Sustainable Portfolio Management

2022 Annual Report

BARCLAYS | Private Bank

Welcome to our Sustainable Portfolio Management Annual Report 2022

Sustainability challenges are increasingly capturing the world's attention, as the COVID-19 pandemic, deepening climate crisis, and more recently, geopolitical conflict, highlight new vulnerabilities and a mounting sense of urgency to address them.

The global appetite for sustainable investing is growing at a phenomenal pace. Bloomberg has estimated that ESG assets may hit USD $53 trillion by 2025, representing a third of the global AUM[1].

Without doubt, private capital can play a critical role in tackling some of the world's most pressing issues. But sustainable investing is not just a 'nice to have', it also makes economic and financial sense.

In this year's report, we focus on some of the exciting new technologies that could meaningfully improve sustainability outcomes, from precision manufacturing and measurement, to genomic sequencing, to digital infrastructure. And we're delighted to feature an article from Sir David King on the strategies urgently needed to ensure climate repair.

You can also find out some of the diverse impacts our investee companies are having, and how we're positioning our sustainable portfolios for the transition to a net-zero economy.

I hope you enjoy reading the report, and I'd like to thank all clients who have invested with us.

Jean-Christophe Gerard
CEO, Barclays Private Bank

[1]'ESG assets may hit $53 trillion by 2025, a third of global AUM', Bloomberg Intelligence, February 2021
https://www.bloomberg.com/professional/blog/esg-assets-may-hit-53-trillion-by-2025-a-third-of-global-aum/

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Views from our Lead Portfolio Manager: In innovation we trust

Our Head of Sustainable Portfolio Management, Michael Topley, explains why company innovation is key to the sustainable revolution.

Unless otherwise stated, companies referenced in this report were companies held by the Sustainable Total Return Strategy as of 31 December 2021 and may no longer form part of our portfolios. Reference to specific companies in this report is not an opinion as to their present or future value and should not be considered investment advice or a personal recommendation.

Our sustainable strategies[1] reached their milestone three-year anniversary in 2021. In this, our third annual Sustainable Portfolio Management Report, we highlight how our investee companies are helping to shape a more sustainable world, and share an update on how we've enhanced our sustainable investment approach.

ENGAGING AND VOTING FOR CHANGE

The way we carry out investment and sustainability due diligence is constantly evolving to adapt to the ever-changing market. A number of new sustainability regulations will take effect this coming year – such as the Sustainable Finance Disclosure Regulation (SFDR), EU Taxonomy, and reporting requirements from the Taskforce for Climate-Related Financial Disclosures (TCFD) – which will increase the availability of sustainability data, and put more emphasis on investors to drive sustainable change.

Over the past year, we have enhanced our stewardship capabilities by partnering with EOS at Federated Hermes (EOS) in the UK and Jersey, to support us with voting and engagement activities.

In this report, our Head of Responsible Investing, Naheeda Rashid Chowdhury, explains how we are engaging with our investee companies and how we've voted on specific resolutions, as well as the outcomes of these activities.

[1] Sustainable strategies include both Sustainable Multi-Asset Class and Sustainable Global Equity discretionary strategies managed by Barclays Private Bank

CORPORATES WAKING UP TO THE CLIMATE CHALLENGE

Last year also marked a significant milestone in our global efforts to address climate change, with the United Nations (UN) COP26 summit in Glasgow. In a world of increasing geopolitical tensions, world leaders demonstrated a rare commitment to multi-lateral cooperation.

But, for me, what stood out most at this event was the huge presence of the corporate sector, which was much greater than at previous conferences. This is important, as ultimately, it is business that is likely to innovate and do much of the heavy lifting when it comes to addressing climate change. At the time of the landmark 2015 Paris Agreement, approximately 50 major global companies had published carbon reduction targets and signed up to the Science Based Targets initiative (SBTi). Today, that figure stands at more than 2,500, and reflects what we are increasingly seeing in the market[2].

Companies are recognising that by improving their sustainability and ESG credentials, they can better mitigate risk, and maximise opportunities to attract talent and customers through brand and reputation enhancement. In many cases, the corporate sector is ahead of governments in terms of climate ambitions.

A number of companies held within our sustainable strategies are already carbon neutral, with some going further by removing their legacy carbon footprints . The majority (78%) have net-zero targets in place, with only a handful of companies yet to announce robust plans to limit climate impact[3]. In this year's guest article, Sir David King, who previously served as the UK government's Chief Scientific Adviser and is the founder and chair of the Centre for Climate Repair, discusses the threats posed to our world from climate change, as well as the need for innovation.

POWERING THE SUSTAINABLE REVOLUTION

Many of our investee companies have been at the forefront of developing and commercialising innovative solutions across a number of sustainable applications. One of our US technology companies, for instance, through a partnership with two other firms, has pioneered a carbon-free aluminium smelting process where the only bi-product is oxygen – a manufacturing process previously thought to be very difficult to decarbonise. This aluminium is now being used across a range of new products.

There has also been continued progress in our ability to produce and measure with increasing levels of precision. Our first focus article looks at how this is providing exciting new opportunities in genomic sequencing, pharmaceutical manufacturing, and the development of digital technologies thanks to the production of invisible transistors.

These new and powerful technologies, which are underpinning the fourth industrial revolution, are also the subject of our second focus article. The overlapping of several technological S-curves – including the internet of things, artificial intelligence, electric autonomous vehicles, and robotics – is driving a period of unprecedented and exponential innovation, which could fuel a sustainable revolution.

Finally, our third focus article looks at how connectivity could offer a solution to marginalisation, with the potential to improve progress towards a wide range of the UN's Sustainable Development Goals. According to the UN, almost half of the world is still not connected to the internet[4]. A number of our investee companies are looking to address this by providing digital infrastructure and technologies, which should also bring the benefits of connectivity – including equitable access to healthcare, finance, education, and marketplaces.

A PIVOTAL MOMENT

The next decade could be humanity's most important. Never before have we faced such an existential threat to our lives, and to the billions or trillions of potential lives of our future descendants. In pre-industrial times, our ancestors lived sustainably for thousands of years, having no alternative. Once again, living sustainably could be our only option.

Through innovation and by changing our relationship with our world, we could regain that balance with nature. If we get it wrong, the implications could be catastrophic. But if we get it right, we have the chance to restore our rich, benevolent and wonderful world for the benefit of many generations to come.

Michael Topley
Head of Sustainable Portfolio Management

ESG Investing Awards 2020: WINNER
Best ESG Investment Fund: Multi-Asset

Best Sustainable Finance Initiative
Barclays Private Bank

[2] The Science Based Targets initiative, March 2022, https://sciencebasedtargets.org/companies-taking-action
[3] As at 8 February 2022
[4] Amina Mohammed, UN Deputy Secretary-General, April 2021 https://www.un.org/press/en/2021/dsgsm1579.doc.htm

Our exposure to key ESG factors

A look at the internal operational quality of our investee companies.

Here we provide a snapshot of our sustainable strategy's exposure to key environmental, social and governance (ESG) factors, and how it compares to the wider market[1].

ESG data helps us to assess the internal operational quality of a business, and its ability to mitigate risks to future cash flow that may arise from ESG factors. We integrate ESG analysis throughout our investment due diligence, and the data shown here is an output of that process.

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MSCI ESG RATINGS

AAA

CCC	B	BB	BBB	A	AA	AAA

Business Involvement

	Strategy[1]	MSCI All Country World Index
Adult Entertainment	0.0%	0.1%
Alcohol	0.0%	4.4%
Gambling	0.0%	1.2%
Tobacco	0.0%	0.8%
Weapons	0.0%	2.5%
Fossil Fuels	0.0%	5.6%

International Norms Violations

	Strategy[1]	MSCI All Country World Index
UN Global Compact Compliance Violations	0.0%	0.9%
Human Rights Norms Violations	0.0%	0.5%
Labour Norms Violations	0.0%	0.2%
Bribery & Corruption Policy in Place	100%	74%

Governance Risk

	Strategy[1]	MSCI All Country World Index
Lack of Board Independence	3.8%	10.9%
Independent Board Members	76.8%	56.3%
No Female Directors	0.0%	2.8%
Females represent at least 30% of Directors	72.5%	56.1%
Females on the Board	30.2%	20.5%
Management Compensation includes ESG performance (% weight of portfolio)	45%	

Our Top 5 Recyclers
(% of waste recycled)

	Strategy[1]
Schneider Electric	96.5%
Nike	96.1%
L'Oreal	95.9%
Adobe Systems	95.0%
TSMC	95.0%

Environmental Risk

	Strategy[1]	MSCI All Country World Index
Total Water Withdrawal Intensity (m3/$ million sales)	489	131,307
Exposure to High Water Risk	2.8%	7.3%
Waste Reduction Initiatives in Place	100%	84%

Source: MSCI ESG Research and Refinitiv, as at 31 December 2021.

For more detailed notes on the data used to generate the figures shown on this page, please see page 27 of this document.

Social Risk

	Strategy[1]	MSCI All Country World Index
Whistleblower Protection Policy	100%	92%
Net Employment Creation	8.1%	7.1%

Gender Pay Gap
Top 10 Companies

Discover Financial Services	102%	Adobe Systems	100%
Amazon.com	100%	Microsoft	100%
Service Now	100%	Apple	100%
UnitedHealth	100%	Visa	100%
Nike	100%	Ecolab	100%

Gender pay gap is defined as the ratio between the median earnings of women and median earnings of men. A value below 100% means that women earn less than men, while a value above 100% means that women earn more.

[1]Sustainable strategy here refers to the equity portion of the Sustainable Multi-Asset Class and Sustainable Global Equity discretionary strategies managed by Barclays Private Bank. The wider market is defined here as the MSCI All Country World Index, which is a stock index designed to represent the wider global equity market. This index does not focus specifically on sustainable companies or consider ESG characteristics.

The positive impact our companies are making

Some of the ways our investee companies are making a real difference to a range of sustainability challenges.

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13 CLIMATE ACTION

134M
METRIC TONS
Strategy*Impact 20,644

SCHNEIDER ELECTRIC

134m metric tons of CO2 saved by customers since 2018 through the IoT-enabled EcoStruxure architecture (equivalent to the emissions from 33.8 coal-fired power stations in one year).

Source: Schneider Electric, Sustainability Report 2020-2021.

6 CLEAN WATER AND SANITATION

70BN
GALLONS
Strategy*Impact 5,004,343

DANAHER

70bn gallons of drinking water and wastewater treated daily using Trojan ultraviolet treatment systems, installed in more than 11,000 municipalities and 150,000 industrial facilities worldwide.

Source: Danaher, Sustainability Report 2021

3 GOOD HEALTH AND WELL-BEING

2BN
MEDICINE DOSES
Strategy*Impact 107,249

JOHNSON & JOHNSON

2bn doses of medicine donated across 50 countries to tackle soil-transmitted helminths, one of the most widespread neglected tropical diseases that disproportionately affects low-income countries. J&J has been in the top 3 companies worldwide on the Access to Medicine Index for the past decade for its efforts in distributing medicines to low- and middle-income countries.

Source: Johnson & Johnson, March 2022

8 DECENT WORK AND ECONOMIC GROWTH

780,000
WOMEN
Strategy*Impact 98

HDFC BANK

780,000 women in the unbanked/ under-banked population supported through the Sustainable Livelihood Initiative, which provides vocational training, financial literacy education, and access to credit facilities, to promote financial independence.

Source: HDFC Bank, Sustainability Report 2019-2020

3 GOOD HEALTH AND WELL-BEING

38M
PEOPLE
Strategy*Impact 3,551

AIA

38m people provided with health and life insurance across Asia, helping to close the region's estimated $83 trillion mortality protection gap, and helping families and communities to build financial resilience.

Source: AIA, Environmental, Social and Governance Report 2020

10 REDUCED INEQUALITIES

200M
PEOPLE
Strategy*Impact 5,375

MICROSOFT

200m people offered "accessible by design" features in Microsoft 365, including AI to assist blind and low-vision readers, and options to reduce eye strain and accommodate light sensitivity.

Source: Microsoft, April 2021

6 CLEAN WATER AND SANITATION

110,000
KM OF WATER PIPES
Strategy*Impact 131

HALMA

110,000km of water pipes are being monitored for leaks using Halma's acoustic leak monitoring system, helping to conserve billions of litres of water each year.

Source: Halma, Annual Report and Accounts 2021

2 ZERO HUNGER

106,455
HECTARES
Strategy*Impact 177

CRODA

106,455 hectares of land saved in 2020 thanks to Croda's agricultural biostimulants, adjuvants, and seed coatings. These products help increase agricultural yield and cropping intensity without soil degradation, biodiversity loss, or requiring land expansion through deforestation.

Source: Croda, Sustainability Report 2020

3 GOOD HEALTH AND WELL-BEING

2M
CONSUMER ENGAGEMENTS
Strategy*Impact 117

UNITEDHEALTH

2m consumer engagements with the GetCovered programme, which helps individuals who lost employer-based health insurance during the pandemic.

Source: UnitedHealth, Sustainability Report 2020

Strategy impact is calculated by multiplying the company impact metric by the proportion of the company held by the strategy as of 31 December 2021, based on share count. This is a point-in-time assessment and we may no longer hold these companies within our portfolio. Strategy impact figures are not an opinion to each company's present or future value. The company impact metric varies for each company shown - please see the accompanying company text for details.

Strategy Impact = Company Impact Metric X (Strategy Nominal Share Holding ÷ Total Company Share Count)

*Strategy refers to both Sustainable Multi-Asset Class and Sustainable Global Equity discretionary strategies managed by Barclays Private Bank

EssilorLuxottica case study: Eliminating poor vision

We explore how one investee company is supporting the UN's bold and admirable target of providing eye care for all by 2030.

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Uncorrected poor vision is the world's most widespread unaddressed disability. It affects 1 in 3 people, 90% of whom live in the developing world. It is estimated that 2.7 billion people live with uncorrected poor vision due to a lack of affordability, access, awareness, and often, acceptance[1].

For a child, an eye test can be the difference between inclusion or exclusion, between access to information and seeking a livelihood or not, according to United Nations (UN) Ambassador Dr. Aubrey Webson[2].

In July 2021, the UN passed a resolution that sets a target for eye care for all by 2030, adding eye care to the Sustainable Development Goals. Countries are set to ensure full access to eye care services for their own populations, as well as to support global efforts. New expectations for financial institutions to provide targeted finances to go towards preventable sight loss have also been created[3]. This resolution aligns with EssilorLuxottica's ongoing efforts to tackle uncorrected poor vision in a generation.

RAISING GLOBAL AWARENESS

Raising awareness of refractive error is one of the most critical actions that can be taken. EssilorLuxottica's social impact fund, Vision For Life, has played a part in creating the See Now global campaign to increase awareness and drive public mobilisation on ending avoidable blindness and vision impairment. By 2020, the campaign had reached 32 million people[4]. The fund also founded Our Children's Vision, which plans to donate more than 500,000 pairs of glasses and screen 50 million children worldwide for vision impairments.

Its Ready2Clip range of glasses is designed to fit any face shape and enable on-the-spot customisation and delivery for each wearer, adapted to their own prescription. These are particularly beneficial for school children, as they reduce waiting times and costs for parents[5]. Furthermore, EssilorLuxottica has pledged to provide 200 million people living below the poverty line with free ophthalmic glasses[6].

Since 2013, EssilorLuxottica's 2.5 New Vision Generation business has been working to help support and extend the eye care infrastructure for refractive error. For example, Eye Mitra[7] trains young and unemployed people to become primary vision care providers, as well as supporting them in setting up their own businesses to sell prescription glasses and sunglasses in their community. Today, this is the world's largest rural optical network[8].

EssilorLuxottica has committed to eliminating poor vision worldwide by 2050.

[1,4,5,7,8] Eliminating Poor Vision in a Generation, Essilor See Change, 2020 https://www.essilorseechange.com/wp-content/uploads/2020/02/Eliminating-Poor-Vision-in-a-Generation-Report.pdf

[2] UN Ambassador W. Aubrey Webson, July 2021 https://www.iapb.org/advocate/eye-health-and-sdgs/united-nations-general-assembly-resolution-on-vision/

[3] United Nations, Vision for Everyone: accelerating action to achieve the Sustainable Development Goals, July 2021 https://www.un.org/press/en/2021/ga12349.doc.htm

[6] Essilor See Change, 2022 https://www.essilorseechange.com/see-life-2-5-nvg/ready2clip/

Climate crisis: The need for action now

Sir David King, one of the world's leading climate change experts, shares his view on the crisis and the solutions.

It is now indisputable that we are in a climate emergency. Soaring levels of carbon dioxide and other greenhouse gases, particularly methane, with combined atmospheric concentrations of more than 500 parts per million today, put the future of humanity at extreme risk[1]. Global heating is already resulting in more extreme weather events at greater frequency, and some irreversible changes have now been triggered in our climate systems as tipping points are exceeded.

The first such tipping point is the Arctic Circle region. This region is warming four times faster than the global average[2], resulting in rapid and irreversible sea ice loss, and ice loss from the Greenland ice sheet. Arctic Sea ice loss is accelerating global warming via the reduction in albedo as the blue sea absorbs the sunlight, rather than ice reflecting the sun's heat back out into space. Ice loss from the Greenland ice sheet is accelerating sea level rise, and is now irreversible. In addition, the Arctic region holds vast amounts of methane, a powerful greenhouse gas, locked within permafrost, which is now starting to thaw, with potentially disastrous consequences.

Loss of ice in the Arctic is accompanied by significant changes across the globe as weather systems react. The amplification of Arctic warming is disrupting the normal functioning of the Jet stream (i.e. the narrow band of strong winds that generally blow from West to East), which has in the past separated the cold air in the Arctic region from the rest of the Northern hemisphere. As a result, the Jet stream starts to meander over large distances (see Figure 1 overleaf) and causes extreme weather events around the Northern hemisphere.

The result of this was temperatures being observed along the West Coast of America that were more than 5°C above previous records in those regions, during the summer of 2021. Some of the largest wildfires ever recorded burned in the forests of North America[3] and South-East Australia[4], some with such fierce power that they were comparable to a moderate volcanic eruption[5]. Such events are already costing us over $100 billion per year in loss and damage[6].

[1] Climate Crisis Advisory Group (2021) The Global Climate Crisis and the Action Needed. Available from: https://static1.squarespace.com/static/60ccae658553d102459d11ed/t/60d421c67f1dc67d682d8d29/1624515027604/CCAG+Launch+Paper.pdf

[2] Rantanen, M., et al. (2021) The Arctic has warmed four times faster than the Globe since 1980, Preprint. Available from: https://doi.org/10.21203/rs.3.rs-654081/v1Voosen, P. (2021) The Arctic is warming four times faster than the rest of the world. Science Available from: doi: 10.1126/science.acz9830

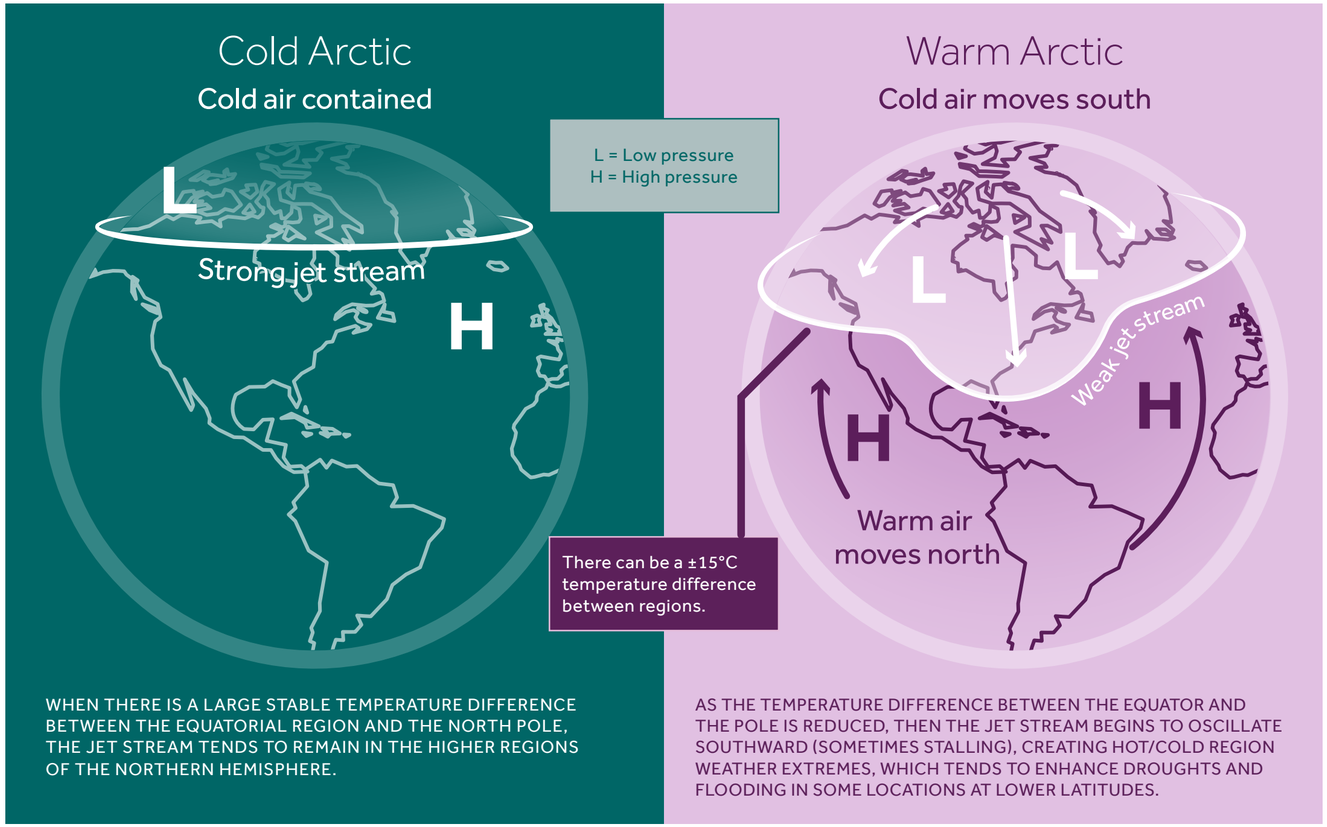
[3] Bermel, C. (2021) Dixie Fire becomes largest single wildfire in California history. Politico. Available from: https://www.politico.com/states/california/story/2021/08/06/dixie-fire-becomes-largest-single-wildfire-in-california-history-1389651;

[4] Van Dijk, A. (2020) Australian National University Report: Australia's Environment Summary Report 2019. Available from: https://www.wenfo.org/aer/wp-content/uploads/2020/03/AustraliasEnvironment_2019_SummaryReport.pdf

[5] Khaykin, S., Legras, B., Bucci, S. et al. (2020) The 2019/20 Australian wildfires generated a persistent smoke-charged vortex rising up to 35 km altitude. Commun Earth Environ 1, 22. Available from: https://doi.org/10.1038/s43247-020-00022-5

[6] World Meteorological Organization (2021) Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes, cited in United Nations News, available from: https://library.wmo.int/index.php?lvl=notice_display&id=21930; Chestney, N. (2013) Losses from Extreme Weather Rise to $200 Billion a Year over Past Decade Scientific American. Available from: https://www.scientificamerican.com/article/losses-from-extreme-weather-rise-to/

FIGURE 1: HOW WARMING TRENDS IN THE ARCTIC AFFECT THE JET STREAM



Source: Graphic adapted from Paul Horn, *Inside Climate News*

Once the ice on Greenland is gone, global sea levels will be up to 7.4 metres higher[7]. A rise of just 0.5m-1m will be disastrous, rendering a number of cities on coastlines unliveable[8]. Huge populations in locations including Kolkata and Jakarta will become homeless, forced to move to higher ground.

Every society is acclimatised to, and built on (literally and metaphorically), historical climatic conditions. Every society will suffer terribly as these changes happen and everyone will be affected by them.

WHAT ARE THE SOLUTIONS?

The only way to reverse some of these catastrophic patterns, and to regain some stability in our climate and weather systems, is "climate repair" – a strategy we call "reduce, remove, repair" – which demands that we make very rapid reductions to achieve net-zero global emissions; that there is massive, active removal of excess greenhouse gases from the atmosphere; and that we undertake to repair some of our most damaged climate systems.

In the first instance, we should seek to refreeze the Earth's poles and glaciers to correct these wild weather patterns, slow down ice-melt, stabilise sea level, and break the feedback loops that relentlessly accelerate global warming. This will "buy us time" while we bring atmospheric greenhouse gas concentrations down to safer levels.

This strategy for creating a manageable future for humanity, while clear, is by no means straightforward.

[7] Morlighem et al. (2017) Complete Bed Topography and Ocean Bathymetry Mapping of Greenland. Geophysical Research Letters 44,21 p11,051-11,061. Available from: https://doi.org/10.1002/2017GL074954

[8] IPCC AR6 WG1 Report, 2021. Available from: https://www.ipcc.ch/2021/08/09/ar6-wg1-20210809-pr/

1.REDUCE

Emissions reduction at the scale and pace required is fraught with challenge. The biggest industry in the world is the energy industry – very largely fossil-fuel driven since the Industrial Revolution – with a massive transition required. Nonetheless, this represents considerable economic potential for those companies that recognise the financial opportunity in developing and taking new post-fossil-fuel technologies to market.

Financial incentives are required to fast track the transition. Mission Innovation – a group of 22 countries and the European Union, representing 90% of global GDP, formed at the 2015 Paris Climate Conference – represents one model for creating the necessary ecosystem. This group made a voluntary commitment to spend $30 billion per annum of public money by 2020 on the development of post-fossil-fuel technologies, in order to de-risk their development and enable them to get into the marketplace more efficiently and more quickly. They have now agreed to raise this to $35 billion per annum by 2025[9].

We urgently need more private sector understanding of these opportunities. Investment that is fit for purpose in the 21st century is the only investment that should be countenanced. This means focusing on those companies taking us safely into this future, and not on those that are creating the stranded assets of the future.

2. REMOVE

Greenhouse gas removal at scale requires considerably more research funding to enable the development of the safe technologies that are needed to remove tens of billions of tons of excess greenhouse gases from the atmosphere per annum. A carefully valued carbon price is required to incentivise the development of a greenhouse gas removal industry. A combination of different solutions – from nature-based through to bio-mimicry – will be needed to meet the removal requirements already baked into countries' net-zero commitments.

[9]Mission Innovation (2021). http://mission-innovation.net/about-mi/overview/

3. REPAIR

Climate repair requires significantly more research and investment. "Repairing" systematically seeks to draw the Earth back from climate tipping points, buying time during which reduction and removal can happen. Political, financial, and societal will is needed, with the right incentives in place to enable rapid research and deployment.

The most urgent effort is to refreeze the Arctic. Marine cloud brightening, in which floating solar-powered pumps spray salt upwards to brighten clouds and create a reflective barrier between the Sun and the ocean, is known to cool ocean surfaces and is a promising way to promote Arctic summer cooling. It mimics nature, and can be scaled up or down in a flexible way. Studies of marine cloud brightening, its climate impacts, and interactions with human systems, are underway.

Research is critical, to ensure the solutions in question do not bring with them unintended consequences, which could be unleashed if these techniques were deployed in an emergency. Public engagement is needed, to understand which solutions are publicly acceptable, and which are not.

"Nowhere is safe." As the Intergovernmental Panel on Climate Change (IPCC) warned in a recent report, climate change and its consequences are here to stay. The challenge of surviving the next 50 years is a planet-wide existential crisis; we need to work together urgently. What we do in the next five years will determine humanity's fate.

Professor Sir David King is Emeritus Professor of Chemistry at the University of Cambridge; Founder and Chair of the Centre for Climate Repair at the University; Chair of the Climate Crisis Advisory Group; an Affiliate Partner of SYSTEMIQ Limited; and Senior Strategy Adviser to the President of Rwanda. He was the UK Government Chief Scientific Adviser, 2000-2007, and the Foreign Secretary's Special Representative on Climate Change, 2013-2017.

The Centre for Climate Repair

The Centre for Climate Repair at Cambridge (CCRC) is a cross-disciplinary research institution, aiming to develop and understand the solutions that will safeguard our planet from the disastrous consequences of global warming. CCRC is taking ambitious action on climate repair, supported by scientific research and robust evidence.

To find out more, visit the website at climaterepair.cam.ac.uk

Investing in the net-zero transition

Discover how we're positioning for the energy transition, and proactively encouraging companies to take tangible steps towards net-zero emissions.

In the face of the climate emergency, we can help drive climate repair by allocating capital to innovative companies most likely to succeed in eradicating pollution, phasing in cleaner alternatives, and developing low-carbon products and services.

It is our responsibility to do this thoughtfully and patiently, empowering our investee companies to take the tangible steps needed to move to net-zero emissions. This involves spending considerable time deepening our understanding of companies' internal operations, investigating their supply chains, and reviewing their transition plans.

Our work is ongoing as scientific guidance develops, but throughout we remain committed to having a material influence on the transition that lies ahead. It is our planetary imperative.

A LOW-CARBON PORTFOLIO

Our sustainable strategy[1] emits 96% less carbon per $1 million invested than the wider market[2]. There are several factors driving this comparatively low carbon risk:

1. We have always excluded any investments in fossil fuel companies, and so have no exposure to companies that own thermal coal, oil reserves, or gas reserves, including unconventional reserves, such as oil sands, shale oil, and shale gas. This means that our strategy also has minimal stranded asset risk and far lower carbon costs to pass on to customers.

2. By focusing on high-quality, knowledge-based businesses, we typically invest in companies that add value through their intellectual property, rather than the number of products they produce. This naturally steers us away from more commoditised areas of the market that tend to be carbon-intensive.

3. We have always invested in companies supporting the energy transition. Of the companies held in the portfolio, 45% are working on clean-energy solutions across areas such as energy efficiency, pollution prevention, and sustainable water management[3].

4. On the fixed-income side, we hold green bonds where proceeds have been allocated to directly fund projects to accelerate the transition towards a net-zero planet. This includes projects focused on energy efficiency, clean energy, green buildings, and clean transportation.

[1] The equity portion of our sustainable strategies, as at 31 December 2021. Sustainable strategies include both Sustainable Multi-Asset Class and Sustainable Global Equity discretionary strategies managed by Barclays Private Bank

[2] The wider market is defined here as the MSCI All Country World Index, which is a stock index designed to provide a broad measure of global equity market performance

[3] As at 31 December 2021

SUPPORTING THE PARIS AGREEMENT

Our strategy is well-positioned for the transition to net zero. An encouraging 78% of our investee companies have net-zero targets in place[4], a large majority of which are ambitious and science-based. This means they are in line with what the latest climate science deems necessary to meet the goals of the Paris Agreement, limiting global warming to well below 2°C above pre-industrial levels and pursuing efforts to limit warming to 1.5°C.

At the time of writing[5], eight of our 37 investee companies have yet to publish comprehensive net-zero plans or targets. While the majority of these are already doing better than the market average on carbon abatement given their capital-light business models, we are concerned that they do not have formal strategies in place to prove that they are limiting the worst impacts of climate change and future-proofing their business growth.

As we intend to have a net-zero investment strategy, we are actively engaging with these businesses – via EOS at Federated Hermes, in the UK and Jersey – to encourage the adoption of science-based targets[6].

96%

fewer carbon emissions per $1 million invested than the wider market

45%

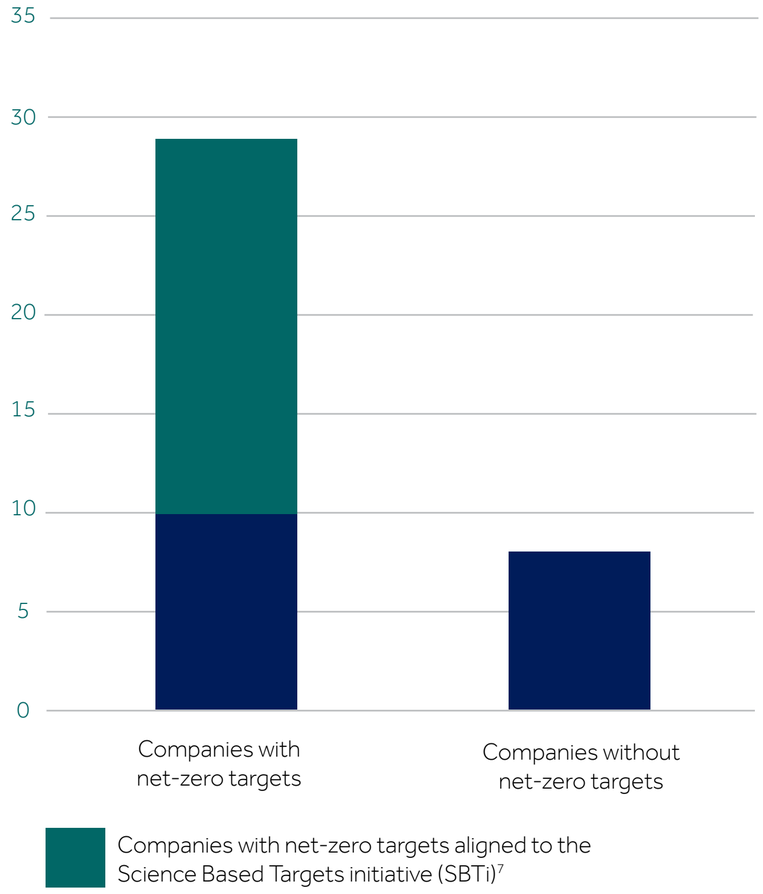
of our investee companies are generating revenues from clean-energy solutions

0%

exposure to fossil fuels

All percentages as at 31 December 2021

OUR COMPANIES' COMMITMENTS TO NET ZERO



Source: Barclays Private Bank, as at 8 February 2022

[4] As at 8 February 2022

[5] As at 28 March 2022

[6] Barclays Private Bank has partnered with a leading stewardship provider, EOS at Federated Hermes (EOS) in the UK and Jersey, to support us with engagement across our private banking assets, in equity and fixed income as well as with voting activities. For more information, visit https://privatebank.barclays.com/what-we-offer/investments/responsible-investing-engagement-and-voting-activities/

[7] The SBTi defines and promotes best practice in science-based target setting, and independently assesses and approves companies' targets in line with its strict criteria. For more information, visit https://sciencebasedtargets.org/

WEIGHTED AVERAGE CARBON INTENSITY

SUSTAINABLE STRATEGY	27.3
MSCI AC WORLD INDEX	159.7

Source: MSCI ESG Research, as at 31 December 2021. This table shows a comparison between the equity portion of our sustainable strategies[8] and the MSCI All Country World Index, which is a stock index designed to represent large- and mid-cap stocks across a number of developed and emerging markets. Please note that this index represents the wider global equity market and does not focus specifically on sustainable companies or ESG characteristics.

Weighted average carbon intensity is a measure of a portfolio's exposure to carbon-intensive companies. The figure is the sum of security weight multiplied by the security carbon intensity (tonnes of CO2 emitted per $1 million sales).

CARBON EMISSIONS BY SECTOR

	Sustainable Strategy	MSCI AC World index	Sustainable Strategy vs MSCI AC World Index
	Tonnes of CO2 emitted per $1m invested		Comparison of tonnes of CO2 emitted per $1m invested
MATERIALS	11.9	530.3	-97.8%
CONSUMER DISCRETIONARY	5.7	15.6	-63.2%
REAL ESTATE	5.6	13.5	-58.4%
INDUSTRIALS	4.4	54.9	-92.1%
CONSUMER STAPLES	4.3	31.4	-86.4%
INFORMATION TECHNOLOGY	2.3	7.4	-68.9%
HEALTHCARE	2.0	5.4	-63.2%
FINANCIALS	1.7	6.2	-72.2%
COMMUNICATION SERVICES	0.8	8.0	-90.1%
UTILITIES	N/A	1,023.0	N/A
ENERGY	N/A	388.1	N/A
OVERALL	**3.4**	**82.7**	**-95.9%**

Note: Utilities and energy are shown as N/A as the sustainable strategy did not invest in any companies in these sectors, as at 31 December 2021.

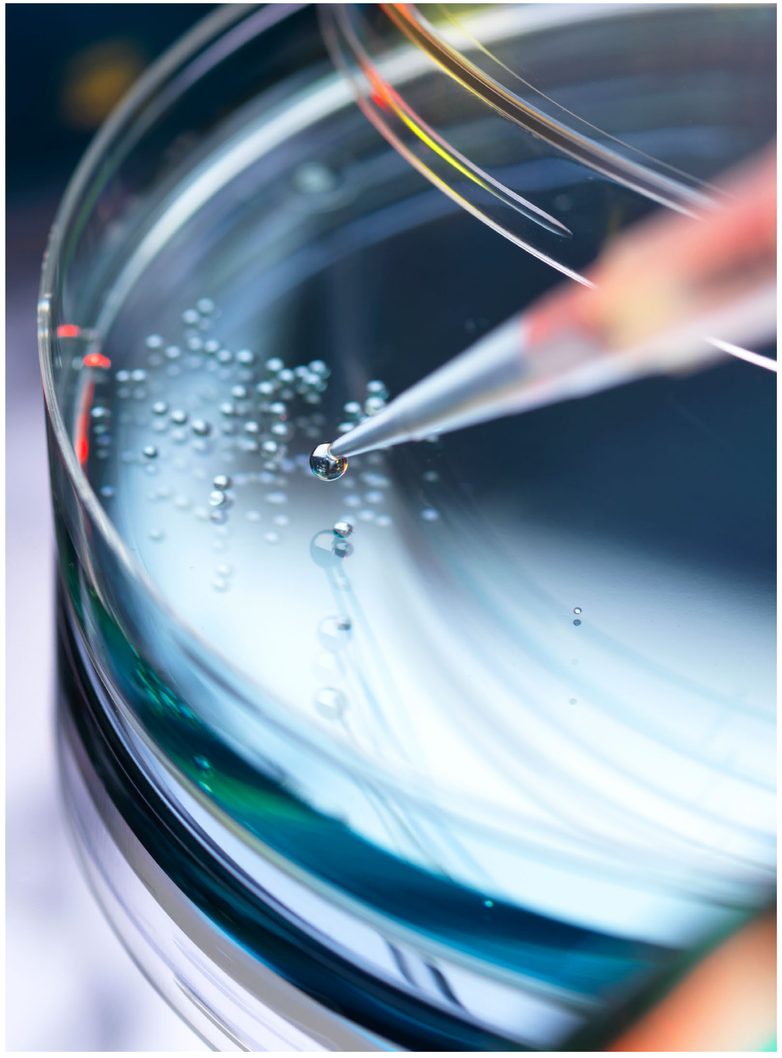
Key 0 — 82.7 — 1,023.0

Source: MSCI ESG Research, as at 31 December 2021. This table shows a comparison between the equity portion of our sustainable strategies[9] and the MSCI All Country World Index, which is a stock index designed to represent large- and mid-cap stocks across a number of developed and emerging markets. Please note that this index represents the wider global equity market and does not focus specifically on sustainable companies or ESG characteristics.

[8,9] Sustainable strategies include both Sustainable Multi-Asset Class and Sustainable Global Equity discretionary strategies managed by Barclays Private Bank

Pushing science to its limits: The value of precision

The ability to measure and manufacture with atomic-level precision is helping to improve sustainability outcomes.



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Mettler Toledo, a portfolio holding and global leader in precision instruments, manufactures laboratory balances that are precise to a tenth of a millionth of a gram – or roughly a 1000th of an eyelash[1]. For the active ingredients in pharmaceutical products we widely consume, a difference in the weight of an eyelash can be the difference between life and death. The pharmaceutical industry is just one that has benefited from society's ability to measure and manufacture with greater precision.

Over the past few hundred years, improving levels of precision have been critical in producing things with scale, at a lower cost, with less waste and more interchangeability. It has started revolutions, and will be crucial in tackling the many sustainability challenges we face – be it through better measurement of carbon emissions, or understanding the genome, or by underpinning the many advanced and innovative technologies on which we will depend.

FROM INDUSTRIAL TO TECHNOLOGICAL REVOLUTION

One of the first great advantages from improved precision came with the creation of the James Watt engine in 1776. Watt had spent several years looking at ways to improve the efficiency of steam engines, which suffered from significant leakage from the steam cylinder as the piston moved in and out. So he turned to the famous Cumberland ironmaster, John "Iron-Mad" Wilkinson, who used a boring machine to create cast-iron piston cylinders, precise to the thickness of a British shilling. This new technique of using a machine tool to reliably increase precision greatly improved the efficiency of Watt's engine, ushering in the era of steam power and the start of the Industrial Revolution – a period that greatly improved the quality of life for millions, but which also accelerated the climate challenges we face today[2].

Two hundred years later, the level of precision to which we produce and measure things is barely conceivable. The world's most advanced manufacturing processes now operate at the ångström level – a unit of length used to describe the sizes of individual atoms. This has had a profound impact on our ability to create increasingly powerful and innovative technologies for improving outcomes across a number of sustainability areas (as covered throughout our annual reports). These include artificial intelligence, the internet of things, dematerialisation of the physical world, the transition to renewable energy, precision agriculture, and how we treat disease, to name just a few.

PUSHING SCIENCE TO ITS LIMITS

In 1925, Julius Lilienfeld patented the world's first design for a transistor – an electrical device that used low-voltage current to control the flow of higher-voltage current by amplifying it, or switching it on or off. The first working transistor, built by Bell Labs around 20 years later, could fit into the palm of a hand, and started the modern computer age[3].

Three-quarters of a century later, our ability to make transistors smaller and with greater precision has been pushed to its very limits, as we have moved from a world governed by Newtonian mechanics into the world of Einsteinian electronics. Modern microchips, the ones in our smartphones, contain up to six billion transistors, spaced five nanometres apart – approximately 10 atoms of silicon across. This distance is shorter than the wavelength of visible light, meaning these transistors are now literally invisible to the naked eye[4].

[1] Bank of America Merrill Lynch Health Care Conference, 2015
[2] Exactly: How Precision Engineers Created the Modern World, Simon Winchester, April 2018
[3] Dec 23 1947: Transistor Opens Door to Digital Future, Wired.com, December 2009 https://www.wired.com/2009/12/1223shockley-bardeen-brattain-transistor/
[4] Exactly: How Precision Engineers Created the Modern World, Simon Winchester, April 2018

Astonishingly, there are now more transistors in the world than there are leaves. While our ability to cram more transistors into a space has consistently improved – roughly doubling every two years in an industry-motivating observation known as Moore's Law – the manufacturing process has remained similar throughout. The critical step in the production of semiconductors is called photolithography. Essentially the reverse of an old darkroom photography projector, the process involves shining light through a mask showing the chip design, then using optics to shrink it down. The parts exposed to light are then etched using gases and turned into transistors.

THE MOST ADVANCED MANUFACTURING CAPABILITY ON EARTH

To meet the challenge of manufacturing ever-smaller components, Dutch company ASML (one of our European equity holdings, as at April 2022) has developed one of the most advanced machine tools in human history[5]. They use very short wavelengths of light from the extreme end of the UV spectrum, which are then focused using mirrors to produce the atomic-scale transistors on which the modern world depends. To do this, they start by squirting 50,000 discrete droplets of molten-liquid tin into the machine. Each drop is then hit by an initial laser to flatten it, then smashed by an incredibly powerful second laser to create UV radiation. Finally, this is steered down a series of exceptionally flat mirrors to focus the light onto the chip with atomic precision.

These highly engineered mirrors themselves test the limits of what is believable. Each mirror varies in flatness by less than the diameter of a single hydrogen atom, and is made by pushing each individual atom into place. Put another way, if each mirror were the diameter of the Earth, they would vary in flatness by less than the width of a single human hair.

Each machine usually costs upwards of €150 million, and a typical factory will require up to 50. Machines like these are essential to the continuation of Moore's Law, as well as in delivering the sustainable benefits that digitalisation and advanced technologies promise to bring.

READING THE GENOME WITH MOLECULAR PRECISION

Oxford Nanopore Technologies (one of our UK equity holdings, as at April 2022) also uses ångström-level precision, in this case to sequence genomes in real time. The company has developed a portable genomic sequencing device that can provide rapid answers to biological questions in the field, such as identifying the strain of e-coli causing a patient's stomach upset at a GP surgery, or the microbes present in a glacier.

The technology starts by splitting a double-helix DNA strand in two, and attaching a motor enzyme at one end. This then helps to feed the DNA strand through a tiny nanopore embedded in a silicon chip. Each nanopore is made using a programmed bacterium, and has an internal diameter of one nanometre – roughly the size of a molecule, or 100,000 times smaller than a human hair[6]. As the DNA strand is pulled through, each DNA base disrupts the electrical current in a unique way, much like placing different objects under a running tap can disrupt the water in different ways. This flow is interpreted by a machine-learning algorithm, which can provide an answer in as little as 10 minutes.

The company's ultimate aim is to decentralise genomic sequencing and provide equitable access to answers to a wide range of important biological questions, to help solve real-world challenges in areas such as healthcare, environmental science, food and agriculture, or epidemiology. Genomic sequencing has been a key technology in the fight against COVID-19, and represents a paradigm shift in how to diagnose and treat disease.

TOWARDS A MORE SUSTAINABLE FUTURE

Our ability to measure with ever-greater precision, and to manufacture from the atom up, is likely to be invaluable in building a more sustainable future. It could revolutionise the way we address climate change, manage pandemics, feed the world, and protect our natural resources. Increasing computing power should open up new possibilities for innovative new technologies that can answer questions we as humans cannot – with the potential to transform our lives in ways we've not even begun to imagine.

[5]Exactly: How Precision Engineers Created the Modern World, Simon Winchester, April 2018
[6]Oxford Nanopore Technologies, March 2022 https://nanoporetech.com/how-it-works

When S-curves align: An exciting future for tech

The exponential evolution of powerful new technologies could revolutionise the way we tackle global sustainability challenges.

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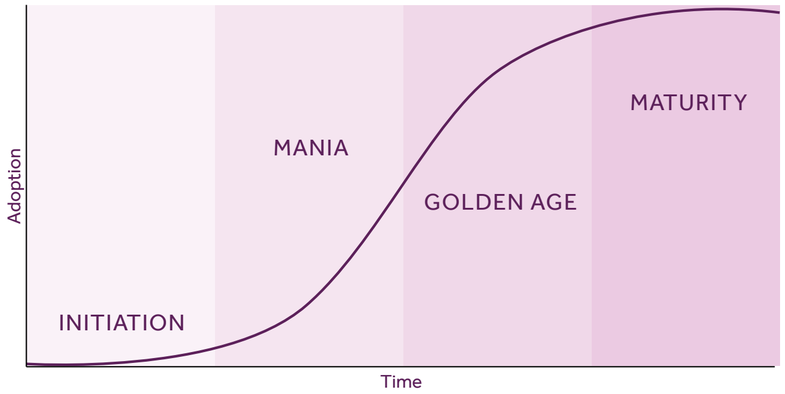
Technological revolutions drive rapid societal change. They are usually brought about by new multi-purpose technologies combining with a new infrastructure and a cheap input.

In the 1950s, the combination of the internal combustion engine and mass production techniques, with cheap petrol and road networks, created suburbanisation, cheap housing, and a consumer culture as people filled their houses with electrical goods. The combination of railroads, cheap coal, and steam-driven machinery in the late 19th century, meanwhile, saw economies rapidly industrialise, with an ability to move goods over long distances.



The evolution of revolution

Technological revolutions follow somewhat predictable paths of adoption, known as S-curves:

1. The 'Initiation' phase sees the emergence of a new technology being used by early adopters.
2. A 'Mania' phase then pulls capital and people into the space, to develop the infrastructure without sight of profit. This was the case with the early construction of railroads, or the internet during the dot-com years, and likely with the current crypto frenzy.
3. Often these then correct, but from the ashes a 'Golden Age' phase is built upon the freshly laid infrastructure. This was the case with Apple (one of our North American equity holdings at the time of writing, April 2022), which brought mobile internet to the masses, or the internet giants who created fortunes by building on the capital investment into infrastructure made by telecommunication companies.
4. Finally, a 'Maturity' phase sees technologies mature and the market becomes saturated.

When several technologies emerge at once, they can often accelerate one another, to drive more significant periods of change. For instance, the invention of the shipping container, along with cheap microchips and plastic technologies, drove mass global adoption of the many appliances we now use every day.

EXPONENTIAL TRANSFORMATION

When compared with previous revolutions, the Fourth is evolving at an exponential, rather than linear pace, and is underpinned by several powerful emerging technologies. Thanks to rapidly decreasing cost curves over the past decade, the commercialisation of a number of technologies – the seeds of which were planted during the 1990s tech bubble – has finally reached an inflection point, making them viable for the first time. These technologies include the internet of things, artificial intelligence, genomic sequencing/editing, electric autonomous vehicles, and robotics.

While each of these transformational technologies is exciting in its own right, what makes this period truly extraordinary is the way they are converging and overlapping, accelerating one another multiplicatively. The commercial impact of this revolution will inevitably be profound, but crucially, we believe it has the potential to expedite progress towards achieving the United Nations (UN) Sustainable Development Goals – and so turn the tide on some of humanity's greatest challenges once and for all.

SOLVING BIOLOGY'S GRAND CHALLENGES

Artificial intelligence – something we have explored in previous reports – is a powerful general purpose technology that can accelerate the adoption and performance of many others. This may be through combining with the internet of things to optimise power grids, factories, or farming practices, to name just a few examples. It is also being used to advance healthcare.

In 2020, the Alphafold 2 neural net from Alphabet (another of our North American equity holdings at the time of writing, April 2022) solved one of biology's grand challenges[1] – to predict the shape of a protein from its DNA sequence. As the building blocks for life, understanding protein structures provides the opportunity to better understand and treat disease. The difficulty of this feat should not be downplayed, however. In 1969, Cyrus Levinthal estimated that there are 10^{300} possible ways a single DNA chain could fold into a single protein. Calculating this manually would take longer than the age of the known universe, but thanks to the Alphafold breakthrough, it can be done in just a few days[2]. Alphabet has now predicted the entire human proteome and made it freely available to scientists, opening up exciting new avenues for biological discovery.

This technological advancement was only made possible because of previous advances in computational power, combined with the rapidly declining cost of genomic sequencing which, in turn, has only been made possible thanks to advances in artificial intelligence.

Oxford Nanopore Technologies (a UK equity holding at the time of writing, April 2022) has capitalised on these trends, developing a powerful genomic sequencing platform that offers advantages over incumbents in terms of speed, cost, and portability. The firm's technology, which uses artificial intelligence algorithms to read long genomic sequences in real time, provides an affordable solution that can produce answers quickly, and in the field.

ADVANCING BEYOND GENOMIC SEQUENCING

Gene editing is another area revolutionising the pace of modern medicine, and builds on the developments in artificial intelligence and genomic sequencing. While genomic sequencing allows us to read DNA data, gene editing goes further and makes the data actionable, through the interrogation of gene function and the modification of sequences. This has vast implications for advancing the global sustainability agenda, from the production of curative treatments to increasing global food supply.

CSL (an Australian holding at the time of writing, April 2022) is developing a stem-cell gene therapy, which has the potential to offer a significant advantage to patients suffering from currently incurable genetic diseases. Haemophilia B is one such example, where a mutation in one gene leaves patients without enough Factor IX – a key blood clotting protein. CSL's AAV5 (adeno-associated virus) gene therapy, which is currently in trials, could prove to be a breakthrough medical advance, offering patients a one-time treatment that permanently alters their genetic makeup to produce Factor IX – removing the need for regular injections.

A NEW ENERGY PARADIGM

Overlapping technological S-curves are also helping the world to decarbonise, by increasing the generation of renewable energy, and by reducing the amount we need through optimisation.

Schneider Electric (a European equity holding, as at April 2022) is building the foundations to facilitate a new energy paradigm. The company's Square D Energy Centre is a "grid-to-plug" solution for battery storage and back-up power in the home. It enables electric vehicle charging, the inversion of solar power, and whole-home surge protection, preparing residential homes for deriving their power from multiple sources.

The firm's EcoStruxure platform also optimises energy usage within facilities such as hospitals, combining internet-of-things technologies with renewable energy, battery storage and artificial intelligence to steer uninterruptible power through the building to precisely where it is needed. This has been shown to reduce the energy usage of a building by up to 40%[3].

INNOVATION THROUGH DISRUPTION

Joseph Schumpeter is famed for having coined the term Creative Disruption, describing it as the "process of industrial mutation that incessantly revolutionises the economic structure from within, incessantly destroying the old one, incessantly creating a new one"[4]. While we have seen this manifested in technological progress to date, the speed of adoption and discoveries that we are seeing now is happening at a much faster rate of change than we've seen historically. If harnessed correctly, the tools that emerge could have the potential to tick off the UN's Sustainable Development Goals one by one.

Maya Tabaqchali,
Sustainable Portfolio Manager

[1] Grand challenges as described in Research at the Intersection of the Physical Life and Sciences (2010), National Research Council (US) Committee
[2] Deepmind, November 2020 https://www.deepmind.com/blog/alphafold-a-solution-to-a-50-year-old-grand-challenge-in-biology
[3] Schneider Electric, 2022 https://download.schneider-electric.com/files?p_Doc_Ref=SustainabilityReport2020EN
[4] Capitalism, Socialism and Democracy (1942), Joseph Schumpeter

Connectivity: A solution for marginalisation

Building the digital infrastructure to connect the world could contribute to more than half of the UN's Sustainable Development Goals.

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The past two years have outlined the importance of connectivity and the digital infrastructure that supports it. In the modern world, being connected is no longer a choice, but a necessity, with inequality increasing between those who are connected and those who are not. Improved connectivity increases opportunity, drives innovation and productivity, and provides access to critical services. That is why the United Nations (UN) Secretary-General's Roadmap for Digital Cooperation calls for universal connectivity by 2030[1].

Connectivity has the great potential to accelerate human progress, bridge the digital divide, and develop knowledge societies. However, there is much work to be done since:

- Almost half of the world's population currently does not have access to the internet[2].
- In two out of every three countries, more men use the internet than women, and this gender gap has been growing rather than narrowing[3].
- In 2019, close to 87% of individuals in developed countries used the internet, compared with only 19% in the least developed countries[4].
- In 19 of the least developed countries, the price of 5GB of fixed broadband is more than 20% of monthly gross national income per capita[5].
- Countries report that 93% of the world's population live within physical reach of mobile broadband or internet services[6], yet an estimated 3.7 billion people remain without access[7].

In Bill and Melinda Gates' 2019 Annual Letter, Melinda stated that "connectivity is a solution for marginalisation"[8]. Across the world, phones can now act as banks, providing a crucial lifeline for escaping poverty for the millions that remain unbanked. With a click, small farmers can access information to support them in determining how much they can charge for their crops. Those living in rural or hard-to-reach geographies can access healthcare, such as a heart examination using a medical tablet in rural Cameroon, or having blood delivered by drones in Rwanda.

Connectivity is especially critical for women in the developing world, a group that remains one of the most marginalised in the world, historically left behind by global development priorities. Access to a connected mobile phone can provide a woman in the developing world with financial independence through mobile banking ,online educational resources to improve employability, or access to contraceptives through telemedicine. This connectivity promotes societal inclusion, helping to lift her out of poverty, with benefits rippling throughout the community via the so-called girl effect.

The fundamental key to delivering universal connectivity – and thereby addressing a number of the UN's SDGs – is reliable digital infrastructure.

[1,3,4,5,6] United Nations, Report of the Secretary General: Roadmap for Digital Cooperation, June 2020 https://www.un.org/en/content/digital-cooperation-roadmap/
[2,7] Amina Mohammed, UN Deputy Secretary-General, April 2021 https://www.un.org/press/en/2021/dsgsm1579.doc.htm
[8] GateNotes, February 2019 https://www.gatesnotes.com/2019-Annual-Letter

KEY SDG	IMPACT OF DIGITAL INFRASTRUCTURE
NO POVERTY 	• Internet access provides free online educational resources and job portals that reduce the costs and information asymmetries normally associated with finding a job. • Earnings are estimated to increase between 3% and 10% through acquiring digital skills, according to the CEBR [9]. • Shopping online can allow for price comparison and is on average 13% cheaper than shopping in-store[10].
GOOD HEALTH AND WELL-BEING 	• Real-time monitoring of patients' health metrics can reduce costs, save time, and support improved diagnostics. • Telemedicine makes it easier for marginalised groups, including the disabled, the elderly, and those who live in rural, hard-to-reach geographies, to access healthcare services.
QUALITY EDUCATION 	• Mobile technology enables students and teachers to access learning materials, school curricula, tests, online courses, and certifications in underserved and remote areas. • The far-cheaper overhead costs associated with online learning tools make learning more accessible for everyone, everywhere.

KEY SDG	IMPACT OF DIGITAL INFRASTRUCTURE
GENDER EQUALITY 	• According to the UN, around a third of married women in developing countries have no control over household spending on major purchases, and approximately one in 10 are not consulted about how their own earnings are spent[11]. Increasing digital financial inclusion for women would help make them more independent and better able to take care of themselves and their families. • Access to the internet can encourage more women to work from home and start their own business. Given the positive correlation between work flexibility and employment rates among mothers, digital platforms increase labour participation rates amongst women and reduce the gender wage gap[12].
CLEAN WATER AND SANITATION 	• Digital infrastructure (through the internet of things, or IoT) can provide tools to efficiently manage and monitor water consumption. • Smart water infrastructure, such as SCADA systems, can improve drainage or water supply plans, leakage detection services and network performance.
AFFORDABLE AND CLEAN ENERGY 	• Smart grids and smart logistics can promote energy efficiency by reducing energy consumption and transportation. • According to research by McKinsey, IoT technology can also collect useful information for generator companies that could help them reduce costs and achieve more energy efficiency[13].

KEY SDG	IMPACT OF DIGITAL INFRASTRUCTURE
DECENT WORK AND ECONOMIC GROWTH 	• Since technological investment increases the quality of capital and the skills of the average worker, the development of ICT and IoT can boost productivity, innovation, and growth. • Frontier Economics estimated in 2018 that a 10% increase in machine-to-machine connections would generate an increase in GDP of $2.26 trillion in the US between 2018 and 2032[14].
SUSTAINABLE CITIES AND COMMUNITIES 	• In combination, IoT and mobile big data can be used to inform the planning of transport to improve air quality. The datasets generated can be used to create real-time city-wide air quality alerting and prediction models. This, in turn, can help deliver socio-economic benefits in terms of improved quality of life, reduced healthcare costs and working days lost to illness, thereby helping to lessen the negative environmental impact of cities.
CLIMATE ACTION 	• ICT systems can help monitor emissions from factories, producing real-time data on energy consumption and reducing energy consumption by buildings. • According to the World Economic Forum, digital technologies including 5G, IoT and artificial intelligence can help reduce global carbon emissions by up to 15%[15]. • 5G technology can help speed the transition to electric and driverless vehicles, which could reduce GHG emissions.

[9] The Economic Impact of Digital Skills and Inclusion in the UK Report, CEBR 2015

[10] United Nations, Report of the Secretary General: Roadmap for Digital Cooperation, June 2020

[11] United Nations, 2015 https://unstats.un.org/unsd/gender/downloads/Ch8_Poverty_info.pdf

[12] OECD, Bridging the Digital Gender Divide, 2018 https://www.oecd.org/digital/bridging-the-digital-gender-divide.pdf

[13] McKinsey & Company, The Internet of Things: How to capture the value of IoT, May 2018 https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/The%20Internet%20of%20Things%20How%20to%20capture%20the%20value%20of%20IoT/How-to-capture-the-value-of-IoT.pdf

[14] Antonio García Zaballos, Enrique Iglesias, and Alejandro Adamowicz, The Impact of Digital Infrastructure on the Sustainable Development Goals: A Study for Selected Latin American and Caribbean Countries, 2019 https://publications.iadb.org/publications/english/document/The_Impact_of_Digital_Infrastructure_on_the_Sustainable_Development_Goals_A_Study_for_Selected_Latin_American_and_Caribbean_Countries_en_en.pdf

[15] World Economic Forum, 'Digital technology can cut global emissions by 15%. Here's how', January 2019, https://www.weforum.org/agenda/2019/01/why-digitalization-is-the-key-to-exponential-climate-action/

BUILDING GLOBAL WIRELESS CONNECTION

American Tower (a North American equity holding, as at April 2022) is on a mission to supply wireless connectivity to the world. The company has one of the largest portfolios of cellular broadcast towers globally, with more than 220,000 connection sites spread across the globe, from India to Brazil, to Ghana to Columbia, and across the United States. Every day, millions of people access the infinite resources of the internet through equipment hosted on American Tower communication sites.

Cellular towers, and the connectivity they facilitate, have made it possible for developing countries to bypass the traditional path to prosperity paved by developed nations, and to catapult their development agendas. For example, the mobile revolution, spearheaded by the likes of Apple, put phones in the hands of millions, thereby allowing developing nations to leapfrog the landline infrastructure stage of their development.

Responsible investing: How we're engaging for change

Our Head of Responsible Investing, Naheeda Rashid Chowdhury, explains our approach to voting and engagement, and why it matters to investors.

Over the past year, we've partnered with a leading stewardship provider, EOS at Federated Hermes, to support us with voting and engagement activities in the UK and Jersey. In this interview, we discuss the importance of stewardship, our approach, and activities across our portfolios with Naheeda Rashid Chowdhury, our Head of Responsible Investing.

COULD YOU START BY EXPLAINING WHY VOTING AND ENGAGEMENT ACTIVITIES ARE IMPORTANT FOR INVESTORS?

Voting and engagement are the key tools investors have to encourage companies to manage their environmental, social and governance (ESG) risks[1]. Companies that do so effectively are likely to be less prone to severe incidents, such as fraud, litigation, or reputational risks, and may also enjoy a stronger reputation, or lower cost of capital. This, in turn, can help protect – and potentially enhance – shareholder value.

There are several examples of ESG controversies facing companies, both current and historical, that reinforce this view, such as poor worker safety, supply chain issues, and oil spills. Over time, we've seen a growing awareness that ESG risks can materially impact investment performance, and of the crucial role that investment managers can play in addressing ESG issues, such as climate change or diversity and inclusion.

By identifying and managing ESG risks and opportunities more effectively, we should be better placed to deliver competitive long-term returns for our clients. Our engagement activities also provide our Portfolio Managers with additional data and insights to supplement their traditional analysis.

COULD YOU GIVE US AN OVERVIEW OF BARCLAYS PRIVATE BANK'S APPROACH TO VOTING AND ENGAGEMENT?

We've partnered with a leading stewardship provider, EOS at Federated Hermes (EOS) in the UK and Jersey[2], to support us with our voting and engagement activities. Through this partnership, we engage and vote globally with corporates and key stakeholders, such as policymakers and regulators.

Our engagement with corporates (via EOS) has taken place at board and senior executive level, covering a range of topics, such as climate change, climate transition plans, net zero, human rights, gender and racial equity, and executive pay. Through these activities, we've sought to highlight key ESG issues of concern, which could affect shareholder value and stakeholder wellbeing.

In 2021 for our sustainable strategies[3], we engaged with 39 companies on 169 ESG issues and objectives via EOS. Of these, 20% were environmental, 31% social and ethical, 34% governance, and 15% strategy, risk and communication.

On environmental issues, we focused on improving company practices on climate change and water stewardship. For instance, encouraging companies to adopt stretching and meaningful climate targets, and to make robust TCFD[4] disclosures. On social and ethical issues, we had a strong focus on human rights and diversity, and executive remuneration under governance.

We also voted at 21 shareholder meetings, on 275 resolutions, supporting management on 84% of the resolutions we voted on[5]. You can find more information on our voting and engagement activities in the charts below, or on our Responsible Investing webpage.

WHY DID WE CHOOSE TO PARTNER WITH EOS?

EOS has a long history of leading on responsible investment, dating back to the 1980s, and was one of the founding signatories to the United Nations' (UN) Principles for Responsible Investment[6].

The company works on behalf of large institutional investors, so it has significant leverage to seek change. Pooling resources with other like-minded investors creates a strong and representative shareholder voice, and is likely to make company engagement more effective than if we were engaging individually.

EOS has one of the world's largest teams of engagers, so its activities are targeted and focused on delivering genuine corporate change – which, in turn, should benefit our clients. Their diversity of skills, experience, languages, connections, and cultural understanding gives them the gravitas and credibility to access and maintain constructive relationships with company boards.

THE PORTFOLIO MANAGEMENT TEAM HAS ALWAYS SPOKEN TO SENIOR MANAGEMENT OF OUR INVESTEE COMPANIES. HAS WORKING WITH EOS CHANGED THIS?

Our Portfolio Managers remain at the centre of decision-making, particularly around voting, and continue to engage with companies on financial issues. Our partnership with EOS has enabled them to form an even deeper, more holistic understanding of a company's approach to ESG issues – by incorporating observations, learnings, and insights gained through engagement and voting into their ESG analysis and due diligence.

By working with EOS, our Portfolio Managers are able to track each company's response and progress against pre-defined objectives and milestones. Overall, we believe our partnership will enable our Portfolio Managers to effect change across their holdings, and to make better-informed investment decisions.

[1] ESG refers to a range of environmental, social and governance factors that can influence a company's operations e.g. climate change, working conditions, executive pay
[2] Please note engagement and voting activities are being exercised in relation to the UK and Jersey Discretionary Portfolio Management platform only
[3] Barclays Private Bank and EOS at Federated Hermes, for the period April-December 2021 in the UK, and October-December 2021 in Jersey. Sustainable strategies refer to both Sustainable Multi-Asset Class and Sustainable Global Equity discretionary strategies managed by Barclays Private Bank
[4] Task Force for Climate-related Financial Disclosures. For more information see https://www.fsb-tcfd.org/
[5] Barclays Private Bank, for the period May-December 2021 in the UK, and October-December 2021 in Jersey

THERE ARE CLEARLY MANY SUSTAINABILITY ISSUES WE COULD ENGAGE ON. COULD YOU SHARE SOME OF THE MAIN AREAS OF FOCUS OVER THE PAST YEAR?

EOS links its engagement issues and objectives to the UN Sustainable Development Goals (SDGs), which is quite progressive in the responsible investing industry. (As a reminder, the SDGs are a set of 17 goals designed as a blueprint to achieve a more sustainable future for all, and our sustainable strategy invests in companies whose business practices actively address one or more of these goals.)

For the sustainable strategy, the most frequently engaged SDGs include:

- SDG #8 - Decent work and economic growth (i.e. human rights, risk management, diversity)
- SDG #12 - Responsible consumption and production (i.e. sustainability reporting, environmental indicators)
- SDG #13 - Climate action (i.e. climate strategy, forestry and land use)
- SDG #16 - Peace, justice and strong institutions (i.e. lobbying, bribery and corruption)

Engagement example, SDG #5 - Gender equality:

Following our engagement, five of our investee companies have enhanced their public disclosures on diversity and inclusion[7]. This includes employee breakdowns by level, gender pay gap reporting, and detailed workforce diversity statistics.

HAVE THERE BEEN ANY TANGIBLE CHANGES SO FAR?

Engaging for change is often a long-term process, with activities spanning several months or even years, depending on the nature of the issue. For this reason, EOS sets clear, specific and measureable objectives for each engagement at the outset, and uses a four-step milestone approach to monitor progress, as follows:

1. Concern is raised with the company
2. Company acknowledges our concerns
3. The company commits to a credible change
4. The change is implemented.

Since we began working with EOS, 37 milestones have been reached in relation to holdings in our sustainable strategies, across various engagement objectives[8]. Some highlights include:

- A US manufacturing company enhanced its public ESG reporting, which included an alignment to the TCFD recommendations, and introduced environmental targets.
- A US scientific instrument supplier established a human rights policy in combination with its global equal employment opportunity policy, covering freely chosen employment, child labour, freedom of association, and compliance with applicable wage and hour laws. The company also released a statement on modern slavery and human trafficking that addressed its supply chain due diligence, risk assessment and management, and also references its conflict minerals statement.
- A US conglomerate improved its sustainability disclosures by providing more detail on its sustainability strategy, and introducing new targets at corporate/ individual company level for material issues related to manufacturing and human health.

HOW DO THESE DEVELOPMENTS FIT IN WITH BARCLAYS PRIVATE BANK'S BROADER STEWARDSHIP COMMITMENTS?

We believe that engagement and voting activities help give us a deeper understanding of the assets we invest in, which is an essential part of good stewardship. They enable us to better manage ESG risks, which can affect investment performance, and so support us in our fiduciary duty to clients.

We also recognise our responsibility to society and key stakeholders. ESG considerations, engagement and voting activities, in our view, help alleviate the pressure for short-termism and encourage a focus on long-term value creation – to the mutual benefit of companies, investors and the world at large. These beliefs align well with the Barclays Group values of Respect, Integrity, and Stewardship.

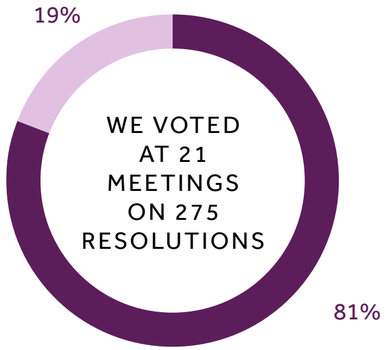
Our voting and engagement activities are carried out, in partnership with EOS, on behalf of all our traditional and sustainable discretionary strategies in the UK and Jersey. We may engage with companies where we manage bond or equity holdings, and vote at shareholder meetings where we manage equity holdings. Further details are available on the Barclays Private Bank Discretionary Portfolio Management website.

[6] Federated Hermes, March 2022 https://www.hermes-investment.com/ukw/about-us/

[7] Barclays Private Bank and EOS at Federated Hermes, as at 31 December 2021

[8] Barclays Private Bank and EOS at Federated Hermes, for the period April-December 2021 in the UK, and October-December 2021 in Jersey. Sustainable strategies refer to both Sustainable Multi-Asset Class and Sustainable Global Equity discretionary strategies managed by Barclays Private Bank

OVERVIEW OF OUR VOTING ACTIVITIES ACROSS OUR SUSTAINABLE STRATEGIES[9]



- Meetings against at least one resolution: Where we did not support the management recommendation on at least one resolution at the meeting, either by voting against, withholding, or abstaining on the resolution(s).
- Meetings in favour on all resolutions: Where we have supported management recommendations on all resolutions at the meeting.

Definitions for voting decisions:

Vote for: A voting decision taken to support a management recommendation on a resolution.

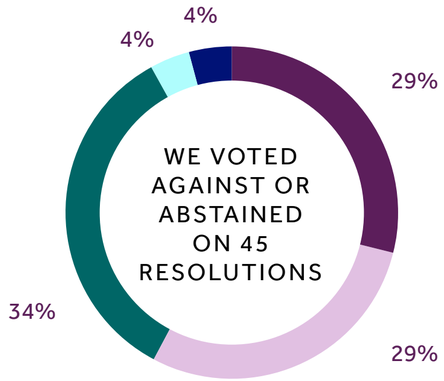
Vote against: A voting decision taken that does not support a management recommendation on a resolution.

Withhold vote: A withhold vote is used to express dissatisfaction with a candidate where they are the only candidate nominated for the role. This is specific to directorship elections in the USA.

Abstain: A voting decision that declines to vote either for or against a resolution.

While we aim to vote on all resolutions on a best-efforts basis, we may be unable to do so where there are operational barriers, internal or market restrictions. For example, we may be unable to vote due to restrictions relating to share blocking (markets where proxy voters have their securities blocked from trading during the period of the annual meeting), split voting (the ability to provide different instructions in relation to assets held in the same account) and partial voting (when only a portion of the total shares in an account is voted on).

Source: Barclays Private Bank, for the period May-December 2021 in the UK, and October-December 2021 in Jersey



- Board Structure
- Remuneration
- Shareholder Resolution
- Capital Structure & Dividends
- Audit and Accounts

Source: Barclays Private Bank, for the period May-December 2021 in the UK, and October-December 2021 in Jersey.

[9] Sustainable strategies refer to both Sustainable Multi-Asset Class and Sustainable Global Equity discretionary strategies managed by Barclays Private Bank

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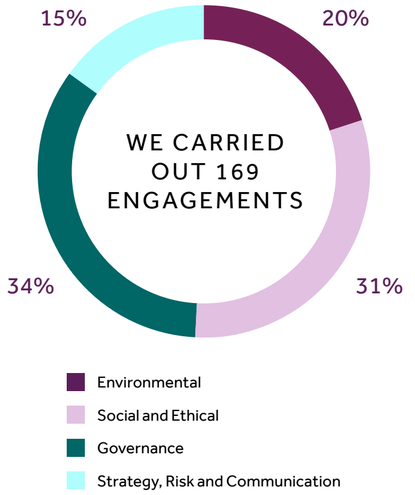

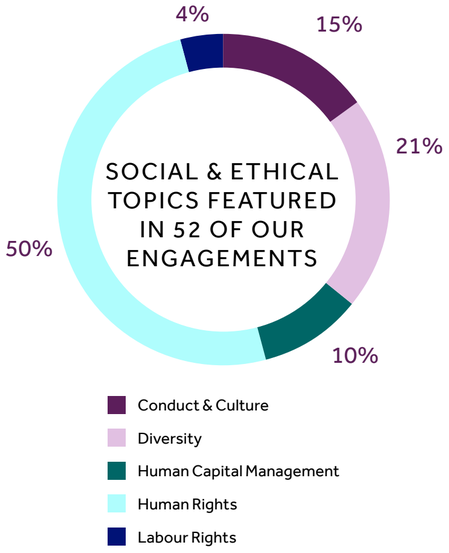

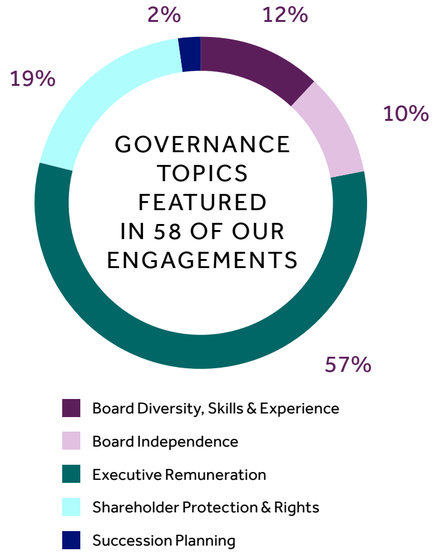

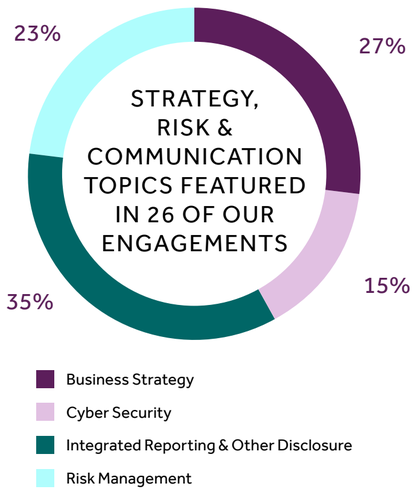

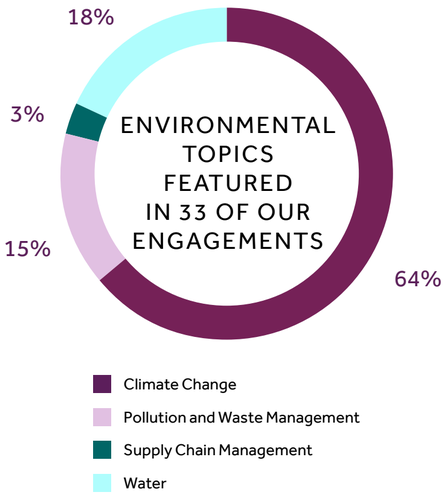

Source for all: Barclays Private Bank and EOS at Federated Hermes, for the period April-December 2021 in the UK, and October-December 2021 in Jersey

[9] Sustainable strategies refer to both Sustainable Multi-Asset Class and Sustainable Global Equity discretionary strategies managed by Barclays Private Bank

Sources and references

NOTES FROM PAGE 6

International Norms

Global Compact Compliance Violation (%): The percentage of portfolio's market value exposed to companies in violation of the UN Global Compact principles.

Human Rights Norms Violation (%): The percentage of portfolio's market value exposed to companies in violation of international norms around human rights.

Labour Norms Violation (%): The percentage of portfolio's market value exposed to companies in violation of the International Labour Organisation's broader set of labour standards.

Business Involvement

Adult Entertainment Involvement (%): The percentage of portfolio's market value exposed to companies flagged for involvement in adult entertainment according to MSCI ESG Research's Highly Restrictive screen definition. This includes all adult entertainment producers as well as adult entertainment distributors and retailers if the total revenue is => 5%. The full weight of each flagged company is included in the calculation.

Alcohol Involvement (%): The percentage of portfolio's market value exposed to companies flagged for involvement in alcohol according to MSCI ESG Research's Highly Restrictive screen definition. This includes all alcohol producers as well as alcohol distributors, suppliers, and retailers if the combined revenue is => 5%. The full weight of each flagged company is included in the calculation.

Gambling Involvement (%): The percentage of portfolio's market value exposed to companies flagged for involvement in gambling according to MSCI ESG Research's Highly Restrictive screen definition. This includes all gambling facility operators as well as support products & services if the revenue is => 5%. The full weight of each flagged company is included in the calculation.

Tobacco Involvement (%): The percentage of portfolio's market value exposed to companies flagged for involvement in tobacco according to MSCI ESG Research's Highly Restrictive screen definition. This includes all tobacco producers as well as tobacco distributors, suppliers, and retailers if the combined revenue is => 5%. The full weight of each flagged company is included in the calculation.

Weapons Involvement (%): The percentage of portfolio's market value exposed to companies with ties to the manufacture of conventional (including depleted uranium), biological/chemical, or nuclear weapons systems and components. This includes companies that provide support systems and services, as well as those with indirect ties to weapons production through ownership. Note: Involvement in the production of landmines and/or cluster bombs is not captured here, but tracked separately.

Fossil Fuels (%): The percentage of portfolio's market value exposed to companies that own fossil fuel reserves.

Governance Risk

No Female Directors (%): The percentage of portfolio's market value exposed to companies with no female directors.

Females Represent 30% of Directors (%): The percentage of portfolio's market value exposed to companies where women comprise at least 30% of the board of directors.

Lack of Independent Board Majority (%): The percentage of portfolio's market value exposed to companies lacking an independent board majority**.**

Environmental Risk

Exposure to High Water Risk (%): The percentage of portfolio's market value exposed to companies with a Water Stress Exposure Score > 6.6. Scores combine the geographic and business segment components and range from 0 to 10

Total Water Withdrawal Intensity: The company's reported water withdrawal (m3) normalised to sales (USD million), which allows for comparisons between companies of different sizes.

Top 5 Recyclers:

Top 5 highest-scoring investee companies for waste recycling, calculated as total recycled and reused waste produced in tonnes divided by total waste produced in tonnes.

Top 10 for Gender Pay Gap:

Top 10 highest-scoring investee companies for gender pay gap, defined as the ratio between the median earnings of women and median earnings of men. A value below 100% means that women earn less than men, while a value above 100% means that women earn more.

Key investment risks

ESG data risk: Some positions within the strategy may not have an ESG rating due to the nature of their asset class (e.g. government bonds, gold, hedging derivatives). Should a position not be covered by MSCI (or an equivalent provider) due to lack of coverage, the Portfolio Manager will determine the position's equivalent rating.

Market risk: The possibility for an investor to experience losses due to factors that affect the overall performance of the financial markets. Market risk, also called "systematic risk", cannot be eliminated through diversification, though it can be hedged against. Sources of market risk include major natural disasters, recessions, political turmoil and geopolitical tension.

Liquidity risk: The risk stemming from the lack of marketability of an investment that cannot be bought or sold quickly enough to prevent or minimise a loss.

Derivatives exposure: The use of these instruments can, under certain circumstances, increase the volatility and risk profile of the strategy beyond that expected of a strategy that only invests in equities. The strategy may also be exposed to the risk that the company issuing the derivative may not honour their obligations which could lead to losses arising.

Currency risk: An investor will be exposed to currency fluctuations between their domestic currency, a fund's holding currency, and the local currency of an investment.

Interest rate risk: An investor will be exposed to interest rate risk. Changes in interest rates will impact the performance and/or value of instruments. Interest rates tend to change suddenly and unpredictably.

Inflation: Inflation will reduce the real value of your investments in the future.

Taxation and tax relief: Levels of taxation and tax relief are subject to change.

Returns are not guaranteed: Past performance is not an indication of future performance. The value of investments, and any income, can fall as well as rise, so you could get back less than you invested. Neither capital nor income is guaranteed.

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