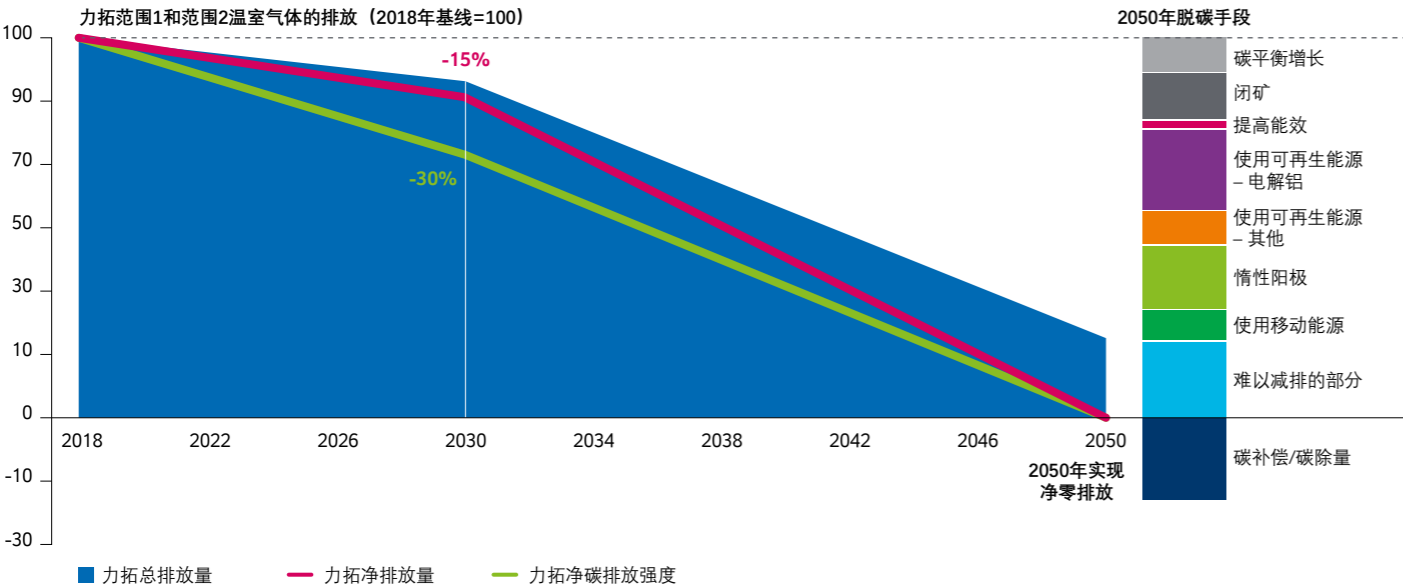
30% reduction in emissions intensity by 2030

15% reduction in absolute emissions by 2030

\$1bn estimated spend on climate-related projects over five years

Carbon-neutral growth

2050 decarbonisation pathway



Exploring the potential of investment in natural climate solutions

Given the high cost of emissions reductions for parts of our business, our long-term ambition is for our operations to be net zero emissions by 2050, rather than zero emissions. Carbon removals and offsets will therefore form part of our decarbonisation strategy. We appreciate the concerns about the integrity of forest carbon offsets. We support the mitigation hierarchy outlined by the World Business Council on Sustainable Development (WBCSD): companies should prioritise avoiding and minimising emissions before using offsets.

We would adhere to the four principles that WBCSD and Nature4Climate recommend for any investment in Natural Climate Solutions (NCS):

1. Raise ambition with respect to climate action.
2. Provide an interim solution for hard-to-abate emissions, but not a permanent one.
3. Deliver environmental and social safeguards and benefits in addition to GHG emissions reductions.
4. Apply sound and verified carbon measurement and accounting methodologies to ensure high environmental integrity of NCS credits.

From 2020, we will evaluate the potential to implement natural climate solutions at our sites as part of work to enhance the productive use of the large land areas we manage. If NCS opportunities are implemented effectively, they may also have the potential to provide wider benefits. These include ecosystem services such as water infiltration, soil health, improved biodiversity and flood buffering as well as community and social benefits.

Emissions reduction performance

The work to decarbonise our business started many years ago. Many of our operations are energy intensive and we have been taking action to improve both productivity and efficiency, as we reduce emissions. This starts with making sure we have a strong understanding of how energy in our business is used, constantly assessing low-emission technology opportunities, and building our own capability to innovate.

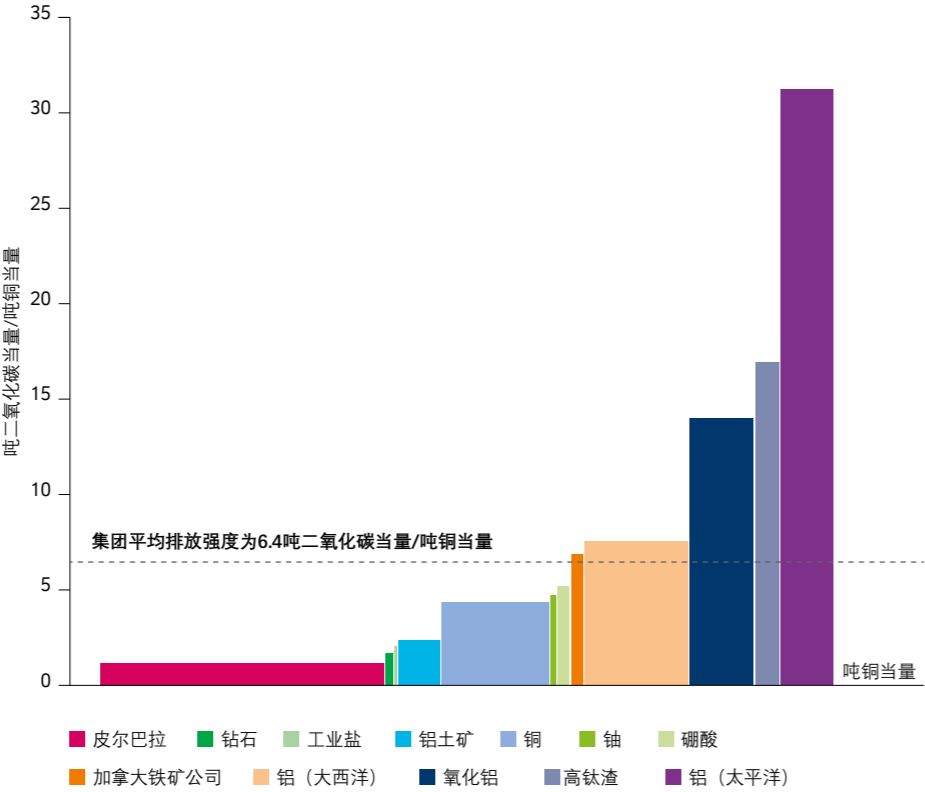
The carbon intensity of our assets varies widely across our portfolio, and largely reflects the balance between mining and processing activities. Operations with a predominant mining and logistics focus are generally situated in the lower part of the Group's carbon intensity curve. Meanwhile, alumina refining, aluminium smelting and the upgrading of titanium feedstocks are all high temperature, energy-intensive processes, pushing such assets to the right of the intensity curve and lifting the Group's average carbon intensity to 6.4tCO<sub>2</sub>e / tCu-eq.

Moving from managed to equity-based emissions reporting

We currently report the emissions from assets we manage. From 2020, our emissions reporting will be on an equity basis. This also means adding the equity share of managed joint ventures such as parts of our Pilbara operations, Boyne Smelters Limited and Oyu Tolgoi. It also includes our share of our non-managed joint ventures such as the Tomago Aluminium, Queensland Alumina Limited and Escondida copper mine. This will increase our reported emissions from 28.4Mt CO<sub>2</sub>e (managed) to 31.8Mt CO<sub>2</sub>e (equity) for the 2018 baseline used for our new targets. In future, we will adjust this emissions baseline to account for acquisitions and divestment.

2018 Scope 1 & 2 carbon intensity by assets

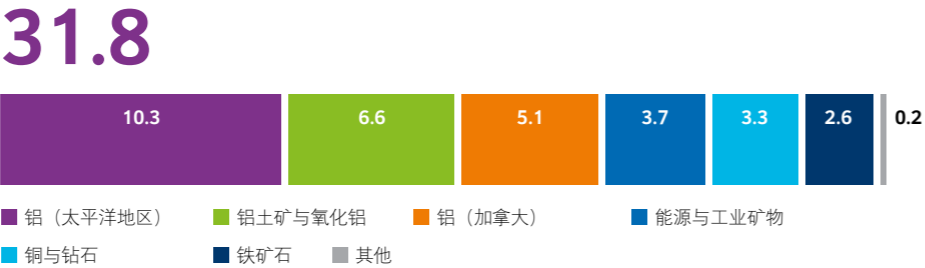
Managed and non-managed assets (equity basis)



2018 Group-wide scope 1 & 2 carbon emissions

(Mt CO<sub>2</sub>e)

New 2018 equity baseline for 2030 targets: managed and non-managed assets



In 2008, we set our first climate change target, to reduce the GHG emissions intensity of our managed operations. Our latest target called for a 24% reduction in intensity by 2020. We continued to beat that target last year, managing a 29% reduction in intensity by the end of 2019 against the 2008 baseline.

We have also reduced the absolute emissions from our managed operations to 26.4Mt CO<sub>2</sub>e in 2019, a 46% reduction since 2008, or around 18% if excluding divestments.

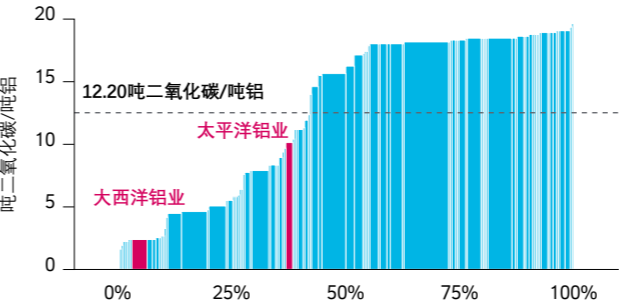
Today, 76% of our electricity consumption is already sourced from renewable energy (primarily hydro-electric power), compared with 26% of global electricity production.

So today, even our most carbon-intensive assets are favourably positioned within their respective industry contexts. Most of our assets are in the bottom half of carbon intensity curves, reflecting better energy efficiencies than their peers and a higher proportion of low-carbon energy sourcing.

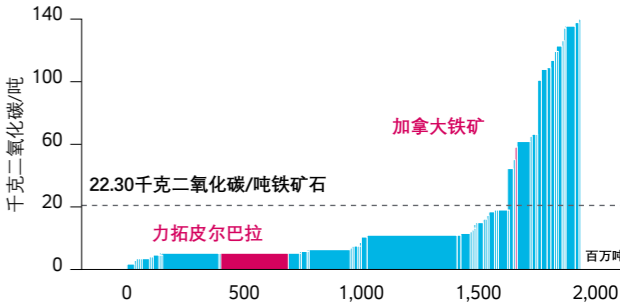
In Canada, for example, the emissions from our smelters are only 2.3tCO<sub>2</sub> per tonne of aluminium, around 80% below the industry average and close to 90% below typical coal-fired smelters in China. Our Vaudreuil alumina refinery in Québec, Canada has the lowest carbon footprint in the world today.

Carbon intensity curves of global commodity producers by sector

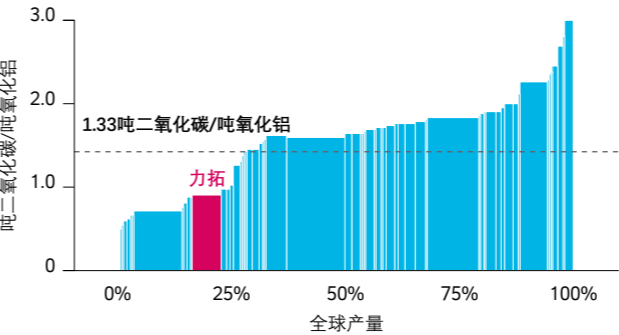
Aluminium



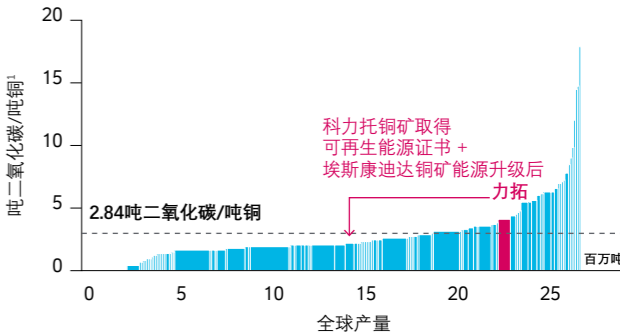
Iron Ore



Alumina



Copper



Source: CRU, Wood Mackenzie, Rio Tinto analysis  
Notes: 1. excluding emissions from smelting and refining

# 3

## Partnering to reduce the carbon footprint across our value chain

We have an important role to play in advancing climate action but we cannot do this alone. Everyone, including business, government, customers, suppliers and consumers, needs to work together. Government policy that creates the right framework for change is critical, coupled with real business action and societal shifts. We believe collaboration across countries, industries and society is key to achieving the systemic change needed to meet climate challenges.

This is why we are working with partners – including many of our customers – through the value chain to explore solutions to tackle climate change and collectively improve environmental performance; why we are involved in key climate policy discussions such as the World Bank’s carbon pricing competitiveness analysis; why we take part in climate action initiatives such as the Energy Transitions Commission and why we actively engage in industry forums.

### Climate policy advocacy

We actively engage on climate change policy with governments, industry associations, investors and civil society in the countries where we operate. We are guided by our overall policy position that supports market mechanisms including carbon pricing, as we believe this is the best way of stimulating innovation and achieving emissions reductions at least cost.

Effective climate policies should incentivise the private sector to invest in low-carbon technology, while avoiding the negative unintended consequences of transferring industrial production to countries with weaker emissions regulation. A challenge as serious as climate change requires transparency, collaboration and a shared contribution to the solution.

Greenhouse gas emissions across our value chains

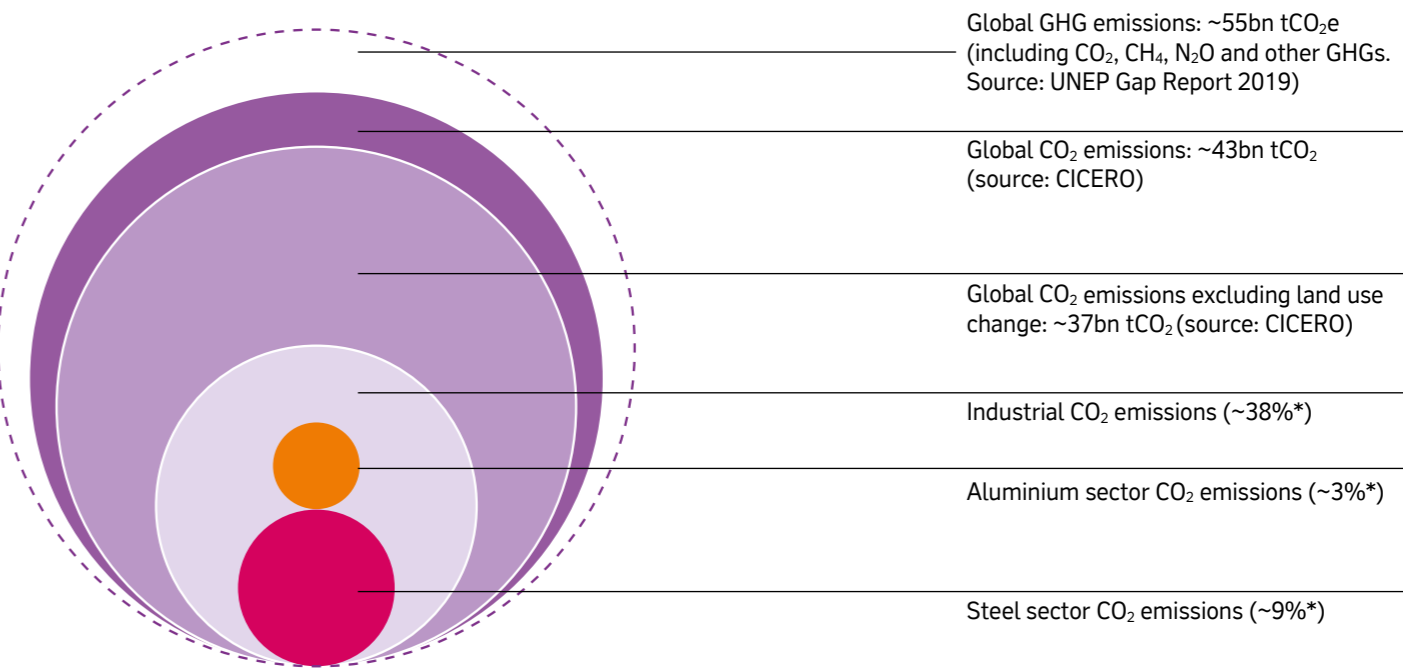
Our operational footprint of 31.8Mt CO<sub>2</sub>e represents less than 0.1% of global CO<sub>2</sub> emissions. However, we operate within value chains which have significant scale globally, from the extraction of minerals in the ground to the manufacturing and use of consumer products. These value chains include some processing steps which are highly energy and carbon intensive such as aluminium smelting or steelmaking.

Emissions from across the aluminium value chain account for less than 3% of global CO<sub>2</sub> emissions from fossil fuels and industry. Around 80% of these occur at

the smelting phase, which converts alumina into primary aluminium metal. In turn, just over a quarter of these aluminium smelting emissions come from the combustion of carbon anodes, with the rest mostly from the generation or purchase of electricity. The energy source used for that electricity, is therefore the key factor driving the carbon intensity of an aluminium smelter, which as shown previously ranges widely from around 2tCO<sub>2</sub>e / t Al for hydro-based smelters to around 17t CO<sub>2</sub>e / t Al for smelters using coal fired power.

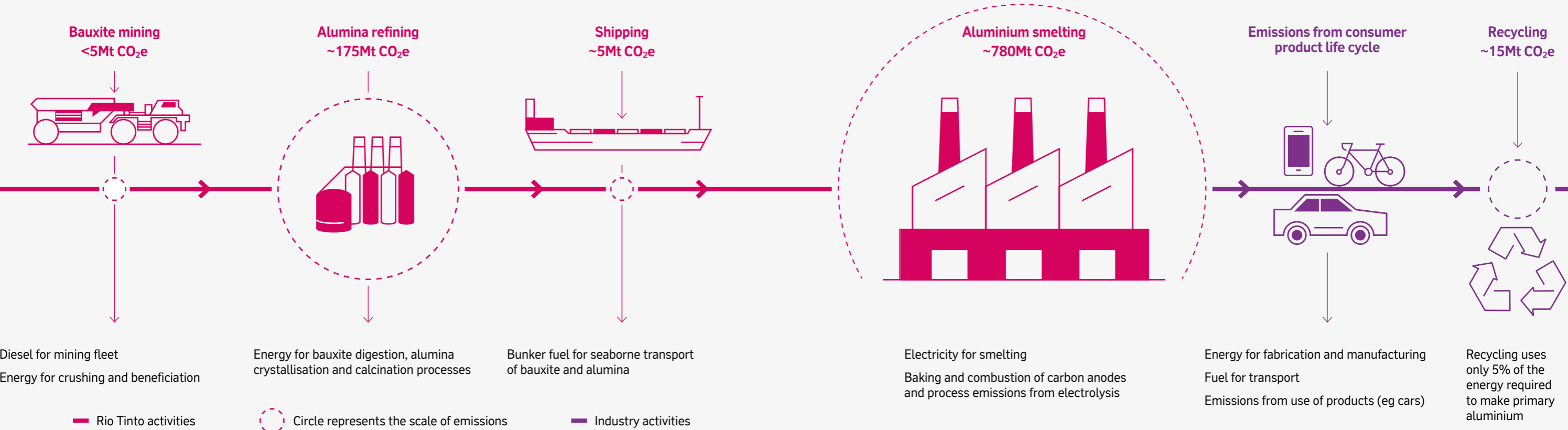
As noted already, our aluminium business, with a high share of hydro-based electricity, has a competitive carbon-intensity footprint compared to the rest of the industry. Around 70% of the bauxite we produce, as well as some alumina, is sold to third parties, including customers in China. These customers generally have alumina refineries and smelters with higher carbon intensities than our own operations. We estimate their emissions from the processing of our bauxite and alumina into primary aluminium add up to around 112Mt CO<sub>2</sub>e, based on industry average intensities.

Global greenhouse gas emissions



\* % of global CO<sub>2</sub> emissions excluding land use change

Emissions throughout the aluminium value chain



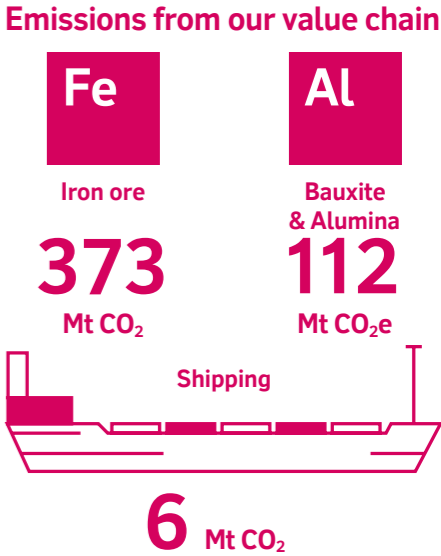
Steelmaking is less carbon intensive than aluminium, but the steel industry operates at a significantly greater scale with emissions across its value chain accounting for about 9% of global CO<sub>2</sub> emissions from fossil fuels and industry. Emissions at the mining phase account for less than 5% of the overall carbon footprint of the steel value chain. Most of the emissions are generated at the steel making stage, both as part of the sintering and coke-making processes as well as in the blast furnace and oxygen furnace (BF/BOF) where iron ore is converted into steel. There is some variability in the carbon intensity of

integrated steel mills based on operating performance and the input materials used, but this produces only small deviations around an average of just above 2 tonnes of CO<sub>2</sub> per tonne of crude steel for the BF/BOF route. In 2019, we produced and shipped around 270Mt of iron ore products (Rio Tinto equity share) and generated in the process 3.2Mt of scope 1 & 2 CO<sub>2</sub> emissions across our Pilbara and Iron Ore Canada (IOC) operations. We estimate that, in turn, our customers produced around 373Mt CO<sub>2</sub> emissions from the processing of our iron ore products into steel. Our higher-grade

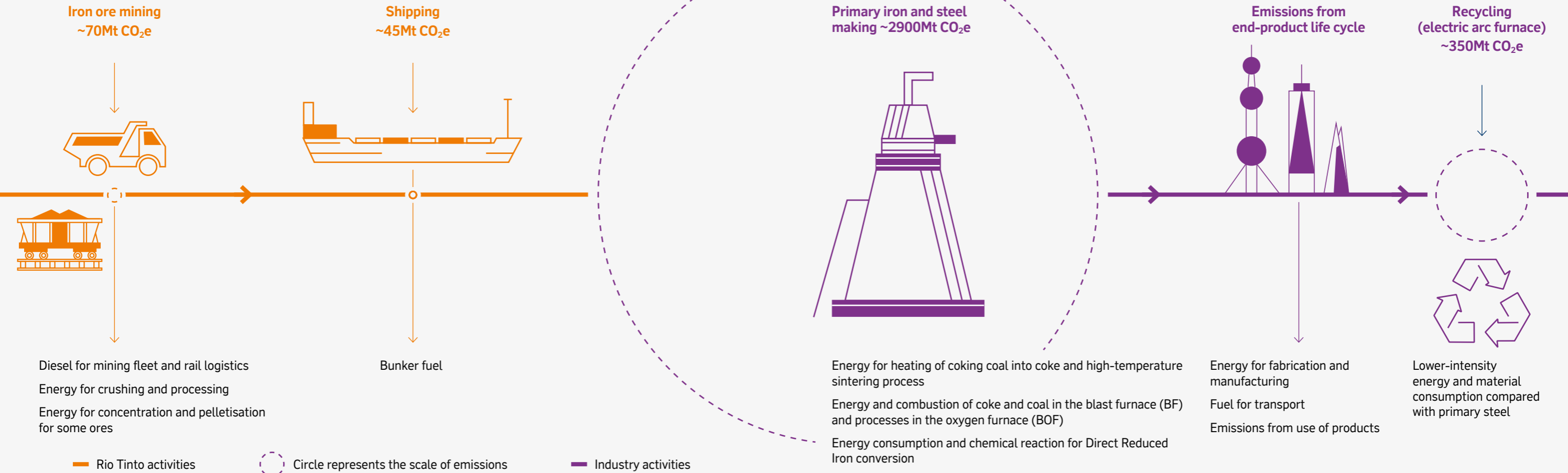
ores, including lumps and IOC pellets, contribute to our customers' management of their carbon footprint. We estimate emissions from shipping all our products to add up to around 6.2Mt CO<sub>2</sub>, based on shipping sector emissions factors. After the processing stage, primary metals such as steel, aluminium and copper are transformed into semi-fabricated products (extrusions, sheets, plates, wires, etc.) and then into parts that get assembled into final products (buildings, cars, machineries, consumer

goods, etc.). Emissions from this part of the value chain as well as through the life cycle of end products are more difficult to quantify. In many cases, the ultimate use of the materials we produce will actually contribute towards reducing emissions compared with alternative solutions. For example, the increased use of aluminium in cars is helping to manage their fuel efficiency by reducing their weight. Copper is a highly efficient electrical conductor and a key material for low-carbon technologies such as wind or solar power. Steel is essential to the construction of modern cities and their

infrastructure, which provide more efficient energy or transport solutions. This is why we believe that we are well positioned to supply the materials essential to human progress and to the transition to a low-carbon economy. The metals we produce or those produced by our customers from our raw materials also have the benefit of being easily recyclable. And the energy and carbon intensity of producing secondary aluminium or steel is significantly lower than the primary metal processing activities described above.



Emissions throughout the steel value chain



Value chain partnerships

We partner with our customers to find collaborative solutions and share best practice. The nature of these partnerships depends on our position in the value chain, and we do this in different ways depending on the product value chain. As shown above the significant emissions occurring in the steel value chain are from our customers who are mainly major steel producers in China, Korea and Japan.

Our Aluminium business works with customers throughout the value chain to provide technical support to improve the efficiency of their refineries and smelters.

We will continue to focus on commercial partnerships to support emissions reductions as new technologies become available. During 2019 we started a number of new environment and climate change partnerships and further developed existing ones.

Baowu, CISA, Tsinghua University

In September, Rio Tinto signed a partnership Memorandum of Understanding with China’s largest steel producer, China Baowu Steel Group and Tsinghua University, one of China’s most prestigious and influential universities, to develop and implement new methods to reduce carbon emissions and improve environmental performance across the steel value chain. The China Iron and Steel Association (CISA) hosted the signing of the MOU at its China International Steel and Raw Materials Conference held in Qingdao. A working group has been established to:

- explore technical cooperation and capacity-building to strengthen greenhouse gas inventory and reporting programmes;
- research, design and implement initiatives to reduce greenhouse gas emissions across the whole steel value chain;
- cooperate to advance multilateral and subnational action on climate change in the steel sector.

A detailed action plan is in development and will include technical programmes focused on blast furnace performance, value chain carbon modelling and a number of research projects performed at the Tsinghua-Rio Tinto Joint Research Centre for Resources, Energy and Sustainable Development.

Aluminium Stewardship Initiative

As a founding member of the Aluminium Stewardship Initiative, we have helped pioneer social and environmentally responsible production standards for the aluminium industry alongside customers and a broad range of other stakeholders. In 2018, we became the first producer to offer ASI Aluminium through a “chain of custody” spanning the Gove bauxite mine in Australia to our alumina refinery, aluminium smelters and casthouses in Québec, Canada, adding our operations in British Columbia in 2019.

We now offer independently certified, responsibly produced aluminium from our smelters in Australia and New Zealand that predominantly use hydro-powered electricity. ASI has granted its Performance Standard and Chain of Custody certifications to our Amrun and Weipa bauxite mines, Yarwun alumina refinery, and the Bell Bay and NZAS aluminium smelters. This strengthens our ability to offer ASI aluminium throughout our global supply chain, building on the certifications in place for our Canadian operations.

ASI certification means customers can be assured that the aluminium they purchase has been produced with high environmental, social and governance standards, ranging from greenhouse gas emissions to human rights. This certification expands our offering of independently certified, responsibly produced aluminium to customers around the world. It continues our leadership on responsible aluminium production from mine to market, so that our customers can meet growing consumer demand for sustainably sourced materials.

ELYSIS™

In 2018, in partnership with Alcoa and with support from Apple and the governments of Canada and Québec, we announced ELYSIS™ the world’s first carbon-free aluminium smelting process. The ELYSIS joint venture is further developing a breakthrough inert anode technology – the most significant innovation in the aluminium industry for more than a century. This will eliminate all direct greenhouse gases from the traditional aluminium smelting process, instead producing pure oxygen.

In Canada alone, the use of ELYSIS™ technology has the potential to reduce GHG emissions by 7 million tonnes – equivalent to taking 1.8 million cars off the road.

In August 2019, ELYSIS marked the start of construction on its new Research and Development Centre at Rio Tinto’s Complexe Jonquière in Canada. The C\$50 million construction project is expected to be fully operational in 2020, employing 25 technical experts. Our technology team in France is creating commercial scale designs for the ELYSIS™ technology so it can be retrofitted into existing smelters or used for new ones.

In December 2019, Apple purchased the first commercial batch of aluminium from ELYSIS™.

Climate leadership forums and industry associations

Energy Transition Commission

In early 2019, we joined the Energy Transitions Commission (ETC), a group of leaders from public, private and social sectors who meet to advance the goal of accelerating change towards low-carbon energy and industrial processes. The ETC is particularly focused on technical solutions to reduce emissions from the hard-to-abate industrial and transport sectors of the economy, such as steel, shipping and aluminium.

Industry Associations

We believe that industry associations have an important role in sharing best practice and developing standards. Industry associations provide us with an opportunity to better understand a range of external views and to contribute our perspectives and experiences in support of good policy outcomes which benefit business, the economy and society.

We recognise there is increasing stakeholder interest in the nature of industry associations and the role they play in policy advocacy. This is particularly relevant when associations represent a membership with disparate views. In 2020, we updated our review of our industry association memberships, listing the top five industry groups by membership fees and industry groups actively engaged on climate policy issues. The review highlights industry associations that have adopted positions on climate change that differ significantly from our public policy position.



We continually review the value of our membership of individual industry associations prior to joining and when membership is due for renewal. Where significant differences in policy positions arise, we may:

- Provide greater clarity on our own policy positions, such as company submissions on policy issues and/or direct engagement with policy makers.
- Work as part of that industry association to understand alternative points of view and to seek common ground that enables progress to be made.
- Ultimately, if differences in policy positions appear to be incapable of being resolved, consider reviewing our membership of that industry association.

# World Bank: carbon pricing and competitiveness

In 2019, our Chief executive participated in the High-Level Commission on Carbon Pricing and Competitiveness.

As governments and industry aim to achieve growth while also addressing the threat of climate change, carbon pricing, whether in the form of a carbon tax or an emissions trading scheme, has emerged as an indispensable part of a strategy to reducing emissions in an efficient way.

However, the possibility that putting a price on carbon may have an adverse effect on the competitiveness of a carbon-intensive firm, sector or country, is often a major concern for industry and policy makers considering the introduction of this type of policy. For industry the concern is partially about the low-carbon transition challenge and partially about the potential for international competitors to have an unfair advantage if they do not face a similar carbon price.

– High-Level Commission on Carbon Pricing and Competitiveness

## 4

### Enhancing our resilience to physical climate risks

We consider climate-related risks over the life of our operations, from design to closure and beyond. We have already seen the impact of extreme weather events at many of our sites and we are using scenarios to assess the probability and potential impact of these risks in the future. The two types of physical risks that we focus on are acute and chronic climate risks, and an explanation of each is given below.

#### Acute climate risks

Changes to the intensity and frequency of extreme events, such as tropical cyclones, storm surges, wildfires or extreme heat days, have the potential to damage infrastructure and interrupt business operations. This could impact on health, increase operational costs and result in loss of revenue from reduced production. The changing nature of extreme weather events also has the potential to impact the design criteria for new projects and for closure.

Climate change and energy considerations are built into the study definition guidelines that support our project development and closure processes. However, infrastructure design criteria can become outdated as climate science advances, so there is a risk that compliance with existing engineering codes and standards provides insufficient resilience for future extreme weather events.

#### Chronic climate risks

Longer-term trends can be more difficult to identify and respond to. For example: warming temperatures could significantly reduce the usability of ice roads in sub-arctic locations, resulting in supply chain disruptions and increased operational costs; rainfall patterns may vary both in terms of average rainfall, and seasonal variability, impacting water availability and requiring stronger discipline in water balance management. This could have knock-on, indirect impacts, including on the health of our employees and the wider communities where we operate. We anticipate that energy use profiles at facilities may change, particularly where energy is used for heating or cooling.

CASE STUDY

# The Pilbara

Our iron ore operations in the Pilbara, Western Australia, comprise an integrated network of 16 mines, four independent port terminals, a 1,700 kilometre rail network and related infrastructure. This integrated network of assets – supported by our Operations Centre in Perth – is designed to respond rapidly to changes in demand. We are expanding our output from the Pilbara operations while introducing next-generation technologies to deliver greater efficiency, lower production costs and improve health, safety and environmental performance.

	2019	2018
Pilbara Production (million tonnes – Rio Tinto share)	270.7	281.8
Pilbara Production (million tonnes – 100%)	327.7	337.8
Average iron ore price (\$ per wet metric tonne)	79.0	57.8
Gross sales revenue (\$ millions)	23,804	18,485
Underlying EBITDA (\$ millions)	16,023	11,322
Scope 1&2 emissions (million tCO <sub>2</sub> e, equity basis)	2.7	2.6

We have many years’ experience in assessing and managing extreme weather risks and impacts, as well as in enhancing the resilience of our Pilbara assets.

Image: Tom Price, the Pilbara, Australia

In last year’s climate change report we summarised the results of our assessment of physical climate risks to our assets. These results focus on the potential exposure of the regions in which we operate through to the end of the century, both for our existing assets and future project developments. This analysis used a scenario (Representative Concentration Pathway 8.5) from the IPCC’s 5th assessment report.

This analysis highlights that our Pilbara operations have a high exposure to all physical climate risk variables, and are material to Group revenue. We have many years’ experience in assessing and managing extreme weather risks and impacts, as well as in enhancing the resilience of our Pilbara assets. In 2006, six cyclones passed through the Pilbara, flooding mines and disrupting our operations for several weeks. In 2009, flooding shut down part of our railway network while bridges and culverts were repaired. In December 2013, Tropical Cyclone Christine, resulted in loss of

essential services to residential towns and operational disruption.

In March 2019, Tropical Cyclone Veronica caused some damage to the Cape Lambert port facility in Western Australia. As a result, we declared force majeure on certain contracts and worked with our customers to minimise any disruption in supply.

Rapid recovery of essential services and central coordination of workforce kept interruptions to a minimum. Learnings from these events have led to a number of initiatives to enhance our resilience and informed our preparedness for future events at these and similar assets.

We have a series of controls to manage the threat of extreme weather in the Pilbara. These controls include structural integrity programmes across all mine, rail and port system-critical assets, ensuring our people are trained in: response, weather monitoring, infrastructure inspections and dynamic scheduling. Structural integrity standards are critical

at our engineering design stage to ensure we address extreme weather risk exposures.

There are further controls to respond in the event of an impact including emergency response plans, cyclone tie-down procedures, flood management plans, communication plans and coordination with local, regional and state agencies. These controls help to keep our people safe and ensure our operations return to normal capacity as quickly as possible after an event.

During 2019, we continued our work to enhance asset resilience at the Pilbara. We made further progress on the project to upgrade two site rail control rooms to address flood risk exposures. We also secured funding approval to strengthen the wharf at Cape Lambert, and progressed the engineering study for the reinforcement of the transmission line from Port Dampier to the Yurralyi Maya power station. We aim to complete the power line reinforcement in 2020.

CASE STUDY

# Oyu Tolgoi

The Oyu Tolgoi copper mine is situated in the southern Gobi desert of Mongolia, approximately 550 kilometres south of the capital, Ulaanbaatar, and 80 kilometres north of the Mongolia-China border. The mine is located in an arid, water-scarce region that is already being impacted by climate variability and increased desertification. As a consequence, optimising water management was a key design objective for Oyu Tolgoi.

- We have invested in recycling and conservation practices that make it one of the most water-efficient mines of its kind in the world. These include:
- use of an advanced tailings thickener that reduces water consumption within the tailings transfer and deposition process;
  - placement of a plastic cover on the water lagoon to reduce evaporative water loss;
  - operational awareness and education on the importance of recycling and conservation practices;
  - complete treatment and reuse of all domestic wastewater;
  - established efficiency target and zero water discharge commitment to the environment;
  - comprehensive water monitoring programme.

Today, more than 80% of the water used in production is recycled and, on average, Oyu Tolgoi uses around half the industry average per tonne of processed copper ore.

### Climate considerations in water management

We work in some environments where water is scarce – like the Gobi Desert in Mongolia – and others with large variations in rainfall from year to year – like Weipa in far North Australia. Based on the World Business Council Global Water Assessment Tool, in 2019 41% of our managed sites were assessed as located in a “water stressed” environment. Of these sites, only one was locally assessed as having its operations marginally impacted by water availability. Many of our sites are likely to experience changes in rainfall and water availability due to climate change, so we take this into consideration too.

Whatever the context, we see ourselves as water stewards and we take this commitment seriously, because water is essential – not just for human life, health, and the environment, but also for economic prosperity. Our processing plants, refineries, and smelters and mines use water to process ore, manage dust and promote rehabilitation. In some instances, water is used to produce hydroelectricity to power our operations and minimise our emissions to the environment. As such, changes in water availability will impact not just our operations, but how we mitigate our impacts on the environment as well.

We are committed to balancing our operational needs with those of local communities, and ecosystems, as we meet local and international regulatory requirements. We seek to avoid disturbance or degradation of water resources like lakes, streams and groundwater aquifers, and to control the quality and quantity of the water we use and then return it to the environment. We also seek to use water as efficiently as possible in the design and everyday operations of our sites.

Water targets remain a core part of our water management approach. The 2019-2023 Water Strategy represents the third implementation of water targets for our business and demonstrates a maturing in the understanding of the importance and relevance of our work in this key area.

We have created new water targets, learning from past experience, which will build the datasets we need to drive good water stewardship in the future. We aim to use these targets and data to improve our performance over the next five years through a programme of risk awareness and response.

Image: Gobi Desert, Mongolia

# Part of the solution



Image: Forest rehabilitation at QIT Madagascar Minerals

Climate change represents an unprecedented challenge for the world and for our business. But as producers of the materials essential to human progress, we believe it also presents opportunities for us. Our portfolio is well positioned for the transition to a low-carbon future, but there is much more to be done, both within our business and in partnership with others.

We have considered climate change as part of our strategy for two decades and it is fully integrated into our strategic planning, risk and governance processes.

Our ambition is to reach net zero emissions by 2050 across our operations. We have set new targets to reduce our emissions intensity by 30% by 2030 and our absolute emissions by 15% over the same timeframe. To help us achieve our ambition and targets, we plan to invest around \$1 billion over five years in emissions reduction projects, research and development.

Since 2008 we have reduced the absolute emissions from our managed operations by 46%. Today, 76% of our electricity consumption is from renewable energy, compared with 26% of global electricity production. Most of our operations already have significantly lower carbon intensities than sector averages. We also continue to work on new technology solutions such as our partnership with Alcoa and Apple, to produce aluminium without any direct CO<sub>2</sub> emissions.

We have made significant progress, but we are reaching the limits of what a responsible business, acting alone, can achieve through incremental change. Enabling regulation is essential to provide a business case for investment in many of the hard-to-abate sectors within the mining and metals value chain. And unilateral action would potentially harm our employees, our customers, the communities around our operations, local and state governments and our shareholders.

**We are ready to play our role in tackling the climate change challenge and we believe we are well positioned to be part of the solution, working in partnership with other businesses, technology developers, investors, consumers and civil society. But we also recognise the essential role of governments around the world to create the legal and regulatory certainty and incentives necessary for investment and innovation. The best solution will come from global collaboration.**

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