Taskforce for Climate-related Financial Disclosures

In this section

Introduction

Climate change is one of the most pressing threats facing our planet today. It is affecting our environment and poses a growing risk for people and businesses alike. We recognise that what we do at JM has impacts – both positive and negative. Our products and services remove harmful air emissions and recycle scarce metals, and we are designing new technologies so that we can help accelerate the transition to a low-carbon future. But the manufacturing and chemical processes we use have their own environmental impact, creating greenhouse gas emissions, using water, and producing waste.

Our strategy is shaped, therefore, around the opportunities and the risks that our changing climate presents. And we have set ourselves the ambition of achieving net zero by 2040 with a series of challenging intermediate targets for 2030, to ensure we keep driving up the benefits of our products while reducing their environmental impact (see page 35 for a full table of targets).

The requirement to report using the framework of the Task Force on Climate-related Financial Disclosures (TCFD) is a useful tool in this process. It helps us think holistically about the future impact that climate change and the transition to a low-carbon world could have on us and, during the year, we continued to work with global sustainability consultancy Environmental Resources Management (ERM) to develop our approach. We have organised our report under the headings of the four pillars of TCFD framework because we believe that it's most useful for our stakeholders to include our response to TCFD as a standalone section within our annual report. In doing so, we have reported consistent with the framework, although we are still working on quantifying the climate-related impact of some of our risks.

Governance

Given the nature of our business, and how closely aligned our strategy is to a warming world, climate-related risks and opportunities have been on the board's agenda for many years. In May 2021, we announced the creation of a new board committee, the Societal Value Committee (SVC), to help the board focus more closely on the governance of sustainability matters including response to climate change. Nonetheless, the SVC is only part of the wider governance arrangements that support the board in discharging these responsibilities, as summarised in the diagram on page 61.

Role of the board and its committees

The board is responsible for setting and overseeing the implementation of the group's strategy, including the annual budget and detailed business plans. In doing so, it considers climate-related issues, including when approving requests for capital expenditure or new initiatives.

The SVC meets at least three times a year. It supports the board by overseeing the delivery of our sustainability strategy, and monitoring and overseeing progress against our sustainability goals and targets, with regular updates from the Chief EHS and Operations Officer. Jane Griffiths, the SVC Chair, reports to the board after each meeting, including bringing forward any recommendations from the committee. Given how fast society's response to climate change is developing, the SVC receives papers on emerging issues at each meeting, such as legislation and stakeholders' expectations. It also invites external experts to get an 'outside-in' view on our sustainability plans, and other emerging topics, which this year included diversity and inclusion, and human rights for more on the SVC's work, see page 98.

During the year, the wider board received an update on climate-related legislation and a training session on the implementation of TCFD recommendations.

Together with the Nomination Committee, the board ensures that, among the directors, it has the necessary sustainability and climate-related expertise. For more details of our non-executive directors' skills and experience, see pages 86-87.

As an initial step, the Audit Committee has this year reviewed the internal assurance in respect of TCFD. It will continue to assess the level of assurance over TCFD and climate-related issues as we continue to develop our reporting in this area. The Audit Committee is also responsible for reviewing the effectiveness of internal control and risk management, which includes climate-related risk.

This year, the Remuneration Committee reviewed the role of sustainability and climate-related targets within the group's remuneration approach. Measures will be included within the Performance Share Plan, reflecting our intent to contribute to an acceleration of the transition to a net zero world. For more details, see page 69.

As a result of our internal board effectiveness review, the responsibilities of the board and its committees in relation to climate-related issues and the broader sustainability agenda have been refined and clarified.

Role of management

The board delegates responsibility for running the business to the Chief Executive; this includes overall responsibility for climate-related issues, which resides with the Chief Executive, assisted by the Group Leadership Team (GLT). The Chief Executive is supported by the Chief EHS and Operations Officer who is responsible for day-to-day climate-related matters and provides updates to the GLT on the steps taken to develop or implement our sustainability strategy, including key metrics, risks and opportunities. The Chief EHS and Operations Officer is in turn supported by the Sustainability Council. The Sustainability Council is made up of managers from across our sectors and functions who, together, develop our sustainability vision, goals and targets. To prioritise driving our sustainability agenda and threading all elements into our business, we appointed a new Chief Sustainability Officer with effect from 16th May 2022. The Chief Sustainability Officer will report to the Chief Executive and be a member of the GLT.

Governance structure for climate-related issues

Board

Chief Executive

Responsible overall for climate-related issues

Chief EHS and Operations Officer

Responsible for day-to-day climate-related issues (from 16th May 2022, our new Chief Sustainability Officer will assume this responsibility)

Sustainability Council

Develops our sustainability vision, goals and targets

Members: representatives of all sectors and functions

Societal Value Committee

Assists the board in overseeing the sustainability strategy

Members: full board

Chair: Jane Griffiths

Meets at least three times a year

Audit Committee

Reviews the assurance process for TCFD

Members: all independent non-executive directors

Chair: Doug Webb

Meets five times a year

Remuneration Committee

Reviews climate-related targets for incorporation in incentive plans

Members: all independent non-executive directors

Chair: Chris Mottershead

Meets five times a year

Strategy

Our business strategy is based on addressing the world's need to transition to a low-carbon future through enabling the necessary transitions in transport, energy, industry and the circular economy. Climate change offers us many opportunities, while also requiring us to adapt our operations to ensure we are resilient. So that we properly understand and can plan for its potential impacts, this year we developed climate-change scenarios to frame the ambiguities of an increasingly volatile and complex environment. These scenarios, which project the impact of climate change on our operational and commercial performance, are essential in informing our strategic choices, such as how we invest in R&D, or which new products to develop. We also use climate scenarios to consider the resilience to changing weather patterns of our own operations, those of our strategic suppliers and our core supply routes.

Climate scenarios for evaluating transition risks and opportunities

Our climate scenarios are central to our plan to achieve net zero by 2040, and our nearer-term ten-year strategic planning. They are used by all our businesses as a common basis for planning, forecasting and stress testing their strategy and assumptions on growth.

To test the resilience of our strategy and portfolio, and our assumptions about growth, we have developed three transition scenarios that represent a wide range of outcomes.

- Rapid transition scenario (aligned to 1.5^{0}C) – net zero achieved globally by 2050, in line with the goal of the Paris Agreement to limit the world's temperature rise to well below 2^{0}C by 2100, and preferably no more than 1.5^{0}C. This reflects swift and decisive action with regard to policy interventions and decarbonisation commitments.
- Pragmatic evolution scenario (aligned to 2^{0}C) – net zero achieved globally by 2080, which reflects a step-up in policy interventions and decarbonisation commitments compared with today, but not as decisive as under the rapid transition scenario.
- Slow transition scenario (aligned to 3^{0}C) – net zero not achieved by 2100, reflecting a global lack of urgency on climate change with limited policy or legislative interventions.

We developed our climate scenarios internally with support from an external expert, reflecting the latest available research from internationally recognised sources such as the International Energy Agency (IEA). The IEA research we used included three scenarios: the Net Zero Emissions Scenario, the Sustainable Development Scenario, and the Stated Policies Scenario. Our methodology breaks down the different energy sources (electricity, hydrogen, gas, coal, oil, renewables, biomass and others) and considers forecasts for each source by demand type: transport, buildings, industry, power and heat, and feedstocks for materials. We developed in-house forecasts for specific source / demand combinations close to our areas of expertise in automotive, chemicals, hydrogen and other industries, while ensuring that, at a macro level, we remained within IEA's forecasts. This methodology allowed us to develop an economy-wide view, while also including enough detail about our key markets to inform our specific strategies for different parts of the business.

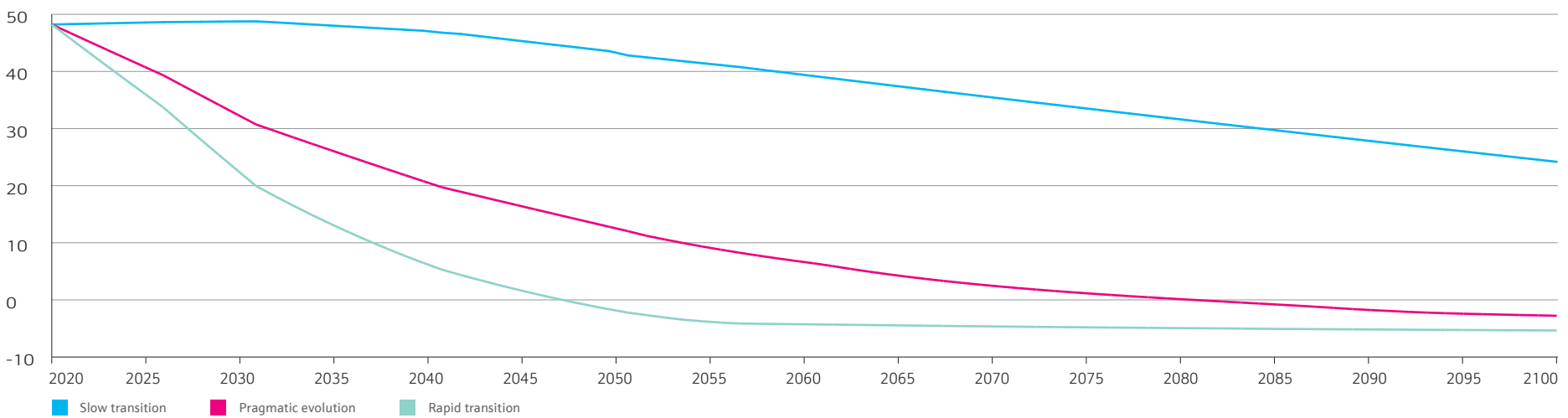
We update the scenarios at least annually to reflect any changes in external drivers. In these updates, we incorporate the latest from internationally recognised sources alongside our own forecasts, which take into account policy developments, technology evolution and the rate of public and private investment in new plants and infrastructure.

We model scenarios up to 2100 (see chart below), but look at shorter-term horizons, specifically 2030 and 2040, to inform our strategic and operational decisions. The table below details the main qualitative and quantitative assumptions we used for our 2040 scenarios, given that this is our target date to achieve net zero. We use the pragmatic evolution scenario as our base case for our strategic planning.

Market Sector	Metric (2040)	Unit	Rapid transition	Pragmatic evolution	Slow transition
Global	Total primary energy demand	EJ	500-550	550-600	690-740
	Renewables supply	% of total energy supply	c.55%	c. 40%	c. 25%
Automotive	Global sales of zero-emissions vehicles	% of total automotive sales	c. 90%	c. 70%	c. 40%
	Global sales of fuel cell electric vehicles	% of total automotive sales	c. 20%	c. 15%	c. 10%
Hydrogen	Global hydrogen production	Mt p.a	350-400	200-250	150-200

IEA's NZE and SDS scenarios are used to inform our rapid and pragmatic transition scenarios, respectively. Both rely on policy interventions beyond current pledges to reduce fossil fuel-related emissions. The NZE assumes a wider range of interventions and stronger implementation rates, including in terms of near-term support to early deployment of key innovative technologies and supporting infrastructure. The NZE also assumes substantial energy efficiency gains through stronger standards for appliances and fuel economy, among other levers.

Total anthropogenic emissions ($GtCO_2/yr$)



Our transition risks and opportunities

Through our scenario work, we identified four distinct potential climate-related impacts, which represent both risks and opportunities for our business. We have added the first climate impact risk to our principal risks because it is of strategic importance to our business (see page 74).

	Climate impact	Description of the transition risk and opportunity
1	**Changing customer and consumer demand for our products**	Increasing awareness of the impacts of a warming climate is changing consumer habits, leading to lower demand for some of our existing products and higher demand for new products. We need to carefully match supply as demand changes, and to identify new markets for our solutions catalysing the net zero transition for our customers to avoid negative financial impacts and realise opportunities for our revenue, cash flow and profitability.
2	**Increasing demand for low-carbon manufacturing and recycling of key materials**	Customers and policy makers are increasingly interested in the carbon footprint of our products, demanding a lower carbon footprint and specifying recycled content for key raw materials. We need to make the right capital investment decisions to transition our operations to net-zero emissions in line with market demand, and use low-carbon raw materials to increase our competitive advantage and avoid the potential issue of stranded assets.
3	**Increasing carbon taxation**	An increasing number of governments are introducing or considering introducing a carbon tax or trading schemes. This could raise the costs of energy, water and waste both for us and our suppliers, and also the cost of transport and logistics, which may be affected by international border carbon tax mechanisms. If this results in higher prices for our products, our customers may be less willing to buy them.
4	**Increasing stakeholder expectations of corporate climate policy and performance**	Market expectations are rising and corporate policy / performance regarding climate-related targets are under increasing scrutiny. If we do not meet our stated net-zero commitments and strategy, or our commitments do not keep pace with societal / market expectations of net zero, we could suffer from a loss of stakeholder and / or shareholder confidence, loss of reputation, shareholder action and climate-related litigation. Conversely, if we outperform our competitors in how we adapt to climate change, we could attract new shareholders and customers.

We have used our climate scenarios to evaluate these risks and opportunities in the short (0–3 years), medium (3–10 years) and long term (10+ years), in line with our usual business planning timescales. We believe the pragmatic evolution climate scenario is most likely to occur, so have used it as the base case for assessing our transition impacts, and the other two scenarios to stress test the sensitivity and resilience of our business plans.

Climate transition impact	Primary driver of impact	Opportunities (with time horizons)	Risks (with time horizons)	Management of impacts	Financial impacts (after management)	KPIs to monitor impacts
1. Changing customer and consumer demand for products	**Regulation** • Emissions standards for vehicles • Emissions standards for energy production • Requirements for use of bio-based feedstocks **Markets** • Shifts in consumer preferences • Uncertainty over which technologies will prevail.	Sustained sales of existing products for internal combustion engine vehicles in the short and medium term, as tighter emissions standards demand state-of-the-art technology for exhaust pipe catalysts. Opportunities for new products in the medium and long term: • Lower carbon energy sources (blue and green hydrogen). • Hydrogen-powered vehicles (fuel cells) and sustainable aviation fuels. • Low-carbon solutions for the chemicals industry.	Without adaptation of our portfolio, there is a long-term risk that we may not have a financially viable future business model and / or capability as society transitions away from fossil fuels. • Reduced demand for existing autocatalyst products for light duty vehicles (long term). • Uncertainty in the rate of market evolution from existing to new technology options which could affect profitability (medium / long term). • Ability to scale up rapidly to manufacture new products for new markets (short / medium term).	We focus on managing our existing businesses effectively, while pivoting away from fossil fuels-based industries to ones based on sustainable chemicals, fuels and clean energy as markets develop. • We are closely monitoring the changing market environment, updating our climate scenarios at least once a year to inform our strategic decisions. • We keep investing in innovation to make sure we have products that differentiate us in all our markets. • For our maturing businesses, we have a plan to reduce our cost base to improve efficiency and cash flow • For some of our growth businesses, we plan to invest in production assets and to make sure our capital projects are implemented effectively through our capital expenditure control programme.	**Growth** Accelerating profit growth, with low double-digit growth rate towards end of decade[1] and c. 40% of profit coming from businesses related to the net zero transition by 2031/32. Clean Air remain a cash generative business of scale, with sales[2] c. £2bn in base case by end of decade. **Costs** c. £300m of cumulative capital expenditures dedicated to businesses related to the net zero transition over 2022/23-2024/25. £100m-£200m fixed cost savings from Clean Air by 2030/31. 1. At constant 2021/22 average PGM prices and FX rates 2. Sales excluding precious metals	Progress towards our 2030 sustainability targets for products and services: • Sales, R&D and revenues aligned with SDG7 and SDG13. • Tonnes of GHGs avoided by customers using our products. Economic activity aligned with EU taxonomy regulation - climate delegate act. **Market evolution forecasts** • Automotive emissions regulation changes • Market forecasts for vehicle sales by type and region • Governments' investments in hydrogen infrastructure • Evolution of the use of sustainable aviation fuels

Climate transition impact	Primary driver of impact	Opportunities (with time horizons)	Risks (with time horizons)	Management of impacts	Financial impacts (after management)	KPIs to monitor impacts
2. Increased demand for low-carbon manufacturing and recycling	**Markets** • Shift in consumer preferences towards products with a low-carbon footprint **Regulation** • Emerging rules on recycled content of consumer goods and the need for companies to declare the carbon footprint of their products	As the world's largest recycler of secondary PGMs, we could benefit from the increased demand for goods with low-carbon and / or recycled critical raw material content (short / medium term). Opportunity to expand our knowledge of metal recycling into new markets, particularly lithium, nickel and cobalt, which are required by the electric vehicle industry to meet the EU's directive on battery recycling (medium / long term). Commercial advantage if we adapt our manufacturing plants to low carbon operation faster than our competitors.	Medium-term risk that we cannot transition our operations for net zero at the correct pace to meet customer demand of low carbon products. • Loss of customers and failure to attract new customers (medium / long term). • Greater capital required to transition our assets to low-carbon manufacturing (medium / long term). • Inability to access the alternative renewable energy sources needed to decarbonise our operations (medium / long term).	• We have set challenging recycling, and net zero targets to decarbonise our manufacturing operations • We have established a cross-functional Sustainability Council to drive progress towards these targets • In 2022, we will introduce an internal carbon price for our capital investment decisions to help us make the right choices for decarbonising our operations for net zero in the long term • We are developing a roadmap to net zero by 2040, which we plan to publish in 2023	Work is under way to quantify the financial impact of our commitment to net zero manufacturing by 2040.	Progress towards our 2030 sustainability targets for products and services: • % recycled PGM content in our products. • % reduction in Scope 1, 2 and 3 GHG emissions % products with a cradle-to-gate LCA available to our customers • Number of customer requests for low-carbon and recycled content in products.
3. Increasing carbon taxation	**Regulation** • Carbon pricing mechanisms	Increasing regulations and the introduction of carbon taxes will accelerate growth in our new target markets – sustainable chemicals, sustainable fuels and clean energy (medium term).	Many jurisdictions are implementing carbon pricing mechanisms with rates increasing over time. • Increased costs to us and our suppliers of goods and logistics due to carbon taxation on raw materials and fossil-fuel derived energy (medium term). • Loss of competitive advantage due to the increasing price of our products (medium / long term). • Reputational damage if we do not transition fast enough to cleaner energy solutions in our operations (medium / long term).	We are tracking carbon price risks through: • An annual exercise with the help of outside experts to forecast the effect of long-term carbon prices on our portfolio. • Working to embed carbon prices within our three- and ten-year planning cycles going forwards. • In 2022, we will introduce an internal carbon price for our capital investment decisions to help us make the right choices for decarbonising our operations.	Work under way to quantify financial impacts to our portfolio.	Potential exposure to carbon taxation in 2030 by Scope 1, 2 and 3

Climate transition impact	Primary driver of impact	Opportunities (with time horizons)	Risks (with time horizons)	Management of impacts	Financial impacts (after management)	KPIs to monitor impacts
4. Increasing stakeholder expectations of corporate climate policy and performance	**Reputation** • Increased concerns or negative feedback from stakeholders **Legal** • Exposure to litigation	Developing and delivering robust climate policy will increase our long-term business resilience, attracting shareholders and employees aligned with our values. Delivering our net zero commitment and science based targets will help us demonstrate sustainability leadership, and increase our profile with new customers and shareholders.	Investors, employees and wider society are scrutinising companies' sustainability commitments ever more closely. Failing to meet their expectations could damage our reputation, losing us customers, making it difficult to attract and retain staff, and ultimately increasing the risk of shareholder action. (medium / long term) • Our climate policy, net zero ambitions and sustainability targets do not keep up with stakeholder expectations. • Our plans for meeting these commitments are not deemed sufficiently detailed or credible. • We fail to meet these commitments.	We continue to monitor and manage the expectations of our stakeholders as follows: • Formed SVC and Sustainability Council to enhance our governance of climate-related issues. • Close monitoring of the latest case law and developments in climate litigation. • Developing and monitoring net zero roadmaps to 2040. • Maintaining regular dialogue with investors. • Market scanning and benchmarking of targets to ensure our climate-related polices and commitments meet the highest expectations.	Reputation risk is not easily quantified.	Progress towards our 2030 sustainability targets: • % reduction in Scope 1, 2 and 3 emissions. How we score on leading ESG platforms: • CDP Investor score. • DJSI, Sustainalytics and MSCI climate sections. • Employee engagement score.

Climate scenarios for evaluating physical risks

Changing weather patterns as the climate warms may result in physical risks to our assets and supply chains. During the year, we worked with Zurich Resilience Solutions to evaluate the exposure of all our assets and those of our strategic suppliers to these risks. To support this work, we used the Shared Socio-economic Pathways (SSPs), the latest climate change modelling scenarios from the Intergovernmental Panel on Climate Change (IPCC). The SSPs produce forward-looking climate data by running climate models driven by assumptions about future global GHG emissions, together with plausible future socio-economic development metrics (economic growth / GDP, demographics, land use and urbanisation), and incorporating the likely implementation of adaptation and mitigation measures.

We looked at three SSPs for the locations of all our own operations and those of our strategic suppliers. We considered four time horizons - 2020 (our baseline), 2030, 2040 and 2050 to identify the top hazards and how they are likely to change. SSP 1-2.6 assumes the lowest temperature rise, and therefore the least physical impact, disruption and adaptation costs; SSP 2-4.5 is the middle temperature rise; and SSP 5-8.5 assumes the highest temperature rise, and therefore the greatest physical impact, and disruption adaptation costs.

Given its potential severity, for scenario SSP 5-8.5, the resilience of our most critical sites. SSP5-8.5 is an extreme scenario that is unlikely to arise, but it is useful for stress testing. We then used it to test the resilience of our top 10 most critical sites. The site criticality ranking included financial criteria such as external sales and total asset value, as well as those climate-related perils ranked highly for increases in 2050. The ranking also took into account commercial factors and those sites considered to be of significant strategic importance to us. In looking at location-specific hazards, we also used various forward-looking climate data, including Jupiter Intelligence's Climate Score Global.

Scenario	Assumed temperature increase (relative to 1850-1900)
SSP 1-2.6	Best estimate of 1.7^{0}C warming by 2041-2060, and 1.8^{0}C by 2081-2100
SSP 2-4.5	Best estimate of 2.0^{0}C warming by 2041-2060, and 2.7^{0}C by 2081-2100
SSP 5-8.5	Best estimate of 2.4^{0}C warming by 2041-2060, and 4.4^{0}C by 2081-2100

Our physical risks

The physical risks of climate change can be grouped into two categories:

- **Acute**, which are extreme events such as tropical cyclones, severe flooding events, heatwaves and fires.
- **Chronic**, which are gradual changes like rising sea levels that damage coastal property, or sustained changes to temperature and rainfall.

In total, we investigated eight weather-related perils across these two types of risk: temperature, rainfall, thunderstorms, flood, drought, wind, wildfire and hail. We looked at them in two ways:

- **Risk to our own assets**, which could damage our sites and disrupt production, leading to loss of sales and increased costs, as well as posing risks to our employees.
- **Risk to our suppliers and value chain**, which could hamper our access to strategic raw materials (including metals) and products, and increase costs.

Analysis of our ten most critical locations shows that there is no material financial impact from climate change risks on the quantifiable hazards (flood and windstorm) on the medium time horizon (to 2030) in any of the scenarios. The most significant impact predicted by the models out to 2030, under the worst case scenario, was an additional 35% of our physical asset value to be subject to a high rainfall hazard. This includes our facilities in Skopje (N. Macedonia), Devon (USA), Manesar (India) and Royston (UK). Over time, drought may also become more significant. We have evaluated the impact this could have on water availability to our operations using the World Resource Institute's (WRI) Water Risk Atlas tool see page 46 for more information about this.

For risks to our supply chains, we concluded that our precious metal suppliers, on horizon of 2030 climate change under the worst case scenario of SSP5-8.5 could become subject to a high or very high rainfall hazard, and additionally a high or very high heat stress. This includes PGM mines and the processing operations in the Rustenburg region in South Africa, mines in Zimbabwe and some smelters in central USA.

For our other suppliers, on the shorter-term horizon of 2030, climate change under the worst case scenario of SSP5-8.5 is expected to cause a small number of our strategic suppliers' locations to be subject to a high rainfall hazard, heat stress or high or very high drought. In particular, this includes suppliers' locations in Vietnam, India, and USA.

Going forward into the next year, we will start to use this information to communicate with our strategic suppliers about their climate adaption plans and resilience.

Physical climate impact	Primary driver of impact	Opportunities (with time horizons)	Risks (with time horizons)	Management of impacts	Financial impacts (after management)	KPIs to monitor impacts
5. Disruption to our operations resulting in damage to or loss of assets, increased costs and harm to our employees.	Physical risks (acute and chronic). Increased frequency, severity and variability of extreme weather events and natural disasters.	Competitive advantage by improving our business resilience and controls through diligent climate-related screening of assets, and integration with business continuity plans. (medium term, three to ten years)	Damage to our key sites, equipment or stock from severe weather (wind, rain and drought) if any increased risk is not prioritised and there is no formal planning of climate-change mitigation and / or adaptation measures. (medium term) Insurance of our sites could become inadequate, more expensive or even unavailable, if a site is at very high risk of weather-related damage. (medium term)	Integration of weather-related risks in business continuity plans and follow-up action plans. (medium term) We regularly review the type and limit of insurance available for climate risks to our portfolio. See more in risk 8 Asset failure on page 77. (medium term) Climate change considered as part of new investments, including new sites with the business in transition e.g. China – fuel cell vehicles growth market, which reduces our operating costs. (medium term)	Zurich's analysis of our ten most critical locations shows that there is no material financial impact from climate change risks on the quantifiable hazards (flood and windstorm in the medium term). We are currently assessing whether we will need to do any mitigation to improve asset resilience in the medium term.	We use the WRI tool to monitor where clean water availability could be at risk in the long term (see page 46). Proportion of physical asset value exposed to a climate change related high or very high hazard levels by 2030: • Number of sites in water-stressed areas. • Amount of water consumed in areas or high or extremely high baseline water stress.
6. Disruption to our supply chain (upstream and downstream) hampering our access to strategic raw materials (including metals) and products, and increasing costs.	Physical risks (acute and chronic). Increased frequency, severity and variability of extreme weather events and natural disasters.	Engaging with our suppliers to help them manage climate risks to their sites could enhance our relationships with them and save us money. (medium term) Increase in business resilience through more diligent and frequent screening of our suppliers' assets (e.g. through integration with business continuity plans). (medium term)	Disruption of supply of key raw materials risks our ability to deliver goods on time to customers, resulting in loss of sales and future business and damage to our reputation. (medium term) Insurance cover of suppliers is inadequate, and uncertainty over the future level of increased risk responsibility that will be assumed by suppliers and / or JM relating to climate risks, or if physical risks should be transferred. (medium term, three to ten years)	We work with strategic suppliers to integrate specific climate mitigating actions for strategic and extreme cases. (medium term) We ensure that the type and limit of our suppliers' insurance is in line with our own risks and external obligations. (medium term) We work with suppliers to prioritise and integrate forward-looking potential climate risk actions and costs reductions in alignment with JM timeframe and ambitions. (medium term)	Not yet quantified. We are currently assessing whether we need to do any mitigation work in partnership with our strategic suppliers to improve their resilience or switch to alternative partners for high-risk delivery routes. (short / medium term)	We are working on developing these indicators as part of our broader supplier risk management (see principal risk 4 on page 75).

Next steps

- Our own assets – Building on the group-wide assessment, we will carry out local site assessments to determine their resilience and, if necessary, develop plans to mitigate their specific climate-related risks.
- Suppliers – We will continue to work with our suppliers, particularly those at highest risk from climate change, to develop plans to mitigate these risks.

Risk management

This year, we set up a cross-functional working group to help us identify, assess and manage the impact of climate on our business. The group includes representatives from our finance, strategy, sustainability and risk teams, and is supported by sustainability consultancy ERM.

Identifying climate-related risks

Through a series of workshops, the cross-functional working group identified six potentially significant climate-related risks, covering both the physical (extreme events, slow-onset hazards) and transitional (policy, legal, market, technology and reputation) aspects of climate change. We have yet to fully develop our monetary definition of material financial impact. However, in the context for our risk identification exercise, materiality was defined as a matter that in the short, medium or long term could significantly influence our ability to meet our strategic objectives.

As part of our work with ERM this year, they provided detailed guidance on how to carry out a thorough assessment of climate-change risk. During the identification stage of this process, we used a range of inputs, including:

- The TCFD risk taxonomy, including physical and transitional climate risks.
- Expert judgement within our TCFD working group, including technical experts from our finance, strategy, sustainability and risk teams.
- Consideration of risks in the context of our climate scenarios used for businesses strategic planning.
- An external review of risks disclosed by industry peers.

We documented what drives these risks, what their potential effects might be, and what mitigating actions we need to take to manage them. We also had the risks validated by ERM. We will continue to develop and refine our response to risk and target our mitigating actions towards the root causes of those risks.

Assessing those risks

JM's group risk framework provides guidance on the tools and processes required to manage and assess all risk types, including climate-related risks. During the year, with the help of EY, and approved for use by ERM, we developed a standardised group risk impact scoring methodology. We have since used this to conduct initial qualitative assessments of our transitional climate-related risks.

Our working group helps us assess climate-related risks across the whole organisation. The group manages each risk, making them part of our principal risk agenda, and drives meaningful discussion and actions around risk at all levels.

From our physical risk assessments, we can see that we need to put a time scale on specific risks that might affect our business – and we need to align those risks with the climate-change scenarios we consider in our strategic planning. To help us, Zurich Resilience Solutions provided a detailed analysis of which locations and suppliers we should prioritise, in the short and long term, as discussed on page 66 – climate scenarios section. We will refine these first assessments with assessments on site, which will help us better understand what mitigating actions we need to consider and when.

We have also made significant progress in assessing future product demand and carbon taxation risks, and have begun quantifying the potential financial impacts of these risks and opportunities, aligned with our climate scenarios.

Integrating those risks

It is essential that we integrate climate-related risks and opportunities into our strategic decision making, and our risk management framework guides us on the tools and processes we need to manage all risk types, including those related to climate. We want considering climate change to be an everyday part of how we operate, so we've included climate in our bottom-up operational risk management process, giving us a clear view of climate-related risks across the organisation. We've aligned our climate change work with the TCFD risk taxonomy to make sure we're covering physical and transitional climate risks.

This focused climate-change work now sees us aligning strategic growth with the transition to a low-carbon economy and including this as a standalone principal risk. We're also embedding what we've learnt from our early assessments of physical climate risk into our principal risk of asset failure and supply failure. Prioritising climate by incorporating it into our principal risk process means it will be reviewed formally, twice a year, by the GLT and the board – on top of the more detailed and focused review already done by the SVC.

In the coming year, we aim to:

- Continue to integrate the six climate-related risks we've identified.
- Strengthen our overall governance of climate-related risks.
- Ensure we are properly monitoring the risks themselves, and how we are mitigating them, by tracking progress against the targets we have set.

Managing those risks

The board SVC committee oversees our sustainability strategy, including climate-related risks. Our climate risks may have a direct or indirect impact on our principal risks and are therefore managed alongside and integrated within our principal risk process. Each of our climate risks has been assigned a risk coordinator. These individuals are senior stakeholders who are accountable for reviewing, monitoring and assessing the magnitude of the risk as well as overseeing the implementation of appropriate mitigations to treat the risk.

But truly managing risk effectively throughout the business has to be a collective endeavour by all our people. We hold quarterly risk knowledge-sharing forums to raise awareness and understanding of risks throughout the business. Our Clean Air and ENR sectors have established sustainability steering committees to help drive our sustainability agenda and improve the governance of climate-related risks in their areas.

Metrics and targets

We have reflected on appropriate metrics and targets to help us manage our climate risks and opportunities effectively. They were identified in climate-impact tables on pages 63-65 and their values are summarised here. We are still considering additional metrics and targets that would be most useful in helping us monitor our physical risks. We have had our Scope 1, 2 and 3 GHG targets independently verified by the Science-based Targets initiative to ensure that our level of ambition is aligned with the UN Paris agreement on climate change's Well below 2^{0}C scenario (WB2DS).

Metric description	Alignment	Target type	Baseline year	Baseline value	FY2029/30 target	2022 progress	More on page
Tonnes GHGs avoided by customers when using our technologies	1	Absolute	2020/21	211,000	50 million	489,000	38
% sales aligned with SDG7 and SDG13	1	Intensity	2020/21	6.1%	No target	5%	37
% R&D spend aligned with SDG7 and SDG13	1	Intensity	2020/21	22.3%	No target	22.8%	37
Scope 1 and Scope 2 GHG (tonnes)	2, 4	Absolute	2019/20	391,459	260,973	399,905	42
Scope 3 GHG purchased goods and services (tonnes)	2, 4	Absolute	2019/20	3,282,096	2,625,269	3,008,648	42
% recycled PGM content in our products	2	Intensity	2021/22	71%	75%	71%	40
Potential exposure to carbon taxation in 2030	3	Intensity	2021/22	Not disclosed	Not disclosed	Not disclosed	
CDP climate score	4	Absolute	2019/20	B	A	B	66
% physical asset value exposed to high weather-related hazard by 2030	5	Intensity	2020/21	35%	No target	35%	66
Water consumed in regions of high baseline water stress (m^{3})	5	Absolute	2020/21	531,000	No target	499,000	46

EU taxonomy eligibility

As supporting global decarbonisation is one our strategic aims, we have assessed how our portfolio is aligned with the EU Green Taxonomy Regulation (EU) 2020/852. The first delegated act to the Taxonomy Regulation, the 'Climate Delegated Act', was adopted in June 2021 and addresses the first two environmental objectives, Climate Change Mitigation and Climate Change Adaptation. Our activities in our growth businesses, particularly Hydrogen Technologies meet the eligibility criteria for this activity.

We have evaluated what percentage of our financial activity meets the eligibility criteria for these activities.

Another delegated act, the 'Environmental Delegated Act', addressing the remaining four environmental objectives of the EU Taxonomy Regulation, has not yet been adopted. Once the remaining four criteria are published, we expect our percentage alignment to increase substantially.

Remuneration Committee integration of targets into PSP

The Remuneration Committee has agreed to include a sustainability performance measure into its long-term Performance Share Plan (PSP) for the first time in 2022. This sustainability measure will represent 20% of the total award, with the balance of the award focused on financial performance measures. The sustainability measure will consist of a scorecard of quantitative measures that cover the three areas of our sustainability ambition, namely Products & Services, Operations, and People. Further details on the specific targets will be published on our website during June.

Introducing internal carbon pricing

In the next year, we will be introducing a shadow carbon price to our capital investment business case assessment process, as recommended by the Bank of England. This will incentivise us to reach net zero, by ensuring all investments are made for a low-carbon world where the price of carbon is higher than it is today. Although the ICP is not a real cost of the investment, it demonstrates what the impact would be of carbon taxation forecast for 2030 and beyond, and we will use it to evaluate and compare potential investments. At this stage, we plan to apply the ICP only to emissions related to the asset when operational (including raw material and supply chain impacts emissions). We do not plan to apply them to emissions related to the development of the project itself, such as equipment manufacture, or to construction-related emissions, since such emissions are both short term and generally minor in relation to the overall life of the assets.

Scope 1 and 2 greenhouse gas (GHG) footprint and energy efficiency

	2020/21			2021/22			
	Global	UK only	Global (excl UK)	**Global**	**UK only**	**Global (excl UK)**	% change (global)
Scope 1 (tonnes CO_2 eq)	203,930	66,634	137,296	**219,846**	**68,282**	**151,564**	+7.8%
Scope 2 – market based method (tonnes CO_2 eq)	181,525*	3,969	181,005	**180,060**	**1,488**	**178,572**	-0.8%
Scope 2 – location based method (tonnes CO_2 eq)	227,381	34,871	192,510	**240,897**	**29,768**	**211,129**	+5.9%
Total operational carbon footprint – Scope 1 and 2 market based method (tonnes CO_2 eq)	385,455*	70,603	318,301	**399,906**	**69,770**	**330,136**	+3.8%
Total operational carbon footprint – Scope 1 and 2 location based method (tonnes CO_2 eq)	431,311	101,505	329,806	**460,742**	**98,049**	**362,693**	+6.8%
Total Scope 1 and 2 carbon intensity – market based (tonnes CO_2 eq/tonnes sales)	3.4	7.1	3.1	**3.5**	**13.0**	**3.0**	+2.9%

	2020/21			2021/22			
	Global	UK only	Global (excl UK)	**Global**	**UK only**	**Global (excl UK)**	% change (global)
Total energy consumption (MWh)	1,312,084	431,466	880,618	**1,380,234**	**422,225**	**958,009**	+5.2%
Total energy efficiency (MWh/tonne)	11.5	43.4	8.5	**12.1**	**78.7**	**8.8**	+2.5%

Scope 3 GHG emissions by category

(tonnes of CO_2 equivalent)

Category	Category number	**2021/22**	2020/21	2019/20
Purchased goods and services	1	**3,008,648**	2,851,616	3,282,096
Capital goods	2	**349,214**	308,835	399,630
Fuel and energy-related activities	3	**46,990**	39,725	41,425
Upstream transportation and distribution	4	**168,750**	102,552	102,552
Waste generated in operations	5	**5,775**	5,257	5,303
Business travel	6	**1,336**	67	9,202
Employee commuting	7	**15,718**	29,957	29,957
Upstream leased assets	8	**698**	602	5,094
Use of sold products*	11	**0**	0	0
Investments**	14	**16**	665	10,997
Total		**3,597,145**	**3,339,276**	**3,886,256**

* We have removed Use of sold products from our footprint by agreement with SBTi, as it determined that the emissions we reported in this category were 'indirect' and should not, therefore, be included.
** Investments category accounts for JM's Joint Ventures only.

Five-year performance table

	2021/22	2020/21	2019/20	2018/19	2017/18
Total energy consumption (MWh)	1,380,234	1,312,084	1,355,295	1,444,890	1,431,360
Total Scope 1 and Scope 2 (market based) GHG emission (tonnes CO_2 eq)	399,906	385,455	391,459	423,130	445,509
Total Scope 3 GHG emission (tonnes CO_2 eq)	3,597,145	3,339,276	3,886,256	–	–

For more information on our methodology, please see pages 214-220 in Basis for Reporting.