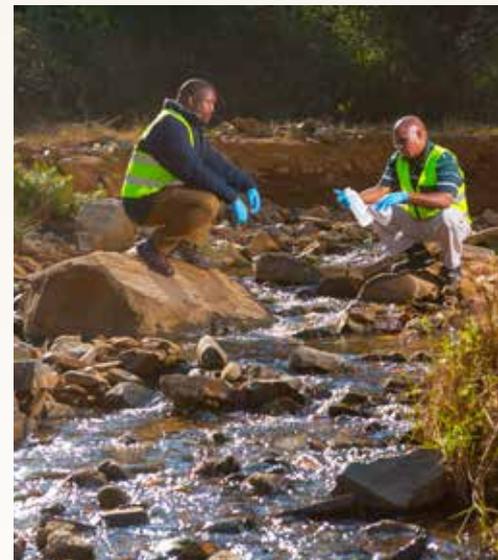




SUPPLEMENTARY REPORT ON CLIMATE CHANGE AND WATER



2020



Contents

1	INTRODUCTION	1	4	WATER MANAGEMENT	37
1.1	Supplementary disclosure of climate change and water information	1	4.1	Water stewardship policy	38
1.2	About this report	2	4.2	Interactions with water	39
2	STATEMENT OF THE CHAIRMAN OF THE ARM SOCIAL AND ETHICS COMMITTEE	3	4.2.1	The importance of water	39
3	CLIMATE CHANGE	5	4.2.2	How we use and impact water	39
3.1	Climate change policy	6	4.2.3	Water metrics	40
3.2	Governance	7	4.3	Water challenges and opportunities	42
3.2.1	Board level oversight and management responsibility	7	4.3.1	Material water risks	42
3.2.2	Incentives	8	4.3.2	Material water opportunities	45
3.3	Strategy	8	4.3.3	Water and tailings	45
3.3.1	Integrating climate change into the business strategy	8	4.4	Water-related detrimental impacts	46
3.3.2	Carbon pricing	9	4.5	Commitment and response	46
3.4	Risk management	10	4.5.1	Responsibility for water	46
3.4.1	Integrating climate change into the risk management process	10	4.5.2	Integrating water stewardship into our strategy	46
3.4.2	Material climate change risks	15	4.5.3	Engagement around water	51
3.4.3	Material climate change opportunities	21	4.6	Future water focus areas	54
3.4.4	The impact of risks and opportunities on business and financial planning	23			
3.5	Metrics and targets	24			
3.5.1	GHG emissions	24			
3.5.2	Energy	28			
3.5.3	Verification	29			
3.5.4	GHG emission reduction target	29			
3.5.5	GHG emission reduction initiatives	30			
3.5.6	How our products contribute to the transition to a low-carbon economy	33			
3.6	Engagement around climate change	33			
3.6.1	Value chain engagement	33			
3.7	Future climate change focus areas	35			
3.8	TCFD index	36			

REFERENCES IN THIS REPORT

 2020 Integrated annual report	 2020 Sustainability report	 2020 Section reference	 2020 Page reference
 www.arm.co.za	 www.transitionpathwayinitiative.org/tpi Transition Pathways Initiative – TPI		

All monetary values in this report are in South African rand unless otherwise stated. Rounding may result in computational discrepancies on management and operational review tabulations.



1

Introduction

1.1 SUPPLEMENTARY DISCLOSURE OF CLIMATE CHANGE AND WATER INFORMATION

This report is aimed at communicating more information regarding our efforts towards improved performance and reporting on climate change and water management and should be read in conjunction with the 2020 ARM sustainable development report (SDR) and integrated annual report (IAR), available on our website at www.arm.co.za.

INTRODUCTION continued

This second supplementary report replaces our prior disclosure via the Carbon Disclosure Project (CDP) in terms of climate change and water management and performance. A material consideration in this regard, was the timeframes of reporting of the CDP, which led to a delay of ARM's CDP submissions by 12 months since data collection, verification and external assurance of data for a specific financial year would still be underway when CDP reporting was due. This necessitated submission of a report on assured data regarding the performance during the previous financial year, which has been commented on by a number of stakeholders.

Our climate change and water management strategies and reporting continue to draw on various frameworks, guidelines, good practice and regulatory compliance requirements and also seek to meet multiple and evolving stakeholder reporting requirements.

This report uses the recommendations of the Task Force on Climate Related Financial Disclosures (TCFD) and the Position Statement of the International Council on Mining and Metals (ICMM) on Water Stewardship and Climate Change as the core frameworks. Consideration has also been given to:



1.2 ABOUT THIS REPORT

Information in this report covers those operations over which ARM has direct or joint management control, namely the operations that form part of the ARM Ferrous and ARM Platinum divisions. Consistent with reporting in the Sustainability Report, the report excludes those operations, joint ventures and investments that we do not manage directly (ARM Coal, the Sakura Ferroalloys Smelter and Harmony Gold), as well as projects that are in exploration, development or feasibility phases.

Glencore. As the managing partner of the joint venture, Glencore reports on GHG emissions to the Department of Environment, Forestry and Fisheries (DEFF), consolidated with its reporting on all its South African operations. Following engagement with Glencore, we have received GHG emissions related data for the relevant operations and have, for the first year, reported on these for the current financial year.

Carbon emissions have been calculated based on joint operational control and in accordance with the Greenhouse Gas (GHG) Reporting Protocol. This is also consistent with the operational boundary required by the Mandatory GHG Reporting Regulations.

Climate change and water related information in this report covers ARM's activities for the year to 30 June 2020 (F2020) on a 100% basis and is consistent throughout, with the exception of carbon emissions which are disclosed on an attributable basis (proportional to ARM's shareholding in the operations).

In F2019 stakeholders requested disclosure of GHG emissions from the ARM Coal operations, which form part of a joint venture with



2

Statement of the chairman of the ARM social and ethics committee

Responsible social and environmental practices are integral to ARM's strategic priorities to operate safely, responsibly and efficiently, and to partner with communities and other stakeholders. The company values, governance structures and ethical leadership guide employees and management to behave with integrity and act appropriately in the context of our natural environment and the country's socio-economic realities.

STATEMENT OF THE CHAIRMAN OF THE ARM SOCIAL AND ETHICS COMMITTEE continued

The board delegates responsibility for monitoring the effective management of sustainable development to the social and ethics committee while retaining ultimate responsibility for this area. The committee is supported by executive management and relevant executive committees and governance structures, including the employment equity and skills development committee. The social and ethics committee oversees the management of sustainability risks in accordance with its terms of reference which is revised regularly. Sustainability risks are identified by internal and external stakeholders and governance processes, including the enterprise risk management programme. ARM's values are formalised through our code of conduct and commit us to the highest moral, ethical and legal compliance standards in dealing with our stakeholders.

The increasing focus on environmental and social responsibility by investors, funders, customers and civil society, among others, represents a maturing of the sustainability discourse and is a positive development. We acknowledge our responsibility to manage and mitigate the potential negative impacts of our business activities, to create value that allows us to support growth and development in the societies in which we operate. We believe that our approach to sustainable value creation is effective in discharging this responsibility and were extremely pleased when ARM's environmental, social and governance (ESG) practices were ranked fourth in the FTSE/JSE Responsible Investment Top 30 Index.

We believe in sharing learnings across our diverse operations, learning from others and implementing industry good practice. As a member of the International Council on Mining and Metals (ICMM), ARM shares its commitment to "Mining with Principles" and has implemented the Sustainability Framework of the ICMM. In recent years, the ICMM developed a set of 38 performance expectations (PEs) with input from NGOs, international organisations and academia, which set a benchmark for responsible mining principles. As part of the initial testing of the PEs, we piloted self-assessment against the PEs at two operations during F2019 and during the year under review, self-assessment was conducted by three operations as well as the corporate office. In addition, validation of these self-assessments was included in the scope of the external assurance over sustainability data, performed by IBIS ESG Consulting Africa (Pty) Ltd. The gaps identified are being addressed as part of our preparation to report on this in more detail in 2021.

The financial year ended 30 June 2020 was challenging, particularly in the second half of the year with the onset of the Covid-19 pandemic. All ARM operations (in South Africa) except the ARM Coal operations were placed on temporary care and maintenance for the duration of the 21-day national lockdown that started on 27 March 2020. This called for a review of the objectives, scope and timing of some of the planned climate and water activities.

Preparing for the next phase of greenhouse-gas mitigation-related regulatory instruments and growing pressure from investors and civil society to improve climate change performance and reporting was a particular focus during F2020.

As part of this we improved our reporting and performance on GHG emissions reductions; designed a system for identifying, preparing, implementing and reporting on measures that save energy and reduce GHG emissions; and updated our GHG emission reduction target. We also improved our reporting on material emissions in our value chain (Scope 3) including reporting on attributable emissions from the coal operations.

ARM reduced Scope 1 and 2 GHG emissions by 3.3% relative to our Business As Usual baseline. This fell short of the targeted 5% by the end of this reporting year. Encouragingly ARM registered significant additional GHG reductions in the year including a reduction in process emissions as a result of improved efficiencies achieved at Cato Ridge Works.

The F2020 estimated carbon footprint (Scope 1 and 2 attributable emissions) decreased 7.8% to 1.02 million equivalent tonnes of CO₂ (mtCO₂e) from 1.10 mtCO₂e in F2019.

In F2020, ARM began investigating the feasibility of solar PV plants with battery storage in the Northern Cape and is piloting the integration of a carbon price into the financial modelling. We will also undertake a climate scenario analysis in F2021 to explore the potential extent of these climate-related drivers on demand for our products as an input to our strategy, and taking into account the impacts of Covid-19 and the momentum building around net-zero carbon objectives.

We continued to improve our water reporting in line with the ICMM Position Statement on Water Stewardship which is based on the Water Accounting Framework (WAF) for the Minerals Industry of the Minerals Council of Australia.

In F2020, water withdrawal decreased by 7% to 20.3 million m³ due to decreased activity in the last quarter due to Covid-19 and ramping down at Nkomati Mine, which last year accounted for 20% of group water consumption (F2020: 12%).

The implementation of the WAF also improved our understanding of water reuse efficiency, which is above 72% and is a key performance indicator in monitoring and managing consumption and losses.

In closing, I would like to thank my fellow social and ethics committee members and colleagues on the Board for their support during the year. We believe that operational excellence goes beyond financial returns and production targets to include acting with integrity and delivering on our environmental and social priorities. Achieving this is only possible with the buy-in and diligence of ARM's employees and management, and we thank them for their commitment in this regard.

We also appreciate the support of our broader stakeholders and look forward to working with them in the year ahead to continue to 'do it better'.

Dr R V Simelane

Chairman of the social and ethics committee



3

Climate change

Climate change is one of the most critical global challenges of our time which will have a lasting impact on our business, our communities and the world. We are committed to participating in the global response to reduce carbon emissions and mitigate the physical impacts caused by climate change. ARM, together with the rest of the mining industry, provides some of the metals which are critical to creating a low carbon future. We have implemented robust processes to measure and report on carbon emissions at our operations. The operations continue to identify opportunities to reduce carbon emissions through improved energy and fuel efficiency and targeted reduction initiatives in order to reduce our footprint. ARM is actively developing technology and processes to enhance energy efficiency at our operations.

CLIMATE CHANGE continued

3.1 CLIMATE CHANGE POLICY



CLIMATE CHANGE POLICY

ARM recognises:

- The need for an urgent global response to the threat of climate change, across all areas of society and the economy. We are committed to being part of the solution.
- The need for an effective binding global agreement on climate change which we support, and related efforts made under the Paris Agreement to hold the increase in the global average temperature to well below 2°C and to pursue efforts to limit the temperature increase to 1.5°C.
- The need to reduce emissions from the use of fossil fuels and support collaborative approaches to accelerate the use of low-emission technologies as part of a transition to a lower-emissions economy.
- The practical challenges that South Africa as a developing country with domestic supplies of fossil fuels will face in making that transition to a low carbon economy.
- The vital role in reducing greenhouse gas (GHG) emissions that a broad-based, effective carbon pricing can play, alongside other market mechanisms that drive the reduction of GHG emissions and incentivise innovation.
- The importance of providing climate-related disclosure to measure and respond to climate change risks and opportunities. ARM welcomes the transparency around climate-related risks that the Task Force on Climate Related Financial Disclosure (TCFD) has brought and sees value in its recommendations.

We commit to:

- Engage with our peers, governments, and others to develop effective climate change policies. ARM supports the movement towards a low carbon economy and is committed to constructive engagement with government on measures aimed at achieving this. Important issues still under consideration and discussions with government include the utilisation of carbon tax to support targeted mitigation actions, alignment with other mechanisms such as carbon budgets, and clarity around carbon tax allowances and offsets.  3.6.
- Implement governance, engagement and disclosure processes to ensure climate change risks and opportunities are considered in business decision-making.  3.2.

- Support carbon pricing and other market mechanisms that drive the reduction of GHG emissions and that incentivise innovation. We support global efforts to address systemic challenges that inhibit the transition (e.g. a lack of willingness to pay for lower carbon products, limited alternatives and options to reduce emissions especially in hard-to-abate industrial sectors, and a lack of incentives and support to facilitate expensive, long term investments in new technologies and processes). These will require collective efforts and ARM will collaborate, to the extent that is appropriate, to drive changes necessary to achieve net zero carbon industry.  3.3.2 and 3.5.6.
- Demonstrate leadership by advancing operational level adaptation and mitigation solutions (through, for example, researching, developing and piloting new technologies).  3.4.2.
- Engage with host communities on our shared climate change risks and opportunities and help host communities to adapt to the physical impacts of climate change.  3.6.1 and 4.5.2.
- Support efforts to mitigate GHG emissions, both in collaboration with our peers and individually, by promoting innovation, developing and deploying low emissions technology, and implementing projects that improve energy efficiency and incorporate renewable energy supply in our energy mix.  3.4.2 and 3.5.5.
- Disclose Scope 1 and 2 emissions on an annual basis and set emissions reduction targets informed by the scientific requirements to achieve the 1.5°C global temperature goal and associated efforts towards net zero carbon industry by 2050.  3.5.1 and 3.5.4.
- Engage with stakeholders to determine a preferred approach to reporting Scope 3 emissions and explore our role in reducing those emissions.  3.5.1 and 3.6.1.
- Support the global transition to a low carbon economy, by continuing to contribute to the sustainable production of commodities essential to the energy and mobility transition, working with our partners and key suppliers along our value chains.  3.5.6 and 3.6.1.

As a member of the ICMM, this policy is in line with the commitments expressed in the ICMM updated Climate Change Position Statement. We also support the TCFD's recommendations and this report presents the second report on our performance in line with those recommendations.



TPI Questions 1 – 3, 10 and 19

CLIMATE CHANGE continued

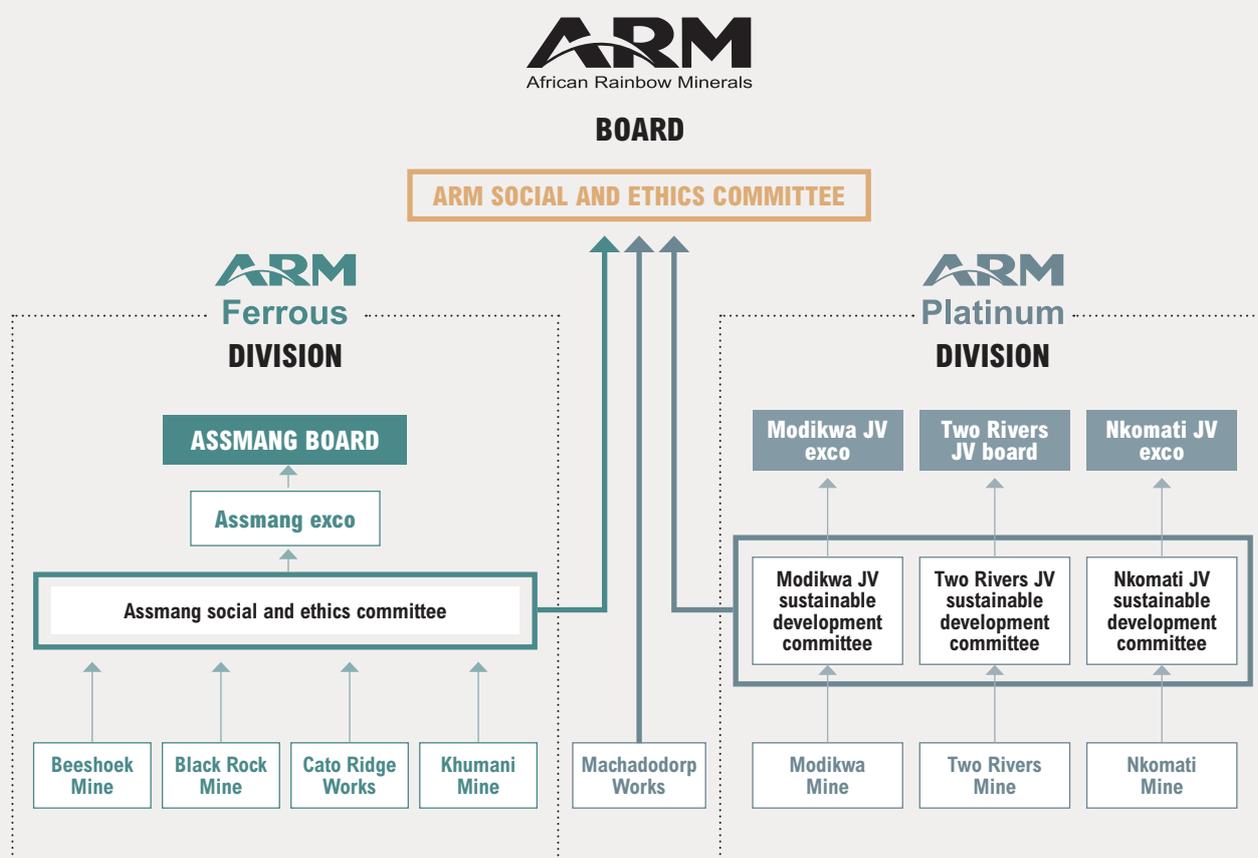
3.2 GOVERNANCE

3.2.1 Board level oversight and management responsibility

The ARM board, through the social and ethics committee, has ultimate responsibility for climate change management. The responsibility for implementation rests with the chief executive officer; delegated to the chief executives of each division and the executive sustainable development, who is responsible for reviewing sustainable development-related policies, strategies and targets (including ARM's revised GHG reduction target) and ensuring that these are aligned with the board's commitment to zero tolerance for harm to employees, host communities and the environment. The ARM social and ethics committee provides oversight in this regard and approves the GHG emission reduction targets as part of the reporting approval process.

Climate change is an essential component of our strategic intent factor to remain responsible stewards of environmental resources. The ARM social and ethics committee monitors and reports on the manner and extent to which ARM protects, enhances and invests in the well-being of the economic, social and the natural environment in which ARM operates, to ensure that its business practices are sustainable. Climate-related issues, through the reporting of the social and ethics committee and operational reviews of the divisions, form part of the agenda of quarterly board meetings.

The governance and reporting structure is presented below.



Assmang, a joint venture between ARM and Assore Ltd, has established a social and ethics committee which monitors environmental performance in the ARM Ferrous division and is chaired by the executive director for investor relations and new

business. Each operation in the ARM Platinum division has a sustainable development committee, chaired by the executive sustainable development, which reports to the exco or board of the respective Joint Ventures, as appropriate.

CLIMATE CHANGE continued

The executive sustainable development also reports to the management risk and compliance committee, a sub-committee of the audit and risk committee of the board, on matters and activities related to climate change and carbon emissions as a standard agenda item.



TPI > TPI Question 6

3.2.2 Incentives

In F2019, carbon emission performance targets were included in ARM's remuneration policy and in the conditional share plan for ARM executives. The incentives are based on actual savings over three years, with a stretch target of 2%+ reduction from new and existing carbon reduction initiatives still active since the 2014 base year. The approach is based on the GHG Protocol's Policy and Action Standard (available at <https://ghgprotocol.org/policy-andaction-standard>).

IAR > Refer to the summarised remuneration report in the integrated annual report.

Engineers and production staff are incentivised on energy efficiency per tonne of ore milled, time of energy use and the use of alternative energy sources. Remuneration and incentive packages of production teams and other appropriate positions at the smelters include KPIs linked to emission reduction initiatives.

TPI > TPI Question 15

3.3 STRATEGY

3.3.1 Integrating climate change into the business strategy

ARM's strategy is to deliver competitive returns and sustainable value by: operating our portfolio of assets safely, responsibly and efficiently, applying disciplined capital allocation and focusing on value enhancing and integrated growth. Climate change impacts our ability to transform natural capital into financial and other forms of capital as efficiently as possible while minimizing our negative impacts. We have integrated climate change considerations into our business strategy. This is done on an on-going basis by considering climate change risks and opportunities at the company and asset levels; measuring and managing our carbon footprint and acting to mitigate risks and take advantage of opportunities. Our emissions data and efficiencies, as appropriate to each operation's metrics, are reported quarterly, discussed at the individual operational, divisional and corporate sustainability meetings and assessed according to potential exposure, probability, and the consequence for the business.

Information on the level of risk or opportunity and capacity to manage these are reported on to the ARM management risk and compliance committee as well as the ARM social and ethics committee whose outputs feed directly into the strategy development process. Climate change-related training takes place at all levels and annual climate and water workshops are conducted at ARM's operations. Climate change issues are discussed at the annual strategic planning session of the ARM board and executive committee, considered by the strategic growth committee and through other mechanisms that feed into our strategy development.

Managing increasing operating costs due to climate risks is consistent with, and reinforcing of, our short-term strategy (F2020 – F2021). The process of determining an appropriate target considered site-specific mitigation potential (most options resulting in reduced energy consumption and associated cost-savings).

Our long-term strategy (focusing on growth through new projects, acquisitions, JVs, and exploration) is influenced by expected long term (beyond 2021 to 2050), regulatory changes that will affect costs (particularly energy costs in geographies where fossil fuels have traditionally been dominant) and supply of energy and water. Certain geographies are more likely to be affected by climate change and this will impact our ability to operate.

Mines and smelters have long lifetimes and therefore adequate supplies of energy, water, and other resources have to be ensured while maintaining our social licence to operate. The increasing impact of climate change on commodities and the markets into which our products are sold has further contributed to the increased focus on climate change in our boardrooms and in making strategic decisions.

Producing higher grade "cleaner" products that produce fewer emissions provides us with a competitive advantage in the growing Asian market. This demand is growing and increasingly provides opportunities to differentiate ourselves from our competitors. This trend was identified by the ARM and Assmang executive and marketing teams and has delivered a premium on these products over the past years. ARM expects, as the global economy becomes increasingly carbon-constrained, that this demand will become increasingly material.

Similarly, the demand for manganese is projected to increase as a component of some lithium-ion batteries used in mobile and stationary electricity storage applications.

Platinum will have a key role to play in the hydrogen economy and it is expected that demand will increase given climate-related drivers in the transport sector (increasing demand for Fuel Cell Electric Vehicles (FCEVs)) and in industry (increasing demand for hydrogen as a clean energy source and as a reductant that can reduce process emissions). Demand for platinum used in catalytic converters will decrease as demand for Internal Combustion Engine (ICE) vehicles is expected to decrease in the medium to long term.

Climate change concerns are recognised to have a material impact on the market demand, supply and price of thermal coal going forward.

We will undertake a climate scenario analysis in F2021 to explore the potential extent of these climate-related drivers on demand for our products as an input to our strategy, and taking into account the impacts of Covid-19 and the momentum building around net-zero carbon objectives

TPI > TPI Question 16

CLIMATE CHANGE continued

3.3.2 Carbon pricing

There have been assessments of opportunities to reduce GHG emissions at our South African operations where the carbon tax has come into effect from June 2019. This allows us to understand, plan and budget for initiatives that will reduce future carbon tax liability. We have also invested in a robust carbon footprint reporting system that has matured over a number of years. In 2018 we commenced a project to respond to evolving stakeholder and regulatory reporting requirements and expectations relating to climate change and water. This included a process to update the GHG reporting system to be able to report to different stakeholders based on their requirements, e.g. different reporting periods (calendar year versus financial year) and for different boundaries (e.g. excluding versus including emissions associated with purchased electricity and ARM's value chain). This should be considered when interpreting or comparing data from different sources and for different years.

During this process, we further explored evolving expectations, beyond reporting. This includes the use of scenario planning and setting an internal price on carbon.

Internal consideration has been given to establishing an internal carbon price to be used, initially, for evaluating new projects and acquisitions. This requires estimating the annual GHG emissions associated with proposed projects and acquisitions, applying a price in line with the South African carbon tax, and adding the carbon "cost" to OPEX calculations to evaluate the impact on the project's Net Present Value (NPV) or Internal Rate of Return (IRR) on prospective investments. We have initiated a pilot project to consider the implications of a carbon price in evaluating the feasibility of solar PV and storage plants in the Northern Cape. This process will inform the decision-making processes and will likely evolve based on clarity regarding the carbon tax (and international carbon markets) and lessons learned in the initial application.

We will also assess long-term carbon pricing scenarios that impact our business, including the demand for our products.

CASE STUDY

Using a carbon price in assessing the feasibility of solar PV and storage projects in the Northern Cape

In F2020, ARM began to investigate a solution to reduce the electrical power consumption at its mines in the Northern Cape. It appears for now that a hybrid electricity solution, which integrates power from Eskom, solar panels and battery storage is the most optimal solution. As part of the process, ARM will pilot the integration of a carbon price into the financial modelling. This will serve to offer a scenario that demonstrates the IRR when considering potential avoided carbon tax costs (i.e. modelling the potential indirect carbon tax that would be passed through by Eskom if the electricity generated by the plant had been supplied by the grid).

This will include modelling a range of carbon tax pass through costs, assuming a grid emission factor based on the Integrated Resource Plan's technology mix and a range of effective tax costs that could be passed through by Eskom. Avoided costs, based on the zero-carbon electricity generated and consumed by ARM's operations, will be considered over the life of the assets to determine a range of impacts on the project IRR. The pilot will not require that the final IRR include a carbon tax component but rather provide some insight into the financial implications of a project that reduces carbon tax liability and generate lessons for integrating an internal price of carbon into ARM's new projects and acquisitions.

TPI > TPI Question 18



CLIMATE CHANGE continued

3.4 RISK MANAGEMENT**3.4.1 Integrating climate change into the risk management process**

Our processes for identifying, assessing, and managing climate-related issues are integrated into the overall risk management process.

ARM's enterprise risk management (ERM) policy aligns with the risk management requirements of the King Report on Corporate Governance for South Africa 2016 (King IV™) and assesses the risks and opportunities emanating from the triple context in which the Company operates as well as the capitals that we use and affect. The policy recognises the importance of protecting and improving the health, safety, and wellbeing of everyone affected by our operations, as well as the need for responsible environmental management.

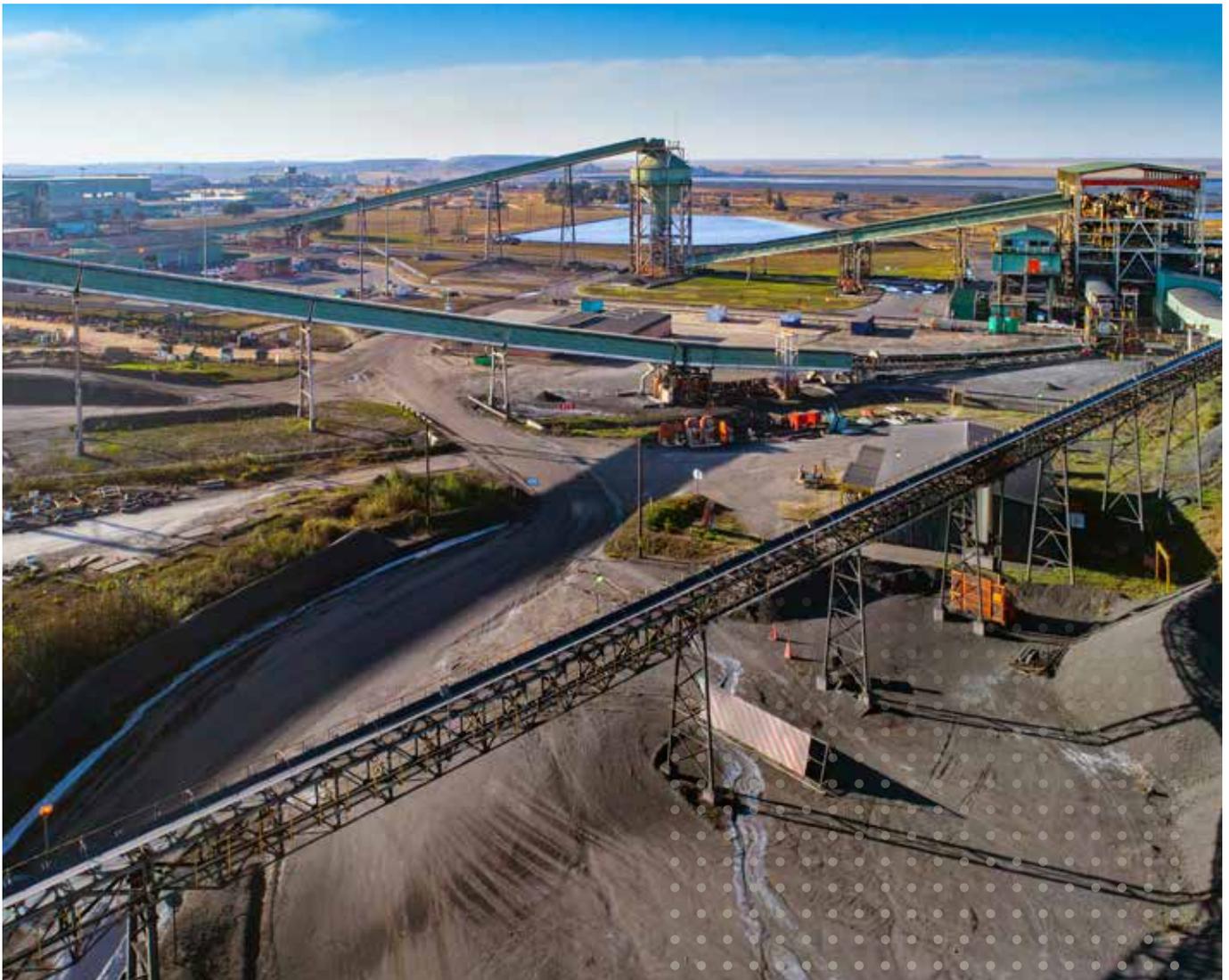
The management risk and compliance committee (a subcommittee of the audit and risk committee) coordinates and monitors the Company's ERM process, which includes climate change risks. Climate change matters and performance are included in the committee's formal agenda.

To continuously improve the risk management process, we initiated a review of the Company's current risk management methodology, processes, maturity and culture in April 2018. A key output of this

process has been the full alignment of the current risk methodology with ISO 31000. ARM developed an impact rating scale that required aligning ARM's strategy to the strategic factors through which we drive and measure business performance. Climate change-related risks feature in ARM's top ten risks identified through the ERM process.

Company level risks, such as the evolving climate change mitigation regulations (including the carbon tax and carbon budgets), are tracked by the executive technical services, group electrical engineer, the executive sustainable development, the environmental specialist, the divisional SHEQ managers, and the engineering managers. A bottom-up assessment of mitigation potential is considered and used to inform engagement with government and the development of the company GHG emission reduction target. At an asset level, a comprehensive risk register, which includes aspects of climate change, is compiled.

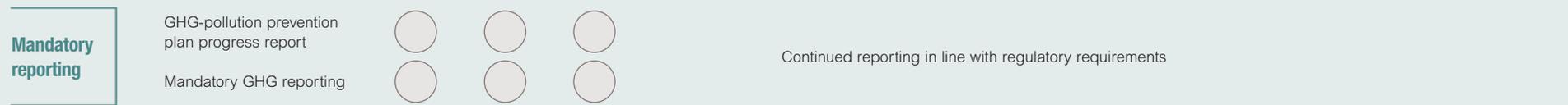
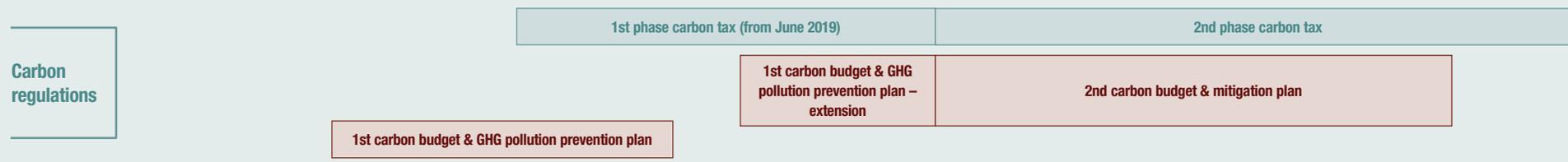
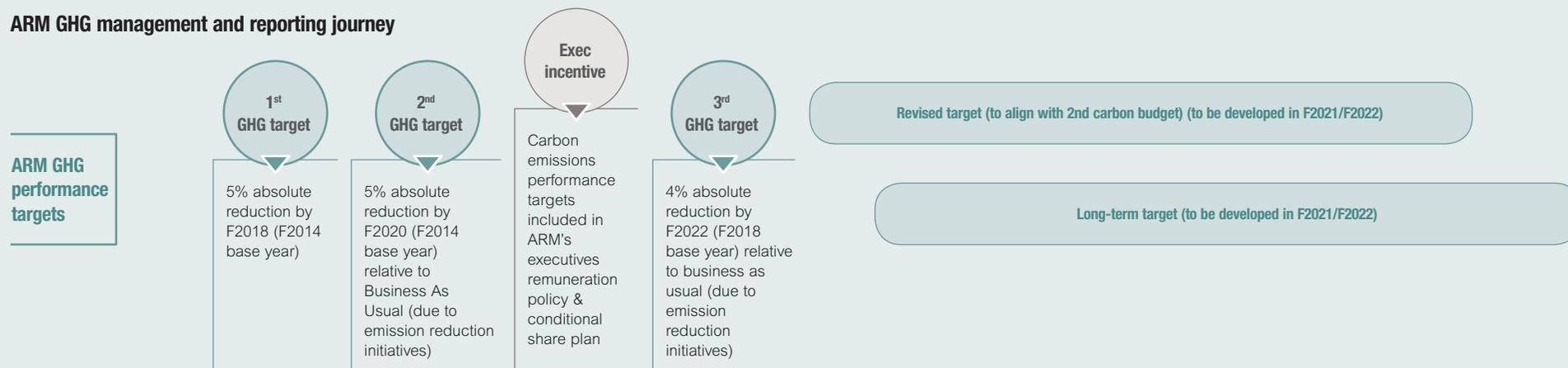
This process is supplemented by board and management discussions, stakeholder needs and concerns raised, peer reporting, guidelines and frameworks (such as the TCFD), legislation (such as the Climate Change Bill and Carbon Tax Act), and industry good practice and initiatives such as those of the ICMM and the Minerals Council South Africa (MCSA), often jointly with Business Unity South Africa (BUSA) and the National Business Initiative (NBI) climate change advocacy work and media monitoring.



ARM climate change and water compliance and reporting programme

Our focused programme to comply with new climate change regulations as well as “non-negotiable” but voluntary requirements and reporting expectations related to climate change and water originated in 2017 and have continuously been reviewed and updated. The regulatory and “voluntary” requirements are related, and ARM aimed to develop a systematic process for developing systems, reporting and building capacity to meet the current and evolving requirements over the past years.

ARM GHG management and reporting journey



Calendar Year	Pre 2017	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	To 2030
Financial Year		F2017	F2018	F2019	F2020	F2021	F2022	F2023	F2024	F2025	F2026	F2027	Beyond F2027

CLIMATE CHANGE continued

ARM climate and water compliance and reporting programme phases

Phases 1–3 have been completed and met its objectives:

- To comply with the requirements to submit a Climate Change Pollution Prevention Plan (CC-PPP) and greenhouse gas emissions to the Department of Environment, Forestry and Fisheries (DEFF), previously Department of Environmental Affairs (DEA);
- To facilitate a process of identifying gaps in climate and water risk assessment, management and reporting to inform a practical and realistic strategy for filling gaps and to support immediate reporting needs; and
- To comply with the ICMM member commitments related to climate change and water.

Phase 4 undertaken during F2020, included a greater climate change focus, informed by a variety of drivers affecting ARM. Specific objectives included:

- Meeting climate change GHG requirements and expectations (existing target and share plan, carbon budgets and mitigation plan, setting a new target);
- Improving ARM's GHG management and reporting systems;
- Initiating a climate scenario analysis;
- Engaging with ARM's value chain (reporting GHG emissions for the coal operations, managed by Glencore; engaging with stakeholders and our supply chain);
- Continued improvement in our water reporting in line with the ICMM Water Accounting Framework;
- Integrating climate change and water risks formally into ARM's Enterprise Risk Management (ERM) Framework;
- Meeting and updating our water target; and
- Integration into ARM's annual reporting processes (including this supplementary report).



CLIMATE CHANGE continued

Annual climate and water workshops to build skills and respond to evolving regulatory requirements and stakeholder expectations

As part of the climate and water compliance and reporting programme, climate change and water workshops are conducted annually at each operation. Representation at these includes senior management, engineers and environmental managers on-site, together with the executive sustainable development, the environmental specialist and the divisional SHEQ managers; and facilitated by a specialist consultant in this field.

These workshops explore evolving climate change and water risks and opportunities and include an explicit assessment of upstream (supply-chain) risks that have the potential to impact operations directly (e.g. through production stoppages or increased costs) and our stakeholders (e.g. particularly around the availability of water for communities). The workshops also serve to build awareness, gather data and inform the approach to complying with and responding to these requirements and expectations.

Due to Covid-19, the F2020 workshops were undertaken virtually using an online platform. Careful preparation was undertaken to counter challenges expected with such an approach. This actually provided an opportunity to improve the process which included numerous targeted workshops at the ARM corporate level ahead of the individual workshops with each operation. This process involved more people within the organisation and generated additional discussion and new ideas to improve ARM's climate and water performance and reporting.

The focus of workshops undertaken to date include:

May 2017: Water risk assessment, reporting and water and carbon target/goal setting (phase 1)

- **Objective:** to assess current water management and reporting processes, to identify gaps in relation to ICMM and other stakeholder requirements/expectations (noting ARM operation-specific contexts and the need to consider value chain risks) and to move towards developing water and revised GHG targets.
- **Outcomes:** to set water goals at the operational level, elicited operational data to inform an ARM water target, agreed on a process for managing water risks in the supply chain, gathered data and enhanced strategies for stakeholder engagement (catchment-level collective action), gathered data to inform a revised GHG target at the corporate level.

February, November and December 2018: GHG mitigation analysis, target setting and complying with pollution prevention plan (PPP) regulations (phase 2)

- **Objectives:** take initial steps to implement the ICMM Position Statement on Water Stewardship, focusing on the application of consistent water reporting in line with ICMM metric definitions (based on the Australian Minerals Council's Water Accounting Framework).
- **Outcomes:** initial application of consistent and comparable reporting using standardised metrics.
- **Objectives:** building awareness of the evolving climate change regulatory and reporting requirements, determining potential, cost and implementation considerations of all GHG mitigation options at each operation to inform ARM's second GHG reduction target, PPP and the reporting of GHG reduction initiatives. Agreeing on a water target and gathering climate and water data for reporting purposes.
- **Outcomes:** revised GHG target and agreed water target for ARM, final GHG PPP, as well as gathering and reporting of relevant data.
- February 2019: Implementing ICMM member commitments related to water.
- **Objectives:** implementing the ICMM Position Statement on Water Stewardship focusing on the application of consistent water reporting in line with ICMM metric definitions.
- **Outcomes:** application of consistent and comparable reporting using standardised metrics.

June – July 2020: preparing for the the next phase of GHG mitigation-related regulatory instruments and growing pressure from investors and civil society to improve climate change performance and reporting

- **Objectives:** meeting climate change GHG requirements and expectations (existing target and share plan, carbon budgets and associated mitigation plan and setting a new target); improving ARM's GHG management and reporting systems; contributing to meeting and updating ARM's water target; and gathering data on climate change and water-related risks and impacts to feed into ARM's annual reporting processes (including updating this supplementary report).
- **Outcomes:** improved reporting of GHG reduction initiatives; agreement on a system for improved reporting of GHG reduction initiatives going forward; inputs into ARM's updated GHG and water targets.

CLIMATE CHANGE continued

Considering climate change risks in ARM's investments

Coal

ARM's investment in coal has an effective 20.2% share in the Participative Coal Business (PCB) and an effective 26.01% in Goedgevonden (GGV). Our partner Glencore Operations South Africa (GOSA), owns the remaining stakes.

GGV is an open-pit mechanised mine producing 7Mt of saleable thermal coal per year with a Life-Of-Mine of 23 years. PCB includes Impunzi and Tweefontein operations, an open-pit and underground mechanised mine producing 15.3Mt of saleable thermal coal per year with a Life-Of-Mine of 14 years. Coal is marketed and sold by our joint-venture partner, Glencore, to various markets, mainly China and India.



Information on the coal resources and reserves can be found on pages 82 to 87 of ARM's integrated annual report.

GGV is governed by a management committee controlled by ARM Coal, with ARM and Glencore representatives. Operational management is contracted to Glencore. PCB is governed by a

supervisory committee with representatives from both ARM and Glencore.

The operational management of PCB mines is contracted to Glencore. Climate change risks are assessed and tabled as appropriate at the quarterly steering committee meetings. GHG emissions associated with the operations are measured and Glencore reports on these consolidated with its reporting on all its operations in South Africa as part of the mandatory reporting regulations. This report constitutes our first reporting on GHG emissions attributable to ARM's investment in these operations (see 3.5.1.2).

ARM recognises that, while global emission reduction initiatives and the move to cleaner mobility and energy are expected to put pressure on demand for platinum group metals (PGMs) and thermal coal, it creates opportunities for other commodities in our portfolio, including bulk and base metals.

Gold: Harmony

ARM owns 13.83% of Harmony's issued share capital. Harmony is separately run by its own management team. Mineral resources and mineral reserves of the Harmony mines are the responsibility of the Harmony team and are published in Harmony's annual report.

Risk processes are not linked to African Rainbow Capital and African Rainbow Energy and Power. These are separate companies with their own processes for assessing and managing climate change-related risks and opportunities.



TPI Question 12



CLIMATE CHANGE continued

3.4.2 Material climate change risks

TRANSITION RISKS

Policy and legal risk

Risk

Carbon tax: The Carbon Tax Act became effective on 1 June 2019. Carbon tax, at a rate of R120/tCO₂e, must be levied in respect of the sum of the Scope 1 greenhouse gas (“GHG”) emissions of a taxpayer. The carbon tax rate will increase by the amount of the consumer price inflation (“CPI”) of the preceding tax period plus two percent until 31 December 2022, thereafter only by CPI of the preceding tax period. Through Assmang, ARM’s JV with Assore, ARM pays direct carbon tax. Operations in the Northern Cape (Beeshoek, Black Rock and Khumani mines) collectively trigger the 10MW energy generation threshold requiring that direct carbon taxes be paid (Black Rock Mine alone has backup diesel generation capacity of 14MW). Cato Ridge Works and the separate JV Cato Ridge Alloys conduct an activity (“ferroalloy and other metal production”) that require direct carbon taxes to be paid. In addition, 7 cents per litre (c/ℓ) on petrol and 8 c/ℓ on diesel are passed on through the fuel levy as an indirect carbon tax. There is no electricity pass-through cost in the first phase.

Our platinum division operations do not, as legal entities on their own, trigger the 10MW energy generation capacity threshold and are therefore not subject to direct carbon taxes. These operations do pay indirect carbon tax through the tax levied on liquid fuels. The impact in the first phase (direct liability of almost R2m and a combined direct and indirect liability of below R10m for 2019 increasing to an estimated maximum of R16m in 2022) is not expected to be significant. From 2023 onwards, with an electricity price pass-through, costs could exceed R290m a year (based on current emissions).

Response

- ARM has set a revised GHG reduction target, allocated budget to implement emission reduction initiatives, established incentives for executives linked to reduction initiatives as part of the GHG reduction target, and set incentives related to energy efficiency for engineers and production staff (at the mines) and related to GHG emission reductions for production teams (smelters).
- It has initiated a feasibility study to install 74 GWh at Black Rock Mine and 87 GWh at Khumani Mine (47% and 39% of its current Eskom consumption respectively) from a combination of solar and battery storage.
- Engaging transparently with government.
- ARM has developed a climate change and energy working group and conducts annual workshops at operations that include assessments of energy reduction opportunities and reporting.
- Quarterly reporting and tracking on progress with GHG reduction initiatives and projects.
- Evaluating carbon tax pass-through risks in the supply chain and actively engaging with suppliers to mitigate risk and enable operations to reduce their own energy consumption and GHG emissions.

Risk

Carbon budgets and associated mitigation plans: The South African government has published a draft Climate Change Bill (2018). The Bill aims to develop an effective climate change response (CCR) and to achieve the long term, just transition to a climate-resilient and lower carbon economy and society. The Bill includes, in line with achieving the country’s targeted national GHG emissions trajectory, the establishment by government of Sectoral Emission Targets (SETs), the Sectoral Emissions Reduction Plans and the associated budgets that will be allocated to companies (a cap on emissions at the company level).

The first phase of the carbon budgets (2016 – 2020) is non-mandatory but subject to government approval. It is being used as a pilot phase to test the system and structures required to move to a mandatory phase which is now set to align with the second phase of the Carbon Tax (i.e. from 2024). The DEFF, will extend the current budget to cover the period 1 January 2021 to 31 December 2023. Companies are likely to have the option of choosing the old method for the carbon budget or to trial the DEFF’s new method (currently undergoing consultation with business). Work around aligning the carbon budget and carbon tax processes is still underway. Linked to the budget is a requirement to submit a GHG mitigation plan (previously a “pollution prevention plan” (PPP)) and to report on progress on an annual basis.

Response

- ARM submitted a proposed carbon budget for 2016 to 2020 and this was approved by government. The benefits of participating in the first phase include a 5% tax-free allowance for the first phase of the carbon tax.
- ARM developed and submitted a GHG PPP which was also approved by government.
- The first PPP progress report was submitted in March 2019.
- Various efforts to reduce GHG emissions (as listed above) also mitigate risk associated with carbon budgets and the GHG PPP.
- Our mature GHG reporting system enables compliance with the GHG PPP progress reporting requirements. The new system for identifying, preparing, implementing and reporting on measures that save energy and reduce GHG emissions has been designed and will be rolled out in F2021.
- Active engagement with government and, as a member of industry associations such as Business Unity South Africa, the Minerals Council South Africa and the National Business Initiative, creates awareness of the latest developments and enables us to share and learn from peers.

CLIMATE CHANGE continued

TRANSITION RISKS continued**Policy and legal risk continued****Risk**

Global policies and measures to reduce GHG emissions: COP 21 concluded with the Paris Agreement, which has the purpose to hold the increase in global average temperatures to well below 2°C, and pursue efforts to achieve 1.5°C above pre-industrial levels; improve the ability to adapt to adverse climate change and foster low carbon emissions development; and support funding, consistent with a pathway towards low carbon emissions and climate-resilient development.

The negotiated outcomes will influence national policies and energy technology choices for decades into the future. All countries will be required to contribute to the global effort to deliver on the Paris Agreement. Domestic policies will likely follow where they are not in place already. This may mean that Malaysia could implement some form of domestic climate change policy that could affect the Sakura operation in which ARM has equity. The Paris Agreement provides further signals that the global economy is becoming increasingly carbon-constrained and as such ARM understands the need to continue with efforts to reduce direct and value chain emissions to remain competitive.

Response

ARM has invested in ongoing R&D to reduce the cost and climate impact of alloy production. By reducing the electrical energy per ton of alloy, ARM aims to reduce related GHG emissions by 40% through this innovative process. ARM also aims to process waste streams to enable more efficient production.

The ARM ERM process continuously monitors developments in climate-related domestic policy in the areas in which we operate as well as in primary customer markets.

We will undertake scenario analysis as a tool that is needed for understanding and reporting on the strategic implications of the transition to a lower carbon, climate-resilient economy. This will further feed into the climate risk assessment process as well as strategic, long term business decisions.

Risk

Mandatory reporting regulations: DEFF introduced the National Greenhouse Gas Emission Reporting Regulations effective on 3 April 2017 and requiring submission of data at the end of March each year. In September 2020 government gazetted amendments to the regulations and released a draft Validation and Verification Guideline for the National Greenhouse Gas Emissions Reporting System (NGERS) for comment. The Department of Energy (DoE) indicated that it was developing regulations that will require companies to measure and report energy as well as develop and submit Energy Management Plans. ARM exceeds the proposed energy consumption threshold and would therefore have to measure and report energy and develop and report on Energy Management Plans. The regulations remain in draft format and therefore uncertainty exists. If implemented, it is expected that these processes would attempt to align with those of DEFF.

Response

- ARM has successfully submitted GHG data to the DEFF in March 2018, 2019 and 2020 and has a mature GHG reporting system that will enable ongoing reporting that complies with the regulations.
- The ARM Ferrous division, through our joint venture with Assore Ltd (trading as Assmang (Pty) Ltd), is part of the Energy Intensive Users' Association and has an energy efficiency charter in place which includes targets for energy-efficient practices.
- Continuously improving and updating the ARM GHG reporting system from 2018 to 2020, enabling a disaggregated reporting system that can package information to meet multiple regulatory (and other stakeholders) requirements.
- The ongoing bottom-up assessment of energy and GHG reduction opportunities will identify energy reduction initiatives that will serve to inform site-level Energy Management Plans in line with the regulations, should the DoE's requirements come into effect.

CLIMATE CHANGE continued

TRANSITION RISKS continued**Technology risk****Risk**

Technology substitution (electric vehicles): Climate change and other drivers (e.g. air quality) are leading to an increased uptake of electric vehicles. This, coupled with new models of mobility (e.g. use of ride-sharing), could limit sales of internal combustion engine vehicles and the associated demand for PGMs in their catalytic converters. Roughly one-third of platinum is sold to the automotive industry (the remaining meeting the demands of the industrial and jewellery sectors). Limited impact is expected in the short term but the net impacts in the long term remain unclear.

Response

ARM will undertake scenario analysis to explore the potential impact of climate-related drivers on demand for internal combustion engines and the associated demand for platinum in autocatalysts. This will include an assessment of the potential role of platinum in Fuel Cell Electric Vehicles (FCEVs) and other industrial applications (for example in the broader hydrogen economy) that could represent positive drivers for demand, driven by climate change.

Reputational risk**Risk**

Increased stakeholder concern or negative stakeholder feedback: There is a reputational risk associated with not adequately responding to evolving, and increasing, climate change-related stakeholder expectations. Failure to demonstrate positive climate change performance would damage ARM's reputation and impact our relationships with customers, investors, business partners, regulators, and the broader society. There is increasing pressure from investors, in particular for mining companies, to proactively manage climate change risks and opportunities which are perceived as material to shareholder value.

For example, in 2019 the Raith Foundation and Just Share engaged ARM about a number of questions and concerns related to climate change. One of the key concerns raised was the fact that ARM's GHG emission reporting excludes the emissions from its investment in coal (managed by Glencore).

Response

- ARM has been admitted to the FTSE4Good Emerging Markets Responsible Investment Index since inception and in F2020 was ranked fourth in the FTSE/JSE Responsible Investment Top 30 Index (previously included in the JSE Socially Responsible Investment Index). The FTSE/JSE Responsible Investment Index Series has been designed to identify South African companies with leading Environmental, Social and Governance (ESG) practices and to facilitate investment in those companies.
- To manage our overall sustainability performance, ARM regularly engages with stakeholders and produces an annual integrated sustainability report. Additionally, in 2017 ARM initiated a programme to comply with new climate change regulations as well as "non-negotiable" but voluntary requirements and reporting expectations related to climate change and water. The regulatory and "voluntary" requirements are related, and ARM sought to develop a systematic process for developing systems, reporting and building capacity to meet the current and evolving requirements. This report represents one output of that process.
- ARM engaged with the Raith Foundation and Just Share and has responded to formal requests for information. As part of the request to disclose GHG emissions related to the ARM/Glencore joint venture operations, ARM has engaged Glencore as the managing partner to provide emissions data related to those operations and has, for the first time, for the first year, reported on these for the current financial year.
- Communities receive additional benefits from the mines and smelters through corporate social responsibility (CSR) investment programmes. During F2020, ARM spent a total of R130.3 million on CSR and R14.5 million was provided to projects facilitated by the ARM Broad-Based Economic Empowerment Trust.

CLIMATE CHANGE continued

TRANSITION RISKS continued**Reputational risk continued****Risk**

Shifts in consumer preferences: fossil fuels will be increasingly contested by society and, as a result, the role of thermal coal will decline. This could affect ARM's investment in coal, which currently contributes to the company's attributable headline earnings.

Response

- ARM participates in the governance processes with our partner, Glencore, towards reducing the climate impact of the Goedgevonden and Participating Coal Business operations.
- ARM will undertake scenario analysis to explore the potential impact of climate-related drivers on demand for thermal coal.
- This risk is considered at a strategic level within the company.
- ARM supports the need for a Just Transition in South Africa.

PHYSICAL RISKS**Acute risk****Risk**

Increased severity of extreme weather events (affecting water availability): Drought due to climate change is a material risk where water is a critical resource for operations. In locations where ARM currently operates, water is seen as a scarce resource, particularly in the Northern Cape and Limpopo Province. The availability of water determines our ability to continue operating and expanding mining, beneficiating and smelting operations in a sustainable manner. Drought coupled with periods of extreme rainfall (a risk in the Northern Cape) also poses the risk of sinkholes with the potential to affect production. The Khumani and Black Rock operations in the Northern Cape have already identified water as a strategic business risk and due to regional water infrastructure problems, lack of access to water has the potential to impact the business significantly. Two Rivers and Modikwa mines also face long term supply risks and would be susceptible to drought causing production disruptions. Investments in bulk water infrastructure result in higher water costs. If extreme climatic events do get worse as predicted by the climate models, further pro-active management and mitigation measures will have to be taken to ensure that operations do not experience business interruption and loss of production.

Response

- ARM anticipates greater investment in bulk water infrastructure as part of industry – government collaboration.
- Sedibeng (utility service provider) is responsible for supplying potable water from the Vaal Gamagara Water Supply Scheme (VGGWSS) to our Northern Cape mines. Mines are expected to fund a significant portion of the Scheme. A Mines' Leadership Forum was established in the Northern Cape Mines Leadership Forum as a Principal Committee of the Minerals Council South Africa, to among other things, collaboratively and proactively engage around the appropriate design and cost of the VGGWSS.  4.5.3.
- An ARM executive participates on the Lebalelo Water User Association (LWUA), a Section 12 entity set up by mining companies operating in the area. The Association acts as a water utility supplying bulk raw water to member mines & other clients from the Olifants River and the Flag Boshielo Dam (and the De Hoop dam in the future).  4.5.2.2.
- Various investments have taken place at the mine level. For example, Khumani Mine funded the upgrade of the Olifantshoek bulk water infrastructure; and various investments in maintenance. Investment in on-site water storage; reduced consumption through efficiencies (e.g. reduced water consumption for mining activities through the use of "additives"); lining of dams and tailings facilities and improving return water infrastructure.  3.5.5.

CLIMATE CHANGE continued

PHYSICAL RISKS continued**Acute risk continued****Risk**

Increased severity of extreme weather events (increasing the risk of discharges): Climate change will likely result in an increase in extreme rainfall events. Extreme prolonged rainfall events could affect mining operations and also result in operations having to discharge water into the environment. This could result in legal non-compliance and potential fines which will have both reputational and financial consequences. Implications for the operations are, for example, greater investment in dewatering, increased capital costs to build water-related infrastructure with larger retention capacity and possibly increased requirements for water treatment facilities to treat process/mine water that may need to be discharged to the environment after extreme rainfall events. This is a potential risk for our Nkomati Mine and Machadodorp Works.

Reduced production activities due to economic and market conditions have impacted the system at Machadodorp Works. Due to reduced re-use and consumption, any rainwater poses a potential risk of controlled discharge and associated non-compliance with the waste management and water use licences.

Response

- ARM manages its water use at all its operations proactively and in line with its Water Use Licences and EMPR commitments. All operations run closed water circuits. The operations have developed management tools such as water balances to allow them to further optimise the usage and management of water. Discharges only take place in line with permits in times of extreme precipitation or in emergency situations and these discharges are reported to authorities as required.
- Nkomati has a dewatering programme to ensure safe in-pit mining. Management measures include borehole management, a code of practice for the tailings storage facility, continuous pumping excess water, monitoring of discharge points, a stormwater management plan and engagements with the authorities.
- Machadodorp Works established a water management project team and has constructed cut off trenches to capture any dirty run-off water and redirect it to the sump and then to the stormwater dams.

Risk

Increased severity of extreme weather events (affecting electricity costs and supply): The long-term cost and lack of security of a reliable and adequate supply of electricity, presents a top ten Group risk. Climate change has the potential to exacerbate this risk. Climate-related regulatory burdens could place additional strain on the already constrained national electricity generation utility affecting maintenance and investment in new generation capacity. Additionally, physical climate change impacts could affect the supply of coal (and other products used in the generation of power) and damage infrastructure which, given the lack of reserve margin, could exacerbate power supply risks. "Load shedding" in South Africa also creates an indirect climate change risk as ARM is forced to use backup generators. Increased load shedding during the year has had a significant impact on diesel consumption, particularly at Black Rock Mine which has 14 MW of backup generator capacity.

Response

- Operations have invested in diesel generators to mitigate load shedding and unplanned electricity supply constraints.
- Emergency plans and monitoring systems are in place.
- ARM engages in quarterly liaison meetings with Eskom. The group electrical engineer is the dedicated liaison person and remains in constant communication with Eskom and is made aware of possible power outages that may affect the various operations.
- There is ring feed power supply at the operations. Khumani, Beeshoek, Two Rivers, Modikwa and Nkomati mines as well as Cato Ridge Works have ring feed capabilities and projects are underway at Black Rock Mine to improve power supply contingencies.
- A service level agreement (SLA) is in place with Eskom and joint venture partners for the provision of generator capacity from Black Rock Mine when available.

CLIMATE CHANGE continued

PHYSICAL RISKS continued

Chronic risk

Risk

Rising mean temperatures affecting our workforce: Climate models project increases in the short term (2015 – 2025) of between 1°C and 2°C, in the medium term (2040 – 2060) of between 2°C and 3°C and in the long term (2080 – 2100) of between 2.5°C and 5°C, relative to 1970 – 2005, across South Africa, according to dynamically downscaled projections from the Long Term Adaptation Scenarios (LTAS). The risk of rising temperatures impacts water requirements for the Northern Cape operations as the higher the temperature, the greater the evaporative losses.

Higher temperatures could result in work disruption as staff may suffer from heat stress. For example, at Beeshoek Mine, historical weather data has shown that the weather patterns locally have changed considerably over time. The site experienced a high of 41°C in F2013, which was the highest temperature recorded in 10 years. It was indicated by the Beeshoek Mine team that temperatures rising to 45°C may result in the site stopping work or will at least result in rotation of staff to prevent heatstroke. For Black Rock Mine, higher temperatures may also necessitate additional cooling requirements in the underground workings (where applicable) and in all the Northern Cape operations, additional air conditioning for cooling of offices and buildings could lead to increased costs from additional energy and contribute to rising greenhouse gas emissions.

Response

- Operating sites monitor weather data on an ongoing basis. Should temperatures exceed a threshold then action will be taken to ensure that staff are not exposed to heat stress. Mandatory Codes of Practice related to thermal stress (prescribed by the DMRE) are implemented to ensure this. In order to mitigate the risk on water supply in water-scarce areas, it is likely that technology that uses less water than conventional tailings disposal (which entails slurring of waste in high volumes of water) will be investigated and implemented more (e.g. paste disposal as is the case at Khumani Mine).
- Various other water conservation measures are described in [4.5.3](#).

Risk

Increasing social unrest related to inadequate water service delivery (exacerbated by climate change): Climate change could affect the livelihoods and well-being of vulnerable communities. The effect of reduced food security, negative health implications, higher costs and destruction of assets could indirectly influence our ability to source local skills, to secure our mining rights and could exacerbate employee relation problems leading to industrial action and production losses.

Response

- We attempt to mitigate this risk through investment in and engagement with communities as well as engaging with local and national government and other stakeholders. We focus our Social and Labour Plans around the needs of communities and invest in infrastructure related to water and services, as well as healthcare where appropriate.

Risk

Changes in precipitation patterns and extreme variability in weather patterns affecting ARM's suppliers: Droughts and extreme rainfall events have the potential to impact our value chain. Our Northern Cape operations (Beeshoek, Black Rock and Khumani mines) experienced floods in F2016. These followed a drought period. This combination resulted in sinkholes that affected mine logistics. For example, suppliers to Black Rock Mine had to travel an additional 100km for a period of four days. During F2016, nickel and chrome concentrate sales were negatively affected by poor weather conditions that caused delays in shipments from Maputo Port.

Response

- We have not identified our supply chain as presenting a material water-related risk to our organisation, based on experience and initial investigations into potential risks in the future (other than the need to secure the supply of water for the operations). Substitutes of critical supplies are available and water costs still represent a relatively small contribution to the cost of purchased goods and services. The most immediate concern relates to extreme weather events (floods and droughts) affecting logistics and the ability to receive goods and services in a timely manner.
- We recognise the need to better inform our assessment of supply chain risk and have undertaken an assessment of risks associated with operations' top 5 suppliers by spend. [4.5.3.3](#).
- ARM also actively engages with key suppliers. [3.6.1](#).

CLIMATE CHANGE continued

PHYSICAL RISKS continued

3.4.3 Material climate change opportunities

Opportunity

Resource efficiency incentives: There are a number of tax incentives and cash grants in the area of energy and climate change which ARM could take advantage of: The Department of Trade and Industry (DTI) runs the Manufacturing Competitiveness Enhancement Programme (MCEP) which aims to provide enhanced manufacturing support, including Green Technology and Resource Efficiency; Section 12L Tax Incentive is managed by the Department of Energy and provides tax reduction incentives for businesses to claim if they can show measurable and verifiable savings in all energy forms. The tax relief was increased in 2016 to 95 cents deduction on taxable income per kilowatt-hour of energy saved. This incentive has been extended until the end of the first phase of the carbon tax (31 December 2022) in line with requests from stakeholders. Section 12B allows companies to deduct the cost incurred from investing in assets that are used directly for the production of renewable energy from their taxable income.

Strategy to realise the opportunity

- Due to the fact that energy consumption and the management thereof is so important, tax incentives and grants will be investigated in order to aid the implementation of further energy efficiency measures.
- A project was implemented to secure 12L benefits for the two projects implemented at Cato Ridge Works in F2014 (related to the installation of two variable speed drives (VSDs) on the suction fans serving the tapping room of electric furnaces). These initiatives saved 11 661 MWh of electricity and resulted in a net saving of over R2 million in F2020.



CLIMATE CHANGE continued

3.4.3 Material climate change opportunities continued

Opportunity

Access to new markets (high-quality iron and manganese ore):

Lumpy and high-grade iron ore enable steel producers to reduce energy consumption and GHG emissions associated with the sintering process. The lumpy premium is roughly 15% of the base price with an additional premium of roughly 4.8% due to the high ore grade. The high ore grade of fines is roughly 4% of the base price.

High-grade manganese ore also enables smelters to use less energy. In China, authorities have stopped local miners from mining low-grade manganese. This is the result of air pollution, energy efficiency, and climate change drivers. This has led to an increase in the import of the type of high-grade ore that ARM produces.

Strategy to realise the opportunity

- Assmang has positioned itself to meet developments in demand in this market.
- Lumpy iron ore is upgraded to 55% (the industry benchmark is 62%). 55% of the Khumani Mine iron ore product is lumpy.
- The climate-related drivers increasing demand for ARM's high-grade manganese ore in China have contributed to ARM's decision to modernise and expand Black Rock Mine.

Opportunity

Access to new markets (Platinum): Platinum will have a key role to play in the hydrogen economy and it is expected that demand will increase given climate-related drivers in the transport sector (increasing demand for Fuel Cell Electric Vehicles (FCEVs)) and in industry (increasing demand for hydrogen as a clean energy source and as a reductant that can reduce process emissions).

FCEVs are emerging as a viable technology particularly in the freight transport sector and some analysts see it as playing a significant role in the passenger transport sector where it competes with Battery Electric Vehicles (BEVs) as an alternative to internal combustion engines. This presents an opportunity in the short to medium term.

Industrial use of hydrogen is less mature and while uncertainty exists regarding its future application, it is expected that platinum will play an increasing role in facilitating the decarbonisation of the industry in the long term.

Strategy to realise the opportunity

- ARM monitors developments in the platinum market as well as efforts underway to stimulate and support the hydrogen economy.
- ARM's planned scenario analysis will help inform our understanding of these drivers in the market and the potential scale of this opportunity over time.
- ARM continues to invest in the Platinum division. Capital expenditure at ARM Platinum operations – on a 100% basis – increased slightly to just over R1.2 billion (F2019: R1.2 billion).

Opportunity

Access to new markets (nickel and manganese): The growth in demand for renewable energy has increased demand for battery storage to accommodate the variable nature of technologies such as solar PV. The significant momentum towards electromobility has also resulted in significant investment in battery storage for mobile applications. The battery remains one of the main reasons for a higher cost of electric vehicles relative to Internal Combustion Engines (ICE) but analysts predict significant reductions in the cost of batteries as R&D investments materialize and as producers achieve greater economies of scale. Some analysts suggest that passenger electric vehicles will reach price parity with ICE vehicles around 2025-2030. This would represent a tipping point which would see a significant increase in the demand for ARM's products used in the batteries of these vehicles.

Response

- ARM monitors developments in the battery storage market.
- ARM's planned scenario analysis will again help inform our understanding of these drivers in the market and the potential scale of this opportunity over time.
- ARM continues to invest in manganese. The modernisation and expansion of Black Rock Mine will increase production capacity from 2.6 million tonnes in 2010 to 4.6 million tonnes in 2025. ARM has spent R8.3 billion to date and the full project will cost R10 billion.
- ARM's production of nickel will decrease. Nkomati Mine's joint-venture partners have agreed to scale down production at this loss-making mine and place the open-pit operation on care and maintenance by February 2020 in preparation for closure.

CLIMATE CHANGE continued

3.4.4 The impact of risks and opportunities on business and financial planning

Climate change has resulted in a number of disruptions that have impacted our operations, our suppliers and our communities.

Physical climate impacts have resulted in production stoppages at our mines in the Northern Cape. During F2019, electricity supply interruptions affected water supply to the ARM Ferrous operations in the Northern Cape. Flooding in the area occurred due to excessive thunderstorms in January 2017, which is not normal and affected both Beeshoek and Khumani mines. Flooding resulted in plant stoppages at Beeshoek Mine in January and February 2019. At Khumani Mine, the excessive rain led to seven days of lost production due to unsafe haul road conditions. Between December 2016 and February 2017, the Khumani plant experienced downtime due to water shortage of 113 hours and 92 hours, for the off-grade plant and the on-grade plant respectively. Extreme weather events also contributed to incidents of water discharge at Nkomati and Two Rivers mines.  4.5.2.3.

Production at Cato Ridge Works was affected by load shedding at the start of 2019 and inconsistent electricity supply could have a negative effect on refractory linings and costs. Operations have reported increased use of the backup generators that support critical functions, such as ventilation fans, increasing diesel consumption and emissions.

Floods and sinkholes (likely caused by earlier droughts) affected Black Rock Mine logistics in F2017. Suppliers had to travel an additional 100km, resulting in increased transport costs and delays. There were no production losses associated with the event and no significant financial impact (impacts on Black Rock Mine’s logistics resulted in an estimated increase in costs of R122 000).

Social unrest and strikes have impacted the resilience of our operations and of the communities in which we operate, e.g. community unrest and vandalism of water supply infrastructure that could impact water supply to Modikwa Mine. The Lebalelo pipeline was damaged during 2015 by local communities (remote from mining operations), whose actions were generally driven by frustrations with potable water service delivery. Incidents continue sporadically but have not been as significant as those experienced in 2015.

On the positive side, market trends driven by climate change, among other things, have seen an increase in demand for certain commodities.

ARM continues to invest in PGMs and while climate change presents a risk to demand for catalytic converters used in ICE vehicles, we anticipate an increase in demand for platinum associated with hydrogen as a key source of energy and reductants to enable reduced GHG emissions in the transport and hard-to-abate industrial sectors.

Assmang has experienced a higher demand for better quality iron and manganese ores as steel producers are driven to reduce their GHG emissions. Demand for our quality products has for example, increased significantly in areas like China which is seeking to urgently address its pollution challenges. Steel producers in China have accordingly increased the consumption of high-quality ores in the effort to improve efficiencies, reduce emissions, and curb air pollution, as illustrated in the graphic below.

Concerns globally about industrial emissions are expected to return after the Covid-19 pandemic recedes, encouraging use of higher-grade manganese ores in steel manufacturing. Demand for very high-grade manganese for battery manufacturing (currently 6% of use) is expected to grow firmly due to the growing uptake of electric vehicles, but the impact on overall demand should become noticeable only toward the end of 2025*.

South African supply (largest producer and exporter – has grown strongly in recent years, driven by a surge in demand from China where steel production standards were adjusted to require higher manganese content to boost the steel’s strength. Production has resumed strongly since the second quarter of the 2020 Covid-19 lockdown and is expected to continue expanding.

Climate change risks and opportunities have also contributed to the impetus to invest in innovation. For example, ARM is investigating and testing technology which may reduce the energy requirements in the smelting process.

* Afriforesight: Commodity industries 5-year forecast quarterly report, October 2020.



CLIMATE CHANGE continued

3.5 METRICS AND TARGETS

3.5.1 GHG emissions

3.5.1.1 Scope 1 & 2 emissions

ARM's GHG calculations are based on the Greenhouse Gas Protocol – Corporate Standard (GHG Protocol), published by the World Resources Institute and World Business Council for Sustainable Development in March 2004. The data collection process complies with the data quality requirements set out in ISO 14044, as well as the GRI Standards, and is verified externally on an annual basis.

Scope 1 and 2 emissions have been calculated on an equity share basis in accordance with the GHG Protocol Corporate Accounting and Reporting Standard. Data reported separately to the Department of Environment, Forestry and Fisheries (DEFF) is reported on an operational control basis (for the operations where ARM has operational or joint operational control) and based on a calendar year, as per the regulatory requirements.

ARM's existing base year is F2014. The target base year excludes divested operations (Dwarsrivier and Lubambe mines).

Emissions attributable to our operations arise primarily from the consumption of electricity produced by coal-fired power stations and the combustion of fossil fuels during mining, load and haul, materials handling, and processing activities. Emissions data is monitored and reported internally every quarter, discussed at operational sustainability meetings and assessed as part of quarterly risk management workshops.

Scope 1 emissions mainly relate to diesel consumption (for load and haul activities) and reductants (Cato Ridge Works). Electricity consumption (Scope 2 emissions) comprises 81% of ARM's total carbon footprint.

The F2020 estimated carbon footprint (Scope 1 and 2 attributable emissions) decreased 8% to 1.02 million equivalent tonnes of CO₂ (mtCO₂e) from 1.10 mtCO₂e in F2019.

This represents a 17% decrease compared to the F2014 baseline. Scope 1 emissions decreased by 18% year-on-year and Scope 2 decreased by 5% year-on-year. The Eskom grid emission factor has

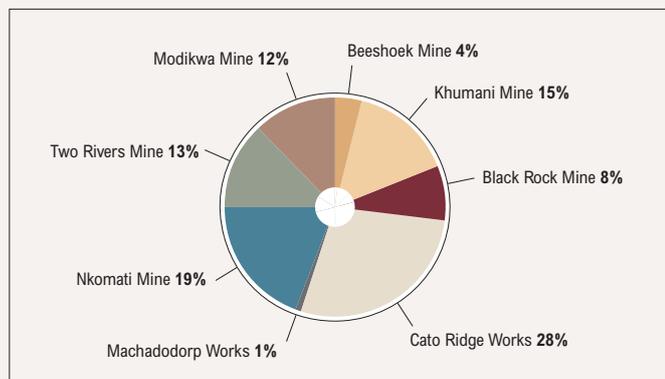
not been updated as, at the time of writing, Eskom had not released the latest figure. A robust and transparent grid emission factor in South Africa remains a concern but collective efforts are underway to address the challenges. ARM's electricity consumption (MWh) decreased by 6%.

Changes in emissions since the F2014 base year are primarily due to the following reasons:

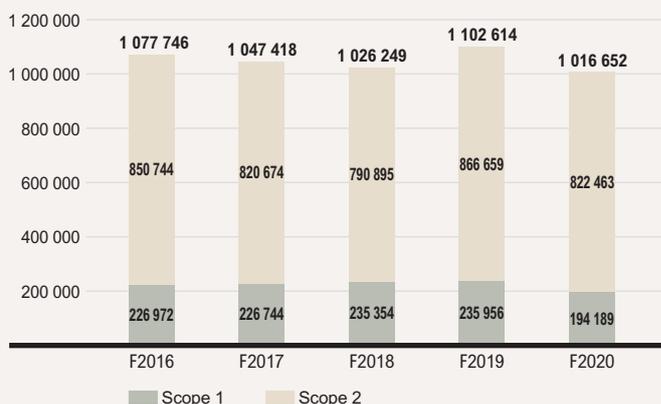
- Covid-19: All South African operations apart from the coal operations were placed on temporary care and maintenance during the national lockdown announced by the President of the Republic of South Africa that started on 27 March 2020. This had a significant impact on production and associated energy consumption.
- Divestments: The disposal of ARM's interest in Dwarsrivier Mine was completed in July 2016. The disposal of ARM's interest in Lubambe Mine and the Lubambe Extension Area was completed on 22 December 2017.
- Changes in production output: Production of manganese alloy at Cato Ridge Works decreased by 36% in F2016 compared to F2015 due to operating fewer furnaces at Cato Ridge Works. Emissions from Nkomati Mine continued to decrease due to scaling down of the mine in preparation for care and maintenance with the mine now expected to cease production in February 2021 (previously reported as September 2020). Production changes at various operations contributed to other changes over time.
- Electricity supply disruptions: Load shedding in 2015 necessitated the use of generator sets, particularly at Black Rock Mine which has a 14MW capacity diesel generator.
- GHG emission reduction initiatives: initiatives implemented since F2014 (and still actively contributing to savings) resulted in a saving of 68 885 tCO₂e in F2020 (contributing a 3.3% reduction to the change in ARM's Scope 1 and 2 emissions).

During F2019, Cato Ridge Works contributed 28% of ARM's total Scope 1 and 2 emissions. Nkomati Mine contributed 19% and Khumani Mine 15%, mainly as a result of diesel consumption during mining, load and haul activities in the open pits.

SCOPE 1 AND 2 CARBON EMISSION CONTRIBUTION BY OPERATION (%)



SCOPE 1 AND 2 CARBON EMISSIONS (tCO₂e)



CLIMATE CHANGE continued

	Scope 1 (tCO ₂ e)	Scope 2 (tCO ₂ e)	Scope 1 & 2 (tCO ₂ e)
Ferrous Division			
Beeshoek Mine	19 821	17 257	37 078
Khumani Mine	52 414	105 055	157 469
Black Rock Mine	9 270	67 817	77 088
Cato Ridge Works	76 104	210 695	286 799
Machadodorp Works	856	12 380	13 236
Total	158 465	413 205	571 670
Platinum Division			
Nkomati Mine	23 968	171 641	195 609
Two Rivers Mine	7 264	121 982	129 246
Modikwa Mine	4 492	115 191	119 683
Total	35 723	408 814	444 538
ARM Corporate Office	–	444	444
ARM Total	194 189	822 463	1 016 652

GHG emissions intensity

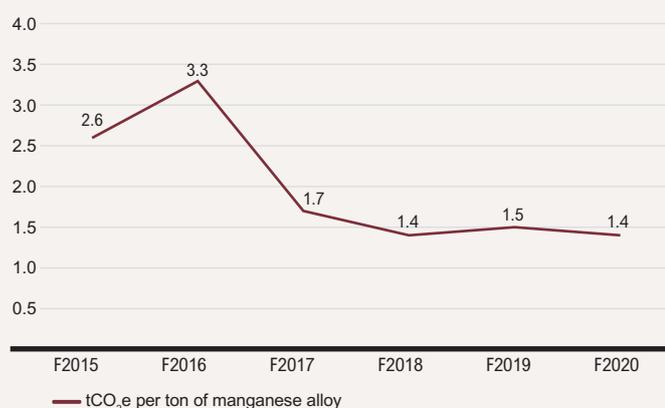
We calculate and track carbon emissions intensity ratios per full time employee and per unit of production or processing to adjust for changes in production activity levels. Scope 1 and 2 carbon emissions per tonne of manganese alloy produced, decreased by 5% to 1.4 tCO₂e/tonne in F2020 from 1.5 tCO₂e/tonne.

Scope 1 and 2 emissions per tonne of iron ore produced was 0.024 tCO₂e/tonne (F2019: 0.023 tCO₂e/tonne). Scope 1 and 2 emissions per tonne of manganese ore produced decreased to 0.043 tCO₂e/tonne from 0.045 tCO₂e/tonne in F2019.

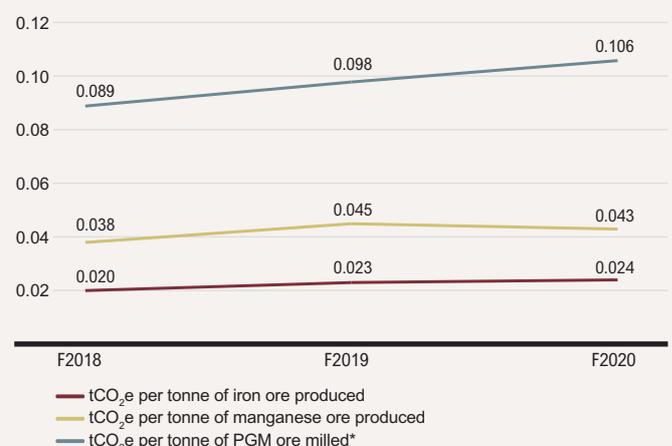
Carbon emissions per tonne of ore milled at our two primary platinum mines, Modikwa and Two Rivers mines, increased to 0.106 tCO₂e/tonne (F2019: 0.098 tCO₂e/tonne). Scope 1 and 2 emissions per full time employee (FTE) decreased by 4.6% to 188 tonnes CO₂e (F2019: 197.1 tCO₂e).

Scope 1 and 2 emissions per man-hour worked increased to 53 kg CO₂e (F2019: 52 kg CO₂e).

SCOPE 1 AND 2 CARBON EMISSIONS PER TONNE PRODUCED – SMELTERS (tCO₂e)



SCOPE 1 AND 2 CARBON EMISSIONS PER TONNE PRODUCED – MINES (tCO₂e)



* Two Rivers and Modikwa Mines only.

CLIMATE CHANGE continued

3.5.1.2 Scope 3 emissions

Reducing operational emissions is vital and while emissions from our value chain are significant, we are working to mitigate risks and take advantage of opportunities arising from the global transition to a lower-carbon, climate-resilient economy. We are assessing supply chain risks and engaging with suppliers to mitigate carbon price pass-through effects and to access goods and services that enable operations to reduce energy consumption and associated emissions. We also see downstream opportunities driven by the continued demand for high-grade iron and manganese ore that enables efficiencies and reduced emissions in the processing of ore by our customers, as well as increasing demand for products such as PGMs and nickel that are used in the growing deployment of low carbon technologies.

The TCFD recommends that organisations should assess not only the potential direct effects of climate change on their operations, but also the “potential second and third-order effects on their supply and distribution chains”, and explicitly recommends that organisations disclose Scope 3 emissions associated with their business and the related risks. Scope 3 emissions are the indirect emissions not included in Scope 2 that occur in the upstream and downstream value chain.

Scope 3 emissions are calculated according to the GHG Protocol – Corporate Value Chain (Scope 3) Accounting and Reporting Standard. The latest UK Department for Business, Energy & Industrial Strategy’s emission conversion factors are used. Source data is gathered directly or estimated depending on the availability of data or the materiality of the Scope 3 category. ARM’s approach to addressing Scope 3 emissions is evolving and includes efforts to improve data gathering and reporting but more significantly to focus on material sources in recognition of our stewardship role to collaborate with stakeholders to reduce emissions across the lifecycle of our products.



Performance

We have improved the completeness and accuracy of our Scope 3 inventory. These efforts have focused on the most material Scope 3 categories: emissions associated with the use and processing of products (notably iron ore, manganese ore and ferromanganese) and emissions associated with our investments (notably our investments in thermal coal with our partner, Glencore). ARM will continue to improve our Scope 3 inventory in F2021 as well as continuing to work closely with our joint venture partners to ensure risks are mitigated.

Category	Scope 3 (tCO ₂ e)	
	F2020	F2019
1 Purchased goods and services	48 793	61 955
2 Capital goods	Relevant–not calculated	
3 Fuel and energy-related activities	51 699	53 092
4 Upstream transport and distribution	883 217	1 123 996
5 Waste generated in operations	1 130	1 473
6 Business travel	2 765	1 456
7 Employee commuting	14 255	14 831
8* Upstream leased assets	–	–
9 Transport and distribution of sold products	393 892	570 669
10 Processing of sold products	44 789 657	41 195 525
11 Use of sold products	12 797 045	Relevant–not calculated
12* End of life treatment of sold products	–	–
13* Downstream leased assets	–	–
14* Franchises	–	–
15 Investments	161 076 [#]	Relevant–not calculated

* Not relevant or not material. ARM makes limited use of leased assets and associated emissions are estimated to be immaterial (Category 8); ARM’s products feed into various end uses, many are recycled and we have limited influence over the end-use (Category 12); ARM has no leased assets (Category 13); ARM does not have any franchises (Category 14).

[#] Emissions attributable to ARM from total emissions numbers provided by Glencore.

Emissions associated with Capital Goods are relevant particularly given the investments in the Northern Cape. These include the commissioning of a new cell in the tailings (paste) storage facility and the start of construction of three additional lined water storage dams at Khumani Mine in F2019 and investing in a new, lined, tailings facility at Two Rivers Mine. Most significantly, ARM continued to modernise and expand Black Rock Mine. The project began in 2013 and will be completed mid-2022 resulting in an increase in production from 2.6m tonnes to 4.6m tonnes of manganese ore.

This also includes the commissioning of a new lined tailings facility at the mine and investment in Black Rock Mine’s private rail facilities.

Going forward, we will look to assess emissions associated with capital goods which form part of our efforts to integrate carbon pricing into our investment decisions. To date, we have not experienced carbon price pass-through that has materially impacted the feasibility of our current and planned capital investments.

CLIMATE CHANGE continued

Assessing emissions associated with processing and use of our products

During the reporting year, ARM undertook an assessment of Scope 3 categories 10 (processing of sold products) and 11 (use of sold products). This is in line with the ICMM Climate Change Position Statement to engage with external parties to determine a preferred approach to reporting Scope 3 emissions.

ARM previously reported on emissions associated with the processing of iron ore using a methodology based on a crude assessment of the emissions associated with the production of iron per unit of iron ore. This year, ARM developed a more robust methodology that draws on the work of the 'Decarbonisation and Energy Efficiency Roadmap' for the Iron and Steel Sector, for the UK government (WSP Parson Brinckehoff 2015). This included emission factors associated

with primary steel production (coking, sintering and iron making using a blast furnace). The amount of iron ore required to produce a tonne of hot rolled coil from the blast furnace was used to determine the emissions per tonne of iron ore. This was applied to the total iron ore sold by ARM in F2020.

The calculation of emissions associated with the use of use of product includes the emissions associated with use phase of crude steel (secondary steel processing: steel making, rolling and casting). The analysis does not consider the emissions associated with further beneficiation of steel into final products.

Going forward, we will investigate emissions associated with the processing and use of manganese ore and ferromanganese.

Reporting on ARM's attributable GHG emissions from coal investments

Category 15 (investments) includes emissions associated with ARM's investments in coal and ARM's equity share in Harmony. For the first year, ARM is reporting GHG emissions associated with ARM Coal.



Please refer to pages 82 to 87 of the 2020 integrated annual report, available at www.arm.co.za.

ARM has an effective 20.2% investment in the Participative Coal Business (PCB) and an effective 26.01% in Goeddevonden (GGV). PCB includes Impunzi and Tweefontein operations. As the managing partner of ARM's joint venture with it, Glencore reports the GHG emissions to the DEFF, consolidated with its reporting on all its operations in South Africa. Following engagement with Glencore, we have received GHG emissions related data for the relevant operations.

Operation	Direct (attributable) (tCO ₂ e)	Indirect (attributable) (tCO ₂ e)	Total (attributable) (tCO ₂ e)
PCB	53 449	53 142	106 592
GGV	34 695	19 789	54 484
Total	88 144	72 932	161 076

Emissions include the following sources for each operation:

Direct emissions (Scope 1 for the operations): Fugitive Methane – Production (Underground) using an emission factor of 0.77m³ CH₄ per tonne; Fugitive Methane - Post-mining (Underground) using an emission factor of 0.18m³ CH₄ per tonne; and Diesel (Mobile) using an emission factor of 0.00315 tCO₂e/litre.

Indirect emissions (Scope 2 for the operations): purchased electricity using a grid emission factor of 1040 g CO₂/kWh.

LPG, petrol and explosives are not included as they are deemed, by our partner, as being immaterial to the footprint.

Emissions have been attributed to ARM based on ARM's effective shareholding in each operation.

Reducing Scope 3 emissions

In line with the ICMM Climate Change Position Statement, ARM is exploring how best to report Scope 3 emissions informed by an understanding of what role ARM can and should play in reducing our Scope 3 emissions. We participate in the ICMM Climate Change Working Group which focused on engaging internally and externally on reporting and accounting of Scope 3 emissions towards a common framework.

CLIMATE CHANGE continued

In 2020, the need to transition away from fossil-fuel dependency is accepted. Major investment funds are no longer investing in fossil fuels, especially coal. Managing this transition requires a range of social interventions to secure workers' jobs and livelihoods when shifting to sustainable production, including avoiding climate change and protecting biodiversity, among other challenges. South Africa has officially embraced a national "Just Transition", informed by a multi-stakeholder engagement process led by the National Planning Commission (NPC) in 2019. ARM supports the need for a Just Transition in South Africa.

Reducing emissions associated with the use and processing of the iron ore we produce is challenging. Steel is one of the "hard-to-abate" sectors due to limited opportunities to reduce process emissions in particular and few viable alternatives to steel in manufacturing and construction end-uses. Various efforts to drive the net zero carbon industry transition are underway. For example, the Mission Possible Platform and the "Leadership Group for Industry Transition". Hard-to-abate sectors require collaborations across the value chains to identify and implement long-range strategic plans that set out actionable measures on innovation, policy, public-private partnerships and the finance required to transform these industries and the markets they serve. ARM is monitoring developments and engage in shaping these collaborations through, for example, our involvement in the ICMM.

We can play a role in reducing some of the emissions associated with the transport of our product (category 9). To date, we have made some progress in this regard. Black Rock Mine has, as part of the operation's expansion project, invested in its private rail facilities and engaged with peers and Transnet to ensure that the rail infrastructure can transport the increasing product. The resultant shift from road to rail product transport at Black Rock Mine has resulted in a GHG emissions saving of 15 951 tCO₂e.

There remain many challenges in terms of data gathering, double counting, traceability of sold product and engagement with value chain partners. We will continue to engage with stakeholders to refine our approach and our understanding, to the point where we can integrate Scope 3 emissions into our strategic processes through, for example, including Scope 3 emissions within ARM's future GHG emission reduction target/s where appropriate and practical.

TPI > TPI Question 8 & 13

3.5.2 Energy

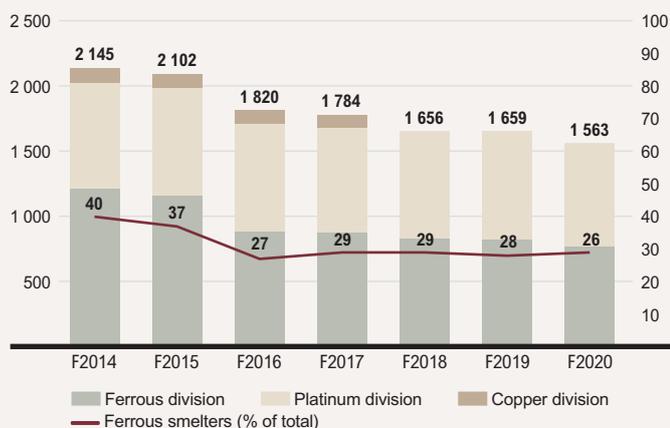
Primary sources of energy consumed in our value chain are electricity and diesel. Electricity is used in mining activities to power ventilation fans, pumps for processing and dewatering, conveyor belt motors and the machines that crush and mill ore. The energy used for heating is one of the biggest cost inputs in the smelting process at Cato Ridge Works.

The ARM Platinum division contributed 51% to total Group electricity consumption, the three ARM Ferrous mines 23%, Cato Ridge Works 25% and Machadodorp Works 1%.

Operations consumed 1 563 GWh (reported on a 100% basis), a decrease of 6% compared to F2019 (1 659 GWh). Nkomati Mine accounted for 21% of total electricity consumption, Modikwa Mine 17%, Two Rivers Mine 13% and Khumani Mine 13%.

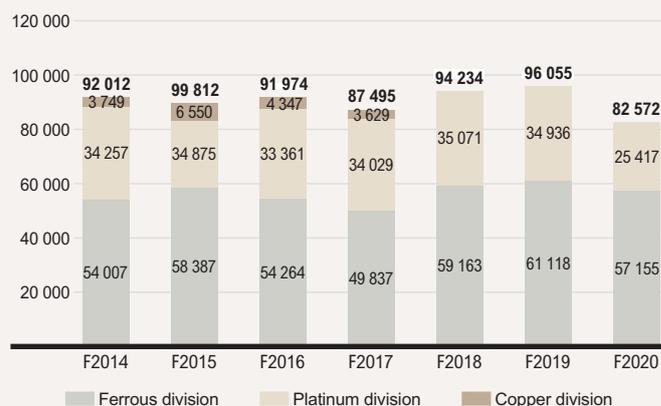
Diesel is used to power mobile equipment (trackless machines and vehicles used for mining, loading, hauling and logistics) and standby electricity generators. Diesel consumption contributed 58% to total Scope 1 carbon emissions in F2020. Total Group diesel consumption decreased by 14% to 82.6 million litres in F2020 (F2019: 96.1 million litres). Khumani (44% of total diesel use), Nkomati (21%) and Beeshoek (17%) are open pit mines that use diesel mainly to haul run-of-mine material to the concentrator plants.

ELECTRICITY CONSUMPTION (100% basis) (GWh)



* Smelting operations at Cato Ridge Works accounted for 25% of the electricity consumption while metal recovery at Machadodorp Works consumed ±1%.

DIESEL CONSUMPTION BY DIVISION (100% basis) (000 litres)



CLIMATE CHANGE continued

Energy consumption is expected to increase at a number of operations. Khumani and Beeshoek mines are mining at deeper levels and mining lower quality ore which increases stripping rates. Black Rock Mine's continued expansion will see a ramp up in diesel consumption by around 10% compared to the current year.

Modikwa Mine is building a new chrome concentrator plant. Two Rivers Mine has invested in a new mill (increasing energy demand by 3.5MW), more ancillary equipment and a new tailings storage facility (TSF) which will increase electricity for pumping requirements by 1.7MW once commissioned. If the mine opts to mine the Merensky Reef then energy consumption will increase significantly (electricity requirements could increase from 35MVA to 80MVA by 2024). Two Rivers Mine's electricity demand is set to increase by approximately 5MVA in the next year. The grid infrastructure cannot accommodate the increased demand in the short term and the mine will need to run diesel generator sets which will increase diesel consumption. The mine is currently engaging with Eskom to supply the required capacity by the end of 2022.

Exploring renewable energy opportunities

ARM is exploring options to invest in renewable energy generation technologies or to procure electricity from renewable sources.

The capital cost of renewable electricity, particularly solar PV, has decreased significantly in recent years and ARM is aware that, in a growing number of contexts, it is becoming an increasingly viable option with significant potential energy security and GHG emission reduction benefits.

South Africa's Integrated Resource Plan 2019 (IRP 2019) was gazetted by the Minister of Mineral Resources and Energy, on 18 October 2019, updating the energy forecast for South Africa from the current period to the year 2030. The plan includes a total of 6,422MW under the government led Renewable Energy Independent Power Producers Programme (RE IPP Procurement Programme), with 3,876MW currently operational and made available to the grid. This is a positive development and, although additional fossil fuel generation capacity is also included in the IRP 2019, it is expected that the carbon intensity of purchased electricity from the grid will decrease over time. This will contribute to reducing ARM's Scope 2 emissions but will not be enough to meet ARM's long term GHG mitigation objectives.

ARM is investigating renewable technologies. Feasibility considerations include capital and operational costs (and associated levelized cost of electricity), electricity generation in relation to the operations' load requirements (security of supply benefits), greenhouse gas and environmental impacts, and the remaining economic life of the asset. A key driver is to align potential green investments with the remaining life of operations. Operations with a short Life-Of-Mine (LOM) are not suitable candidates. At other operations, self-generated renewable energy will not meet the load requirements and therefore cannot fully mitigate against grid electricity supply risks. Storage technology prices are expected to drop significantly given the R&D investment and economies of scale driven by recent and projected increases in Battery Electric Vehicle (BEV) deployment and embedded or decentralised generation.

Options exist to procure renewable energy from Independent Power Producers (IPPs) via arrangements that "wheel" power through the grid. LOM remains a constraint as IPPs require long term power purchase agreements (PPA) to be in place. There are also some regulatory challenges associated with large scale generation capacity and stakeholders are engaging with government and the regulator to create a more enabling environment for renewable energy generation and trading. We continue to track developments in this space.

In F2020, ARM began investigating the feasibility of solar PV plants with battery storage in the Northern Cape. ARM's Ferrous Division is engaging with a service provider undertaking feasibility studies for solar PV plants with battery storage at Khumani and Black Rock mines. The planning department is considering a PPA versus an outright ownership model. Depending on the capital outlay, the collective capacity being considered is 30MW of solar PV and 10MWh of battery storage.

Given trends, ARM is optimistic that direct investment in, or procurement of, renewable energy will play an increasing role in the efforts to reduce greenhouse gas emissions and enhance the resilience of our operations. To date we have explored relatively small installations as part of gaining a better understanding of technologies:

- A 52.8 kWp (kilowatt peak) solar PV solution was installed at ARM's corporate offices in F2019. The installation generates 7 419 kWh of electricity per month.
- Khumani Mine has a solar PV plant installed in F2014. The plant generated approximately 220 901 kWh during F2020.

3.5.3 Verification

ARM's annual Scope 1 and 2 emissions are assured by a third party. Scope 3 emissions are not externally assured.

IBIS ESG Consulting Africa (Pty) Ltd provided independent assurance over ARM's sustainability report and the engagement was performed in accordance with the AccountAbility AA1000AS guidelines (assurance Type II, moderate). This includes a review of the reporting process and an assessment of the report against AccountAbility's guiding principles of inclusivity, materiality, and responsiveness.

The assurance process includes the year-on-year change in emissions (Scope 1 and 2). Change is measured based on the annual assurance process. Additional climate change-related indicators assured include electricity consumption (GWh), total fuels consumed, the total volume of water withdrawal from all sources, and total water discharged from sites.



ARM's Independent Assurance Statement can be found on pages 102 to 105 of the 2020 ARM sustainable development report, available on our website at www.arm.co.za.



TPI Question 9

3.5.4 GHG emission reduction target

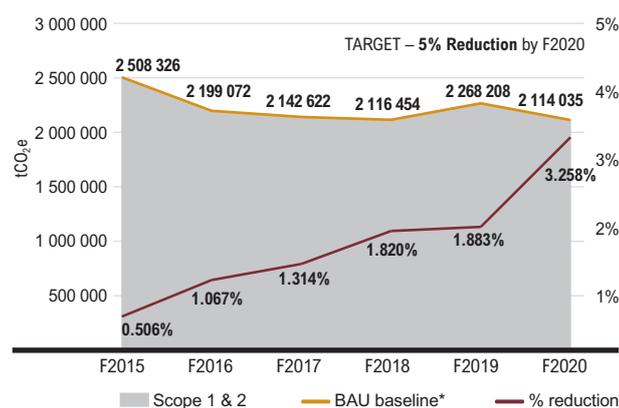
Current Target: 5% absolute reduction of Scope 1 and 2 emissions by F2020 against a F2014 baseline through emission reduction initiatives (excluding divestments).

During F2018, ARM set a revised carbon emission reduction target based on both a bottom-up assessment of opportunities to reduce GHG emissions at operations and a top-down assessment that included benchmarking of peer company targets and stakeholder expectations. Data collected during workshops and subsequently reported by each operation was coupled with a benchmark of other company targets and stakeholder expectations to determine an appropriate, more ambitious GHG reduction target at the company level. The target considers GHG emission reduction initiatives implemented since F2015 and still actively reducing emissions in the target year. The "ex-post" or "business as usual" (BAU) baseline represents what would have been emitted had the emission reduction initiatives not been implemented, in line with the GHG Protocol's Policy and Action Standard.

CLIMATE CHANGE continued

ARM's previous target was to achieve a 5% decrease in Scope 1 and 2 emissions by F2018 relative to a F2014 baseline. This target was achieved and exceeded due to reduced production at Machadodorp Works, the divestments of Dwarsrivier and Lubambe mines and due to emission reduction initiatives. The revised target is seen as a more ambitious target along ARM's journey as it is expressed in terms of emission reduction initiatives achieved and it is informed by a more detailed bottom-up assessment of GHG mitigation potential at the operations.

Progress

ARM GHG EMISSIONS
(Excluding divested operations)

Note: Scope 1 and 2 emissions and emission reductions achieved are the total emissions from operations where ARM has operational or joint operational control.

* The "BAU baseline" reflects what ARM would have emitted had it not implemented emission reduction initiatives (referred to as an "ex-post" baseline according to the GHG Protocol Policy and Action Standard).

ARM has achieved a reduction of 3.3%, falling short of the targeted 5% by the end of this reporting year. However, a number of new initiatives have commenced in F2020 and are planned for the next three years that will deliver additional savings. Some reduction opportunities involve capital investment and a budgeting process over more than one financial year.

During the year we undertook an exercise to better identify measures that save energy, where the primary driver of the measure related operational efficiencies. For example, Cato Ridge Works has achieved improved furnace efficiencies as a result of a new bricks plant enabling optimal reduction conditions, since December 2019. This initiative resulted in a reduction in process emissions of 34 680 tCO₂ compared to what would have been emitted without the initiative. Reducing operational costs was the primary driver for this initiative. In spite of registering a significant improvement on F2019, we failed to meet our target.

3.5.4.1 Setting a new GHG emission reduction target

Important lessons learned have informed an updated target which we believe is both ambitious and achievable. The new target is aligned with the 2018 conditional share plan, as set out in the summarised Remuneration Report. The target excludes Nkomati Mine which is now expected to cease production in February 2021. The target year has been set for F2023 to allow for the subsequent target to align with the second phase of the carbon budget process (which will set an effective target, for a subset of ARM's activities, from 1 January 2023 to 31 December 2028). The new system for identifying, preparing, implementing and reporting on measures that save energy and reduce GHG emissions is seen as a critical intervention to ensure that ARM meets the new target (and the related share plan incentives and regulatory requirements).

New Target: 4% absolute reduction of Scope 1 and 2 emissions by F2023 against a F2018 baseline through emission reduction initiatives (excluding divestments).

ARM plans to set a longer term target that will be more ambitious, informed by the planned scenario analysis, explore the inclusion of material Scope 3 emissions and consider the scientific requirements to achieve the 1.5°C global temperature goal and associated efforts towards net zero carbon industry by 2050.

TPI > TPI Question 4, 7 & 14

3.5.5 GHG emission reduction initiatives

The strategic focus on cost efficiencies and operational cost reduction projects support the focus on reducing energy consumption and emissions. Our energy and climate change strategy aims to identify and develop opportunities for long-term achievable emission reductions through investigating in energy efficiency initiatives, alternative energy sources, new technologies, and diversification into less energy-intensive products.

ARM drives investment in emission reduction activities through the following methods:

- **Incentives:** The 2018 conditional share plan links corporate executive share incentives to the GHG emission reduction target. At the operations, remuneration and incentive packages for engineers and production staff are linked to energy efficiency and GHG emission reductions.
- **Dedicated budget:** there is a capital allowance for energy efficiency projects at the operations.
- **Energy efficiency plans:** The ARM Ferrous division has an Energy Efficiency Charter that includes targets for efficient practices. Energy reduction plans are also in place at the operations in the ARM Platinum division.
- **Engagement workshops:** annual climate and water workshops at the operations include a focus on identifying and implementing GHG emission reduction initiatives. In F2020 these workshops focused on identifying opportunities and improving reporting systems as part of preparing for the revision of ARM's carbon budget and the related setting of new GHG reduction targets.
- **Leveraging incentives and innovative models:** ARM has benefitted from Section 12L energy efficiency incentives offered by the South African government and continues to explore direct support opportunities as well as engaging with third parties around innovative models for procuring renewable energy.
- **R&D and supply chain engagement:** ARM is exploring, internally and with partners, innovative technologies that deliver low carbon products or assist the operations indirectly reducing energy consumption and environmental impacts.

ARM has been tracking and reporting on GHG emission reduction initiatives to the Carbon Disclosure Project since 2010. Performance, as measured by emission reductions achieved, improved between F2013 and F2018 but slowed in F2019 due to challenging market conditions, limited viable options having implemented many of the "low hanging" fruits already as well as financial and governance processes associated with capital investments. However, due to additional investments and improved measurement and reporting, ARM has registered significant additional emission savings in F2020 in spite of challenging market conditions associated with Covid-19.

CLIMATE CHANGE continued

This process, which involves feasibility or product comparison, followed by budgeting and capital allocation and finally procurement or construction, depending on the nature of the project, spans over multiple financial years, e.g. the implementation of electric vehicles at Black Rock Mine over two years.

GHG SAVINGS FROM NEW INITIATIVES PER YEAR
 (tCO₂e per year)

F2020	F2019	F2018	F2017	F2016	F2015
26 164	4 211	10 353	4 688	10 774	12 694

Various saving and carbon emission reduction initiatives were implemented in F2020.

New GHG emission reduction initiatives implemented in F2020	Additional savings per year (tCO ₂ e)
Cato Ridge Works has achieved improved furnace efficiencies as a result of a new bricks plant enabling optimal reduction conditions, since December 2019. The process includes the bonding of "bricks" that contain nine streams, including metal fines, in optimal ratios. The bricks also enable consistent sizing which optimises air flow for optimal reduction of manganese. This has achieved improved furnace efficiencies, despite processing lower quality ores, and has contributed to a significant reduction in process GHG emissions.	34 680
Modikwa Mine has replaced underground haul trucks and road haulage with underground conveyor belts.	4 490
Modikwa Mine has replaced high profile machines with low profile machines, resulting less CO ₂ and diesel consumption.	844
Additional energy efficient lighting was rolled out at Khumani, Nkomati and Two Rivers mines. Other operations continue to replace lights with LEDS when damaged.	619
One component of the modernisation and expansion project at Black Rock Mine is to move ore tipping faces closer to loading areas. This has reduced haul distances significantly and, while saving costs, also reduces energy consumption and associated GHG emissions.	108
Modikwa Mine has been shifting to On-Reef mining to reduce waste generation and transportation underground.	386
Modikwa Mine has been fixing water pipes and reducing water spillages underground resulting in reduced pumping and therefore energy requirements.	218
One component of the modernisation and expansion project at Black Rock Mine is to move ore tipping faces closer to loading areas. This has reduced haul distances significantly and, while saving costs, also reduces energy consumption and associated GHG emissions.	108
Black Rock Mine's investment in private rail facilities resulted in a shift from road to rail product transport.	15 951*

* This represents a saving of Scope 3 emissions and is not included in the assessment of ARM's performance against its GHG emission reduction target which is expressed in terms of Scope 1 and 2 emissions.

Examples of initiatives implemented in F2018 and 2019 include an energy efficiency replacement programme (fans/motors) at Beeshoek and Black Rock mines; the fabrication of a bridle, enabling the transport of metal ladles with a slag hauler, reducing diesel consumption at Cato Ridge Works; scrapping 35 old light duty vehicles and encouraging walking and ridesharing at Nkomati Mine; refueling and maintaining (as far as possible) vehicles underground (drill rigs, bolters, and haulage vehicles) instead of driving them up after each shift to surface at Modikwa and Two Rivers mines; investing in more efficient vehicles at Two Rivers Mine and investing in a rooftop solar PV plant (52.8 kWp) at the ARM corporate offices.

Some projects have a payback period of less than three years. Additional projects currently being investigated include:

- **Investigating the feasibility solar PV plants with battery storage in the Northern Cape:** ARM's Ferrous division is engaging with a service provider undertaking feasibility studies for solar PV plants with battery storage at Khumani and Black Rock mines. The plan is to consider a power purchase agreement (PPA) versus an outright ownership model. Depending on the capital outlay, the collective capacity being considered is 30MW of solar PV and 10MWh of battery storage;
- **Energy efficiency:** Motion detectors for LED lights, automatically stopping conveyors when not in use, further investments in LED lighting;

- **Optimization:** surface fan relocation, right-sizing hauling vehicles (e.g. improved road conditions, reducing idling time, using batteries to support air conditioning systems and lighter bowls to reduce diesel consumption at Khumani Mine);
- **Reducing energy requirements for haulage:** Khumani Mine is investing in a discard spreader system that will replace haul trucks with conveyors. This will reduce diesel consumption, increase electricity consumption and result in a net savings in GHG emissions (from February 2022);
- **Reducing water pumping requirements:**
 - » **Reducing diesel consumption through the use of additives and other efficiency measures:** Modikwa and Two Rivers mines are replacing waste in pit rather than in outside waste sites. This is resulting in a reduction in diesel usage.
 - » **Reducing emissions in our value chain** (Scope 3 – transportation);
 - » **Exploring the potential of liquefied nitrogen gas (LNG) vehicles:** Khumani Mine is considering the use of LNG in vehicles (with suppliers claiming a potential 30% reduction in energy consumption); and
 - » **Piloting battery electric vehicles with multiple benefits.**

CLIMATE CHANGE continued



Reducing diesel consumption

A number of operations have investigated catalyst additives which promise to:

- Reduce fuel consumption;
- Reduce maintenance activities;
- Reduce emissions; and
- Improve combustion efficiency.

Suppliers have suggested a possible net diesel saving of up to 15%. Laboratory tests to date have not confirmed these benefits.

Piloting battery electric vehicles (BEVs) with multiple benefits

Black Rock Mine ordered three electric vehicles in January 2020 and another three electric vehicles in July 2020 at a cost of around R 500 000 per year (this includes electric haul trucks and electric front loaders). Estimated delivery is from January 2021 to May 2021 and the mine will start using the machines from June 2021. This forms part of a two year pilot project. Capital costs compare well with conventional vehicles and the battery costs will be equivalent to diesel costs due to a contractual arrangement with the third party service provider, which will provide batteries “as a service” (rented). The mine will cover the cost of charging the batteries that will be “swapped” out once during a shift.

The BEVs are expected to deliver multiple benefits:

Reduced energy consumption: the vehicles are 70-80% efficient as compared to 30% efficiency of diesel vehicles. Even with a carbon intensive electricity grid, this will result in reduced GHG emissions. Diesel costs, for example, are expected to be cut by R 7.5m a year. Operational costs will double but these are expected to be offset by reduced ventilation investment and operational costs;

Reduced need for ventilation: vehicles generate no particulate emissions and nitrous oxide gases, and reduce heat generation thereby reducing the need for ventilation (also saving energy and associated emissions). In the case of Black Rock Mine, the absence of heat generated by conventional vehicles has resulted in eliminating the initial need for an additional ventilation shaft. One ventilation fan would consume around 4 380 000 kWh/year. The pilot will determine the number of ventilation fans avoided.

Occupational health benefits by eliminating harmful exhaust gases, especially diesel particulate matter which is a known carcinogen. In addition, electric vehicles do not emit high levels of noise, which is significant in terms of the mining industry’s focus on hearing conservation;

Reduced service intervals and costs: motors require less servicing than diesel engines reducing preventative maintenance costs by 25 – 30%; and

Predictable running costs: The mine is also testing an electric personal carrier (with regenerative charging) and has commissioned a BEV drill rig.

If the pilot is successful, it will inform the model for the sustainable capital replacement strategy going forward at Black Rock Mine and may be explored at ARM’s other underground Mines. Success is dependent on battery technology and performance.

Increasing energy efficiency with the Black Rock Mine modernisation and expansion project

One component of the modernisation and expansion project at Black Rock Mine is to move ore tipping faces closer to loading areas.

This will reduce haul distances significantly and, while saving costs, also reduces energy consumption and associated GHG emissions.

CLIMATE CHANGE continued

CASE STUDY

Developing a more robust system for identifying, preparing, implementing and reporting on measures that save energy and reduce GHG emissions

ARM developed a system for collecting data on GHG reduction initiatives initially for the purposes of reporting via the Carbon Disclosure Project. The system was improved over time as ARM required a "bottom up" understanding of GHG mitigation potential to inform the development of an appropriate GHG reduction target. The current system suffers from two primary flaws: the system does not adequately drive more investments in projects that deliver energy (GHG) saving benefits; and because many interventions are driven by efficiency objectives and considered by the operations as GHG reduction measures, the system does not adequately capture all of the savings resulting from energy efficiency and process optimisation projects undertaken at ARM's operations.

Shifting requirements and expectations require a more robust system that can:

Gather and report performance data (including energy and GHG emissions; water; and financial costs and benefits);

Identify energy and GHG emissions saving opportunities (to inform revised targets and the updated carbon budget and associated mitigation plan; and

Track performance (to assess target performance, feed into external reporting and to report mitigation plan progress to DEFF on an annual basis).

A key objective of the climate and water workshops at operations in F2020 was to collectively design the new system. Operations agreed to a system to identify, prepare, implement and monitor and evaluate measures that save energy or reduce process emissions. On an annual basis, operations will determine site-specific options, assess savings and determine costs. In collaboration with ARM's corporate office, a prioritised set of measures will be agreed, per operation. Where necessary, this will include a motivation for resources linked to the existing budget processes. Measures will be rolled out on an ongoing basis and performance tracked and reported quarterly. The system will include clear roles and responsibilities including a champion per measure as well as an individual responsible for reporting, per operation.

This system will be implemented in F2021. Appropriate methodologies to monitor and evaluate savings is a challenge especially when trying to attribute savings to measures driven by production or general efficiency objectives. Appropriate methodologies will be explored and developed over time. The system is therefore expected to evolve as best practices are shared across operations and investments in hardware and software are made, based on a clearer understanding of the needs.

3.5.6 How our products contribute to the transition to a low-carbon economy**3.5.6.1 High grade ores that save customers energy and reduce emissions**

China's focus on addressing its pollution challenges through improved efficiencies in heavy industries has increased demand for higher quality ores, which produce lower emissions when processed. Our high-quality iron and manganese ores offer customers the ability to optimise production and reduce emissions.

For example, the use of lumpy iron ore in the steel making process reduces Scope 1 emissions associated with the sintering process. Lumpy iron ore are also more concentrated and therefore results in lower product transport emissions. High grade manganese ore also enables smelters to use less energy.

3.5.6.2 Platinum enabling the hydrogen economy

Hydrogen fuel cells are a promising source of clean energy that use platinum to generate energy from hydrogen and oxygen, with water being the only emission. Hydrogen fuel cell electric vehicles (FCEVs) offer a zero emissions alternative to internal combustion engine (ICE) vehicles, without the need for consumers to change their behaviour. ARM expects PGM-based FCEVs to contribute to the electrified drivetrain for vehicles, especially in the heavy duty segment of the market.

Industry is increasingly recognising the need to aim for net zero carbon emissions by 2050. In hard to abate sectors such as iron and steel and chemicals production, hydrogen offers a potential clean source of energy (if generated using renewable energy for electrolysis) as well as a reductant that can reduce process emissions.

3.5.6.3 Metals used in energy storage

Nickel and manganese are used in certain types of lithium-ion energy storage technologies, which play a role in the growth in renewable energy and electromobility. Batteries enable the storage of variable renewable power and therefore facilitate greater consumption of renewable energy that reduces customer emissions.

Electric vehicles are three to four times more efficient than petrol and diesel Internal Combustion Engine (ICE) vehicles. Even charging vehicles with the carbon intensive electricity from South Africa's grid delivers GHG reduction benefits. These benefits are most significant when vehicle owners can charge batteries with renewable power.

3.6 ENGAGEMENT AROUND CLIMATE CHANGE**3.6.1 Value chain engagement****3.6.1.1 Supply chain engagement**

ARM has engaged with key suppliers relevant to the operations and strategic objectives. These engagements relate to efforts to mitigate climate risk in the supply chain but also to ensure that we are able to procure best available technologies that enable our operations to increase energy efficiency, reduce GHG emissions and increase resilience to physical climate change risks. For example, the Ferrous and Platinum divisions are working with suppliers to explore diesel additives to, among other things, reduce diesel consumption at our mines.

CLIMATE CHANGE continued

In the Northern Cape, Assmang has engaged extensively with Transnet regarding climate related risks to product transport and expanding and optimising transport infrastructure to reduce emissions and accommodate increased production at Black Rock Mine.

The security of electricity supply in South Africa is a material risk, specifically the reliability and cost of power from Eskom. To help mitigate electricity supply risk quarterly liaison meetings are held with Eskom representatives.

In F2019 ARM undertook an assessment of each operation's top five suppliers by spend. The assessment sought to better understand suppliers' performance with respect to climate change as part of assessing climate-related risks to the operations. This included a review of publicly available documentation (e.g. Carbon Disclosure Project responses and Sustainable Development Reports) and assessments of the companies by third parties (e.g. news sources and research/advocacy reports). Information was available on larger suppliers but limited public information could be obtained for the smaller, more local suppliers.

It is evident that larger suppliers are aware of material climate change risks (notably the carbon tax and physical climate change impacts affecting production and the delivery of goods). There are however concerns around the ability of some of these suppliers to mitigate these risks. In the case of chemical production, for example, there are few opportunities to decarbonise the process and although global efforts are underway to explore viable alternatives, no significant reductions are expected in the short to medium term. Similar challenges are faced in steelmaking and cement production which will affect ARM's ability to source low carbon alternative materials to support expansion projects and capital investments.

Reported deficiencies related to financial and operational management at Eskom, as our primary supplier of electricity, present a risk. Uncertainty around the utility's future, the high level of debt and a lack of proven reduction in emissions historically associated with the production of electricity, present a significant risk to ARM's GHG reduction target and long-term objectives.

Large suppliers report on annual GHG emissions but do not provide information on emissions at the product level. Smaller operations do not always report publicly on GHG emissions and climate-related risk.

Going forward, we will identify additional suppliers to engage with directly based on materiality. There is a need to further analyse our suppliers and consider the best way in which to gather data on those suppliers which produce material GHG emissions, towards adequately assessing climate-related risks in our supply chain on an ongoing basis.

ARM also measures upstream emissions (Scope 3) associated with purchased goods and services (currently limited to water treatment and supply and production of explosives), fuel-related and energy related activities and the purchase of transport services (associated with some goods purchased and with the transport of product by third parties).  3.5.1.2.

3.6.1.2 Customer engagement

We encourage responsible use, re-use, recycling and disposal of our products. We do not sell to general consumers, but rather to industrial customers with whom we engage contractually. Material climate change mitigation risks associated with the use of our products are discussed and addressed through these engagements. There is also an increasing desire from downstream end users of our products (our

customers' customers) to see upstream emissions reduced, and more broadly to ensure that the raw materials they procure are sustainably and responsibly produced.

ARM is a member of the ICMM's Product Stewardship Programme Committee and, together with its joint venture partners, participates in a number of relevant industry forums to monitor developments regarding the properties of metals and minerals and their lifecycle effects on human health and the environment. Ore and Metal, the marketing company for Assore, ARM's joint venture partner in the ARM Ferrous division (trading as Assmang), monitors changes in national and international legislation that could influence the mining, beneficiation, sale or transportation of its products and proactively responds as necessary. Ore and Metal also facilitated customer Environmental, Social and Governance (ESG) audits of operations as required.

ARM engages indirectly with partners through Assmang's participation in industry associations such as the Life Cycle Assessment (LCA) study on manganese commissioned by the International Manganese Institute (IMnI) and the International Chrome Development Association (ICDA) LCA study on chrome reported on in previous Carbon Disclosure Project submissions. The intended application of gaining a company-specific life cycle inventory and impact data, as well as a global average for benchmarking, is to allow the group to be able to communicate the aspects and impacts of manganese production with downstream steel producers (the customers and users of the group's product), governments, key stakeholders and the general public. An outcome of the IMnI LCA study, that Assmang participated in, was the agreement that detailed LCA data, including greenhouse gas emissions, could be shared with other member organisations in order for them to better understand the impacts associated with their value chain (upstream). This agreement is on the basis that these organisations also share their own emissions profile/data such that the group is able to understand the impacts across its own value chain (downstream) in terms of the use of its products.

3.6.1.3 Public policy engagement

ARM supports the movement towards a low carbon economy and is committed to constructive engagement with government on measures aimed at achieving this. Important issues to consider in South Africa, however, would be the utilisation of carbon tax to support targeted mitigation actions, alignment with other mechanisms such as carbon budgets, and clarity around carbon tax allowances and offsets.

ARM has engaged directly with the DEFF and has been supportive in disclosing information that has fed into the design of various climate-related policy developments. There is also further engagement in these processes through industry associations.

Participation in business and industry initiatives enables collective engagement with regulators and stakeholders and promotes benchmarking and sharing of good environmental practice. ARM participates in a number of such initiatives, including the MCSA (including the Environmental Policy Committee), Business Unity South Africa (BUSA), the Ferro Alloy Producers' Association and the ICMM.

Stakeholders and various reporting frameworks have highlighted the importance of ensuring consistency between our climate change policy and the positions taken by industry associations of which we are a member. Involvement in these associations also serves as a sharing and learning opportunity and not only as an advocacy mechanism for engaging with climate policy development processes.

CLIMATE CHANGE continued

3.6.1.4 Engagement with our partners

We work with our joint venture partners to collectively assess and mitigate climate change risks and take advantage of climate-related opportunities. This is achieved through ongoing management interaction during the ordinary course of business and monthly executive management and quarterly board meetings.

The joint venture partnership in the ARM Ferrous division with Assore provides access to important industry initiatives such as LCA and Life Cycle Inventory studies, waste management initiatives and energy efficiency initiatives of the IMnl and the ICDA.

In F2019, stakeholders requested disclosure of GHG emissions from the ARM Coal operations, which form part of a joint venture with Glencore. Glencore is the managing partner and reports on GHG emissions to the DEFF, consolidated with its reporting on all its South African operations. Following engagement with Glencore, we have received GHG emissions related data for the relevant operations and have, for the first year, reported on these for the current financial year.

ARM holds itself to the highest ethical and governance standards in dealings with all stakeholders, including joint venture partners as contained in the ARM Code of Conduct, available in the ARM corporate governance report on the website at

 www.arm.co.za.

3.7 FUTURE CLIMATE CHANGE FOCUS AREAS

AREAS OF FOCUS FOR F2021/F2022 INCLUDE:

<p>Undertake a climate scenario analysis to assess the resilience of ARM's strategy.</p>	<p>Proactively prepare for the interim carbon budget extension in preparation for the second phase of the carbon budgets from 2024.</p>	<p>Implement the new system for identifying, preparing, implementing and reporting on measures that save energy and reduce GHG emissions.</p>	<p>Collaborate and explore to refine our Scope 3 approach and our understanding of our role in reducing those emissions, to the point where we can integrate Scope 3 emissions into our strategic processes through, for example, including Scope 3 emissions within ARM's future GHG emission reduction target/s.</p>
--	---	---	--

Undertaking climate scenario analysis in F2021

We have identified scenario analysis as a tool that is needed for understanding and reporting on the strategic implications of the transition to a lower carbon, climate resilient economy.

Covid-19 has significantly influenced the operating environment and called for a review of the objectives, scope and timing of some of the planned climate and water activities. This includes climate scenario analysis. The drivers behind undertaking such a process remain and have likely been strengthened as a result of Covid-19 and the associated emphasis or scrutiny on company resilience in face of change and uncertainty.

When the pandemic dies down, industrial sectors face two key threats: trade protectionism and decreasing demand for carbon-intensive industrial products. Net zero climate transition poses threats to existing industries particularly the hard to abate sectors such as cement, steel, chemicals and aluminium. Covid-19 has exacerbated the challenge for developing countries by increasing the risk premium paid by private sector players and governments in countries perceived as riskier. The transition to a lower carbon, more climate resilient global society will also create new markets and see certain sectors grow (while others shrink). Examples include electromobility, green hydrogen, and renewable energies that will require particular materials, products and services.

Consistent with the recommendations of the TCFD, ARM will be exploring a form of scenario analysis appropriate for the company, and taking into account the impacts of Covid-19 and the momentum building around net-zero carbon objectives. The intention will be to:

- Initiate a dialogue about the strategic consequences of a changing climate and the transition to a low-carbon economy;
- Structure the dialogue and involve key decision-makers and technical experts with the aim of leading to more robust strategies under a wider range of uncertain future scenarios;
- Use the qualitative outputs of the dialogue for external reporting through this supplementary report and other public reporting processes;
- Based on a first iteration ARM will be in a better position to assess the form that scenario analysis should take in order to be valuable in shaping ARM's climate change and water stewardship journey;
- The outcomes of this process will feed into ARM's risk assessment process and inform the company's low carbon transition plan.

 TPI Question 17

CLIMATE CHANGE continued

3.8 TCFD INDEX

The table below provides references for our disclosures in terms of the TCFD recommendations.

TCFD Recommendation	Reference to disclosure	Page
GOVERNANCE – Disclose the organisation’s governance on climate-related risks and opportunities		
a) Describe the Board’s oversight of climate-related risks and opportunities.	3.2. Governance 3.2.1. Board level oversight and management responsibility	7
b) Describe Management’s role in assessing and managing climate-related risks and opportunities.	3.2. Governance 3.2.1. Board level oversight and management responsibility	7
STRATEGY – Disclose the 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.	3.4. Risk management 3.4.2. Material climate change risks 3.4.3. Material climate change opportunities	15-22
b) Describe the impact of climate-related risks and opportunities on the organisation’s business, strategy and financial planning.	3.4. Risk management 3.4.4. The impact of risks and opportunities on business and financial planning	23
c) Describe the resilience of the organisation’s strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	3.6. Engagement around climate change 3.6.1. Value chain engagement 3.7. Future climate change focus areas	33-35
RISK MANAGEMENT – Disclose how the organisation identifies, assesses and manages climate-related risks		
a) Describe the organisation’s processes for identifying and assessing climate-related risks.	3.4. Risk management 3.4.1. Integrating climate change into the risk management process	10-14
b) Describe the organisation’s processes for managing climate-related risks.	3.4. Risk management 3.4.1. Integrating climate change into the risk management process	10-12
c) Describe how processes for identifying, assessing and managing climate-related risks are integrated into the organisation’s overall risk management.	3.3. Strategy 3.3.1. Integrating climate change into the business strategy 3.3.2. Carbon pricing 3.4. Risk management 3.4.1. Integrating climate change into the risk management process	10-12
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.	3.5. Metrics and targets 3.5.1. GHG emissions	24-29
b) Disclose Scope 1, Scope 2 and, if appropriate, Scope 3 GHG emission and the related risks.	3.5. Metrics and targets 3.5.1. GHG emissions 3.5.2. Energy 3.5.3. Verification	24-29
c) Describe the targets used by the organisation to manage climate-related risks and opportunities and performance against targets.	3.5. Metrics and targets 3.5.4. GHG emission reduction target 3.5.5. Emission reduction initiatives	29-32



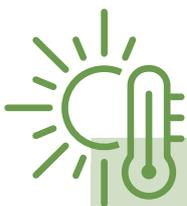
4

Water management

2020 marks a decade since water was enshrined as a human right by the United National General Assembly. Water is vital and the earth's water systems are under significant threat from rising water consumption, greater pollution, weak governance, and climate change. We are seeing shifting weather patterns, altering water supplies and intensifying extreme weather events such as floods and droughts. ARM is exposed to increased water-related risks that could affect production, increase costs, constrain growth, disrupt our supply chains and place our communities under significant strain. We need to contribute to, and focus our efforts on, ensuring a water-secure future that is socially and culturally equitable, environmentally sustainable, and economically beneficial.

WATER MANAGEMENT continued

4.1 WATER STEWARDSHIP POLICY



WATER STEWARDSHIP POLICY

ARM recognises that:

- Water is a precious shared resource with high social, cultural, environmental and economic value. Access to water has been recognised as a human right; integral to wellbeing and livelihoods and the spiritual and cultural practices of many communities. It is also essential to the healthy functioning of ecosystems and the services they provide.
- Water is a vital input for all mining and metals operations – required for the health and wellbeing of employees and at every stage of an operation's life cycle including closure. The dependency and impact on a shared resource creates a material risk for ARM's operations that requires effective management.
- Water challenges are increasing around the world. The earth's freshwater resources are finite and under pressure from industrialisation, urbanisation, climate change, and the needs of a growing global population.
- These challenges are shared across countries, industry sectors, and society. In order to meet demand, a change is needed in the way water is used, managed and shared. This will require collaboration and concerted action from all parties, including government, civil society, business, and local communities.
- Through the Sustainable Development Goals, world leaders have publicly acknowledged the urgency of using and managing water sustainably. ARM can play a significant role in supporting this approach including ensuring access to clean water, sanitation, and hygiene (WASH) for employees in the workplace. There is further opportunity to support government initiatives through leveraging capital or expertise to improve community WASH and other water related outcomes.
- Water-related risks and impacts are predominantly experienced by people and ecosystems at the local/catchment level. Therefore, we look beyond traditional operations-based water management to the dynamics and interactions of various water users in the wider catchment. Effective water management requires a holistic understanding of hydrology and land use, as well as broader political, economic, social and ecological dynamics that influence water availability and quality.
- ARM has an important role to play in the sustainable management of water resources where we operate. Proactive and holistic water management strategies will create substantial competitive advantage through reducing water-related risk, identifying opportunities, attracting investment and building trust through improved transparency.

ARM commits to:

- Apply strong and transparent corporate water governance by:
 - » Publicly disclosing the company's approach to water stewardship (this report as well as ARM's Sustainable Development and Integrated Annual Reports).
 - » Allocating clear responsibilities and accountabilities for water – from the Board to our operations. 4.5.1.
 - » Integrating water considerations in business planning – including ARM's strategy, life of asset and investment planning. 4.5.2.
 - » Publicly reporting our water performance, material risks, opportunities, and management response using consistent industry metrics and recognised approaches. 4.3.1 and 4.3.2.
- Manage water at our operations effectively by:
 - » Maintaining a water balance and understanding how it relates to the cumulative impact of other users at each operation. All operations maintain a water balance, considered in the context of a catchment balance. 4.5.2.3.
 - » Setting context-relevant water targets or objectives for operations with material water-related risks. 4.5.2.2.
 - » Proactively managing water quantity and quality to reduce potential socio-environmental impacts and realise opportunities. ARM started to report publicly on water quality in F2019. 4.5.2.
 - » Ensuring all our employees have access to clean drinking water, gender-appropriate sanitation facilities, and hygiene at their workplace. WASH facilities are in place for all our employees. 4.2.2.
- Collaborate to achieve responsible and sustainable water use by:
 - » Identifying, evaluating, and responding to catchment-level water-related risks and opportunities. 4.3.1.
 - » Identifying and engaging proactively and inclusively with stakeholders that may influence or be affected by our operations' water use and discharge. 4.5.3.
 - » Actively engaging on external water governance issues, with governments, local authorities and other stakeholders, to support predictable, consistent and effective regulation that underpins integrated water resource management. 3.6 and 4.5.3.
 - » Supporting water stewardship initiatives that promote better water use, effective catchment management and by contributing to improved water security and sanitation. 4.5.3.

WATER MANAGEMENT continued

4.2 INTERACTIONS WITH WATER**4.2.1 The importance of water**

Water is a vital input for all mining and metals operations. Without access to water, our business could not operate. Water is consequently a material operational and strategic concern, and water stewardship is fundamental to achieving our strategic objectives.

4.2.2 How we use and impact water

Water is used for milling, beneficiation, cooling and for dust suppression during blasting, on haul roads and at ore transfer points. Our employees need access to sufficient potable water for drinking and water, sanitation and hygiene (WASH) services. Water is critical for various users in the wider catchments, it is a critical supply chain commodity and is needed in the production of other critical supply chain commodities such as electricity, chemicals, and explosives.

The main consumptive uses of water include evaporation, water entrained in tailings and interstitial water in product, seepage, and outputs to 3rd parties. Evaporation is high at Cato Ridge Works which requires water for cooling of the furnaces (however only three out of the six furnaces at Cato Ridge Works are operating). The Northern Cape mines in the ARM Ferrous division record high evaporation rates and a number of these operations supply water to 3rd parties (e.g. villages and farms) within their operational boundaries (and thus not classified as “diversions”).

While all operations run closed water circuits in order to maximise recycling and re-use; discharges are unavoidable in certain instances, e.g. heavy rainfall events or successive heavy rainfall events. Discharges have also occurred during F2020 and were reported to the relevant authorities.

Water uses at the operations have not changed significantly over time except in the case of Machadodorp Works where no smelting operations were conducted after F2017.

Main operational water activities at ARM's operations

Operation	Catchment	Main operational water activities
Beeshoek Mine (Iron ore)	Vaal Water Management Area (WMA)	<ul style="list-style-type: none"> • Dewatering • Dust suppression • Ore processing • Tailings management
Khumani Mine (Iron ore)	Vaal WMA	<ul style="list-style-type: none"> • Dust suppression • Ore processing • Tailings management
Black Rock Mine (Manganese ore)	Vaal WMA	<ul style="list-style-type: none"> • Dewatering • Dust suppression • Mining + screening & washing • Tailings management • Domestic use (village & irrigation)
Cato Ridge Works (Ferro alloys)	Pongola-Uzimkulu WMA	<ul style="list-style-type: none"> • Cooling • Dust suppression • Scrubbing (air quality requirement) • Jigging (in the metals recovery plant)
Machadodorp Works	Inkomati-Usuthu WMA	<ul style="list-style-type: none"> • Jigging (in the ferrochrome metal recovery plant) • Dust suppression
Nkomati Mine (Nickel, PGMs, and chrome)	Inkomati-Usuthu WMA	<ul style="list-style-type: none"> • Dewatering • Ore processing • Dust suppression • Tailings management
Modikwa Mine (PGMs)	Olifants WMA	<ul style="list-style-type: none"> • Dewatering • Dust suppression • Ore processing • Tailings management • Domestic use in mine villages and farms/third parties
Two Rivers Mine (PGMs)	Olifants WMA	<ul style="list-style-type: none"> • Dust suppression • Ore processing • Tailings management

WATER MANAGEMENT continued

4.2.3 Water metrics

Operations withdraw water from a range of sources defined in the terms of their water use licences, which include rivers, boreholes and municipal supplies.

Implementation of the ICMM Water Accounting Framework (WAF) was completed over 24 months and completed during F2019. As part of the process, water accounting definitions were implemented which allowed for better reporting on harvested rainfall and runoff from mining operations. Additional flow meters were also installed to improve accuracy of measurement. A detailed water reporting flowsheet was developed for each operation in consultation with the engineering and environmental teams, to assist in this process. During F2020, we further revised and refined the flowsheets and worked with the environmental and engineering teams to entrench the process in our efforts to continue to improve.

Definitions are available on the ICMM website at <https://www.icmm.com/en-gb/environment/water/water-reporting>.

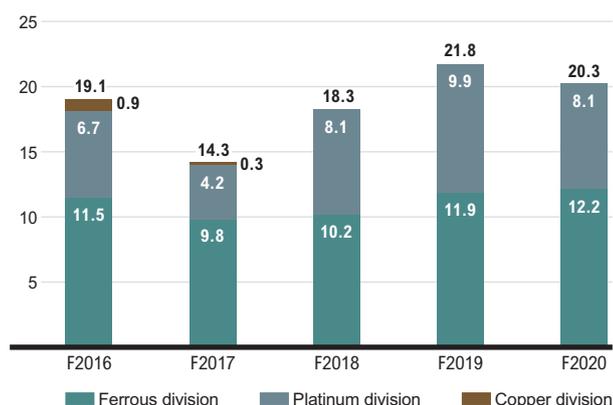
In F2020, water withdrawal decreased by 7% to 20.3 million m³ due to decreased activity in the last quarter due to Covid-19 and ramping down at Nkomati Mine, which last year accounted for 20% of Group water consumption (F2020: 12%).

The implementation of the WAF also improved our understanding of water re-use efficiency, which is above 72% and is a key performance indicator in monitoring and managing consumption and losses.

The most material year-on-year differences include:

- COVID-related production stoppages at all operations and the continued scaling down of activities at Nkomati Mine.
- Improved reporting of water entrained in waste: this resulted in a reported decrease at Two Rivers Mine partially offset by an increase at Khumani Mine, both due to improved measurement.
- New flow meters installed at Black Rock Mine led to improved accuracy of measuring water impacts and led to a 37% increase in reported water consumption at the mine.
- Modikwa Mine pumped more water than in the previous year to improve underground water control and safety, resulting in an 8% increase in reported water consumption.
- Reported evaporation increased due to the inclusion sources of evaporation not previously reported by Beeshoek Mine (evaporation from the TSF pool). This was partially offset by decreased evaporation due to decreased production at Cato Ridge Works.
- A significant increase in rainfall and runoff in the Northern Cape region. For example, Khumani Mine reported a 71% increase in rainfall in F2020 compared to the previous year.
- A 2% improvement in re-use efficiency is largely due to improved measurement and reporting, particularly due to new flow meters and additional use of rainwater at Khumani Mine.

WATER WITHDRAWAL BY DIVISION (100% basis) (m³ million)



CASE STUDY

Improving our water reporting

The ICMM released a Position Statement on Water Stewardship in January 2017, followed by the “Practical guide to consistent water reporting” in March 2017. The comprehensive guideline, based on the Water Accounting Framework (WAF) for the Minerals Industry of the Minerals Council of Australia, is at the core of Water Accounting Principles referred to in the Position Statement.

During May 2017, ARM commissioned a project to ensure that our water management and reporting methodology aligns fully with the commitments of the ICMM. One of the key commitments is for members to report consistently and transparently on water management and accounting. Phase 1 of the project (which was completed in F2018), focused on the quantitative water accounting process which included aligning the detailed water balances and classification of sources of water withdrawal at each operation. While each operation has an approved water balance which is used to report to the Department of Water and Sanitation, there is more detail in the Guidance from the ICMM and hence additional sources such as storm water were included in the water balances. This led to the identification of water withdrawal sources not previously included in the operational water balances, specifically in the Platinum division.

Phase 2 of the project (completed in F2019) focused mainly on the qualitative aspects of reporting, while further refining the water balances and ensuring consistent application of the methodology. This report and ARM’s 2020 Sustainable Development Report represent the second publication of our water performance according to the WAF and ICMM requirements.

In F2020 we continued to improve reporting and registered numerous improvements in the completeness and accuracy of ARM’s water data.

Beeshoek Mine accounted for 25% of total Group water withdrawal, Khumani Mine 22% and Modikwa Mine 20%. Water withdrawal by the Ferrous division increased by 2% to 12.2 million m³ (F2019: 11.9 million m³) and decreased by 18% in the Platinum division to 8.1 million m³ (F2019: 9.9 million m³).

Outputs include flows to surface water, groundwater, and supply to third parties as per ICMM definitions (volume of water which is removed from the operational facility after it has been through a task, treated or stored for use). “Discharges” in this report refer to discharges at operations as defined in their Water Use Licences (WULs).

Consumption includes evaporation (and transpiration), water incorporated into product and/or waste streams (entrainment), and other operational losses.

Re-use efficiency is the volume of untreated water used in tasks which has already been worked by the site as a percentage of the total volume of all water used in tasks. Re-use efficiency varies across the operations and is underreported as some operations do not measure flows of worked water back into tasks. Some operations supply water to neighbouring communities, farms and other users. This is water not intended for primary mining activity use and is classified as a “diversion”.

We aim to continually improve our measurement and reporting of water metrics according to the new ICMM framework and significant expenditure has been committed to the installation of flow meters. F2020 included a focus on capturing all worked water flows, consumption sources and outputs.

WATER MANAGEMENT continued

Discharges – Nkomati Mine

On 31 October 2019, a water truck bowser overturned at the bypass road near the gate to the mining contractor's offices. Approximately 20 litres of diesel spilled and overflowed into the Adit stream. Clean-up was immediately implemented. The incident was reported to Inkomathi-Usuthu Catchment Management Agency (IUCMA) in terms of Section 20 of the National Water Act and Nkomati Mine Water Use Licence (WUL) condition. Samples were taken upstream and downstream of the Gladdespruit River. No negative impact was observed.

Due to the positive water balance, Pit 2 overtopped during the period 11 to 14 February 2020, resulting in water discharged to the Adit stream. Pit 2 continued to overflow on occasions during April. The water quality at the downstream compliance point remained within the quality standards of the WUL.

The storm water containment dam discharged into the environment on 18 May 2020 due to a corroded flange in the drain valve that led to discharge of water into the natural environment and surrounding stream that leads to the Gladdespruit River. Immediate measures were taken to stop the spillage and water samples were taken upstream and at various locations downstream of the spillage and submitted for analysis by an external laboratory. Water quality of samples taken at Nkomati Mine's compliance point was within the compliance parameters stipulated by the WUL.

Incidents were reported to the relevant authorities.

Discharges – Two Rivers Mine

On 24 July 2019, there was an overflow at the plant pollution control dam during which approximately 3 500 m³ of polluted water was spilled. The incident was reported to the Department of Water and Sanitation. A vacuum truck was used to clean up the spillage and the area affected was rehabilitated.



WATER MANAGEMENT continued

ARM WATER BALANCE SUMMARY*

Metric	Source/destination/type	Volume of water by quality					
		F2020			F2019		
		High (m ³)	Low (m ³)	Total (m ³)	High (m ³)	Low (m ³)	Total (m ³)
Withdrawal	Surface water	4 757 629	2 708 867	7 466 496	4 720 458	2 285 234	7 094 735
	Groundwater	7 088 971	5 712 200	12 801 171	7 869 186	6 809 520	14 678 706
	Total withdrawal	11 846 601	8 421 067	20 267 668	12 589 643	9 094 754	21 773 441
Output	Surface water	22 250	955 777	978 027	4 534	429 279	433 813
	Groundwater	–	23 427	23 427	0	215	215
	Supply to third party	29 620	14 573	44 194	0	3 840	3 840
	Total output	51 870	993 777	1 045 647	4 534	433 334	437 868
Consumption	Evaporation	201 745	4 876 586	5 078 331	350 888	1 607 272	1 918 247
	Entrainment	–	3 325 107	3 325 107	0	4 680 141	4 680 141
	Other	–	132 098	132 098	0	165 123	165 123
	Total consumption	201 745	8 333 791	8 535 536	350 888	6 452 536	6 763 511
Re-use efficiency	Total of all flows to tasks (m ³ /a)	16 021 124	58 992 638	75 013 763	6 946 468	63 912 089	70 858 557
	Total worked water flows to tasks (m ³ /a)	n/a	53 693 478	53 693 478	n/a	49 749 766	49 749 766
	Reuse efficiency (%)	n/a	n/a	72%	n/a	n/a	70%
Diversions	Water diverted to neighbouring communities, farms and other users	586 190	714 249	1 300 439	504 376	942 348	1 446 724

* Reported according to ICMM water reporting metrics.

Reuse efficiency associated with all sites in water-stressed areas (i.e. excluding Cato Ridge Works) is 72%.

4.3 WATER CHALLENGES AND OPPORTUNITIES

Certain of our operations face significant catchment-level water risks that arise from poor existing water infrastructure, a lack of funding and capacity to deliver new infrastructure, and the impacts of climate change on supply of water to adequately meet the growing need. Water availability, consumption, and pollution are regarded as key risks to the Group and are included in both the operational and the corporate risk registers. We see water-related opportunities particularly through collective action at the catchment level.

4.3.1 Material water risks

4.3.1.1 Corporate level

Water is a material matter across the Group, although for different reasons at different operations. Key risks to business value and performance relate to potential non-compliance with WULs (especially where mines have a positive water balance and risk discharge events), risks to adequate water supply and climate and water-related disruptions that affect our operations and suppliers and can result in production stoppages. The key risk areas are water availability, uncertainty in the existing policy environment, the state of existing

water infrastructure and the related socio-economic impacts. The security of the supply of water in the Northern Cape is top 10 risk at the Group level (high residual risk).

ARM anticipates that the likelihood and impact of these risks will increase over time as climate change results in more extreme weather events and drought. At the same time ARM has taken steps to mitigate these risks. For example, in the Northern Cape, at the corporate level ARM has played a leading role in securing long term bulk water supplies (4.5.3) in addition to the operations investing in water purification and storage, and implementing various efficiency measures.

4.3.1.2 Operational level

Seven of the eight operations under ARM's direct or joint control are located in water stressed areas. In the Vaal Water Management Area (WMA) this includes Beeshoek, Khumani and Black Rock mines in the Northern Cape (representing 85% of EBITDA and 38% of ARM's operations). In the Olifants WMA, this includes Two Rivers and Modikwa mines (representing 17% of EBITDA and 25% of ARM's operations). In the Inkomati-Usuthu WMA, this includes Nkomati Mine and Machadodorp Works (representing 25% of ARM's operations). Cato Ridge Works, in the Pongola-Uzimkulu WMA, is not in a water stressed area.

Operation	Water Management Area (WMA)	Catchment stress	Operational water risk rating
Beeshoek Mine	Vaal WMA	Moderate	High
Black Rock Mine			High
Khumani Mine			High
Two Rivers Mine	Olifants WMA	Moderate	High
Modikwa Mine			High
Nkomati Mine	Inkomati-Usuthu WMA	High	High
Machadodorp Works			High
Cato Ridge Works	Pongola-Uzimkulu WMA	Not water stressed	N/A

WATER MANAGEMENT continued

Summary catchment and operational risks within the Vaal WMA

Catchment stress

- Moderate according to the WWF Water Risk Filter* (risk rating 2.8).
- ARM's company-specific risk assessment rates the basin risk higher as the Sedibeng pipeline infrastructure requires investment and the source catchment faces water stress.
- There is limited catchment management (no catchment management agency (CMA)). Operations technically need to contribute to the establishment and effective functioning of a CMA as part of their WULs but failure to achieve this is due to governance challenges and capacity constraints of the regulator. This issue therefore does not present a risk of non-compliance but rather a risk with respect to effective catchment management (mitigated to some extent by the Tshiping Water Users Association (WUA)).

Beeshoek Mine

- Overall risk rating (Water Risk Filter): 3.9 (high).
- Primary risk – Physical: water shortage (need for long term supply and storage).
- Secondary risk – Regulatory: limited catchment management.
- Secondary risk – Physical: flooding (resulting in production disruptions) and other extreme weather events and periodic excess of supply.

Khumani Mine

- Overall risk rating (Water Risk Filter): 4.0 (high).
- Primary risk – Physical: water shortage (need for long term supply and storage).
- Secondary risk – Regulatory: limited catchment management.

Black Rock Mine

- Overall risk rating (Water Risk Filter): 4.0 (high).
- Primary risk – Physical: water shortage (including future depletion of underground source – particularly in shallow aquifers (boreholes)).
- Secondary risk – Regulatory: limited catchment management, pending WUL amendments

* WWF's Water Risk Filter (<https://waterriskfilter.panda.org/>) is an online tool that helps companies and investors assess and respond to water-related risks facing their operations and investments across the globe. The tool rates operational and basin risks on a scale of 1 – 5. 4.5.4.

At our operations in the Northern Cape (Beeshoek, Black Rock and Khumani mines), issues around water scarcity can potentially impact on current operations as well as potential future expansion or growth plans. In addition, this presents a core concern for local communities and employees. The key risk areas are water availability, uncertainty in the existing policy environment, the state of existing water infrastructure, Eskom power disruptions (impacting water supply) and the related socio-economic impact.

Historically, water supply restrictions experienced at Khumani Mine had affected the mine's ability to pursue capacity expansion initiatives. Assmang has offered to contribute a portion of the capital required for the Sedibeng infrastructure upgrade.  4.5.3.

Due to this capital infrastructure cost, ARM's Northern Cape Mines look to re-use water to the full extent possible. For example, Black Rock Mine is focusing on getting the village

to use treated water (the village currently consumes around 50% of the potable water supplied by Sedibeng). The intention is to use the mine's reverse osmosis plant for treatment but the new activity must be approved as part of the WUL by the Department of Water and Sanitation. The mine has submitted an application and awaits approval.

There is limited catchment management in the area and while Tshiping Water User Association (WUA) mitigates this risk, there is not a good understanding of the catchment-level water balance.

Water restrictions have been experienced at the operations. During the year water Black Rock Mine had to put in place water restrictions in the villages. The operations also face a relatively minor risk of flooding during extreme weather events.

WATER MANAGEMENT continued

Summary catchment and operational risks within the Inkomati-Usuthu WMA**Catchment stress**

- High according to the Water Risk Filter* (risk rating 4).
- The catchment has one of the few effective CMA's in the country and this helps to mitigate overall catchment risk.

Nkomati Mine

- Overall risk rating (Water Risk Filter): 4.0 (high).
- Primary risk – Physical: surface water contamination (too much water, inadequate storage/space).
- Secondary risk – Regulatory: non-compliance with WUL.
- Secondary risk – Reputational: due to discharge perceived to affect local farmers and the Vygeboom Dam.

At Nkomati Mine, excess water requires de-watering of the area around the open pit to ensure safe mining operations. Our priority is to minimise abstraction from other sources by recycling water and using groundwater from the de-watering process. The physical risk of surface water contamination also presents a regulatory risk of non-compliance with the Water Use License (WUL) and reputational risk as discharge

Machadodorp Works

- Overall risk rating (Water Risk Filter): 3.8 (high).
- Primary risk – Physical: surface water contamination (limited production activities to manage high rainfall events).

is perceived to affect local farmers and the Vygeboom dam. Reduced production activities due to economic and market conditions have resulted in pressure put on the system at Machadodorp Works. There is reduced re-use and consumption and therefore any rainwater poses a potential risk of controlled discharge and associated non-compliance with the waste management and water use licences.

Summary catchment and operational risks within the Olifants WMA**Catchment Stress**

- Moderate according to the Water Risk Filter* (risk rating 2.6).
- There is limited catchment management (no CMA). Operations technically need to contribute to the establishment and effective functioning of a CMA as part of their WULs but failure to achieve this is due mainly to governance challenges and capacity constraints of the regulator.

Modikwa Mine

- Overall risk rating (Water Risk Filter): 4.0 (high).
- Primary risk – Physical: water shortage (driven more by socio-economic dynamics around access to water and services rather than drought).
- Secondary risk – Physical: underground flooding due to a positive water balance underground.
- Secondary risk – Regulatory: lack of established CMA.
- Secondary risk – Reputational: vandalism (Lebalelo pipeline) and poor quality supply to villages/third parties.

Water availability is at risk at Modikwa Mine due to socio-economic reasons rather than drought. Community unrest and vandalism could impact the water supply to the mine. Two Rivers Mine is less exposed to water supply risks, but the area faces poor catchment management and efforts to develop a subcatchment balance have not been successful. During F2020, water levels in the Dwarsrivier River, the mine's main source of water supply, fell to very low levels, and a pipeline was installed to secure an alternative supply of water.

Two Rivers Mine

- Overall risk rating (Water Risk Filter): 4.1 (high).
- Primary risk – Physical: water scarcity; extreme weather events (including increased spillages).
- Secondary risk – Regulatory: lack of established CMA: poor catchment management (the mine tried to develop a sub-catchment balance but other users reluctant to contribute).

WATER MANAGEMENT continued

4.3.1.3 Joint venture and investment level

ARM has an effective 20.2% investment in the Participative Coal Business (PCB) and an effective 26.01% in Goedgevonden (GGV). Our partner Glencore Operations South Africa (GOSA), owns the remaining stakes.

Water risks are considered and reported on where appropriate during the quarterly steering committee meetings of GGV and PCB.

There has been engagement between Glencore and the Centre for Environmental Rights (CER), which has requested information regarding WUL audits conducted on these operations. The Minerals Council South Africa (MCSA) provided an industry response to CER after the publication of their Full Disclosure Report "The Truth about Mpumalanga Coal Mines' Failure to Comply with their Water Use Licenses."

Glencore responded to the CER directly with respect to concerns raised regarding Tweefontein (part of PCB) and GGV operations' WULs.

The MCSA facilitated further engagement with the CER during the year under review. It was agreed that the CER will engage with mining companies more directly.

4.3.2 Material water opportunities

Our focus on improving operational efficiencies includes identifying opportunities to reduce water use. Investment in bulk water schemes affecting our Northern Cape operations, via the Sedibeng pipeline, and Modikwa Mine, as part of the Lebalelo

Water User Association and the Olifants River Water Resource Development Project (ORWRDP) phase 2 investments, have the potential to increase costs between four and fivefold. Reducing water consumption reduces costs and the need for investment in bulk water supply infrastructure in areas where water is scarce.

During the first half of the year, a capital user charge on water became effective as the Vaal Gamagara water system is upgraded, contributing to above-inflation increases in on-mine unit production costs at Khumani Mine.

Operations are increasingly looking beyond operational boundaries to contribute to collective action at the catchment level. Ensuring an adequate supply of water will build community resilience to adapt to a changing climate where projected water availability is expected to decrease (and demand is expected to grow). This is an opportunity to improve community relations and strengthen our social licence to operate.

4.3.3 Water and tailings

There are eleven tailings storage facilities (TSFs) at ARM operations: four at Nkomati Mine, three at Black Rock Mine, and one each at Beeshoek, Khumani, Modikwa and Two Rivers mines. An additional new TSF is currently under construction at Two Rivers Mine. The design and construction of TSFs include physical barriers appropriate to the risk to prevent pollution of groundwater. Ongoing monitoring of surface water runoff as well as ground water around waste rock dumps and TSFs is conducted to alert operations to negative impacts. Ground water modelling predicts the potential impact of tailings disposal on aquifers and allows for mitigation measures.

Catchment		Number of TSFs in operation	Number of inactive TSFs	
South Africa	Vaal WMA	4	0	This includes TSFs at Beeshoek (1 active), Khumani (1 active) and Black Rock mines (3 active including a new TSF operational from March 2019).
	Pongola-Uzimkulu	0	0	This includes Cato Ridge Works which does not have any TSFs.
	Inkomati-Usuthi	2	2	This includes Machadodorp Works (no TSFs) and Nkomati Mine (2 active and 2 inactive). One of the inactive facilities at Nkomati Mine has been closed.
	Olifants WMA	2	0	This includes Two Rivers (1 active and 1 under construction) and Modikwa mines (1 active).

ARM manages potential impacts on human health or water ecosystems associated with the TSFs in our control at the operational and corporate levels.

Ensuring the stability of our TSFs is a priority. The responsible and safe management of tailings is a strategic issue with major financial and reputational value. As such, it is a corporate and board priority. Reporting on tailings is included in the agenda of the quarterly sustainable development committees of every Joint Venture board/exco, as well as the ARM audit and risk committee and social and ethics committees of the board and ultimately to the ARM board of directors. A professional engineer is appointed by each operation to perform annual structural stability audits and

quarterly monitoring of the safety and stability of each TSF. The latest structural stability reports confirm the TSFs at ARM's managed operations as stable.

Recent international catastrophic failures of TSFs have increased the focus of investors, NGOs and other stakeholders on responsible tailings management. In 2016, the International Council on Mining and Metals (ICMM) published a Position Statement on "Preventing Catastrophic Failure of Tailings Storage Facilities" that includes a TSF governance framework. This framework enhances focus on those key elements of management and governance necessary to maintain integrity of TSFs and minimise the risk of catastrophic failures.

WATER MANAGEMENT continued

ARM, as a member of the ICMM, undertook a review of its TSFs in accordance with the framework and included it in the annual review of management controls at ARM managed TSFs by a multi-disciplinary internal team. This process has subsequently been replaced by the external reviews that were commissioned in 2019. Following the tragic failure of a TSF in Brumadinho, Brazil in January 2019, the Investor Mining and Tailings Safety Initiative called for a new independent and publicly accessible international standard for tailings dams based on the consequences of failure.

In February 2019, the ICMM Council committed to convening of an independent review of global tailings management practices, with co-convenors UNEP (United Nations Environmental Programme) and PRI (Principles for Responsible Investment) – under leadership of independent chair, Dr Bruno Oberle. The outcome of this Global Tailings Review (GTR) process was a Global Industry Standard on Tailings Management (GISTM), which has as its main objective the safer operation of tailings facilities. ARM has been actively involved in the process and welcomes the GISTM, which was launched on 5 August 2020.

During April 2019, ARM (in collaboration with our joint venture partners) responded to a request for information by a number of investors represented by the Church of England Pensions Board and the Swedish Council of Ethics.



ARM's comprehensive TSF disclosure is available on our website at www.arm.co.za. (link: <https://www.arm.co.za/sd/files/arm-summary-tailings-storage-facilities-disclosure.pdf>)

4.4 WATER-RELATED DETRIMENTAL IMPACTS

ARM experienced no material detrimental water-related impacts in F2020.

Previously reported detrimental water-related impacts included:

- During F2019, electricity supply interruptions affected water supply to the operations in the ARM Ferrous division in the Northern Cape and water had to be trucked in and bottled water procured for employees working at Black Rock Mine.
- Flooding in the Northern Cape occurred due to excessive thunderstorms in January 2017. This is not normal for the area and affected both Beeshoek and Khumani mines. Plant stoppages occurred at Beeshoek Mine in January and February 2017 due to flooding. At Khumani Mine, the excessive rain led to seven days of lost production due to unsafe haul road conditions.
- Between December 2016 and February 2017, the Khumani Plant experienced downtime due to water shortages of 113 hours and 93 hours, for the off-grade plant and the on-grade plant respectively. The downtimes consequently resulted in a loss amounting to 259 900 tons off-grade feed and 124 605 tons on-grade feed at an expected off-grade product output of 163 737 tons and 102 176 tons for on-grade material.
- Floods and sinkholes (caused by earlier droughts) affected Black Rock Mine logistics in F2016: suppliers had to travel an additional 100km, resulting in increased transport costs and causing delays. There were no production losses associated with the event.

4.5 COMMITMENT AND RESPONSE

Water challenges are shared and require collaboration by governments, civil society, businesses, and local communities. We recognise that we need to manage water impacts at our operations but that responsible water stewardship and holistic risk mitigation requires collective action at the catchment level.

4.5.1 Responsibility for water

The ARM board, through the ARM social and ethics committee, has ultimate responsibility for water management at ARM. The responsibility for implementation rests with the chief executive officer; delegated to the chief executives of each division and the executive sustainable development, who is responsible for reviewing sustainable development-related policies, strategies and targets (including ARM's water consumption reduction target) and ensuring that these are aligned with the board's commitment to zero tolerance to harm.

Water is recognised in our ERM system as one of our principal risks with associated opportunities and is therefore a key input into our sustainable business strategy, which is ultimately the responsibility of ARM's CEO.

The ARM social and ethics committee monitors and reports on the manner and extent to which ARM protects, enhances and invests in the wellbeing of the economic, social and the natural environment in which ARM operates.

The Company's governance and reporting structure is displayed on pages 7 to 8. Assmang, a joint venture between ARM and Assore Ltd, has established a social and ethics committee which monitors environmental performance in the ARM Ferrous division and is chaired by the executive director for investor relations and new business. Each operation in the ARM Platinum division has a sustainable development committee, chaired by the executive sustainable development, which reports to the exco or board of the respective Joint Ventures, as appropriate.

The responsibility for implementation of climate and water related activities rests with the chief executive officer and the chief executives of each division and the executive sustainable development, who reports to the chief executive officer of ARM with oversight from the social and ethics committee. The executive sustainable development also reports to the management risk and compliance committee, a sub-committee of the audit and risk committee of the board, on matters and activities related to water as a standard agenda item.

ARM does not currently have incentives for C-suite employees or board members related to water performance. Water management forms part of the KPIs of relevant engineers at the operations. For example, the moisture content in tailings is linked to employee incentives at Khumani Mine.

4.5.2 Integrating water stewardship into our strategy

Water considerations are integrated into our business strategy by considering water risks and opportunities at the company and asset levels, measuring and managing our water withdrawals, consumption, outputs and re-use efficiency and taking actions to mitigate risks and take advantage of opportunities. Information on the level of risk or opportunity and capacity to manage these are tabled and discussed at the ARM management risk and compliance committee as well as the social and ethics committee whose outputs feed directly into the strategy development process.

The proactive and holistic water management strategy aims to facilitate the Group's role in the sustainable management of water resources. The strategy is built around identifying and mitigating water-related risks, exploring opportunities and engaging with partners to achieve collective action. We focus on water balances, a hierarchy of water use and minimising withdrawal of clean/potable/municipal water. Our goal is to recycle 100% of water (excluding

WATER MANAGEMENT continued

losses due to evaporation, seepage and entrainment) and to have no discharges.  4.1.

Our revised approach to water stewardship is more catchment-based and aims to be more collaborative in delivering on our strategic objectives. For example, at Khumani Mine, ARM engages in the project management and engineering and maintenance issues around the provision of water (public/maintenance service), which supports our growth objectives. We also emphasise the value of water and resultant efficiencies achieved are therefore aligned with our strategic objectives relating to operational efficiencies. Where water is material, relevant KPIs have been introduced at operational level. Where available, operations invest in technology to reduce water requirements and consider these as part of new/expansion projects to reduce our water dependency and competition with other water users. For example, Khumani Mine was designed with severely restricted water availability as a material consideration. The mine's tailings paste disposal facility minimises water use and discharge, ensures maximum recycling and significantly reduces evaporation losses compared to a conventional tailings deposition facility.

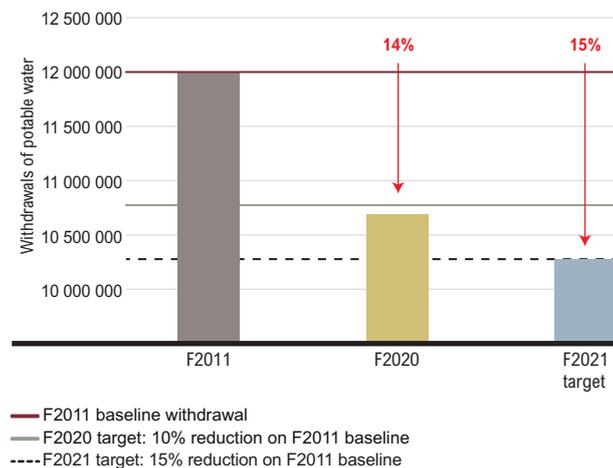
Additionally, ARM intends to conduct a climate scenario analysis to understand the impact of climate change on the resilience of the business. This will include consideration of different water-related futures influenced by climate change.  3.7.

4.5.2.1 Our water target

Current water target: To reduce withdrawals of potable water (surface and municipal sources) by 10% by F2020 relative to F2011 (excluding Machadodorp Works and divested operations).

We set a water target to reduce withdrawals of potable water (surface and municipal sources) by 10% by F2020 relative to F2011. This target includes all existing ARM operations except Machadodorp Works (which is on care and maintenance) and excludes divested operations since F2011 (Dwarsrivier and Lubambe mines). As part of annual workshops at our operations, focusing on climate and water compliance, we explored the development of a new water target related to withdrawals. Operations were consulted on what would constitute an appropriate water target for ARM based on site-specific considerations of what is realistic but ambitious. A realistic target was then set and represented the first step on the water target setting journey.

PROGRESS TOWARDS ARM'S WATER TARGET



We exceeded our F2020 water target, achieving a reduction of 14% compared to F2011. The main contributors to achieving the target include:

- Nkomati Mine decreased withdrawals from the Gladdespruit River by 90%. This was due to containment of the dam in pit 2 becoming a water sink that the mine could exploit. More recently, the reduced production associated with the scaling down of the mine has led to further decreases.
- Beeshoek Mine recorded a 32% decrease in water withdrawals from Sedibeng since F2011 due to the implementation of an optimised water management system, increased storm water use and a shift from monthly to daily monitoring, enabling faults to be resolved more quickly.
- Modikwa Mine recorded a 24% decrease in water withdrawals from Lebalelo since F2011 due to increased groundwater withdrawals and increased use of water as a result of various interventions.
- Cato Ridge Works recorded a 29% decrease in municipal water withdrawals due to fewer furnaces in operation in F2020 compared to F2011.

The decreases achieved were partially offset by increases associated with increased production at Black Rock and Two Rivers mines. Black Rock Mine recorded a 71% increase in water withdrawals from Sedibeng since F2011 due to the mine expansion project.

4.5.2.2 Setting a new water target

ARM has committed to setting a new target, in line with the ICMM framework. However we have experienced challenges in developing an appropriate target. The first challenge relates to the baseline. F2019 was the first year that ARM reported according to the WAF in line with the ICMM Water Position Statement. This process resulted in significantly improved reporting. Further improvements were achieved in F2020 which now represents a more accurate account of our water performance. However Covid-19 has had a significant impact on our water withdrawals, to the extent that a company-level target based on a F2020 baseline is unlikely to be appropriate.

During the engagements with operations as part of the annual climate and water workshops, it emerged that a number of targets will be needed to accommodate location and process specific contexts. For example, Beeshoek, Khumani and Black Rock mines are in the same catchment but face different challenges. Dewatering by a nearby mine led to an arrangement where that mine pays for Beeshoek Mine's withdrawals from Sedibeng. Beeshoek Mine is incentivised to reduce withdrawals for the benefit of other users. Khumani Mine is incentivised to reduce withdrawals from a cost perspective but is already very water efficient. Black Rock Mine does not get their full allocation and therefore is seeking permission to use its reverse osmosis plant to increase treatment and re-use to ensure, in particular, that the villages have adequate potable water.

Additionally, as part of this process, ARM undertook a benchmark to assess how other companies have set water targets. This process identified a lot of variation in how water targets are set across mining companies. Targets related to withdrawals and recycling / re-use are the most common and it is not uncommon to set sub-company level or commodity-based targets.

WATER MANAGEMENT continued

Extended water target: To reduce withdrawals of potable water (surface and municipal sources) by 15% by F2021 relative to F2011 (excluding Machadodorp Works and divested operations).

For this reason we have chosen to extend, but ratchet up, the existing target while we focus on setting a more appropriate suite of targets. These will likely include commodity-level targets as well as an ARM level target.

The suite of targets will consider the contexts of the water catchments in which our operations are based. This will include the following steps:

Step 1: Prioritize shared water challenges within each operational catchment, and understand operational risks, dependencies and impacts;

Step 2: Understand the desired catchment condition and determine ARM's contribution towards the desired conditions for each priority shared water challenge; and

Step 3: Set targets with the aim of contributing to existing efforts to meet desired conditions, determine implementation strategies and measure progress towards meeting targets.

4.5.2.3 A catchment-based approach

We have also adopted a more catchment-based approach and have thus become more collaborative in delivering on our strategic objectives. For example, at Khumani Mine, the team engaged in the project management and engineering and maintenance issues around the provision of water (public/maintenance service). This is fundamental to our growth objectives. Similarly, we have increasingly recognized the value of water and resultant efficiencies achieved are therefore aligned with our strategic objectives relating to operational efficiencies and relevant KPIs have been introduced at the operational level.

At the corporate level, ARM recognises the strategic imperative in understanding the bulk water suppliers and as such, participates in active platforms. The operations engage with catchment level forums that estimate current and future catchment balances. The Inkomati-Usuthu CMA where Nkomati Mine operates is effective in facilitating this. Tshiping Water User Association (WUA) in the Northern Cape serves this function reasonably well but other forums or CMAs are less effective and catchment-level water availability and quality are less well understood.

The operations engage with the Department of Water and Sanitation (DWS), local communities, local, provincial and national authorities, irrigation boards, catchment management agencies, and other industry users to ensure the sustainability of water resources for all stakeholders. We have also invested in borehole sinking and equipping for local social use through the ARM BBEE Trust water provision projects.

The future impacts of climate change are expected to impact the availability of water which, in the river basins where we share water resources with other users, has the potential to create conflict with local communities if not planned and managed appropriately. Future changes in the availability, quality, and price of water and the associated impacts on communities are assessed as part of risk management and strategic planning processes. Appropriate technology is considered during feasibility studies to reduce our own water requirements.

CASE STUDY

A viable water public-private partnership contributing to meeting catchment needs

The Lebalelo Water User Association (LWUA) is a Section 12 entity set up by mining companies operating in Limpopo. The association acts as a water utility supplying bulk raw water to member mines and other clients from the Olifants River and the Flag Boshielo dam (and the De Hoop dam in the future). The establishment of the LWUA was preceded by a number of requests for water out of the Olifants River for urban and industrial use, by Water Authorities and mining companies situated in the area of jurisdiction of the Sekhukhune District Municipality, Limpopo Province. This includes Modikwa Mine.

In 2016 the disestablishment of LWUA was gazetted. Government cannot buy out the scheme at present and therefore LWUA continues to operate it successfully. Further, the successful operation of the public private partnership has positioned the LWUA to play a bigger strategic role in the Olifants Water Resources Development Project (OWRDP) and the delivery of water to the appropriate catchments.

An ARM executive is currently the vice chair of the association (previously the chair) on behalf of Modikwa Mine. ARM's interests are in securing adequate water supply for the mine and other users in the catchment and ensuring the mine does not get burdened with unnecessary costs and that costs are appropriately apportioned. Involvement in the LWUA is also important from a strategic expansion perspective, providing the flexibility to enable potential growth in the area.

Community water

Access to water is a challenge in the Northern Cape and the ARM Ferrous division mines support various projects that aim to address these challenges. Khumani and Black Rock mines contributed to the construction of the new Kuruman bulk water reservoir to replace the old reservoir and help to address the bulk water storage challenges in Kuruman, which will benefit around 11 000 households. Khumani Mine implemented a project in partnership with the Gamagara municipality to upgrade the wastewater treatment plant that services the Deben area (approximately 7 800 residents).

The mine also provided R14.5 million to construct 321 waterborne toilets for 321 stands in the Olifantshoek community and upgraded and secured sewerage pump stations in Kathu and Mopoteng. Beeshoek Mine upgraded water infrastructure at Postmasburg Hospital, which serves Tsantsabane. The project improved water availability and included the renovation of 14 ablution facilities. The mine also erected a fence around the hospital to improve security.

WATER MANAGEMENT continued

4.5.2.4 Metrics

This is the second year that ARM has reported data according to the definitions and formats prescribed by the ICMM.

ARM's aggregated water reuse efficiency for sites in water stressed areas is **72%**.

WATER BALANCE SUMMARY FOR ARM OPERATIONS IN THE VAAL WMA*

Metric	Source/destination/type	Volume of water by quality					
		F2020			F2019		
		High (m ³)	Low (m ³)	Total (m ³)	High (m ³)	Low (m ³)	Total (m ³)
Withdrawal	Surface water	2 989 235	504 509	3 493 744	2 598 233	157 354	2 755 587
	Groundwater	6 289 703	2 036 356	8 326 058	7 000 110	1 786 502	8 786 612
	Total withdrawal	9 278 938	2 540 865	11 819 803	9 598 343	1 943 856	11 542 199
Output	Surface water	0	181 377	181 377	0	0	0
	Groundwater	0	23 427	23 427	0	215	215
	Supply to third party	0	3 840	3 840	0	3 840	3 840
	Total output	0	208 644	208 644	0	4 055	4 055
Consumption	Evaporation	0	2 145 676	2 145 676	0	530 245	530 245
	Entrainment	0	2 231 610	2 231 610	0	1 816 590	1 816 590
	Other	0	132 098	132 098	0	165 123	165 123
	Total consumption	0	4 509 384	4 509 384	0	2 511 958	2 511 958
Re-use efficiency	Total of all flows to tasks (m ³ /a)	11 690 518	35 781 888	47 472 407	4 839 677	42 268 545	47 108 222
	Total worked water flows to tasks (m ³ /a)	(n/a)	39 297 912	39 297 912	(n/a)	35 746 612	35 746 612
	Reuse efficiency (%)	(n/a)	(n/a)	83%	(n/a)	(n/a)	76%
Diversions	Water diverted to neighbouring communities, farms and other users	586 190	0	586 190	504 376	0	504 376

* Includes Beeshoek, Khumani, and Black Rock mines.



WATER MANAGEMENT continued

WATER BALANCE SUMMARY FOR ARM OPERATIONS IN THE PONGOLA-UZIMKULU WMA TOTAL*

Metric	Source/destination/type	Volume of water by quality					
		F2020			F2019		
		High (m ³)	Low (m ³)	Total (m ³)	High (m ³)	Low (m ³)	Total (m ³)
Withdrawal	Surface water	265 829	0	265 829	293 499	0	293 499
	Groundwater	0	0	0	0	0	0
	Total withdrawal	265 829	0	265 829	293 499	0	293 499
Output	Surface water	22 250	0	22 250	4 534	0	4 534
	Groundwater	0	0	0	0	0	0
	Supply to third party	0	0	0	0	0	0
	Total output	22 250	0	22 250	4 534	0	4 534
Consumption	Evaporation	190 649	49 546	240 195	282 264	134 599	416 863
	Entrainment	0	0	0	0	0	0
	Other	0	0	0	0	0	0
	Total consumption	190 649	49 546	240 195	282 264	134 599	416 863
Re-use efficiency	Total of all flows to tasks (m ³ /a)	265 829	49 546	315 375	293 499	134 599	428 098
	Total worked water flows to tasks (m ³ /a)	(n/a)	49 546	49 546	(n/a)	134 599	134 599
	Reuse efficiency (%)	(n/a)	(n/a)	16%	(n/a)	(n/a)	31%
Diversions	Water diverted to neighbouring communities, farms and other users	0	0	0	0	0	0

* Includes Cato Ridge Works. (note that the operation is not in a water stressed area).

WATER BALANCE SUMMARY FOR ARM OPERATIONS IN THE INKOMATI-USUTHI WMA TOTAL*

Metric	Source/destination/type	Volume of water by quality					
		F2020			F2019		
		High (m ³)	Low (m ³)	Total (m ³)	High (m ³)	Low (m ³)	Total (m ³)
Withdrawal	Surface water	158 332	498 110	656 442	236 395	487 521	723 916
	Groundwater	609 861	1 271 277	1 881 138	664 660	2 974 530	3 639 190
	Total withdrawal	768 193	1 769 387	2 537 580	901 055	3 462 051	4 363 106
Output	Surface water	0	686 484	686 484	0	424 279	424 279
	Groundwater	0	0	0	0	0	0
	Supply to third party	0	0	0	0	0	0
	Total output	0	686 484	686 484	0	424 279	424 279
Consumption	Evaporation	0	802 480	802 480	68 624	909 836	978 461
	Entrainment	0	54 993	54 993	0	53 289	53 289
	Other	0	0	0	0	0	0
	Total consumption	0	857 473	857 473	68 624	963 125	1 031 750
Re-use efficiency	Total of all flows to tasks (m ³ /a)	340 579	11 339 754	11 680 333	466 731	13 431 185	13 897 916
	Total worked water flows to tasks (m ³ /a)	(n/a)	6 269 876	6 269 876	(n/a)	8 112 975	8 112 975
	Reuse efficiency (%)	(n/a)	(n/a)	54%	(n/a)	(n/a)	58%
Diversions	Water diverted to neighbouring communities, farms and other users	0	714 249	714 249	0	942 348	942 348

* Includes Machadodorp Works and Nkomati Mine.

WATER MANAGEMENT continued

WATER BALANCE SUMMARY FOR ARM OPERATIONS IN THE OLIFANTS WMA TOTAL*

Metric	Source/destination/type	Volume of water by quality					
		F2020			F2019		
		High (m ³)	Low (m ³)	Total (m ³)	High (m ³)	Low (m ³)	Total (m ³)
Withdrawal	Surface water	1 344 233	1 706 248	3 050 481	1 681 374	1 640 359	3 321 733
	Groundwater	189 408	2 404 568	2 593 975	204 415	2 048 488	2 252 904
	Total withdrawal	1 533 641	4 110 815	5 644 456	1 885 789	3 688 847	5 574 637
Output	Surface water	0	87 916	87 916	0	89 417	89 417
	Groundwater	0	0	0	0	0	0
	Supply to third party	29 620	10 733	40 354	271 245	0	271 245
	Total output	29 620	98 649	128 270	271 245	89 417	360 662
Consumption	Evaporation	11 096	1 878 884	1 889 980	0	1 902 707	1 902 707
	Entrainment	0	1 038 504	1 038 504	0	3 481 916	3 481 916
	Other	0	0	0	0	0	0
	Total consumption	11 096	2 917 388	2 928 484	0	5 384 623	5 384 623
Re-use efficiency	Total of all flows to tasks (m ³ /a)	3 724 198	11 821 450	15 545 648	1 435 603	8 077 761	9 513 364
	Total worked water flows to tasks (m ³ /a)	(n/a)	8 076 144	8 076 144	(n/a)	5 755 580	5 755 580
	Reuse efficiency (%)	(n/a)	(n/a)	52%	(n/a)	(n/a)	60%
Diversions	Water diverted to neighbouring communities, farms and other users	0	0	0	0	0	0

* Includes Modikwa and Two Rivers mines.

ARM is not currently able to report on the proportion of sites with water performance targets as the existing water target applies only at the ARM level. Although the target is informed by site-level assessments, the approach is intended to enable flexibility to accommodate different operational and market contexts that influence our operations' ability to reduce withdrawals of potable water. This will be possible once ARM has set a more appropriate suite of targets.

4.5.2.5 Verification

ARM's annual water data are assured by a third party. IBIS ESG Consulting Africa (Pty) Ltd provided independent assurance over ARM's Sustainability Report and the engagement was performed in accordance with the AccountAbility AA1000AS guidelines (assurance Type II, moderate). This includes a review of the reporting process and an assessment of the report against AccountAbility's guiding principles of exclusivity materiality, and responsiveness.

The assurance process includes the total volume of water withdrawal from all sources and total water discharged from sites.



The Independent Assurance Statement can be found on pages 102 to 105 of the 2020 sustainable development report.

4.5.3 Engagement around water

There is a growing awareness of the need for collective action to reduce water usage, use water more efficiently, repair leaks, restore ecosystem health, and to identify and manage water risks through stakeholder engagement. Investors and other stakeholders are increasingly calling for greater insight into catchment-level water balances, including projected demand and supply as well as water quality elements.

ARM's commitment to water stewardship drives our engagements with various stakeholders to find solutions appropriate to all water users' needs. We engage with a broad range of water-related stakeholders to ensure the sustainability of water resources and that all operations have the necessary controls in place to ensure that the quality of water around them is not negatively affected. These stakeholders include the Department of Water and Sanitation, local communities, authorities at the local, provincial and national levels, water forums, irrigation boards, catchment management agencies, farmers and other industry users. Engagements with communities help us to understand and mitigate their concerns, identify how to contribute to community water security and increase transparency regarding our operations. We partner with local and regional government structures where appropriate to mitigate water risks that arise outside mine boundaries.

Operations participate in forums that discuss issues relating to sustainable water supply in the region. These include climate change and the potential influence of changing climate and potential regulation could have on the supply and cost of water.

Operations engage with catchment level forums that estimate current and future catchment balances. The Inkomati-Usuthu CMA where Nkomati Mine operates is effective in facilitating this. Tshiping Water User Association (WUA) in the Northern Cape serves this function reasonably well but other forums or CMAs are less effective and catchment-level water availability and quality are less well understood.

WATER MANAGEMENT continued

WATER-RELATED FORUMS IN WHICH ARM OPERATIONS PARTICIPATE OR INTERACT INCLUDE:

- The Gladdespruit Forum;
- The Tubatse Environmental Forum;
- The Lebalelo Water User Association;
- The Olifants River Water Resources Development Project;
- The Tshiping Water User Association; and
- The Manganese Leadership Forum (engaging around the appropriate design of the Vaal Gamagara Water Supply Scheme).

CASE STUDY**Leading collective investments in bulk water infrastructure in the Northern Cape**

The increasing cost and unreliable supply of water in the Northern Cape present material risk to our operations in the area. We have been leading a process to proactively mitigate this risk.

In 2017 Assmang was instrumental in setting up the Mines Leadership Forum (MLF) as a collaborative platform under the Minerals Council of South Africa. Funds were raised through the MLF to support ongoing technical, legal and financial engagements with the municipal water provider, Sedibeng. Due to the protracted finalization of the offtake agreement, a capital raising fee was proposed by the MLF to address immediate funding requirements on the Vaal Gamagara Water Supply Scheme (VGGWSS), and a steering committee has been convened with Sedibeng Water to provide oversight on the ongoing VGGWSS work. An ARM executive is the vice chair of this committee.

Engagement is focused on agreeing on contributions from various stakeholders and clarifying the scope, expenditure outlook and available funds for subsequent investments. Assmang continues to collaborate with Sedibeng Water to deliver this project. During the first half of the year, a capital user charge on water of R6/t became effective as the system is upgraded, contributing to above-inflation increases in on-mine unit production costs at Khumani Mine..

To mitigate supply disruptions, mines are maximising stockpiling at the mines and at the port. This has been driven by the MLF and allows “catching up” if there are water supply disruptions. For example, Khumani Mine has invested in additional capacity to accommodate for water supply interruptions. There are however limits to this measure and therefore sustaining funding and moving forward with the development of the project is needed to secure long-term bulk water supplies.

Mines continue to participate through a steering committee and are committed to supporting Sedibeng to ensure appropriate governance to take this project forward.

ARM is a member of the ICMM and is committed to implementing the ICMM Sustainable Development Framework and the ICMM’s Position Statement on Water Stewardship (2017). The executive sustainable development is a member of the ICMM Water Working Group which considers emerging issues driven by new legislation or society and

translates this into the need to develop collective industry/good practice, policy or position statements as appropriate.

4.5.3.1 Identifying and managing water risks and opportunities at the operational level

ARM’s ERM process links the strategic intent factors to the water risks that may help or hinder the operation from achieving its objectives. Water is inherently included in the strategic intent factors. Water availability is considered as part of each operation’s five-year business plan and these assess the availability and use of appropriate technology to address water requirements or manage impacts.

In 2017 and 2018 we undertook site-specific risk assessments at Beeshoek, Black Rock, Khumani, Nkomati, Modikwa, and Two Rivers mines as part of a water performance and reporting gap analysis and compliance project. In F2019 the WWF Water Risk Filter was used to support the identification and assessment of water-related risks at the operations. Water risks were discussed again as part of the climate and water workshops in F2020.

At the corporate level, ARM has embarked on a process to identify risk associated with critical suppliers that may result in a business continuity impact on the operations. We have not identified our supply chain as presenting a material water-related risk to our organisation, based on experience and initial investigations into potential risks in the future (other than the need to secure the supply of water for the operations).

4.5.3.2 Direct water risks and mitigation measures

Our focus on operational efficiencies emphasises the value of water and the need to use it efficiently. Water balances at operations manage and optimise water use and, where water is material, relevant KPIs are in place to incentivise increased water efficiency.

All operations run closed-circuit water systems to the extent possible to maximise reuse and minimise discharge into the environment. Dirty and clean water are separated, and operations implement a hierarchy of water use to ensure that “dirty” or process water is recycled for re-use before clean water is abstracted from the natural environment. Where appropriate, technologies such as reverse osmosis (RO) have been implemented to clean process water and we continue to investigate natural, sustainable alternatives such as wetland formation, particularly for mine closure plans and objectives. Surface water and groundwater quality are monitored to measure compliance with WUL conditions, assess our impact on the receiving environment and flag the need for mitigation. Biomonitoring of aquatic/riverine environments is performed as appropriate and as stipulated in each operation’s WUL conditions.

Various measures are in place to reduce consumption, increase storage and mitigate production downtime, including the use of dust suppression surfactants to reduce evaporation.

Mines use dust suppression surfactants to reduce evaporation as well as various other measures to reduce consumption, increase storage and mitigate production downtime.

ARM’s Ferrous division is in the process of investing in new ultra-thickened tailings facilities at Black Rock and Beeshoek mines. Black Rock Mine has commissioned a new ultra-thickened tailings facility at Nchwaneng. The integrated process water recovery, clarification and deposition circuit at Nchwaneng commenced early in 2019 and was completed and handed over early in 2020. A similar facility will be commissioned at Gloria to be completed in late 2021. The facility at Beeshoek Mine is expected to be completed around mid-2022. Water harvesting has commenced partially with recovery and re-use of

WATER MANAGEMENT continued

sewage water at Khumani and Black Rock mines. The optimal water recovery and clarification of process water at Khumani Mine is the most mature. The process is underway at Black Rock Mine and will commence at Beeshoek Mine pending a feasibility study currently underway. The mines are also maximising slurry densities going to tailings, reducing water per unit of tailings deposited. These investments will result in reduced water consumption.

Beeshoek Mine has invested in mobile pumps, a new storm water dam, software to optimise dust suppression using water trucks and plans to build a new return water dam.

Black Rock Mine has invested in a reverse osmosis (RO) plant and filters and reuses process water for gland services. A new lined tailings storage facility is being commissioned and once functional, will improve water performance by reducing the loss of water through seepage. The mine has undertaken significant capital expenditure on water metering with an addition 56 flow meters approved and expected to be rolled out by May 2021. Additionally, the mine is investing in a combined sewage treatment plant that, subject to permission, will treat effluent using the RO plant to provide potable water for the village and reduce the quantity of potable water withdrawals from Sedibeng (the village currently consumes around 50% of the potable water used at the mine). Investment in a system to divert grey water to the village for irrigation will further reduce the mine's withdrawals from Sedibeng.

In addition to a design that uses a paste technology for tailings disposal (recovering up to 85% of water), Khumani Mine has invested in long term on-site water storage and built additional storm water trenches and dams which also reduces safety risks during extreme weather, thus limiting production downtime. The mine also commissioned a new cell in its tailings storage facility in F2019. This will have a negative water management impact for the first six months as the mine will not be able to recover the water during the commissioning phase. Thereafter there will be significant water saving benefits. A further three additional lined water storage dams will provide a holding facility to mitigate the risk of water supply disruptions from Sedibeng. Khumani Mine has also upsized production capacity to allow for an ability to catch up in the case of stoppages due to water and electricity supply disruptions. During summer, production has to decrease but can ramp up in winter to reach the production target. Additional measures undertaken in F2020 include lining of trenches, upgrading the Parsons storm water return pumping system, installing a return water pumping system from the load-out storm water dam; and replacing the King Braithwaite tank. New cyclones to de-water the paste and pipeline replacement and a new return water line are planned.

Nkomati Mine has invested in additional water storage and evaporation fans to manage excess water in an attempt to eliminate discharge. The mine has also achieved improved reuse and recycling of water from the Onverwacht TSF through the utilisation of the old tailings pipeline as an additional new return water pipeline, effectively doubling the pumping capacity of excess water from the TSF to the plant. Additional benefits include a significant reduction in the requirement for freshwater make-up to the processing plant as well as reducing water containment on the TSF which is a known stability risk on tailings dams.

At Machadodorp Works, a water management project team has been established. The smelter has constructed cut off trenches, doubled the sump size and is investigating a RO plant to mitigate the risk of discharges to the environment.

Two Rivers Mine is in the process of lining a new TSF to reduce water seepage (scheduled for completion in September 2021). In F2020 the

mine installed a brominator to improve drinking water quality and started using gel blocks when reusing dirty water underground. Previously the mine optimised flocculant and increased pump and pipe sizes to reduce spillage.

Modikwa Mine made investments in F2020 to reduce leaks and spillages. This included replacing some plastic pipes with steel pipes (4 500m of piping) to reduce leaks and pumping requirements and fixing of water pipes and water spillages underground.

We are increasingly looking beyond our operational boundaries to contribute to collective action at the catchment level. For both our Northern Cape and Platinum division operations we are engaging in collective actions to ensure long term bulk water supplies.

ARM and its joint venture partners, through its operations, invest in local water infrastructure through their Social Labour Plans (SLPs) to improve community access to sufficient potable water and increase community resilience. The ARM BBEE Trust funds water provision projects including the sinking and equipping of boreholes for various schools and communities around South Africa.



4.5.3.3 Water risk in the value chain

Management has embarked on a process to identify risk associated with critical suppliers that may result in a business continuity impact on the operations. Our supply chain has not been identified as presenting a material water-related risk to our organisation, based on experience and initial investigations into potential risks in the future (other than the need to secure the supply of water for the operations). Substitutes of critical supplies are available and water costs still represent a relatively small contribution to the cost of purchased goods and services.

The most immediate concern relates to extreme weather events (floods and droughts) affecting logistics and the ability to receive goods and services in a timely manner. We recognise the need to better inform our assessment of supply chain risk and have undertaken a more comprehensive assessment of water risk in our supply chain.

WATER MANAGEMENT continued

Assessing water risk in our supply chain

In F2019 ARM undertook an assessment of each operation's top five suppliers by spend. The assessment sought to better understand suppliers' performance with respect to water as part of assessing water-related risks to ARM's operations. This included a review of publicly available documentation (e.g. Carbon Disclosure Project Responses and Sustainable Development Reports) and assessments of the companies by third parties (e.g. news sources and research/advocacy reports). Information was available on big suppliers but limited public information could be obtained for the smaller, more local suppliers. This information, together with locations of suppliers' primary operations, was used to assess operational and basin level water risks using the WWF's Water Risk Filter  (<https://waterriskfilter.panda.org/>).

This is an online tool that helps companies and investors assess and respond to water-related risks facing their operations and investments across the globe.

Applying this tool, Eskom, Total SA, and Sasol were found to have high basin and operational water risks. Only one supplier was found to have an operational risk rating lower than the basin risk in their key area of operation. Applying the Water Risk Filter, the analysis suggests that many suppliers may not be adequately considering and managing water risks.

It was also observed that large suppliers report on water impact and performance but do not provide information on water impacts at the product level. No evidence was found to indicate and to that smaller operations assess and manage water-related risks.

Going forward ARM will identify additional relevant suppliers to engage with directly and will consider the best way in which to gather data on suppliers' water performance measures that can help to adequately assess water-related risks in our supply chain on an ongoing basis. This process will be repeated in F2021.

4.6 FUTURE WATER FOCUS AREAS

AREAS OF FOCUS IN F2021/F2022 INCLUDE:

Explore and develop a more appropriate suite of water targets.

Undertake an assessment of water risks in our supply chain.

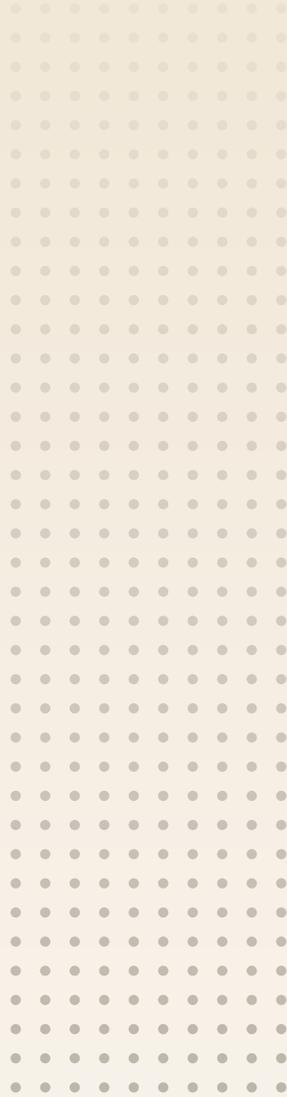
Continue to improve water reporting aligned with the ICMM guidance. The ICMM is moving towards reporting water into two main categories:

- Operational use – withdrawn with the intent for use; and
- Other water – actively managed or affected by the organisation but not with the intention for use*.

These changes are expected in the second quarter of 2021.

* Reporting other water will be more aspirational initially.





www.arm.co.za