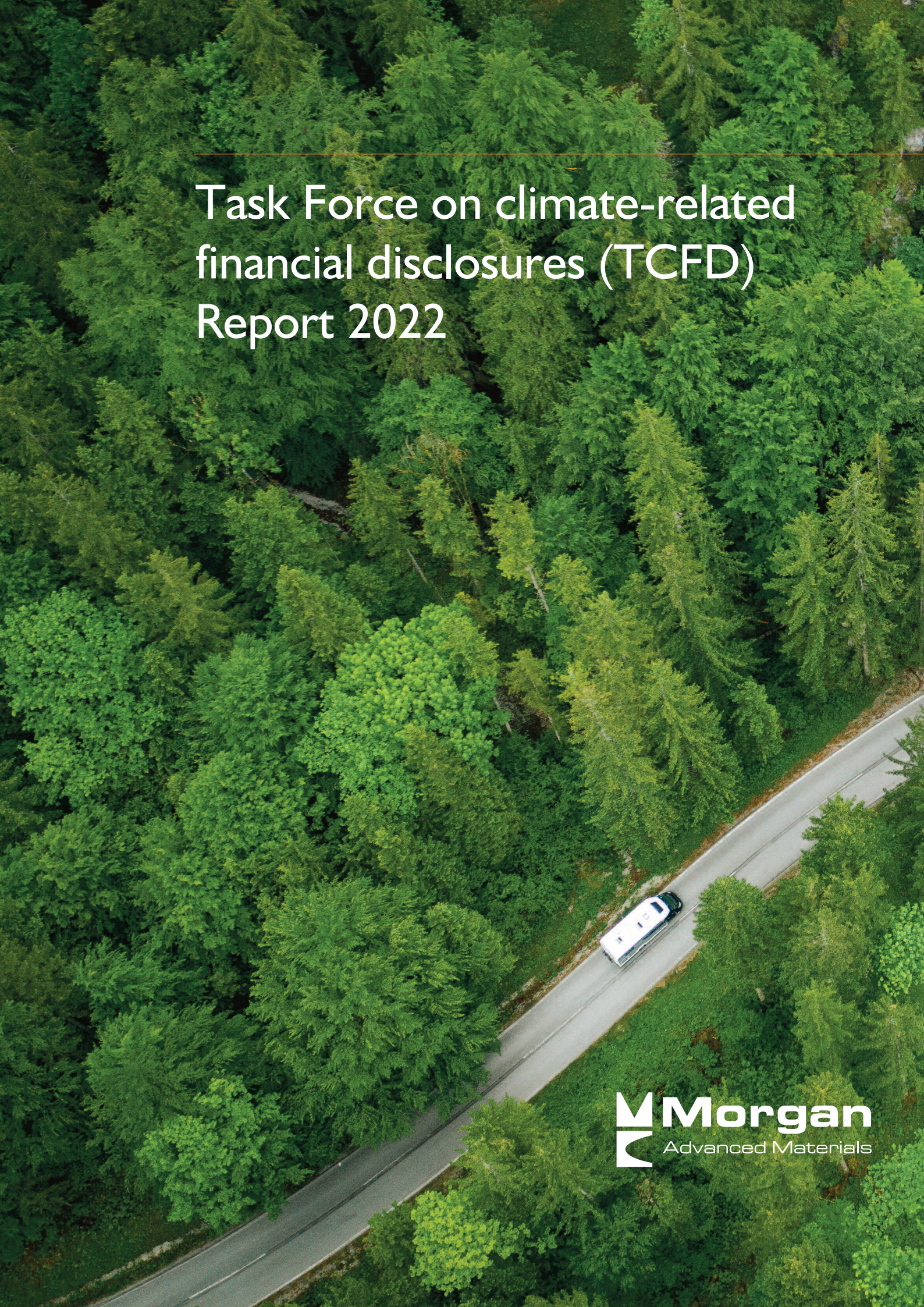
Task Force on climate-related financial disclosures (TCFD) Report 2022



Morgan Advanced Materials

Our Ambition

In 2022, we have focused on driving our sustainability agenda further into our organisation. We understand that engaging with and inspiring our people to create local initiatives will better enable us to reach our goals. We are proud of the contribution Morgan is making and in particular the contribution of our people to creating a more sustainable world. For us, sustainability is fundamental to our purpose and our strategy.

Morgan's greenhouse gas (GHG) emissions are predominantly generated by the combustion of fossil fuels at various stages of our manufacturing processes. We are pleased to report that our absolute GHG emissions for Scopes 1 and 2 are down by 9% compared to end of year 2021. This correlates to a 39% reduction compared to our 2015 baseline.

We are also focusing on water reduction in areas of high or extremely high-water stress. Water withdrawal in water stressed areas accounted for 8% of our total water withdrawals in 2022. Water withdrawal and use increased slightly from 2021, due to increased production levels and one-off incidents. Further investment is planned to upgrade key facilities and install new equipment in water stressed areas to reduce water usage and increase water recycling. We are pleased to report that absolute water withdrawal remains 18% lower in 2022, when compared to our 2015 baseline. Water use in high and extremely high water stressed area is down 34%, when compared to 2015.

Scope 1 & 2 CO2e emissions continue to fall as a result of efficiency improvements completed by the Group (Cross-GBU)) Engineering team, and our increased renewable energy procurement. In 2022 we reached the milestone of 49% carbon free electricity. We plan to increase this further in the coming years, with a target of 65% renewable or carbon free electricity by 2025.

Our progress against our ambitions has been recognised by MSCI, Ecovadis and CDP climate change and water security, with our scores improving year on year. We are also in the process of gaining approval for our science-based target initiative (SBTi) targets.

In 2021 Morgan committed to the science-based target initiative (SBTi). This commitment drives our governance agenda, including setting targets and monitoring progress against these. Our targets are currently in the process of being approved, and if confirmed will be as follows:

Absolute targets

· Reduction in absolute scope 1 and 2 GHG emissions 50% by December 2030 from a 2015 baseline

· Reduction in absolute scope 3 GHG emissions 15% by December 2030 from a 2019 baseline

Renewable electricity procurement target

· We commit to increase annual sourcing of renewable and carbon free electricity from 1% in 2019 to 65% by the end of 2025 and commit towards annually sourcing 100% renewable and carbon free electricity by December 2030.

Governance

Disclose the organisation's governance around climate related risks and opportunities.

a) Describe the board's oversight of climate related risks and opportunities.

Morgan's climate related risk and opportunities governance structure starts at our highest level—the Board, and cascades down through the organisation, supported by specialist committees as outlined in the table below.

Our **Board** has oversight of our climate change, environmental and corporate responsibility matters and ensures that our executive team progresses as planned to meet our commitments and goals. The Board Chair and Board of Directors monitor Morgan's progress against climate related actions at each meeting.

The metrics reviewed at each meeting include:

- Absolute Scope 1 & 2 CO_2e emissions
- Water withdrawal
- Absolute energy use
- Energy intensity

Climate change risks and opportunities are considered as part of a top-down (from the board) and a bottom-up (from the GBUs), multi-disciplinary risk management process, where it is considered as a contributory factor within several risk categories, as an emerging risk. The severity of each risk is quantified by assessing its inherent impact and mitigated probability, to ensure that the residual risk exposure is understood and prioritised for control throughout the Group. Substantive impacts are assessed and monitored through Morgan's risk assessment process[1].

Board of Directors	
Board Chair	**Board of Directors**
• Has oversight of our climate change, environmental and corporate responsibility matters to ensure our executive team progresses as planned to meet our commitments and goals.	• Monitors Morgan's progress against climate related actions and progress on a monthly basis. • Where appropriate, reviews large sustainability capital spend projects. • Reviews the status of all principal risks with a significant potential impact at Group level on an annual basis, including climate risks. • Climate-related risks and opportunities are a scheduled board agenda item twice per year.

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Board Committees	
Audit Committee	**Remuneration Committee**
• Conducts a robust review of the scope, remit and effectiveness of the internal control environment and ensures risk management procedures are appropriate and effective. • Receives annual risk presentations from GBUs, including climate and environmental risk.	• Reviews the structure of the annual bonus and Long Term Incentive Plan (LTIP) to ensure that the framework remains appropriately aligned with our strategic aims and culture, and motivates and rewards management for delivering sustainable performance.

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Group Executive Team		
Chief Executive Officer	**Chief Finance Officer**	**Group Director, Environment Heath, Safety and Sustainability**
• Responsible for climate change, environmental and corporate responsibility matters. • Supported by the Chief Financial Officer, by the Group Executive Management Team and the Group Director for Environment, Health, Safety and Sustainability (EHS&S). • Communicates ESG progress and strategy quarterly to the wider business unit and site leadership teams.	• Supports the Chief Executive Officer in the development and delivery of Group strategy, including ESG matters. • Leads the Group's finance function, including the processes and controls regarding climate risks.	• Reports to the CEO. • Responsible for developing further and driving the Environmental Sustainability and Governance strategy and driving strategy execution. • Manages and reports progress on environment and sustainability matters monthly to the executive team and board. • Reports on climate related matters to the board.

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Group Committees		
EHS&S SLT (Environment, Health, Safety and Sustainability Senior Leadership Team)	**Supply Chain Committee**	**Group risk review process**
• Lead by the Group Director, Environment, Health, Safety and Sustainability. • Consists of the GBU EHS Directors, and EHS and ESG specialists • Monitors and reports monthly on key metrics and programs. • Provides specialist knowledge and support to both the group and GBU Executive teams.	• Consists of procurement leads from across the GBUs. • Reviews and improves supply chain governance and policy monthly. • Lead by the Group Director, Environment, Health, Safety and Sustainability.	• Comprises representatives from central Finance, Legal, EHS&S and IT functions. • Reviews current and emerging risks every 6 months and reports these to the executive team. • Reviews the principal risks (including climate risk), and the controls, mitigate these risks to acceptable levels.

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Global Business Units	
GBU Presidents	**GBU executive teams**
• Form part of the executive team, and are responsible for the sharing and reviewing of both principal and emerging risks including climate risks.	• Responsible for the sharing and reviewing of both principal and emerging risks including climate risks. • Responsible for the strategic management of the Group's principal risks, including related policy, guidelines and process, subject to Board oversight. • Implement climate-related policies and projects across each business unit. • Monitor GBU performance against ESG targets.

b) Describe management's role in assessing and managing climate related risks and opportunities.

Our **Group Executive Management Team** is responsible for climate change, environmental and corporate responsibility matters. It is involved in our environmental, social and governance (ESG) materiality assessment and in the selection of our key ESG priorities each year.

Our **Group Director, Environment Health, Safety and Sustainability (EHS&S)** is responsible for developing further and driving the environmental sustainability &governance strategy, and managing and reporting progress to the executive team and Board. This includes monitoring climate-related issues, driving strategy execution and reporting into monthly executive meetings on environment and sustainability matters.

The implementation of the climate-related projects is managed at a site level across each business unit. The **Global Business Unit** (GBU) leads are part of the Group Executive Management Team, reviewing progress against ESG targets, communicating, and driving strategy execution in their business units. Our five business units develop business-specific risk registers and business continuity plans which are used in their annual strategic planning. These registers identify internal and external factors that could pose threats and opportunities to each business. They evaluate the inherent impact, mitigated probability, risk severity, control effectiveness and risk trends. Each risk is assessed by the business unit senior management team who consider the indicators of relevance and their associated impact. Impact on revenue, litigation outcomes, sites disrupted, applicable fines and others are all quantifiable indicators that could affect each sites risk classification.

Greenhouse gas emissions targets are now part of our Long-Term Incentive Plan (LTIP). As in prior years, the measures used for the Group Executive Management Team's annual bonus for 2023 include ESG measures being covered in the Executive Directors' personal objectives and therefore reflected in the personal performance element of bonus. For the LTIP, an ESG measure (carbon reduction) has been added to the structure, to align more closely with Morgan's strategy and priorities.

The new ESG measure (carbon reduction) will have a performance range of 5% to 15% carbon reduction (scope 1 and 2 emissions) over the three-year performance period, to support the Group's overall sustainability goals and its stated 2030 target to reduce scope 1 and 2 CO_2e emissions by 50%. The three-year performance period over which performance will be measured began on 1 January 2022 and will end on 31 December 2024.

Morgan has taken a proactive approach to upskilling key team members in the area of climate risk. During 2022, third party consultants delivered Task Force on Climate-related Financial Disclosures (TCFD) and climate risk training to the Group Executive team and the Group Finance function. Further internal training was delivered to the Board. Morgan acknowledges that this is a quickly changing area of reporting and will continue to invest in ensuring the competency of key people and committees to support Morgan's ESG targets and to improve future disclosures. The competencies of the board can be found in the annual report, which included skills and experience relevant to climate matters.

Strategy

Disclose the actual and potential impacts of climate related risks and opportunities on the organisation's businesses, 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.
b) Describe the impact of climate related risks and opportunities on the organisation's businesses, strategy and financial planning

Climate related risks and opportunities could impact the Group strategy over the short, medium and long term. These are defined as follows:

- Short term (0 – 3 years). Detailed financial plans are developed, incorporating the strategic spending requirements to decarbonise our business and realise growth opportunities.
- Medium term (3 – 10 years). Aligns with our 2030 ESG targets. Each GBU develops strategic plans in this time horizon to realise these targets.
- Long term (10 – 25 years). Aligns with our 2050 ESG ambitions. In this time horizon we expect to see a significant shift in technologies to allow us to decarbonise our business but realise that significant uncertainties exist and must be considered when developing long term strategy.

Climate related materiality impacts are aligned with our broader risk assessment criteria, which is defined using EBITA impact as follows:

- Negligible financial impact (£0-£0.1m) - The lowest level are those risks where the company can absorb the financial impact, and the reputational impact is relatively non-existent or negligible).
- Low financial impact (£0.1-£1m), with a potential to be known by the public via regulatory notices.
- Moderate financial impact (£1-£5m), with a potential to be known by the public or to damage our company reputation.
- High financial impact (£5-£10m), with the potential to impact customer confidence.
- Significant financial impact (£10-£20m) and/or reputational damage
- Critical financial impact (>-£20m) and/or reputational damage, with the potential to be catastrophic to the organisation.

Our company's products contribute to environmental sustainability by significantly improving the energy efficiency of our customers' operations. We provide products that enable solar and wind energy, as well as those that support efficient high-temperature processes such as ceramic and glass manufacturing, and industrial gas turbines. In late 2020, our Group Executive Team, our Group Director EHS&S, and the CEO conducted a comprehensive double materiality assessment to establish our ESG priorities up to 2030. We obtained feedback from our Board and surveyed over 160 senior business leaders to determine what ESG means to our organisation. Additionally, we gathered input from internal and external stakeholders, assessed our business performance, and based on this double materiality information, we identified our sustainability impacts on the environment and society as well as the risks and opportunities that were material to our business and set ambitious goals for the future. We reviewed this information again in 2021 to incorporate considerations for new and emerging regulations. The information in the table below summarizes our most material risks and opportunities. Risks were assessed across all three time horizons, with the expected time horizons(s) when the impact is likely to become material reported.

Summary of our most material risks and opportunities

Low Moderate Significant

Climate related trend	Potential financial impact	Expected Time Horizon	Materiality Impact	Strategic response
Transition risks				
Increased pricing of GHG emissions	Many of our furnaces use fossil fuels. GHG pricing risks increased operating costs and the possibility of early retirement of assets.	Medium & Long term		Morgan completed a strategic review of it's furnace portfolio to identify which assets were at highest risk. The GBUs and furnace working group are developing decarbonisation pathways for the different technology families. Morgan are collaborating in industry research groups to develop these technologies. Morgan are evaluating implementing a shadow carbon price for all Capex business cases, linked to the European ETS price.
Raw Materials	Potential issues with raw materials and their continued availability, requirement to reduce raw material consumption	Medium and Long term		We regularly engage with key suppliers on the ongoing availability of materials. Our company-wide supply chain committee works with our top tier suppliers to ensure alignment with our supplier code of conduct and is building capability to evaluate supplier sustainability.
Changing customer behaviour	Changes in consumer attitudes and demand for products. Longer term changes to end markets	Medium and Long term		The group's broad market and geographic spread helps mitigate against permanent changes in end markets. Morgan will redirect effort to new end-markets and technologies when, for example, gas boilers are phased out and replaced by other forms of heating, or petroleum-fuelled vehicles are phased out in favour of electric vehicles.
Enhanced emissions reporting obligations	Increased operating costs through higher compliance costs	Short and Medium Term		The EHS&S group function use a third-party platform to monitor current and emerging environmental regulations across our industry and business sectors. We evaluate compliance regularly and consider how these regulations may impact Morgan.
Physical risks				
Heat stress and water scarcity	Reduced production capacity from effects on workforce, plant and materials	Short, medium, and long term		The many available mitigations to control the ambient environment within our facilities will minimise impacts on staff and plant.

Sea Level Rise	Impact on manufacturing sites in affected areas.	Medium and long term		Two sites are identified as being risk of flooding from sea level rise before 2030. Mitigation plans are being built into our GBU business plans.
Opportunities				
Energy Source	Use of lower-emissions sources of energy to reduce operational costs and exposure to fossil fuel price increases or taxation	Medium and long term		Our internal operational excellence teams meets regularly to focus on increasing profitability and competitiveness through energy and operational efficiency improvements. Our global furnace working group and GBU teams are working to develop decarbonisation pathways for each technology family.
Development of new products through R&D and innovation	Increased revenue through demand for lower emissions products and services	Short term		More aggressive regulations regarding energy efficiency and climate drive the use of Morgan's energy saving advanced ceramic materials, products, and systems. We have been increasing our investment in research and development (R&D) to build our technical lead and to accelerate new product development.
Participation in key markets	Increased revenues through access to new and emerging markets	Short term		Morgan is well positioned in the key growth markets of semiconductors, clean energy and clean transportation. Short term investment in capacity to embed and improve our market position.

Transition Plan

The risks and opportunities considered by the board have directly informed Morgan's strategy to deliver on our 2030 goals and 2050 aspirations. These form the foundation of our net zero roadmap to ensure we achieve our targets.

Preparing for the Future

Morgan's short-term planning (0-3 years) focuses on climate change-related actions towards process efficiency, improving net-water consumption, and changing power providers and/or power sources to renewable/carbon free energy to achieve our 2025 target of 65% carbon free electricity.

- **Conversion of lower temperature furnaces to electricity**. Building on the development work to convert low temperature processes, minimising exposure to carbon taxation
- **Development of a Scope 3 emissions strategy and targets.** In 2023 we will complete a Scope 3 inventory as part of our SBTi commitment. From this we will develop strategies to reduce these across the categories which are key to Morgan
- **Life Cycle Assessment on our key products.** To better support our customers in their decarbonisation journeys, we will conduct life cycle assessment on our key products, making carbon footprints available, but also identifying opportunities to reduce their impact.
- **Engineering solutions to increase efficiency & water recycling**. In particular, leveraging our Furnace working group to ensure our existing assets are performing
- **Inclusion of a shadow carbon price in Capex business cases.** This will drive visibility of the potential

environmental costs of business decisions.

· Investing in early stage R&D projects for carbon free furnaces. Acknowledging that the solutions are not yet deployable in many cases, we will work with academia, industry groups and suppliers to develop solutions.

· Investing to grow capacity in key markets. We will invest in equipment to support the fast growth in the semiconductor, clean energy, and clean transportation markets, embedding and improving our market position.

Scaling up

Morgan's medium-term planning (3-10 years) delivers more permanent solutions to achieve our 2030 ESG goals.

· Installation of strategic pilot carbon free furnaces. Higher temperature processes require more development, the installation of pilot furnaces for the different furnace types will support this.

· Further conversion of lower temperature furnaces to electricity. Finishing the remaining low temperature furnaces that can be converted to electricity.

· Working with our value chain to reduce Scope 3 emissions. Deploying our strategy to reduce our Scope 3 footprint in key categories to achieve our target of 15% reduction.

Investment in Key Technologies

Morgan's long-term approach (10-25 years) considers the achievement of long-term goals and implementing the solutions needed to decarbonise our business. Climate change-related long-term planning includes decisions on the future of power generation and supply, advancements in low carbon technology and larger investments in waste heat recovery and carbon capture.

· Conversion of higher temperature furnaces to electricity. Where technologically possible, converting higher temperature furnaces to electricity.

· Working with our value chain to further reduce our Scope 3 emissions. Building on our progress, we will continue to work with our value chain to decarbonise.

· Conversion of remaining furnaces to carbon free alternatives. Electrification may not be possible or viable in all cases, so parallel R&D paths will develop and deploy alternative solutions.

Product Innovation and Decarbonisation

In 2022 Morgan began working to understand our product Life Cycle Assessments. Pilot studies at 4 different sites in 2 different GBUs have been completed successfully and the roll out to other sites and GBUs will continue in 2023. In response to increasing customer interest, we will complete EPDs and product carbon footprints on key products in 2023 to better support our customers with their sustainability ambitions. Life Cycle Assessment software and training will also be rolled out in 2023 at our Carbon CoE, to support their development of future sustainable materials platforms. This will allow us to work with our key stakeholders to reduce both direct and indirect emissions, minimising the complete lifecycle impacts of our products.

The clean energy transition will require innovation across the whole product life cycle, from evaluating lower carbon raw materials, to decarbonising our manufacturing process, to reducing end-of-life impacts. These will be driven by in-house research and development at our CoE's, however we also recognise the large scale of the challenge. We will therefore also seek to be part of industry research groups, to accelerate the commercialisation of the solutions and capitalise on them. We are currently part of the British Ceramics Confederation "towards net zero" initiative. Our Thermal Ceramics team are part of the HyInHeat, European Union funded project. This will run for 4 years with funding of €24million and engage in TRL 5 to 9 development on the use of hydrogen in the aluminium and steel industry. Thermal Ceramics will be a key refractories supplier to the group, tracking the performance of the products in lab and industrial full life cycle trials. This will ensure that we develop products to support our customer in their decarbonisation journeys.

Morgan recognises the opportunities for growth that climate change brings and is core to our growth

strategy. In 2022 the company saw growth of 24% in the key markets of Semiconductors, Clean Energy & clean transportation.

c) Describe the resilience of the organisation's strategy, taking into consideration different climate related scenarios, including a 2°C or lower scenario

Scenario analysis has been carried out on three of the topics most material to Morgan, as identified through a series of workshops with a cross section of leaders from the business. The risks assessed were, increased pricing of GHG emissions, heat stress and water scarcity and sea level rise. All of these were assessed using a <2°C, 2-4°C and 4°C scenario over all three time horizons. It is Morgan's intention to expand this analysis to other climate risks and opportunities in the future.

Summary of results from scenario analysis

● Low ● Moderate ● High

Risk	Scenario/Time horizon	Short - term	Medium - term	Long - term	Strategic response and resilience
Increased pricing of GHG emissions	<2°C	●	●	●	• Plan to convert lower temperature furnaces to electricity • Invest in R&D, including pilot facilities and industrial research projects
	2-4°C	●	●	●	
	4°C	●	●	●	
Heat and water stress	<2°C	●	●	●	• Monitor heat stress in employees through better reporting • Target to reduce water use in regions of high and severe water stress
	2-4°C	●	●	●	
	4°C	●	●	●	
Sea level rise	<2°C	●	●	●	• Develop business continuity plans for high-risk sites

Transition Risk – Increased Pricing of GHG emissions

As a large energy consumer, a potential risk to Morgan is exposure to carbon taxation. Currently only one of our facilities (Casalpusterlengo, Italy) is subject to an Emissions Trading Scheme (ETS), but this is expected to increase in the future. In particular, our kilns and furnaces are large energy consumers, and strategic assets. In many cases there is not currently an alternative carbon-free technology available to switch to. However, with increasing carbon taxation as governments try to curb national emissions, the possibility of these strategic, long term investments becoming stranded assets arises. The analysis used data on the energy consumption of Morgan's furnace portfolio and modelled potential exposure under three scenarios out to 2050. The Network for Greening the Financial System (NGFS) Current Policies, Delayed Transition and Net Zero scenarios were used. The materiality impacts for the different scenarios across the three time horizons are shown in the table.

The results revealed that Morgan's natural gas furnaces in the Europe region are likely to be exposed earliest, followed by North America and then Asia. The electric powered furnaces are not expected to be exposed due to the procurement of green energy and ultimately the national grids becoming greener. The timing and scale of the costs varied depending on the scenario.

It became clear from the results that there is an opportunity to build resilience in this area, through a pro-active kiln strategy in order to ensure that furnaces are transitioned at the right time, where the technology is available, and that we should focus R&D projects on kilns where the technology is not yet available. In this space, Morgan continues its engagement with the British Ceramics Society Low Carbon Working Group and the European Graphite and Carbon Association. We also collaborate with academia and are part of the HyInHeat research program, exploring how our thermal products can support the hydrogen transition in the aluminium and steel industries. In 2022 Morgan invested £31.6 in research and development.

Resulting from the pilot study, the cross-function, cross-GBU furnace working group has been engaged in refining the data used in the pilot to improve accuracy, and in assessing the different furnace types to understand how many have currently available carbon free alternatives. Of the 721 furnaces evaluated, more than half (62%, 447 furnaces) are already fuelled by electricity, so these will de-carbonise in line with our carbon-free energy procurement strategy by 2030. Of the remaining 264 furnaces, 195 have identified current, available carbon free alternative technologies that could be implemented. A further 38 could likely be transitioned with significant development work, leaving only 31 without a currently available carbon-free alternative technology. In 2022 Morgan sourced 49% of its electricity from green or carbon free sources.

To improve our financial planning and increase resilience across the business to carbon taxation, we are evaluating implementing a shadow carbon price for all Capex business cases, linked to the European ETS price.

We have partnered with the British Ceramics Confederation (BCC) and are part of the 'Towards Net Zero' commitment, and Hydrogen Project Working Group. This collaboration brings together businesses from the ceramic manufacturing sector in the UK. It shares best practice approaches and proven decarbonising technologies, helps nurture, and encourage industry decarbonisation, and communicates related challenges for the industry. Our involvement will allow us to explore alternatives to natural gas and share best practice as part of an industry group.

Physical risk – Heat Stress and Water Scarcity

From a physical risk lens, the impact of heat stress on staff productivity compounded with water scarcity interrupting site revenue, was identified as being the most material. The analysis focused on the impact at the largest 25 sites by revenue across Morgan. It predicted the impact in the following areas:

1. Heat impacts to staff productivity and forced downtime

2. Heat impacts to materials manufacturing halting production to avoid spoilage

3. Heat impacts to operational equipment such as control systems

4. Water scarcity impacts to operational sites requiring water access for manufacturing processes

The scenarios considered were:

· <2°C (RCP4.5 Low)

· 2-4°C (RCP4.5 High)

· 4°C (RCP 8.5)

For heat stress, the hourly productivity & revenue loss were estimated across different temperature bands. Using the different scenarios, the change in number of days above each threshold was estimated for each site and a potential annualised loss was estimated, based on the likely impact to staff productivity, material spoilage and operational equipment. For water scarcity, the increase in drought months was also modelled in all three scenarios. The materiality impacts for the different scenarios across the three time horizons are shown in the table.

The results of the assessment indicate that the resilience of the business to heat and water stress is good, as the average annualised financial impact on the business is low across all scenarios with the exception of the 4°C scenario, where the impact rises to moderate in 2050.

As expected, there was variation across the different regions, with geographies such as India impacted earlier and more severely. The analysis however did not take into account the use of many available mitigations including the availability of air conditioning to reduce heat impacts on staff and materials, engineering solutions to make our plants more resilient, or changing working patterns to cooler times of day. These mitigations are already in place at many sites and are low cost to implement.

As a result of this analysis, heat stress related incidents will be added to our employee health metrics, to ensure that we are protecting our workforce.

As a mitigation, we continue to realise water reduction opportunities at water stressed sites, and to increase water recycling and water harvesting in these regions. By 2030 we will reduce our total water withdrawal by 30% in regions of high and extremely high water stress.

Physical Risk - Sea level rise

Separately from the climate scenario analysis we previously evaluated rising sea level impact and timing for each of our facilities utilising the Climate Central Surging Seas evaluation tool, which evaluates sea levels based on 4°C versus 1.5°C in global temperatures above pre-industrial levels. We determined that ten of our manufacturing locations have either a potential or a direct impact due to rising sea levels. During 2022, we subsequently used their Portfolio Analysis Tool to evaluate these 10 locations in further detail across RCP 2.6 (1.5°C), RCP 4.5 (2-4°C) and RCP 8.5 (4°C) scenarios. The results aligned with the Morgan time horizons definitions are shown in the table.

Under the 4°C (most pessimistic) scenario, 5 of these locations showed an extremely low risk of flooding before 2050. Of the remaining 5 locations, 1 was low risk, 2 were medium risk and 2 were high risk across all 3 RCPs in 2030. However, these results are being treated with some caution, as all the five locations are in China where the information on local flood prevention measures is not currently available to the tool for the flood risk calculations. These will therefore be investigated further with the local teams. The remaining manufacturing sites are not considered to be at risk of sea level rise. All conclusions from our evaluations are discussed with the Global and GBU Executive teams and risk mitigation strategies are then built into our business plans.

Risk Management

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

a) Describe the organisations processes for identifying and assessing climate related risks

The Board recognises the need to understand and assess climate related risk and the inherent uncertainty therein. Risk management and internal control are fundamental to achieving the Group aim of delivering long-term sustainable growth in shareholder value.

Principal and emerging risks are identified both 'top down' by the Board and the Executive Committee and 'bottom up' through the Group's global business units (GBUs). Further details on Morgan's procedures for identifying, assessing, and managing risk can be found in the Risk Management section of our Annual Report. As a result of the climate scenario analysis undertaken, 'climate risk' has been added to the risk register, now separated out from 'Environmental risk' which is now limited to issues of environmental reporting and compliance.

The severity of each risk is quantified by assessing its inherent impact and mitigated probability, to ensure that the residual risk exposure is understood and prioritised for control throughout the Group. Senior executives are responsible for the strategic management of the Group's principal risks, including climate related risk. The output of ongoing scenario analyses will be integrated into the risk register using this approach.

Our five global business units (GBUs) develop business-specific risk registers and business continuity plans which are used in their annual strategic planning. These registers identify internal and external factors that could pose threats and opportunities to each business. They evaluate the inherent impact, mitigated probability, risk severity, control effectiveness and risk trends.

b) Describe the organisations processes for managing climate related risks

Our Environment, Health, Safety & Sustainability Senior Leadership Team (EHS&S SLT) meets monthly to oversee management of our most significant environmental and climate risks. This group is chaired by our Group Director EHS&S who reports monthly to our Executive Committee. Morgan recognises the importance of climate scenario analysis and have engaged with a third party to support with modelling and interpretation of results. This will be incorporated into the Risk Management process to identify further actions towards our 2030 strategy.

The EHS&S group function use a third-party platform to monitor current and emerging environmental regulations across our industry and business sectors. We evaluate compliance regularly and consider how these regulations may impact Morgan. Potential risks are shared with the business units through the EHS&S SLT and the monthly Executive committee report.

The senior management team teams for the 5 different GBUs are responsible for developing risk mitigation and management strategies for the risks they identified for their individual businesses Each risk is assessed by using the indicators of relevance and their associated impact. Impact on revenue, litigation outcomes, sites disrupted, applicable fines and others are all quantifiable indicators that could affect each sites risk classification.

c) Describe how processes for identifying, assessing and managing climate related risks are integrated into the organisations overall risk management.

"Climate change" and "Environmental management ESG risk (inc climate change reporting)" are recorded as two principal risks on the group risk register. "Climate change" covers transition and physical risks listed in the strategy section of this report. "Environmental management" includes the potential increase of mandatory regulation and increased scrutiny from stakeholders. These are assessed in the same way as all of the other principle risks. Climate risk is also considered as a component of other principal risks.

Throughout 2022, the Board reviewed the preparedness of Morgan to all known principal risks with a significant potential impact at Group level. Additionally, the Audit Committee carried out focused risk reviews of each GBU. These reviews included an analysis of the principal risks, and the controls, monitoring and assurance processes established to mitigate those risks to acceptable levels. The risk from climate change was assessed to have a high severity rating. How this compares to other principle risks can be found

in the risk management section of the annual report.

Externally led climate risk and scenario analysis awareness training was given to the Group Executive team and the Group financial team in April 2022. Internal training including a deep dive into the results from the scenario analysis was undertaken with the Board of Directors. In 2023 this will continue with each of the GBU Executive teams. This will upskill the risk teams at group level and across business units to understand how to respond to scenario analysis, and climate change risk.

Metrics and targets

Disclose the metrics and targets uses to assess and mange 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 processes.

Morgan is in the process of reviewing the all sector and sector specific metrics in tables A1.1 and 1.2 in the TCFD guidance to identify metrics which support our climate risk and opportunity management, and we welcome stakeholder feedback on which of these would be the most beneficial to report on. We have identified an internal carbon price as being potentially beneficial to our CapEx business case review process however this is not yet implemented. We have also reviewed remuneration as a metric, and although ESG targets are now part of the Executive Management Teams LTIP, we do not intend to develop metrics in this area at this time.

We have however, identified the following metrics to help us manage our impact on climate change and to manage our response to the risks and opportunities. We consider these to be most relevant to our businesses current and future performance against the backdrop of climate change.

As an energy intensive manufacturer, Morgan has significant opportunity to improve profitability and competitiveness through operational efficiency and through procurement of low carbon energy. This is monitored through the amount of carbon free energy procured as a proportion of our total scope 2 energy consumption, and through our energy efficiency metric (MWh/£m). We have a target for carbon free energy procurement as part of our SBTi submission which is still subject to validation.

Heat stress and water scarcity poses a risk to our business with several of our manufacturing sites operating in water stressed areas. We monitor and have targets for total water withdrawal and water withdrawal in water stressed areas.

We have opportunity to grow in our key markets of semiconductors, clean energy and clean transportation. We monitor sales in these key market segments.

b) Disclose scope 1, 2 & if appropriate, scope 3 GHG emissions and related risks

Scope 1 & 2

We track Scope 1 and 2 absolute CO_2e on a monthly basis. The Scope 1 and 2 absolute values for 1 January—31 December 2022 across the group are as follows:

· Scope 1 emissions (metric tons CO_2e) **121,989**[2]

· Scope 2 emissions (metric tons CO_2e) **89,115**[3]

These figures are assured by ERM CVS. For GHG reporting purposes, Morgan outlines its organisational

[2] Total scope 1 emissions were calculated from the addition of emissions from fuels, refrigerants and other process emissions. Carbon emission factors are used to convert energy used in our operations to emissions of CO2 e. Carbon emission factors for fuels are provided by the International Energy Agency (IEA). Process emissions disclosed (4,516 tonnes, or circa 3.7% of scope 1) in 2022 rely on historical calculations that could not be evidenced for assurance purposes. We report our emissions with reference to the latest Greenhouse Gas Protocol Corporate Accounting and Reporting Standard

[3] Carbon emission factors for grid electricity are calculated according to the 'location-based method' and 'market-based' where received. The location-based method reflects the average emissions intensity of the grids on which energy consumption occurs (using mostly grid-average emission factor data). In 2022, the value of scope 2 GHG location-based only emissions is 161,235 tonnes.

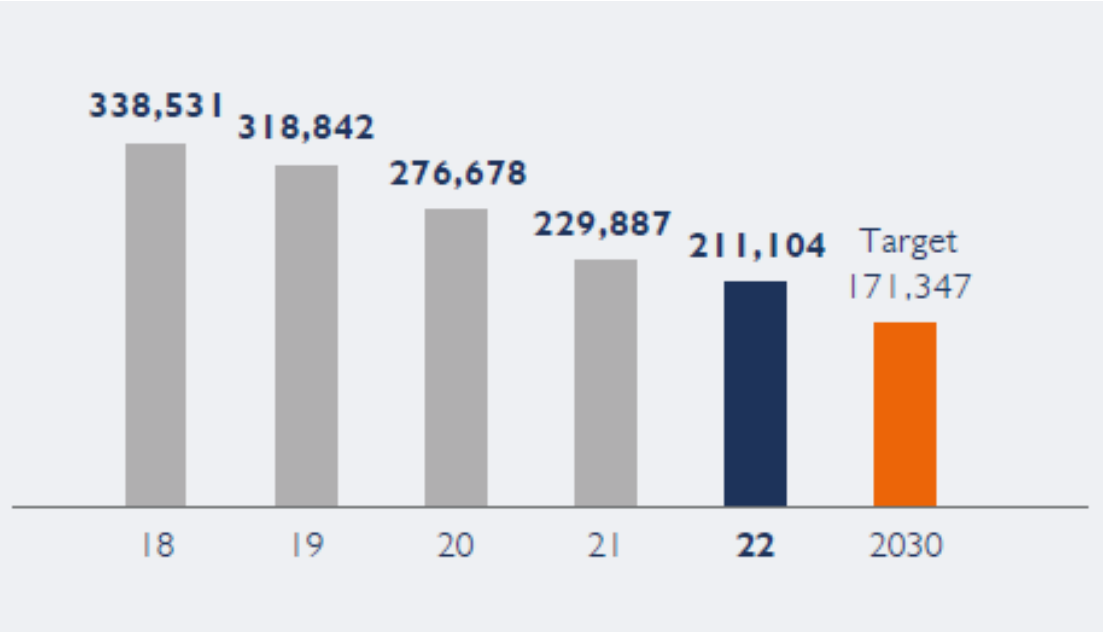
boundary on an operational control basis, and our Scope 1 and 2 emissions are reported on this basis. In line with Streamlined Energy and Carbon Reporting (SECR) requirements, Scope 1 and 2 emissions and energy use are disclosed in our Annual Report.

Scope 1 & 2 Emissions reduction performance

Morgan Advanced Materials submitted its targets to the Science Based Targets Initiative (SBTi) for validation, confirming alignment with the Paris Agreement target to limit global warming to a 2°C or lower scenario. Our submitted target for Scope 1 and 2 is an absolute reduction of 50% by December 2030 from a 2015 base year.

Morgan has reduced its Scope 1 and 2 emissions by 38% from a 2015 baseline. This has been achieved through the increased procurement of carbon free energy and driving energy efficiency within our operations. Our manufacturing sites account for 99% of our scope 1&2 emissions so improving the efficiency of these in the short term is key to our strategy to reducing our scope 1 CO_2e emissions. In the medium term our furnace working group will evaluate and pilot furnace technology in line with our decarbonisation roadmap and informed by scenario analysis.

CO2e scope 1 and 2 emissions (metric tonnes)



Scope 3

We recognise assessment of company's value-chain emissions is an important part of company's long-term sustainability strategy. In 2022, we completed a Scope 3 screening exercise across all of the categories using the GHG evaluator tool. This estimated our Scope 3 emissions to be ~700,000 TCO_2e in 2021. The breakdown across the different categories over the last three years can be found in the table below. In 2023 we will complete a full Scope 3 inventory and develop data collection schemes and specific targets to start to address this.

Morgan Group Scope 3 Screening GHG Emissions Results							
		2019	% 2019	2020	% 2020	2021	% 2021
Category 1	Purchased goods and services	444,705	58%	394,744	62%	439,775	63%
Category 2	Capital Goods	76,684	10%	42,816	7%	49,794	7%
Category 3	Fuel & Energy related activities	70,647	9%	61,163	10%	52,118	7%

Category 4	Upstream Transport	26,143	3%	19,935	3%	23,949	3%
Category 5	Waste Generated in operations	15,968	2%	11,210	2%	11,889	2%
Category 6	Business travel	20,036	3%	3,953	1%	5,509	1%
Category 7	Employee commuting	12,750	2%	12,750	2%	12,750	2%
Category 8	Upstream leased assets	Not considered relevant					
Category 9	Downstream Transport	5,885	1%	4,379	1%	5,259	1%
Category 10	Processing of sold products	Not yet assessed[4]					
Category 11	Use of sold products	40,000	5%	35,000	5%	37,500	5%
Category 12	End of Life of sold products	56,427	7%	53,725	8%	58,062	8%
Category 13	Downstream leased assets	Not considered relevant					
Category 14	Franchises	Not considered relevant					
Category 15	Investments	Not considered relevant					
Total Scope 3 GHG Emissions (MT)		**769,245**		**639,675**		**696,605**	
	% of total GHG emissions	71%		70%		75%	
Total Scope 1 GHG Emissions (MT)		**137,578**		**116,552**		**122,817**	
	% of total GHG emissions	13%		13%		13%	
Total Scope 2 GHG Emissions (MT)		**181,264**		**160,126**		**107,070**	
	% of total GHG emissions	17%		17%		12%	
Total GHG Emissions (MT)		**1,088,087**		**916,353**		**926,492**	

Scope 3 GHG Emissions reduction target

As part of our SBTi submission, we have a Scope 3 target to reduce absolute emissions by 15% by December 2030 from a 2019 base year. In 2023 we will complete a full Scope 3 inventory and develop data collection schemes and specific targets to start to address this. As expected, the screening exercise shows that the majority of our scope 3 emissions occur in category 1 – purchased goods and services. Chaired by the Director EHS&S, the procurement committee will play a key role in compiling the inventory and developing our Scope 3 mapping. A cross functional committee comprised of representatives from EHS&S, Procurement & Ethics and Compliance, the committee works with our top tier suppliers to ensure alignment with our supplier code of conduct, and to map and track our suppliers progress on their environmental commitments. In 2023, we plan to send out a supplier ESG training pack to our top tier suppliers to ensure they align with our ambition. Completion rates will be monitored and discussed with the individual suppliers.

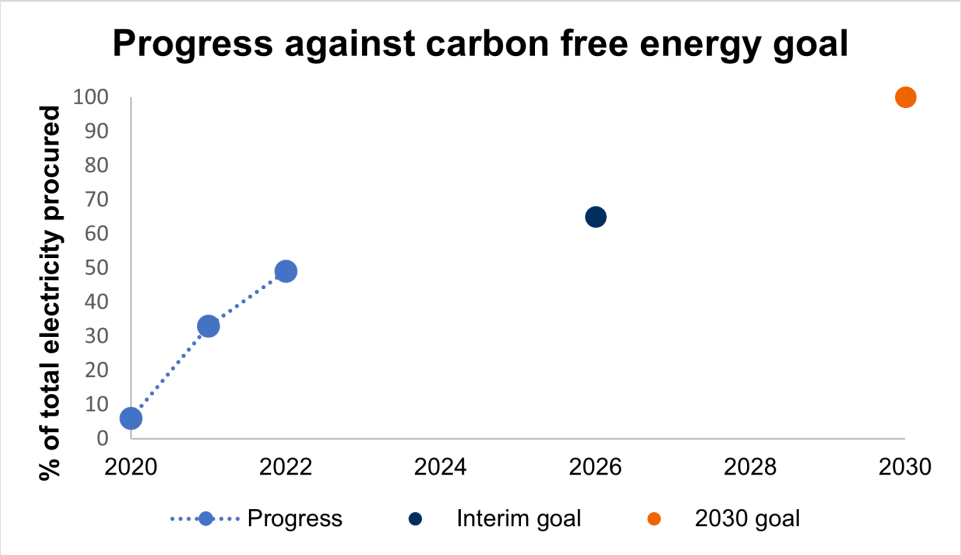
[4] We have a wide and diverse product portfolio which means that high level analysis is not currently possible. We are building life cycle assessment data for key products and will include these data as we build our scope 3 inventory.

c) Describe the targets used by the organisation to manage climate related risks and opportunities and performance against targets.

Metric	2015	2020	2021	2022	2022 Progress vs Plan
Carbon Free Energy Procurement as a % of total electricity procured		6%	33%	49%	On track
Intensity (mt CO_2/£m)	391	304	242	190	NA
Total water withdrawal (m3)[5]	2,337,393	1,497,979	1,731,110	1,934,040	On track
Water withdrawal in water stressed areas (m3)[6]	237,277	150,509	158,727	157,597	Ahead of schedule
Revenue in key market segments (£m)			115.1	143.0	NA

Carbon Free Energy Procurement Target

As part of our commitment to the SBTi, one of our targets submitted for validation is to increase annual sourcing of renewable and carbon free electricity from 1% in 2019 to 65% by December 2025 and commits towards annually sourcing of 100% renewable and carbon free electricity by December 2030.



A large part of our strategy to requires us to reduce our Scope 2 emissions through the purchase of carbon-free electricity. In 2022 Morgan procured 49% of our electricity from green or carbon-free sources. This is a great success given the volatility in the energy markets seen in 2022 and underscores our commitment to decarbonisation. We are also actively evaluating the procurement options for on-site generation. In total in 2022 we generated 1.2GWh renewable electricity on-site and have plans to grow this number further.

Total Water withdrawal and Withdrawal in Water Stressed Regions

Our aspiration is to use water sustainably across our business. Our 2030 target is to reduce our overall water usage by 30% and reduce our water usage in high stress areas by 30% (from a 2015 baseline). We have reduced our total water withdrawal by 17%, and by 34% in water stressed areas compared to our

[5] Data assured from 2021 onwards
[6] Data assured from 2021 onwards

baseline. Our total water withdrawal increased in 2021 following resumption of normal levels of activity following the Covid-19 pandemic. In 2022 the water withdrawal increased due to increasing production demand and an isolated incident at one of our sites where a large water leak occurred. This incident accounted for 112,000m^3 additional water withdrawal, without this our annual withdrawal would have been 22% below 2015 levels. In 2022 we expect to see the total water withdrawal number decrease as water savings projects completed in the course of 2022 take effect.

Total Morgan Group	2015	2020	2021	2022
Water Withdrawal (m3)	2,337,393	1,497,979	1,731,110	1,934,040
% Reduction from 2015		-36%	-26%	-17%

Water Stressed Sites	2015	2020	2021	2022
Water Withdrawal (m3)	237,277	150,509	158,727	157,597
% w.r.t. Total Morgan Group	10%	10%	9%	8%
% Reduction from 2015		-37%	-33%	-34%

Other metrics

Intensity figures are used as a measure of how the business is decarbonising. Currently the downward trend is as a result of carbon free energy procurement, but this metric will also be used in the future to track the efforts to improve efficiency and decarbonise the manufacturing processes.

Our revenue in key climate-driven markets continues to increase. Our products support the clean energy and clean transportation transition. See our annual report for further details on our business model.

In line with the results from the transition scenario analysis, Morgan will track the transition of assets from fossil fuels to carbon-free sources. In 2022 this number stood at 447 out of 721 (62%).

Morgan is actively evaluating the inclusion of further cross industry metrics beyond GHG emissions. We will improve our Scope 3 GHG reporting in 2023 by completing an inventory, and report on the implementation of a shadow carbon pricing on business case Capex decisions.

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