#WhyESGMatters | The Handbook | 2nd edition

HSBC
Global Research

The handbook – overview

Sourced from our global network of over 300 analysts, this handbook from HSBC Global Research aims to help you broaden your knowledge of key areas of the increasingly broad and fast moving world of ESG.

In this second edition, we add sections discussing the urgency of climate action in 2022 and the importance of ESG factors on bond investment. These complement a range of other topics, from how "green" hydrogen is set to play a more significant role to combat climate change to finding solutions to plastic pollution. Choose your topic and expand your knowledge.

And if you want to go deeper get in touch at **askresearch@hsbc.com**

Ask Research – your questions, our answers

Wai-Shin Chan Head, ESG Research introducing the HSBC Global Research #WhyESGMatters handbook

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12 Articles on #WhyESGMatters

The urgency for climate action in 2022

At last year's annual UN Climate Change Conference (COP26), limiting global temperature increases to 1.5°C and setting net-zero emissions targets became the benchmark for many economies. Yet governments and corporates must start to live up to their net zero rhetoric, as COP27 in November will no doubt increase the pressure on global leaders to revise climate pledges, deliver on climate finance and raise the profile of adaptation.

We look at the climate progress made and what investors should anticipate ahead of COP27. We also discuss the latest report from the UN climate science body, on the impacts, adaptation and vulnerability of ecosystems, biodiversity and human communities as a result of climate change. Together these contribute to the urgency of climate actions in 2022.

Did you know?

+13.7%
Emissions trajectory by 2030 vs 2010, based on current climate pledges

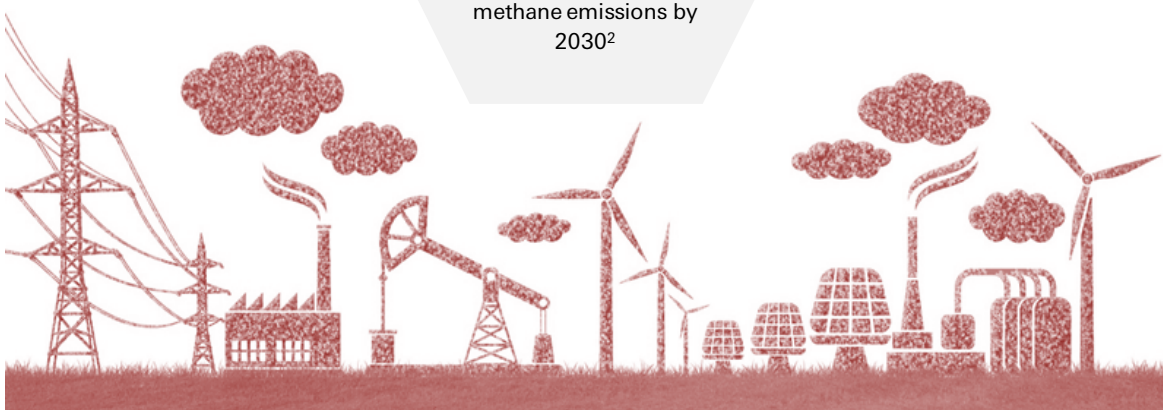
65m
People affected by climate disasters in 2021

140
Number of countries with net-zero targets[1]

-45%
Required emissions trajectory by 2030 vs 2010 to be on a 1.5°C pathway

USD150bn
Damages incurred from climate disasters in 2021

30%
Target reduction in methane emissions by 2030[2]



Source: The Climate Action Tracker, EDMAT

[1] As of 9 Nov 2021

[2] Versus 2020 as per the Global Methane Pledge

1. Climate progress in the past year

COP26 last year was a modest success, involving compromise and a mix of disappointment and progress on many issues. Guidelines for implementing the Paris Agreement were finalised, yet the curbs on coal and fossil fuels, though watered down, were a surprise. Total greenhouse gas emissions are still projected to increase by 13.7% by 2030 (from 2010 levels), in reality this should be a 45% decrease to be on the 1.5°C pathway.

The challenge in 2022 will be to bring even more ambitious 2030 targets to the table. As of November of last year, over 140 countries that cover 90% of global emissions have net-zero targets[3]. This coverage was already increased by 27% in 2020, along with notable new additions in 2021 including India, Australia and the UAE. However, making the pledges is the easy part; delivering and implementing the policies is much more challenging.

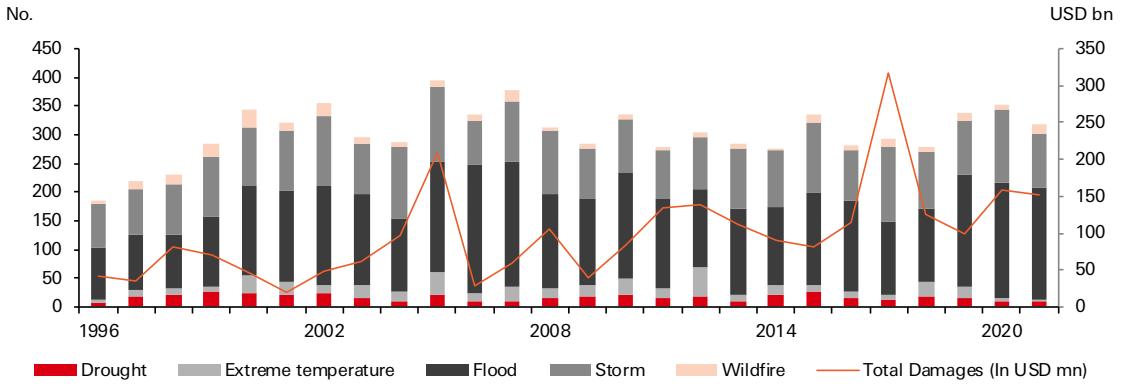
Corporate pledges

Over 220 corporations declared net-zero pledges in 2021, a significant rise from the prior year. Similar to governments, these corporates may be subject to increased scrutiny from investors and civil society, on whether the pledges are credible and amount to real declines in emissions. Some corporates may also be tied to greenwashing, or misleading consumers to think that their products are environmentally sound.

State of the climate

Climate extremes in 2021 continued to break long-standing records. Wildfires in Siberia, Turkey, and the US produced record carbon emissions[4]. The rise in global sea levels and average change in ocean heat content reached an all-time high since the 1955-2006 reference period. Parts of North America witnessed several heatwaves in the months of June and July. Western Europe experienced extreme flooding causing over 200 deaths and economic losses of over USD20bn. The city of Zhengzhou in mainland China received 201.9mm of rainfall in an hour, breaking a national record. In 2021, some 65m people were affected by climate disasters, and damages worth over USD150bn were incurred.

Figure 1: Climate-related disasters



Source: The Climate Action Tracker, EDMAT

[3] The Climate Action Tracker

[4] Copernicus Atmosphere Monitoring Service, the European Union

2. What to look out for in 2022

The science of climate change

The UN's Intergovernmental Panel on Climate Change (IPCC) recently published a report entitled "Impacts, Adaptation and Vulnerability" as part of its current assessment cycle (AR6) on climate science. It is the second of their four key reports incorporating observations from hundreds of scientists and advanced climate modelling. The findings are important in cementing the role of science to influence government policy and highlighting the urgency of ambitious action.

Figure 2: Reports from the AR6 of IPCC

1	**The Physical Science Basis (Aug 2021)**	• Comprehensive view of the climate system and its changes, including human influence on climate variables • Projections of the changes in climate system and possible control to assess the effect of projected climate and air pollution
2	**Impacts, Adaptation and Vulnerability (28 Feb 2022)**	• Benefits, risks and costs of climate mitigation & adaptation • Explores the consequences of inaction, including on biodiversity loss, rapid urbanisation, human demographic shifts, social and economic inequalities
3	**Mitigation of Climate Change**	• Mitigation options are widespread but sufficient deployment requires adequate finance & broad stakeholder involvement • Economic benefits outweigh the costs, financial support is essential
4	**AR6 Synthesis Report**	• Scheduled release in Sept 2022 • To include: current status and trends of climate system changes, near-term responses and long term climate and development futures

Source: IPCC

Impacts, adaption and vulnerability

Investors can refer to the key findings from the latest IPCC report as follows:

- Human-induced climate change has caused widespread adverse impacts, broadly categorised as: 1) those that affect ecosystems and 2) those that have a more direct effect on human systems. **Some changes are already irreversible, as human systems and ecosystems are beyond their ability to adapt.**

- **Vulnerability to climate change** depends on geography and how exposed the local natural systems, economy and people are to specific impacts. Communities that depend on ecosystems for basic needs are the most affected. Climate-resilient standards are key for infrastructure build (water, health, transport, energy, communications) to limit further vulnerability.

- **Risks and impacts vary through time and grow with rising temperatures.** The warmer it gets, the more challenging (technologically and economically) adaptation will be. There is also a gap between implemented adaptation and the goals set by society, the latter influenced by tolerance to climate change impacts, resource limitations and competing priorities. In short, current levels are deemed insufficient for long-term transformative adaptation to cope with temperature rises.

- **Estimating the finances of adaptation is another challenge.** The IPCC report does not mention a definitive number or range on costs, partly due to the lack of agreement over 'how much should we adapt' as views differ on necessity and sufficiency.
- **A number of enablers would accelerate adaptation**, categorised as: political commitments (e.g. public awareness, mechanisms for accountability and transparency), frameworks for institutions (e.g. on policy, legal and climate risk disclosure), financing (e.g. public-private partnerships, budget allocation) and monitoring of outcomes.
- **Adaptation solutions cannot be applied uniformly across the world** as many nuances come in play. These cover economic and social development, as well as cultural and equity differences. The IPCC believes that the knowledge, impacts, planning and implementation of adaptation should take into account disparities such as "gender, ethnicity, disability, age, location and income".
- **Climate resilient development**, defined as the process of implementing greenhouse gas mitigation and adaptation measures, is "more **urgent**" and "progressively **constrained by every increment of warming**". The window to deploy such measures is rapidly narrowing.

Pledges leading up to COP27

Countries had announced or upgraded their climate pledges at COP26 in 2021, known as National Determined Contributions (NDCs). These NDCs are expected to be revisited and strengthened prior to COP27, to be held in Egypt in November 2022. Yet this could prove challenging, as many had already undergone a round of "climate ambition raising" last year, though still far off the mark to reach the 1.5°C trajectory.

For example, whereas the IPCC finds that net-zero emissions should be achieved by 2050, just over four-fifths of national net-zero pledges meet this (2050) criterion. Those pledges that are later than 2050 have the potential to bring their pledges forward – and this would count as strengthening a climate pledge.

Scrutiny of net zero – countries and companies

Most G20 countries now have some form of net-zero target but very few have detailed how it will be achieved. Companies must too, do their parts to implement targets – investors are asking more probing questions specific to net-zero strategies.

Companies have tended to report on their emissions 1) directly produced by their own sources and 2) emissions produced via energy-related purchases e.g. electricity, steam, heating and cooling. All other emissions from sources not owned or controlled by companies are oftentimes ignored, despite the fact that this category can make up the greatest share of corporate emissions. Oil companies, for instance, may emit little themselves, but consumers of their products are responsible for significant emissions.

There is growing scrutiny over these emissions, however, with central banks including them in climate-risk stress tests. During 2022, more investors are likely to analyse corporate emission-reduction targets and net-zero strategies to learn the full climate exposure of their own portfolios.

Carbon pricing

Carbon markets, or trading of emission allowances to help achieve reduction targets[5], will have heightened focus in 2022. As companies and investors (institutional and individual) seek to use carbon credits/offsets to meet their targets, there may be growing concerns over the credibility of carbon offsets. Dubious science, monitoring and accounting can allow 'carbon laundering' – including schemes that actually increase global emissions. Several countries are set to introduce carbon pricing in 2022.

Methane

We also expect much greater awareness of methane emissions. The Global Methane Pledge, signed by over 100 countries ahead of COP26, aims to reduce these emissions by at least 30% by 2030 (from 2010 levels). The US has already tabled the Methane Emissions Reduction Act of 2021 into legislation, and the EU has proposed new regulations on reducing methane emissions.

4. Conclusion

Although the climate spotlight may be a shade less bright in 2022, there is still plenty for investors to digest. New findings in the IPCC report lead to another wake-up call for business and political leaders to action, as they start living up to their net-zero rhetoric and keep up the momentum for COP27 in Egypt. Investors will also want to understand companies' disclosures on greenhouse gas emissions, methane reduction strategies and carbon pricing.

As environmental, social and governance (ESG) trends continue to rise, so will investor interest in sustainable investing opportunities. There is an even stronger case now to demand more actions from businesses and governments to implement net-zero measures, and for companies to deliver the technology that will help scale decarbonisation. Embedding ESG metrics into one's portfolio may also be an effective way to manage risk, enhance the potential for resilience and tap into green innovation to generate long-term capital grown.

Embedding ESG into Fixed Income

ESG in fixed income is now mainstream. The number of funds which now label themselves as sustainable or have some type of sustainable objective is increasing rapidly. For example, 10% of mutual funds in EUR now have a form of explicit sustainability objective, up from just over 6% two years ago.

Investors incorporate ESG into their decision making in myriad ways; through the exclusion of certain issuers or sectors, the purchase of green and labelled bonds, by investing in issuers with better ESG or by factoring in issuer's decarbonisation goals into their portfolios. ESG has exploded not just in the number of green bonds outstanding or in the number of funds that now target ESG criteria but also in the ways in which it is applied. We aim to illuminate how different styles of ESG impact fixed income markets.

Fixed income investors have good reason to take ESG seriously. ESG risks can shape the fate of whole sectors. ESG investment styles can tarnish or burnish bond prices depending on how issuers fare on key ESG criteria. The shape of fixed income markets can be fundamentally altered as the structure of securities are changed to incorporate ESG KPIs.

There is not a direct linear relationship though between "good" ESG and tighter spreads or lower yields. Complex ESG issues like efforts to decarbonise the economy require investors to look at not just the current state of play, but also how issuers are likely to fare over the longer run. At its most developed, ESG asks investors to consider how well an issuer will adapt to future challenges, not just how well it performs today.

Types of labelled bonds

Green bonds

- Fund environmental projects
- Not secured against projects

Sustainability bonds

- Fund a mix of green and social projects
- Not secured against projects

Social bonds

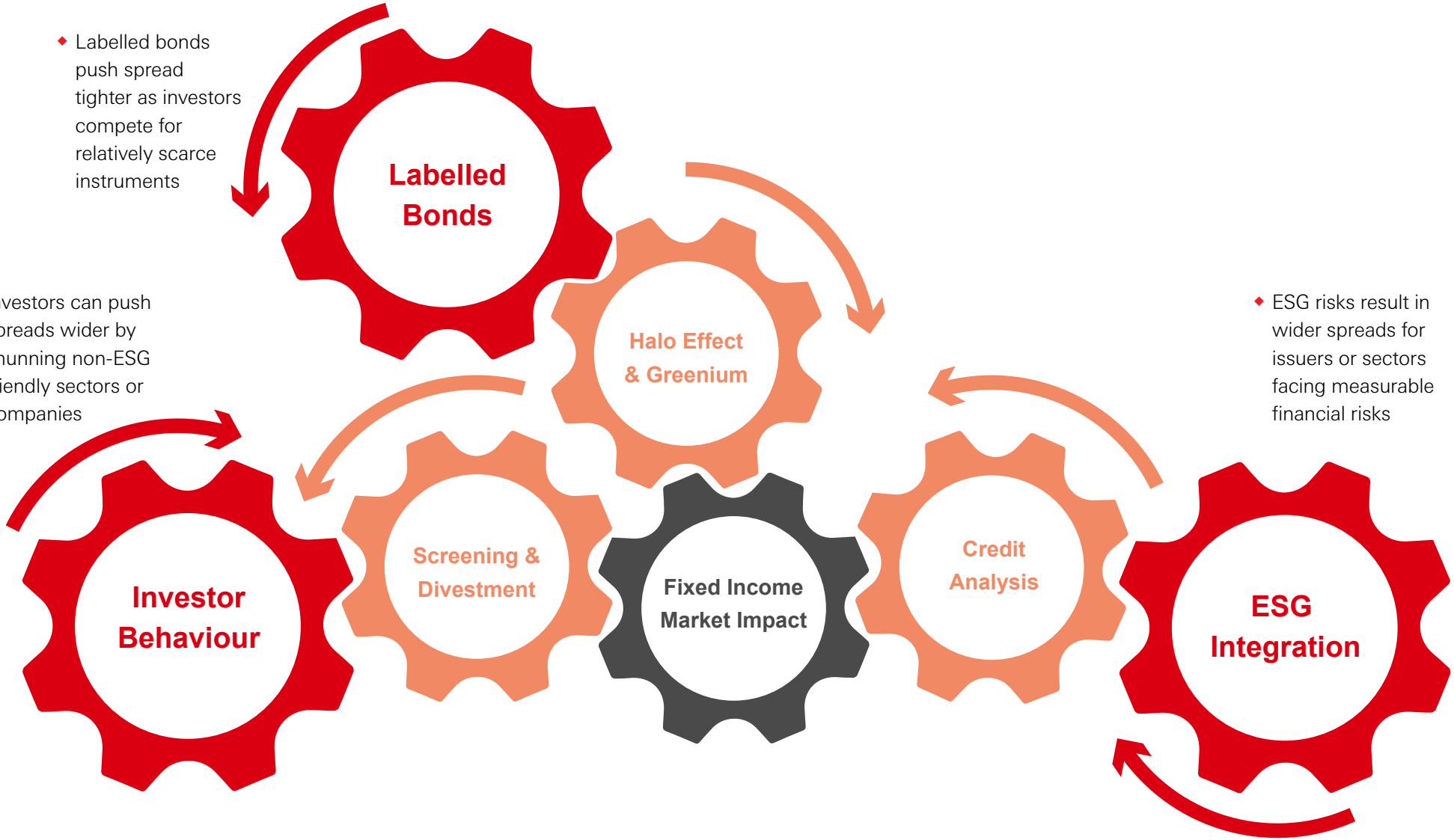
- Fund social projects
- Not secured against projects

Sustainability-linked bonds

- Do NOT fund projects – can be used for opex, capex, refi
- Instead, coupon or principal increases if environmental or social targets missed

1. ESG moves fixed income markets in three key ways

- Labelled bonds push spread tighter as investors compete for relatively scarce instruments



- Investors can push spreads wider by shunning non-ESG friendly sectors or companies
- ESG risks result in wider spreads for issuers or sectors facing measurable financial risks

Source: HSBC

Even for investors who would not naturally consider themselves to be ESG investors, we still think ESG matters. That is because ESG impacts prices in three key ways:

1. Green bonds are more in demand than non-green bonds as investors have set up specific funds that can only buy green bonds. **Higher demand tends to result in better pricing for issuers and tighter primary market and secondary market spreads.** In addition, we also note that issuers who issue labelled bonds for the first time have a "Halo effect" – at the time of the issuance of the first green bond all other bonds from the issuer out-perform.
2. Credit analysis – Buying labelled bonds is not the only approach to fixed income ESG. ESG related risks, such as increased regulation or fines, can impact an issuer's financial profile either by changing their profitability or balance sheet or both. **This will result in a change in their risk profile which might then feed through into spreads**. We have seen this trend globally, from Asian steel companies to European power producers. An ESG integration approach helps investors identify and mitigate the impact of ESG risk factors on performance.
3. Investors now routinely factor in ESG considerations into their decision making. If enough investors pursue similar ESG policies, this can have a clear and demonstrable impact on bond pricing. A prominent example is the collective decision to avoid Tobacco bonds, which has led to the underperformance of that sector in recent years. **We are starting to see a comparable process play out in the Oil & Gas sector in some regions.**

2. A range of approaches to embedding ESG

	Integration	Negative screening	Norms screening	Positive screening	Thematic – Bond level	Impact – Issuer level
Description	Considering ESG risk factors in credit analysis	Excluding issuers based on activity / sector	Excluding issuers based on behaviour	Including issuers based on "best-in-class" metric	Investing in use-of-proceeds bonds	Assessing issuer impact on sustainability theme
Aim	Better risk adjusted returns	Increase cost of funding to "harmful" sectors	Re-inforce good behaviour	Promote better ESG performance across corporates	Reduce cost of funding for desirable projects	Positive real world impact
Key features	Highlighting key risk factors and impact on credit quality	Blanket ban on certain sectors often driven by client requirements	Often refers to broad international standards (e.g. UN treaties)	Typically would use some form of ESG scoring to determine best-performers	Limited, but expanding range of bonds	Adding an additional dimension to investment by setting non-financial goal

Source: PRI, HSBC

Embedding ESG into fixed income portfolios is different from that in equities in two key ways. Firstly, investors can access multiple instruments from the same issuer. Issuers can therefore issue specific bonds which fund investments which contribute to environmental or social objectives allowing investors to clearly demonstrate impact. Secondly, the downside matters more than upside and is inherent to the DNA of fixed income investing. This means that ESG risks have greater emphasis than opportunities.

With those two principles in mind, fixed income investors can apply a range of different approaches to implementing ESG principles. Most commonplace is **integration** in which ESG factors are incorporated directly into the investment process through analysis of the key risks facing the issuer.

Whilst many investors will use an integration approach across all fixed income funds, both sovereign and credit, more specific criteria can also be used, which are tailored to individual portfolios. There are a variety of portfolio screening approaches that can be used to enhance ESG credentials. **Negative screening**, whereby a sector or issuer is removed from the portfolio due to a negative ESG connotation of its business profile are relatively common in fixed income and can often be driven by asset owner priorities. **Norms based screening** can be applied in sovereign portfolios to remove exposure to countries failing to meet certain international standards of behaviour.

Screening processes need not solely focus on negative ESG factors though – **positive screening** involves using ESG scores and positively tilting a portfolio towards issuers that score well.

Many investors will have specific sleeves which can only invest in green or social bonds. This increases the demand for labelled bonds compared to non-labelled bonds and results in a **negative greenium**, which reduces the cost of capital for ESG related projects. In theory, these bonds can be raised by any issuer if they have qualifying expenditure, although in practice certain issuers have found it hard to access this market due to the nature of their business activities or a lack of capex.

Issuer level thematic investing introduces a third dimension into fixed income investing. Investors consider not only the traditional axes of risk and return but also "impact" on one or more social and environmental objectives. This approach has been used most widely in assessing the impact of a portfolio climate change objectives. Investors measure the carbon intensity or decarbonisation ambition of issuers in which they invest and exclude or reduce exposure to issuers who increase the portfolio's carbon intensity or have weak climate ambition, and promote issuers with low intensity or ambitious emission reduction targets.

3. Key questions in Fixed Income ESG

	Integration	Negative screening	Norms screening	Positive screening	Thematic – Bond level	Impact – Issuer level
Process	How should I factor ESG into my credit assessment?	Should I exclude certain sectors because of negative ESG issues?	Should I exclude issuers because of weak ESG?		Should I distinguish between different shades of green?	Should I set a threshold for minimum ESG standards per issuer or across my portfolio?
Performance	Should I expect to out-perform by using ESG?	How does negative screening impact bond performance?	Can we link weak ESG performance to bond performance?	Can we demonstrate that ESG generates out-performance in credit?	Do green bonds out-perform? Do darker green bonds out-perform?	Do I need to sacrifice return to pursue my impact based strategy?
Factors	What are the main ESG risk factors impacting credit?		Should I prioritise E,S or G in my norms screening?	What are the key issues which investors care about?	What are the key projects that green bonds finance?	How should I calculate carbon intensity?
Financial Products		Can issues from more controversial ESG sectors still issue labelled bonds?		Is there a role for GSS or SLB in my best-in-class portfolio?	What are the differences between green bonds and SLB bonds?	
Measurement	Should I use scoring to screen for ESG?	Should I try and distinguish between issuers in "bad" ESG sectors?		What data providers for ESG scoring are there?	Do green bonds really generate additional impact?	Do I need different measures for each sector?
Marketing	What's the best way to demonstrate my ESG practices?			Does positive screening still leave me with potentially controversial issuers and can I explain this to my clients?		What are my competitors doing in this field?

Source: HSBC

This chapter is an extract from our Fixed Income & ESG handbook. **Download** the full version

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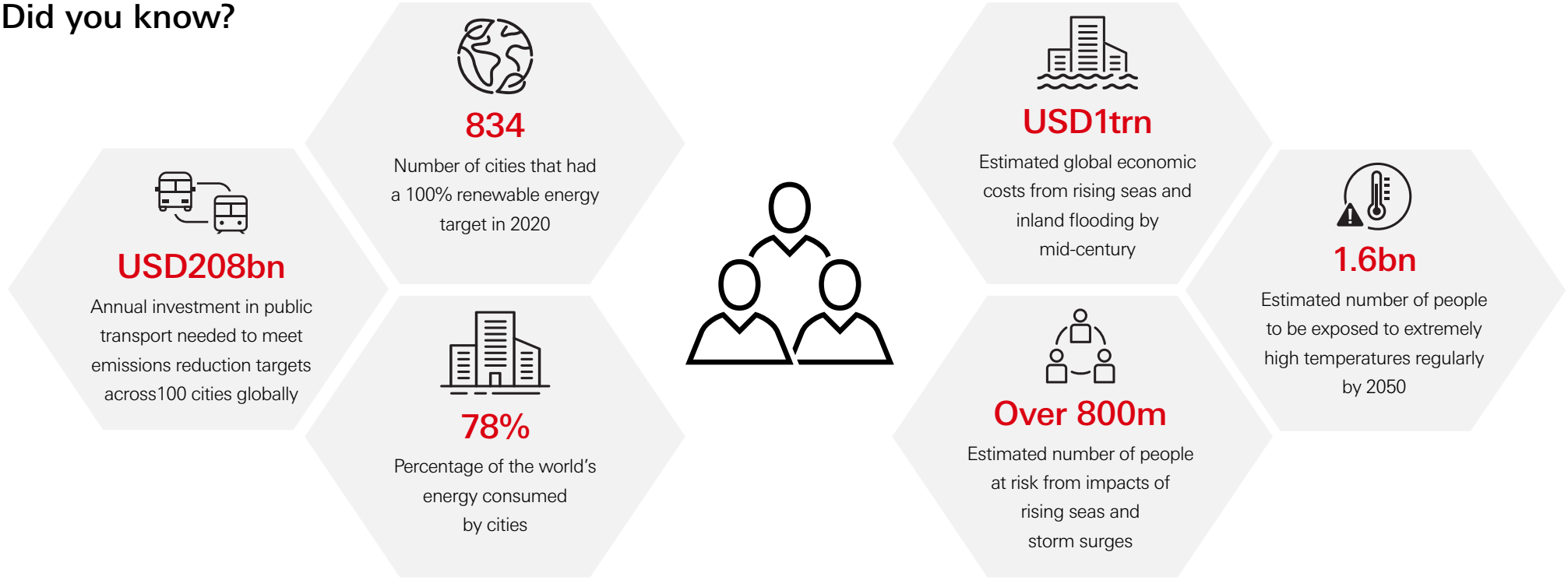
Cities and Climate Change

The United Nations Climate Change Conference (COP26) ended with modest progress across most climate issues. Yet one fact became clear: cities around the world must work towards radical decarbonisation as atmospheric emissions continue to accumulate. Urban areas consume 78% of the world's energy and produce more than 60% of greenhouse gas (GHG) emissions, and are likely to feel the impact of climate change more acutely and disproportionately. Coastal cities face the direct challenge of flooding, tsunamis and hurricanes, while some cities may face extreme temperatures, droughts and water scarcity.

We discuss the potential impacts of climate change on cities and how they should respond. We also highlight some of the financial instruments that will help fund mitigation and adaptation efforts in urban areas.

Did you know?



Source: UN-Habitat, Global report on human settlements 2011, OECD, Sustainable Buildings Market Study 2019, Ramboll Buildings, The future we don't want, C40 cities, February 2018.

1. How does climate change affect urban areas?

For cities, climate change is likely to mean higher temperatures, higher sea levels, air pollution, and destruction of property following extreme events. It could also affect the water and food supply, and the overall health and prosperity of people living in urban areas.

Rising temperatures

Global warming increases the earth's surface temperature. Today, nearly one-third of the world's population is exposed to life-threatening levels of extreme heat for at least 20 days each year[1]. With temperatures soaring, higher energy demand is likely as more household devices are needed to beat the heat.

The cooling industry consumes up to 30% of global electricity and generates 8% of GHG emissions worldwide. By 2030, the number of air conditioners is projected to increase by two-thirds from the two billion units currently installed, and electricity demand for cooling in buildings could also rise by as much as 50% globally[2].

1 The future we don't want, C40 cities, February 2018.
2 IEA (2020), Cooling, IEA, Paris

Water: too much or too little?

Higher sea levels due to climate change increase the chances of flooding and tsunamis for coastal cities (Figure 1), putting assets at risk. Asia and Northern Europe may see heavy precipitation, putting dwellings at a high risk of coastal and high tide flooding, and tsunamis. But equally, if climate change makes weather more erratic, some regions, such as the Middle East and South America, may face extreme droughts and water shortages.

Less rainfall, a lack of renewable water resources, and poor urban management or pollution could lead to water scarcity. This may become more pressing if water demand increases by 20-30% by 2050 (as expected by the UN). In emerging markets, cities such as São Paulo, Bangalore, Cairo and Beijing, could all face water stress in the coming years. In developed markets, Tokyo, Miami and London could experience similar issues, with the Greater London Authority suggesting that the latter could have serious water shortages by 2040.

Figure 1: The top 20 cities exposed to coastal flooding

Rank	Country/region	Urban Area	Exposed Assets in Future (USDbn)
1	US	Miami	3,513.04
2	Mainland China	Guangzhou	3,357.72
3	US	New York-Newark	2,147.35
4	India	Kolkata	1,961.44
5	Mainland China	Shanghai	1,771.17
6	India	Mumbai	1,598.05
7	Mainland China	Tianjin	1,231.48
8	Japan	Tokyo	1,207.07
9	Hong Kong SAR	Hong Kong	1,163.89
10	Thailand	Bangkok	1,117.54
11	Mainland China	Ningbo	1,073.93
12	US	New Orleans	1,013.45
13	Japan	Osaka-Kobe	968.96
14	Netherlands	Amsterdam	843.70
15	Netherlands	Rotterdam	825.68
16	Vietnam	Ho Chi Minh City	652.82
17	Japan	Nagoya	623.42
18	Mainland China	Qingdao	601.59
19	US	Virginia Beach	581.69
20	Egypt	Alexandria	563.28

Source: Nicholls et al (2007), OECD, Paris The rank is based on the amount of assets exposed in future.

2. What should cities do?

The C40 initiative – a global network of city mayors aiming to tackle climate change – will be key to sharing best practices and driving the discussions further in the coming years. While much of the climate policy is set at a national level, local authorities are responsible for policy that could be far more important. Cities need to react to the threat of climate change. The solutions are two-fold: mitigation and adaptation.

Mitigation: Actions to reduce GHG emissions, and put the world on a path to deliver global 'net zero' emissions and limit future average temperature rises.

Mitigation: the essential big steps

In many cities, after decarbonisation of the power sector, transport and building emissions still remain the most significant. To date, over 1,000 cities and regions globally have committed to being net zero, covering over one-fifth of the global urban population. Much more must still be done, however, if the world is to avoid hitting crucial climate tipping points.

Urban climate mitigation will centre on transport policy – more public transport, greater incentives to walk or cycle, and cutting down on the use of petrol or diesel-powered vehicles. There are many ways to do this, but Amsterdam and Copenhagen may offer a blueprint for providing the infrastructure to make cycling and walking easier, safer, and more appealing (see Figure 2). While electric and autonomous vehicles will likely play a large part in cutting urban emissions, there's still a significant role for public transport. In fact, if global warming is to stay on track at 1.5°C, public transport in cities across the world will need to double in capacity by 2030 (this was also announced by the C40 initiative during COP26). The exact type of transition will depend on city size, geography and wealth, but investment is needed across the board.

During COP26, world leaders were called on to ensure that "everyone living in urban areas has safe, frequent, affordable and accessible public transport within a 10-minute walk from their home[3]". In addition, USD208bn (equivalent to 0.2% of global GDP) was requested as annual investment to upgrade public transport in 100 C40 member cities, accounting for 25% of the global economy.

Greener buildings will also be a key part of the story – urban buildings, including homes, workplaces, schools, and hospitals, are responsible for an estimated 40% of global emissions – as will changing the energy mix that fuels cities. A step towards a more circular city could help too, cutting waste and increasing re-use and recycle rates. For example, Berlin aims to replace hard surfaces with green space and water-permeable surfaces, to combat the urban heat island effect and enable the city to adapt to heavy rains. Planting rooftops with mosses or grasses increases the ability to absorb water and creates an evaporative cooling effect.

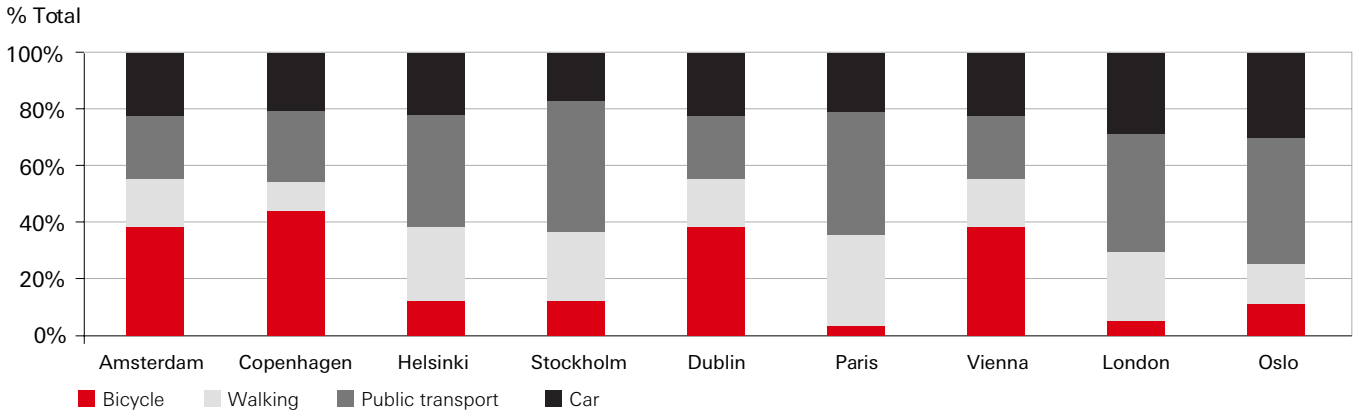
3. C40.org

Adaptation: Steps taken to adjust assets, populations and economies to withstand, and be able to operate in, an expected future changing climate system.

Adaptation

While an estimated 95% of global funding on climate action goes to mitigation, there's a growing acceptance of the need to prioritise adaptation. That is, adapting to become more resilient in the face of the climate risks that will invariably arrive. Some cities have already taken action to adapt to a changing climate. At COP26, the goals for adaptation were focused on financing resilience, habitat protection and restoration, and communication. It was agreed that adaptation finance flows will reach USD40bn by 2025 ("at least double" of 2019 levels) – to help meet global needs.

Figure 2: Amsterdam and Copenhagen are cycling towards net zero



Source: Eurostat

3. Where will the funding come from?

To tackle the substantial environmental and social challenges created by climate change, we expect cities to step up their investment in coming years. This is clearly a significant funding cost – and while much of it will have to come from national governments, both private-public partnerships and capital markets are likely to play a role.

Green, social, sustainability and sustainability-linked bonds, collectively known as 'labelled bonds', are currently USD2.2trn in size. Three green project types stand out as being particularly suited to funding cities: clean transportation, climate change adaptation, and green buildings. Social bonds could also be aimed at providing affordable housing and are well suited to funding cities. Issuers could be sovereigns, regional authorities, or even corporates, especially those in real estate.

Green, social and sustainability bonds also offer two advantages: visibility of the underlying projects and cheaper funding – the 'greenium', or spread at which green bonds trade to non-green bonds, is on average slightly negative.

- environmental and

Types of labelled bonds

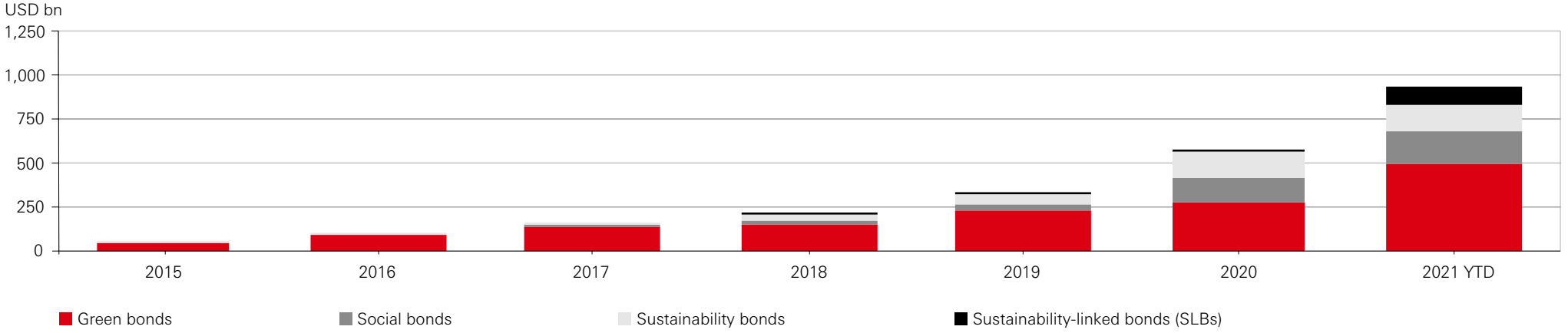
Green bonds fund but are not secured against designated environmental projects

Sustainability bonds fund a mix of environmental and social projects

Social bonds fund but are not secured against designated social projects

Sustainability-linked bonds (SLBs) do not fund projects, instead the coupon or principal steps up if the issuer fails to meet pre-agreed environmental or social targets

Figure 3: Global labelled bond markets



Source: HSBC calculations, Dealogic, Bloomberg (as of 26 November 2021)

Other financial instruments used for environmental, social and governance (ESG) activities are highlighted below:

Green loan: A form of financing that seeks to enable and empower businesses to finance projects with a distinct environmental impact, or rather, which are directed towards financing 'green projects'.

ESG-linked loan: The proceeds of the loan are used for general corporate purposes, rather than 'green projects'. However, the loan pricing is based on the borrower's ESG score or overall sustainability achievements, such as emission reductions. If the borrower achieves its sustainability target(s), it benefits from favourable interest rates on the loan.projects'.

Several large real estate investment trusts have tapped the green bond market over the past year, drawing new, sustainability-focused investors to commercial real estate debt and raising money to finance Leadership in Energy and Environmental Design (LEED)-certified development projects. LEED is the internationally known rating system and symbol for sustainable and environmentally sound buildings.

4. Conclusion

Cities and climate change go hand in hand. While the focus of climate policy has been at the national level in recent months, what the world's urban areas do is likely to be just as important, if not more so. And with a more geographically mobile labour force, making cities work better – with improved public transport and lower levels of pollution – will be key to attracting people to live in them in years to come.

The Glasgow climate pact

After two weeks of intense negotiations in Glasgow, in October/November 2021 COP26 ended with modest progress across most climate issues, a number of small wins, and disappointment that ambition was raised then watered down. Crucially, the Paris Rulebook (the operational guidelines of the Paris Agreement) was finalised, especially the key issues of Article 6 (which covers how Parties may use mitigation outcomes in other countries) and common timeframes for climate pledges.

The final outcome is a carefully worded balancing act of recognising past failures, promises to step up, an appreciation of science – all to keep hopes of 1.5°C alive.

Did you know?

- **2.4˚C:** Warming by 2050 if all 2030 climate pledges are fully implemented
- **13.7%:** Increase in emissions by 2030 vs 2010, on the current track
- **45%:** Decrease in emissions required by 2030 vs 2010 to limit global warming to 1.5oC
- **Over 120:** Number of countries committed to "halt and reverse forest loss and land degradation by 2030"
- **USD100bn:** Climate finance goal for developing nations "before 2023"
- **USD40bn:** Adaption finance goal for developed countries by 2025

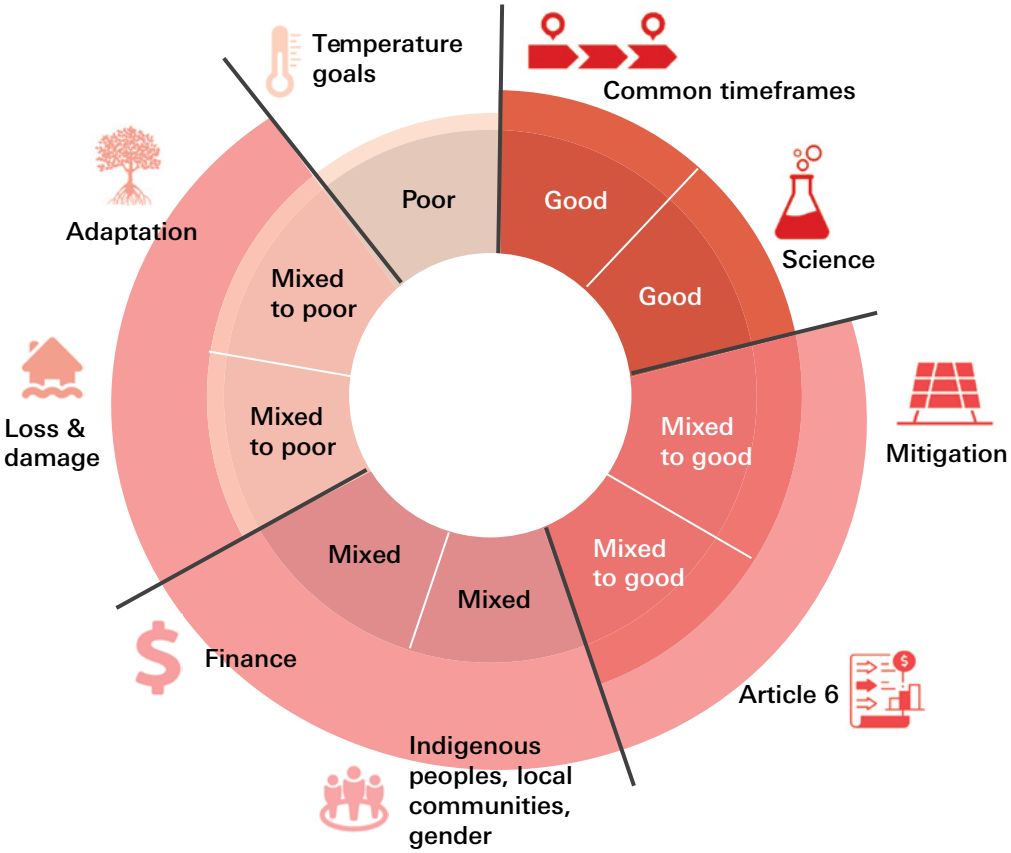
1. COP26 – a moderate success

COP26, in our view, was a modest success because there was more progress (or rather agreement to move forward) than backsliding from previous, recent COP meetings. Indeed, there were more successes than failures, small wins that could always have been better – and certainly do not put us on the path to 1.5°C despite a slight narrowing of the colossal ambition and emissions gap.

We were concerned that there would be a return to bifurcation between developed and developing nations but a joint declaration between the US and China to enhance climate action in the 2020s in areas such as methane, decarbonisation and renewable energy eased concerns. The biggest share of responsibility still lies with developed economies although all parts of society need to contribute: governments, businesses, investors, civil society and individuals.

More regular ratcheting of climate pledges – nationally determined contributions (NDCs) – is a clear winner from the conference. The 1.5°C pathway is in sight, but we are not yet on it. If we stay on our current trajectory, we are still headed for 2.4°C by 2050 if all 2030 NDCs are fully implemented, based on modelling from the *Climate Action Tracker*.

1. Our view on the outcomes of various issues discussed at COP26



2. Summary of key outcomes

Article 6 of the Paris Agreement

After years of negotiation, consensus was reached on Article 6, which covers how Parties may use mitigations outcomes in other countries to count towards their own climate pledges or 'Nationally Determined Contributions' (NDCs). The agreements allow for emission reduction transfers between countries, a carbon market to trade emission reductions and non-market approaches that reduce emissions to contribute towards climate pledges.

Finance

Discussions over finance were a common thread throughout most issues at COP26. There was full recognition that current **financial flows were insufficient, access to these funds was difficult, and a major scale up is required**. But, there was also "deep regret" at missing the target for developed countries to provide USD100bn of climate finance by 2020 and a recommitment to "fully deliver" this through 2025 – aiming for 2022 but definitely by 2023.

Adaptation finance flows will be "at least double" 2019 levels by 2025 in a broader attempt to balance adaptation with mitigation. **Loss & damage** was also recognised with the provision of funds – but not the fund facility that the most vulnerable were seeking. Despite no agreed definition for climate finance, a formal *work programme* was set up to deliberate the **new collective quantified goal on climate finance**, for completion in 2024 – progress, in our view.

Mitigation - climate pledges

The discussions on the duration of climate pledges were remarkably smooth despite being a leftover issue from 2018. We think the final outcome of a 10-year NDC rolling every five years is sensible. It means that countries submit in 2025 for a 2035 end date, and submit in 2030 for a 2040 end date – and so on. Importantly in our view, **there was no distinction between developed or developing countries,** but that this rule applies to all Parties.

Adaptation

The issue of impacts, resilience and funding was more prominent at COP26 than at recent meetings – because of the tangible effects of climate change on developed as well as developing economies. Maintaining a "**balance between mitigation and adaptation**" featured in many decision papers. Adaptation was the second (out of eight) headings in the final Glasgow Climate Pact which we believe is a deliberate placement to raise the profile of adaptation.

The phase out of coal

The mention of coal in the legally binding document was a surprise to many, but its effectiveness was continually diluted from "phasing-out" to adding "unabated" and "efforts to" before settling on "accelerating efforts towards the phasedown of unabated coal power".

Similarly, only inefficient fossil fuel subsidies are to be phased out. We believe it was a "necessary compromise" but highlights the growing divergence of viewpoints between developing economies as the most vulnerable focus on 'adaptation and survival' whereas others pursue 'growth and development'. We consider the inclusion important even if open to interpretation.

3. The path to ambition

There were strong references to **science** (welcome again) and multiple references to **1.5°C** which we think is "all but officially" the new target under the UN climate process. The "serious concern" that 2030 emissions are on track for a 13.7% increase (vs the 45% decrease required) means Parties have been asked to **strengthen climate pledges yet again in 2022**. We consider this a significant win because it is outside the normal 5-year ratchet mechanism. The UN secretary general will also hold a meeting of world leaders to close the "ambition gap" in 2023. **We are closer to – but not quite on – the 2030 net zero trajectory.**

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IPCC on Climate Science

The Intergovernmental Panel on Climate Change (IPCC) of the United Nations published a report on the physical science of climate change in August 2021. Findings include estimates on how much the climate has changed, whether limiting further change is possible, and risks by region.

We discuss the significance behind the IPCC's latest report and why it puts greater urgency in the fight against climate change. As we continue to experience extreme temperatures and precipitation, the report is another wake-up call for world leaders to set more ambitious climate targets and adopt policies for immediate action.

1. The IPCC and key report messages

The IPCC originated in 1988 and was set up by two UN agencies (The World Meteorological Organisation and the UN Environment Programme) to assess the science relating to climate change. It consists of hundreds of scientists from around the world and while they do not conduct any proprietary research, they assess scientific papers on the relevant subject matters. The IPCC publishes Climate Assessment Reports every 6-7 years and is currently in the sixth assessment cycle (AR6) in 2021.

The August report of the AR6 is entitled "The Physical Science Basis" and is a compendium of updated climate science since the AR5 in 2013. Written by 234 authors and totaling 4,000 pages long, it forms as one of the four final reports that the IPCC will release during this cycle[1].

Figure 1: The IPCC's AR6 series of reports

Source: IPCC websites

This report incorporates observations and advanced modelling to estimate on how much the climate has already changed, provisions of further change and whether any of such can be limited, as well as risks that lie in global regions. One key message is that climate change has been observed in "every region and across the whole climate system", and another capturing global attention with: "it is unequivocal that human influence has warmed the atmosphere, ocean and land"[2].

1 https://www.ipcc.ch/report/ar6/wg1/

2 Ibid

The report outline can be found in the "Summary for Policymakers" (SPM) which contains the following:

Figure 2: Outline of the SPM

1 **The Current State of the Climate**	• Comprehensive view of the climate system and its changes • Human influence on climate variables, including climate and weather extremes
2 **Possible Climate Futures**	• Projections of the changes in climate system in the near-term (2021-2040), mid-term (2041-2060) and long-term (2081-2100) at five emissions scenarios
3 **Climate Information for Risk Assessment and Regional Adaption**	• Climate response and possible outcome at global, regional and local scales
4 **Limiting Future Climate Change**	• Possible future control to assess the affect of projected climate and air pollution

Source: IPCC, AR6, SPM

2. Summary of report findings

From our perspective, the key findings of "The Physical Science Basis" can be summarised as:

- The **effect of human activities on all parts of the climate system** is, in essence, much clearer now. Human influence is compounding extreme weather and climate events, with observations that these are either happening at the same time, or similar events are happening across different locations.
- Our **atmospheric greenhouse gases (GHGs)**, with the majority components being carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O), also **measure at new highs**. And, while our lands and oceans have absorbed 56% of CO2 emissions since 1970, cumulative atmospheric emissions have continued to increase over time, resulting in less CO2 being proportionately absorbed.
- The **earth's surface is also rising in temperature** by 1.4-1.7x faster than the oceans. Our lands are measuring approximately 1.09°C higher in 2011-20 than in 1850-1900. This is expected to trend upward until mid-century, where even the Paris Agreement goals of limiting temperature rises to 1.5°C and 2°C could be exceeded, unless deep reductions in GHGs take place in the coming decades.
- The rate of **average precipitation is increasing** across most regions, with frequency and intensity rising with temperature. The warmer it gets, the heavier the precipitation and extreme daily precipitation is projected to intensify by about 7% for each 1°C of global warming.

- Global **sea levels have soared** by 20cm since the beginning of the 20th century. Half of this is attributed to thermal expansion: 42% from glacial and ice sheet loss, and 8% from changes in land water storage.
- Although CO_2 can be removed and stored (e.g. in the form of a carbon sink), its effects are mixed. **CO_2 removal would gradually reverse temperature** increases on land, although not all climatic effects would be reversed.
- **Climate change cannot be reversed in short time frames.** For example, the effects on oceans – surface temperatures, acidification, and deoxygenation, sea-level rises and ice sheet melt, as well as permafrost may not reverse for hundreds of years.
- **Highly disruptive events** that have a low likelihood of occurrence, but with catastrophic effects, **cannot be eliminated.** These can include the collapse of ice sheets or abrupt changes to ocean circulation. The aftermath effects would be highly disruptive to weather patterns and the water cycle.
- The **carbon budget** is an estimation of permissible CO_2 emissions while keeping within the limits of temperature increase. Historic CO_2 emissions levels from 1850-2019 already translates to a 1.07°C temperature increase. From 2020, it is estimated that **only 400 gigatonnes of CO_2 can be emitted** before breaching the 1.5°C warming threshold.

3. Implications for investors

The AR6 has incorporated more details on the climate impact on various geographies. This will have implications for economic and business planning, both in the short and long term.

The world's biggest annual summit on climate change (COP26) will be convening in Glasgow, Scotland, in November 2021. It is a significant milestone in achieving the Paris Agreement goals, in part due to countries needing to set out more ambitious climate targets. With attention building up to COP26, climate change will remain high on the agenda for world leaders as the 'make-or-break' discussions occur before the next AR6 reports come in 2022.

As a bottom-up approach, we think investors have now an even stronger case to demand more actions from businesses and governments to implement decarbonisation measures. For companies involved in high-carbon activities, the demand is to rethink business models and strategies, as well as providing more investor transparency by adopting stronger ESG principles. For industries, the demand is to be more innovative in lower carbon solutions. For all segments of the economy, the demand is to prepare for the impact of climate change.

Major economies such as the US, Europe and China that have pledged to accelerate their climate ambitions will look to deploy green solutions in scale, thus creating opportunities for investors. In particular, sectors, including power generation, transport, buildings and industrials, are expected to see an emphasis in radical decarbonisation to reverse atmospheric emissions.

4. Conclusion

The IPCC's latest report is a testament that the science of climate change is clear. It also serves as a stark reminder that the goals set forth in the Paris Agreement could be missed without deep and rapid emissions cuts. As the race to climate neutrality becomes more critical, so will the calls from global citizens and investors for governments and companies to make radical changes and deliver change. Investors should be prepared to ride on the accelerated transition as more decarbonisation pledges take centre stage and more solutions are developed to achieve these targets.

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The European Green Deal

The European Green Deal was first unveiled in 2019 by the European Commission (EC), with the primary objective for the EU to be the "first climate-neutral continent" by 2050. Since then, the EC have formally proposed a Climate Neutrality Law and announced elevated targets to achieve 55% net reduction in greenhouse gas (GHG) emissions by 2030, compared to 1990 levels. In 2021, the EU formalised these targets as a renewed pledge ahead of the Leaders' Summit on Climate on Earth Day, with new details released in mid-July.

We discuss these recent developments on the European Green Deal and their significance towards achieving climate neutrality. We also delve into the Carbon Border Adjustment Mechanism, a world-first carbon tariff policy and why this could potentially be a strong catalyst for decarbonisation within and outside of the EU.

1. An Overview

The Deal is a multi-year project which aims to revise existing regulation and propose new policies. There are essentially "fifty actions for 2050" which touch upon climate, industry, agriculture, taxation, financing, and investing - as highlighted in Figure 1.

Figure 1: The Framework of the European Green Deal

Source: HSBC

[1] Applicable to the 27 nations currently part of the European Union

Specific to climate neutrality, there are two parts:

- Reducing emissions by decarbonising in all parts of the economy
- For residual emissions, maximising the potential of natural carbon sinks and carbon capture & storage

The EC announced its Climate Neutrality Law in 2020, which is designed to "enshrine" the 2050 climate neutral objective into legislation and provide a long-term direction of travel for EU climate polices. The targets will be an EU-wide collective objective, which implies that not all member states have to achieve individual neutrality.

Significant developments were made recently in July, when the EC announced a work programme aligned with the EU Green Deal and Climate Neutrality Law. The programme includes revisions to existing legislation and new proposals under the "Fit for 55" package, designed to place the EU on course to reach the 55% net reduction in GHG emissions by 2030. These revisions and proposals can be categorised under three areas – see Figure 2:

With Europe as the third highest CO2 emitting region in the world, the European Green Deal is an illustration of extensive government initiatives, that provides a wide range of support to sustainable investments. These top-down government measures will also be increasingly important for companies to be forward-looking and ride on the sustainability trend, and similarly for investors to look for opportunities in companies with sound ESG practices and/or innovative green solutions.

Figure 2: Summary of updates to the "Fit for 55" package

Carbon pricing[2]	Climate targets	Emissions rules
REVISION **EU Emissions Trading System:** to lower the annual GHG emissions cap from certain sectors as well as extend to transport and buildings	**REVISION** **Effort Sharing Regulation:** strengthen GHG emissions target assigned to each EU member state	**REVISION** **EU clean car standard:** require average emissions of new cars to reduce by 55% (from 2030) and 100% (from 2035) compared with 2021 levels
REVISION **Energy Taxation Directive:** align taxation of energy products with EU energy and climate objectives	**REVISION** **Regulation on Land Use, Forestry and Agriculture:** strengthen overall EU target for carbon removals via natural sinks by 2030	**REVISION** **Alternative Fuels Infrastructure Regulation:** require EU Member States to expand charging capacity in line with zero-emission car sales; build new infrastructure
NEW **Carbon Border Adjustment Mechanism:** taxation on emissions for imports	**REVISION** **Renewable Energy and Energy Efficiency Directive:** increased target to produce 40% of energy from renewable sources by 2030	**NEW** **ReFuelEU Aviation Initiative:** suppliers to blend increasing levels of sustainable aviation fuels
	REVISION **Energy Efficiency Directive:** more ambitious binding annual target for reducing energy use at EU level	**NEW** **FuelEU Maritime Initiative:** more sustainable maritime fuels and zero-emission technologies

Source: EU, HSBC

[2] Denotes cost of greenhouse gas emissions borne by the EU public

2. The Carbon Border Adjustment Mechanism

A significant recent proposal is the Carbon Border Adjustment Mechanism (CBAM), a world-first tariff policy on carbon emissions embedded in imported goods based on the EU carbon price. In its transition phase to be soft-launched from 2023, the CBAM will be imposed on five carbon-heavy sectors: iron & steel, aluminum, cement, fertilisers and electricity (more in Figure 3).

Other sectors could also be extended into CBAM's scope after full implementation in 2026. The EC expects to raise about EUR10 billion a year as tax revenue for the EU's budget and own resources. We believe that the CBAM will also accelerate multilateral decarbonisation and initiate the global race on climate ambitions.

The EC's proposal on CBAM is expected to kick-start a series of domestic and international discussions and debates. With the complexity and controversy that it brings, implementation of the CBAM will require extensive dialogue between EU member states and their trading partners. This could influence the target launch timelines, even for the transition phase planned for 2023.

And while approval is likely within the EU, pressure from trading partners such as China, Russia and the US will likely arise given their much publicised criticism on the CBAM. The proposal could also face headwinds from the World Trade Organisation, the global body is responsible for the rules of trade between nations.

There could also be cost impact applied to sectors heavily reliant on imported goods, such as construction and automotive. EU importers may face the scenario of foreign suppliers passing the carbon cost onto them, which will increase costs down the value chain eventually. However, the CBAM proposal could also see importers receiving some level of compensation for the carbon price paid to their origin's regulators, thereby alleviating this cost impact.

Figure 3: Highlights of the EU Carbon Border Adjustment Mechanism

When?

A transition phase will start in 2023. Importers will start paying a financial adjustment after full implementation in 2026.

What sectors?

Iron & steel, Aluminum, Cement, Fertilisers and Electricity.

Which country?

All non-EU countries except members of the European Economic Area and Switzerland.

How does it work?

Importers have to purchase and surrender CBAM certificates to cover emissions embedded in goods.

How much?

The CBAM certificates link to the price of the EU ETS allowance. The EU expects to raise EUR 10bn a year from the CBAM.

Source: EU, HSBC

Aside from these potential headwinds, the CBAM could be one of the most effective and strongest instruments to promote multilateral decarbonisation and climate ambitions. It could also be effective in reducing carbon leakage in the EU's Emission Trading System, or the risk of carbon-intensive companies moving to other developing countries to avoid being subject to climate rules, and also protect selected European industries from foreign competitors that are not subject to stringent climate policies.

It also incentivises countries that have bold climate rules or credible carbon pricing schemes. We expect that more countries to tighten their climate policies and consider similar initiatives to protect their domestic industries in response to the CBAM and carbon leakage. In tandem with the release of the proposal, Canada, Japan, UK and US are also examining the feasibility of introducing a carbon border tax.

3. Conclusion

As the EU continues to unveil the next proposals of its European Green Deal, major economies such as China and the US have also made further announcements in 2021 to accelerate their climate ambitions. In addition to the CO2 emissions reduction targets in their 14th Five Year Plan, China has launched its national emissions trading scheme in July. The scheme will initially focus on the power sector and subsequently expand to others in working towards lower carbon developments. Meanwhile, the US has returned to climate leadership with its rejoining of the Paris Agreement and introduced a series of net-zero pledges, including an Infrastructure Framework announced in June to invest in green infrastructure.

In the race to combat climate change, we believe that not only will this momentum be carried by other global economies in the coming year, but also infiltrate into the corporate sector. We believe that companies who adapt with foresight to the risks and opportunities are better placed to outperform outperform their competitors in the longer run. Investors should prepare for an accelerated transition to a lower carbon economy as more pledges around the world are made, more solutions are developed to achieve these goals, more controls on ESG disclosures are enforced and more likelihood for net-zero emissions to become the norm.

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The ESG impact of cyber crime

The speed and breadth of technological adoption highlights the ease of doing things digitally. However, as the global economy becomes more interconnected, countries, companies and individuals face increased risks of cyber crimes. The cost of these attacks globally is expected to reach USD10trn by 2025, up from USD6trn today and equivalent in size to the world's third largest economy. While spending to counter these activities is forecasted to grow 7.7% annually, this may not be enough, particularly if digitisation accelerates faster than expected in a post-pandemic world.

We discuss the increasing need for companies and industries to protect themselves from cyber threats. We also delve into the related Environmental, Social and Governance (ESG) issues, which are rising in significance for companies, and highlight the industries that set to benefit from the rise of cybersecurity spend.

Did you know?

USD10trn

Expected damages from global cybersecurity crimes by 2025, tripling from 2015

20-30%

Yearly average increase in cybersecurity insurance premiums

USD20bn

Forecasted size of the global cybersecurity insurance market by 2025, from USD7bn currently

7.7%

Forecasted annual growth in cybersecurity spend from 2020-2026

6x

Increase in losses from cyber crimes in 2020

GBP17.5m

(or 4% of company turnover)

Maximum fine under the UK's Data Protection Act 2018

Source: Cybersecurity Ventures, 2020, Cybersecurity intelligence, Beazley, 16 Dec 2020, Standard & Poor's, Munich Re, Allianz, DPA Piper

1. The growing need for cybersecurity

As digitisation grows, so too will digital vulnerabilities, allowing damages from cyber crime to grow. The threat of cyber crime can come from a multitude of sources including hackers, insiders, competitors, industrial spies, organised crime groups, nation states and terrorists.

The intention behind cyber crime is often financial gain, but there are other motives too, including theft and spying. Common types of attacks include:

- Malware - malicious software
- Phishing - fake communication
- Denial-of-service attacks - access prevention
- Domain Name System (DNS) tunneling (which acts as a 'directory' of internet, encoding DNS protocols)

Figure 1 highlights the implications of cybersecurity from an ESG perspective (left) and other factors relevant for investors (right).

Figure 1 - Cybersecurity and investor insights

Governance - companies are experiencing more severe cyber attacks, resulting in significant financial and reputational damage

Social - substantial disruption and stress created for individuals due to stolen data or loss of confidence in digitisation

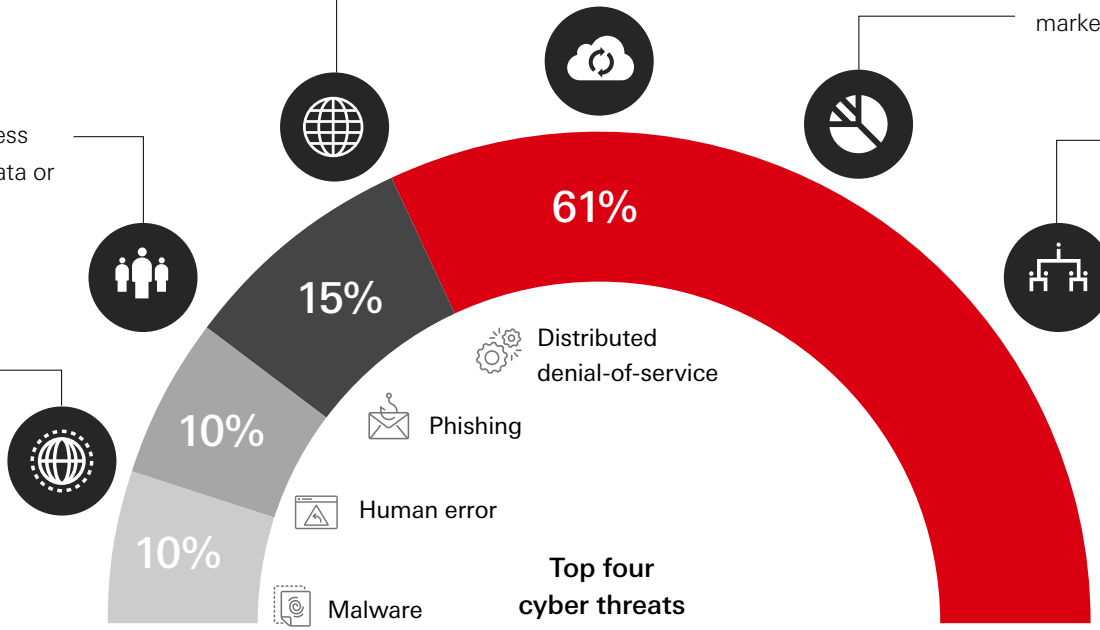
Environment - threats of cyber attacks pose a significant operational challenge for utility companies, rather than data breaches

Cloud computing - as industries become more digitised, cybersecurity for cloud-based products follow suit

Financial impact - cyber attacks and data breaches can have significant impact on a company, both from a financial/operational perspective and via stock market moves

Enterprise cybersecurity - global and regional players supply network security and services to enterprises in multiple sectors

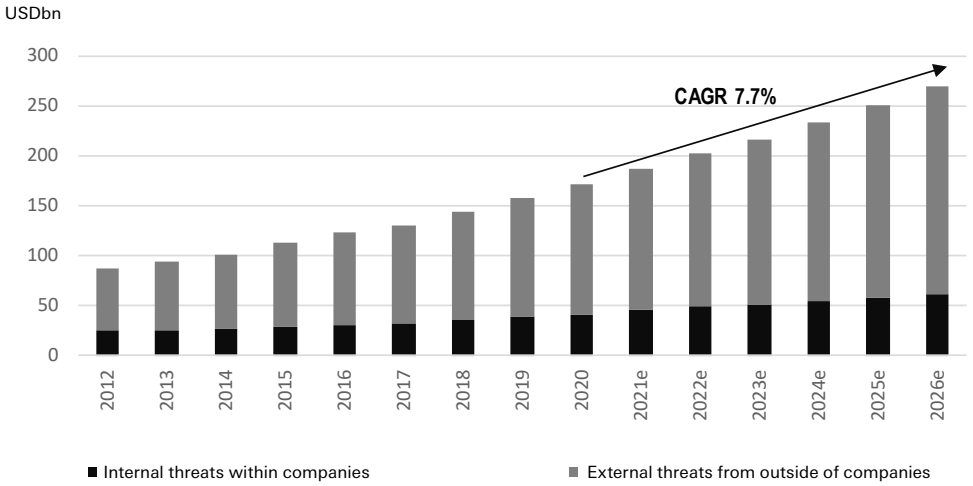
Governments - become more efficient and offer enhanced digital services to continue to strengthen security



Source: SBC, Comparitech, Cybersecurity Ventures, Verizon, Munich Re

With the threat of cyber crime rising, spending to counter it could reach USD270bn per year by 2026 (see Figure 2).

Figure 2 - Global cybersecurity spend by companies is projected to grow at CAGR 7.7% from 2020-2026



Source: HSBC, Cybersecurity Intelligence

Industry impact

A range of industries consume cybersecurity products and services to safeguard their businesses. These include:

Healthcare, which has seen a 60% increase in attacks globally since the start of the pandemic1

Transport and logistics facing increasing threats as the uptake of internet-of-things devices grows

Financials also face significant costs from data breaches, and experienced a 54% increase in reported cyber incidents in the first half of 2020 compared to the year before[2]

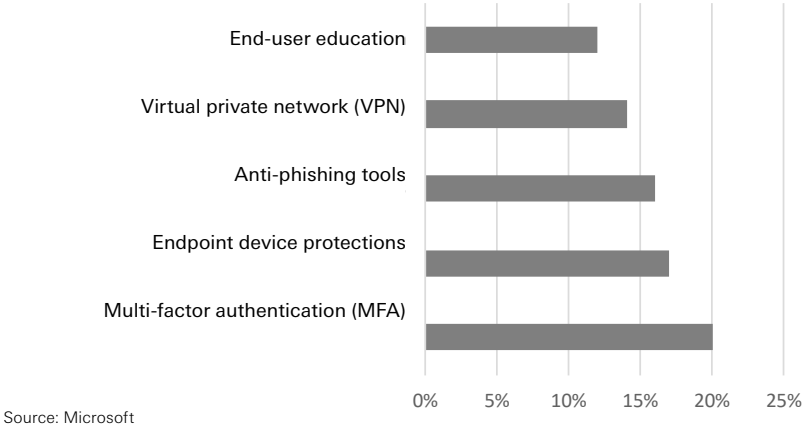
1. Bitdefender
2. Investors Chronicle analysis, Information Commissioner's Office

How 2020 changed cybersecurity

With the pandemic accelerating remote working, the challenges of cybersecurity for businesses have evolved and costs have increased. It's estimated that total IT spending by businesses fell by 8% in 2020, attributed to pandemic-related cost cutting, but cybersecurity spend continued to increase, by 2.4%.

As shown in Figure 3, since the start of the pandemic, cybersecurity investments have been related to working from home, with user authentication reigning high during this time.

Figure 3 - Top cybersecurity investment since Covid-19



Source: Microsoft

2. ESG implications from cybersecurity

Cybersecurity threats touch upon all three components of ESG, with implications from disrupted connections to national infrastructure, to loss of confidence in technology and reputational damage to firms. Investors should take note of these impacts, as discussed below.

Environmental

The related concerns lie with attacks that can cause environmental damage or prevent organisations from operating. Sectors where we believe cyber attacks pose threats to include agriculture, manufacturing, power and renewable energy.

The power sector will face significant challenges given the increasing reliance on remote monitoring, intelligent connected devices and automation. With renewable energy expected to expand by 10% in 2021, these companies could become a target for cyber attacks, attributing to downstream risk with the global transition to net-zero emissions.

A notable example was the 2019 denial-of-service attack on a US-based solar power energy generation provider, which disconnected the generation source with the power grid. Often hackers aim to create power shortages rather than stealing data, which highlights concerns over future attacks on renewables as economies become more reliant on them.

Social

Cyber attacks also have social impact on the public, from anxiety and stress caused by stolen data, to the loss of confidence in technology. The older population is particularly targeted, as seen in the UK where people aged 55 and over lost approximately GBP3.7m between 2018 and 2019 due to cyber crimes[3].

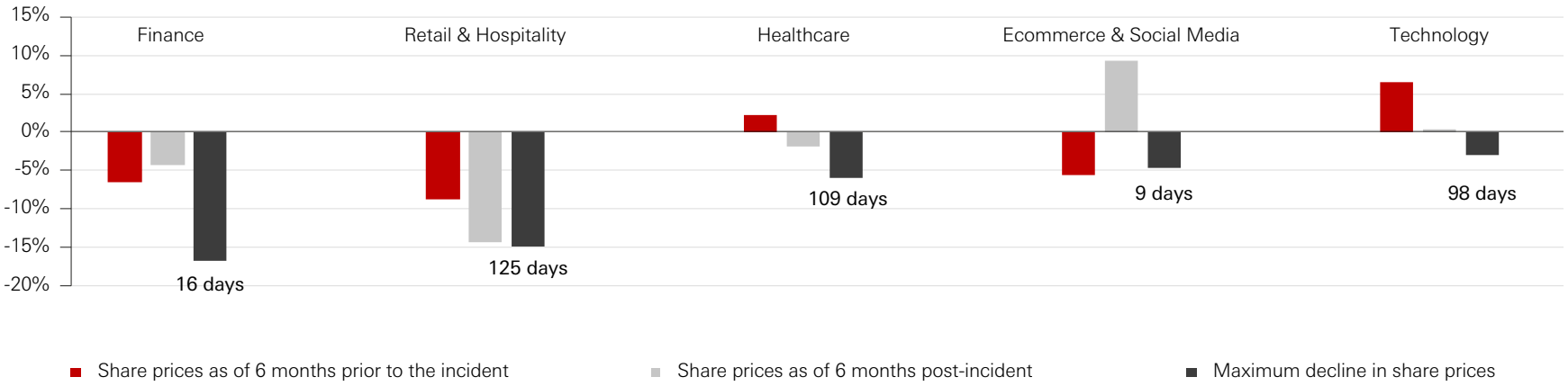
Less economically-developed regions such as Africa are also particularly vulnerable because they lack cybersecurity infrastructure and knowledge. Cyber crime is claimed to have cost the continent USD3.5bn in 2017, with 96% of incidents unreported or unsolved[4].

3. 'Uncovering the extent of cybercrime across the UK', Age UK, 2020
4. 'Africa Cyber Security Report 2017', Serianu, 2017

Governance

In addition to the direct cost of a data breach, firms can suffer reputational damage that has long-term implications, including an impact on stock market values. Figure 4 shows the impact of a company's share price (post a data breach incident) when compared to the NASDAQ. Breaches involving more sensitive data in the Finance sector led to an average decline of 17% over 16 days, versus the Retail and Hospitality industry which saw an average decline of 15% but over a 3-month period.

Figure 4 - Impact on companies' share prices by industry vs the NASDAQ (2007-2020)



Source: HSBC, Comparitech

Note: Data labels on bars represent the number of days to reach maximum decline in share price value, following an industry data breach incident.

On average, business reputation doesn't begin to recover until eight quarters following a data breach announcement[5], with the average cost estimated at nearly USD4 million per breach[6].

Although cyber risk is progressively becoming a principal concern for corporations, for a long time, that has not been reflected in the composition of boards. Directors with expertise are now being appointed, but the focus should be on strengthening training for the entire executive team.

5. Rotman School of Management
6. 'Cost of a Data Breach Report', Ponemon Institute, 2020

3. Industries providing cybersecurity solutions

In this section, we look at industries with growing cybersecurity revenues - grouped into either managed security service providers or cyber insurers. These are also opportunities for investors to explore.

Managed security services providers

These firms manage and monitor the security aspects of their customers' IT infrastructure, providing end-to-end protection. Adoption is growing as pressures from cybercrime, skills shortages and compliance requirements impact under-pressure IT departments and boardrooms that are increasingly worried about the business impact of data breaches.

The managed security services market was estimated at USD27.7bn in 2020 and is expected to reach USD64.7bn by 2026, a growth rate of 15% over the period 2021-267. North America represents the biggest global market (c.45%), while Asia Pacific represents c.15% but is growing quickly.

Three types of players are leading the space of managed security providers:

IT services companies with integration capabilities and proximity to digital transformation projects

Telecom services providers leveraging networks' assets

Independent pure players (companies with products & services that are digital only), **cloud service providers** and **value-added resellers**

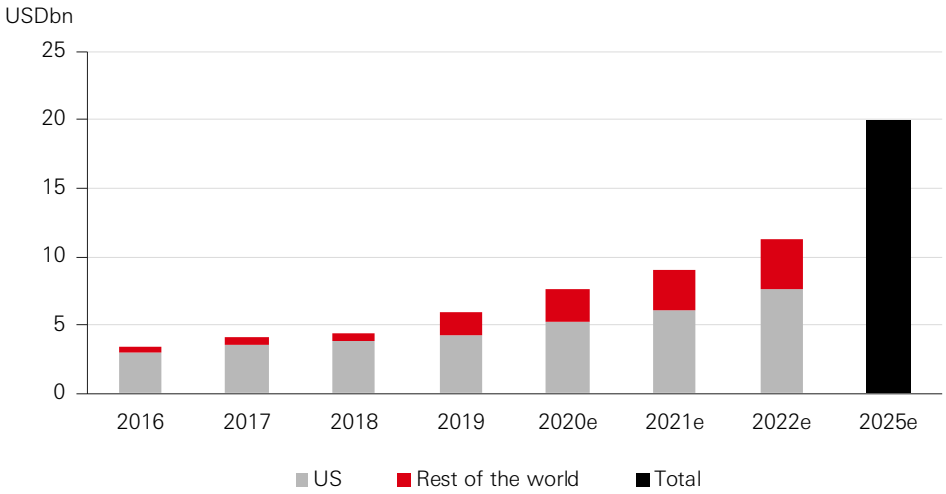
7. Managed Security Services Market - Growth, Trends, COVID-19 Impact, and Forecasts (2021 - 2026), Mordor Intelligence

Cyber insurance

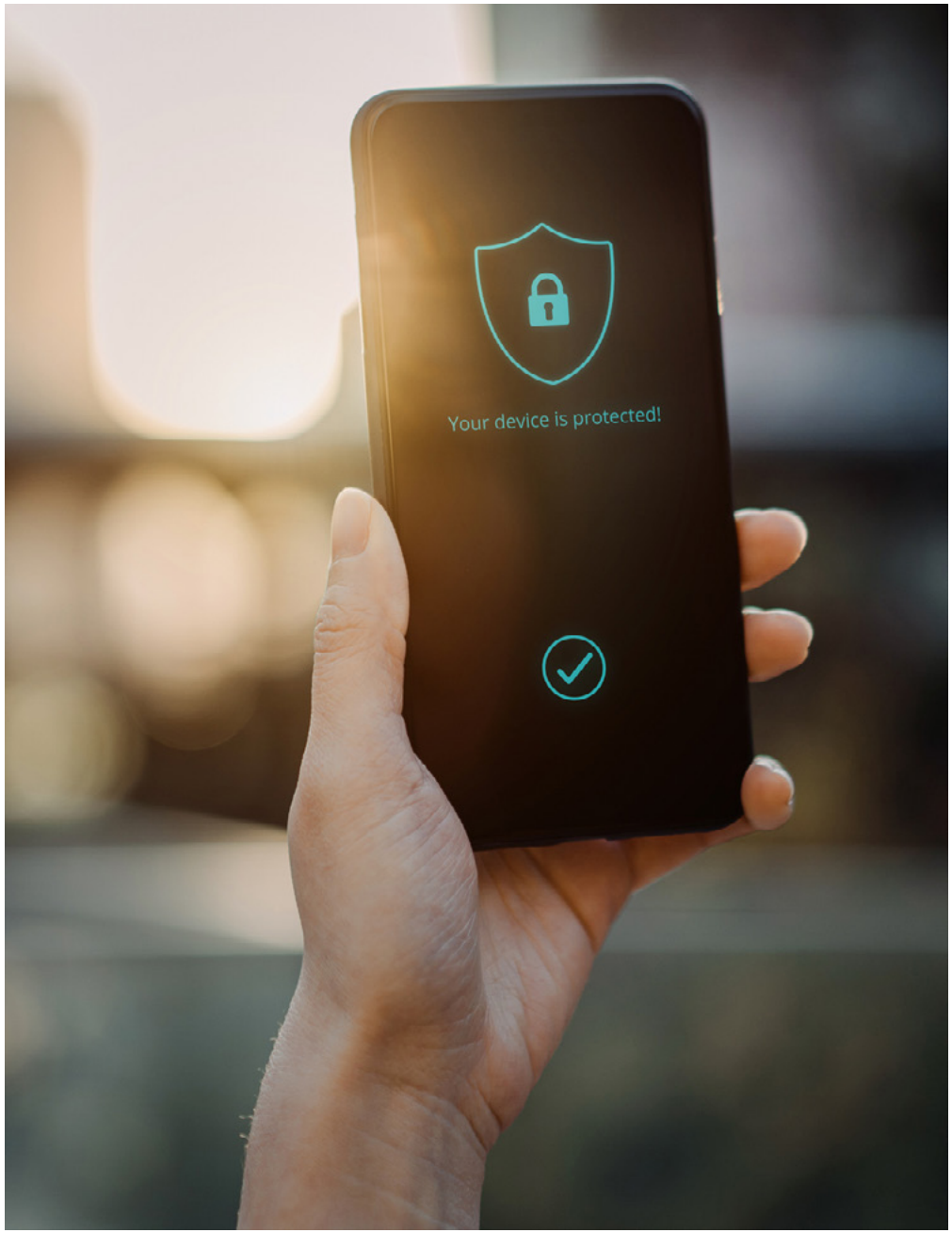
Cyber insurance is one of the few true growth areas within the insurance industry. As the cyber ecosystem grows, the need for insurance as a risk management tool naturally increases. In the US (the largest cyber market) cyber premiums are now estimated at USD2.26bn, while the overall cyber insurance market is estimated to be around USD5bn by Standard & Poor's (S&P).

However, this market is growing rapidly. One Fintech publication[8] expects cyber premiums to increase by 21% in 2021, while S&P forecasts premiums to increase by 20-30% per year on average. Other insurance companies expect global cyber premiums to reach USD20bn by 2025 (see Figure 5).

Figure 5 - Global cyber premiums



Source: Munich Re, Allianz



8. Finaria.it

4. Conclusion

With the rapid increase in digitisation leading to a growing threat of cyber crime, spending on cybersecurity across industries is set to rise. This will help companies and their investors to protect against ESG risks, which include infrastructure outages, loss of personal data and reputational damage.

Investors should also be aware of industries that are set to benefit from companies boosting their defenses against cybercrime, such as IT service companies, telecoms and cloud service providers. With clear indicators of continued growth in cybersecurity, this will offer investors more opportunities within the technology theme.

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Four pathways to global decarbonisation

Carbon dioxide emissions, primarily from burning fossil fuels, account for 70% of greenhouse gases (GHGs) in the atmosphere. This and other emissions (including methane) come from a wide range of human activities across the world. As they continue to have a profound effect on global warming, governments, companies and investors project greater focus to net-zero policies, in efforts to accelerate economy-wide decarbonisation.

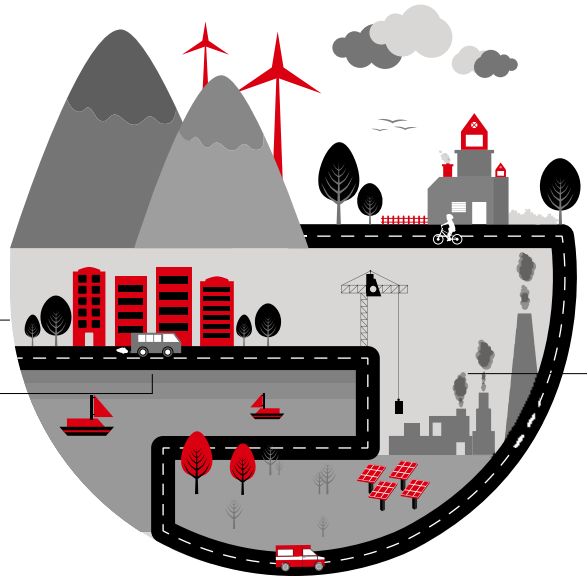
In this issue of #WhyESGMatters, we look at the catalysts that drive radical decarbonisation. We explore how technological innovation and energy efficiency can reduce major sources of emissions across four sectors: power generation, transport, buildings and industrials. Investors can regard these as 'decarbonisation pathways' with the potential to reduce total emissions by 81% by 2050.

Did you know?

2035
The year by when the US pledges to have zero-carbon power generation

34x
Global Warming Potential[1] of methane compared to carbon dioxide (over 100 years)

30%
Percentage of total primary energy used by buildings



64%
Percentage of coal consumed through electricity generation

92%
Percentage of oil used by the transport sector in its feedstock

50
Gigatonnes of CO2 equivalent that reach the atmosphere annually

Source: International Energy Agency (IEA), The World Resources Institute, HSBC
[1] The Global Warming Potential is a measurement that compares the warming impact of different greenhouse gases in the atmosphere. US Environmental Protection Agency.

1. Decarbonisation across sectors

Radical decarbonisation across the four sectors can be connected via one trend: electrification – or the shift to electricity as a power source. With increased methodologies to generate renewable power at scale, this single transition driver can gradually replace fossil fuels, thus lowering emissions across land-based transport modes, in buildings (e.g. heating/cooling) and multiple industrial activities. Achieving energy efficiency and technology innovation are also key – less energy demand will have a positive impact on emissions.

Power generation

- This sector emits over a quarter of total GHGs, with fossil fuels accounting for 64% of world total
- Solar, wind and energy storage solutions are seen as dominant drivers for decarbonisation
- Electricity will be a key enabler to reduce fossil fuels for other sectors

Transport

- Oil is the key energy feedstock (92% of total sector)
- Batteries and hydrogen fuel cells will be essential for a low-carbon transition
- Global regulations to help limit shipping and aviation emissions

Buildings

- Building emissions generated from fossil fuels used for heating/cooling and electricity consumption
- Retrofitting existing buildings with green technology can enable the use of less fossils and increase energy efficiency
- Hydrogen gas may form as a future energy feedstock

Industrials

- Electrification can play a major role to replace fossil fuels in mining and production of some metals
- Cutting methane emissions will also be crucial from oil & gas production and coal mining
- Clean hydrogen can also play a role in multiple industrial sectors

Source: UNEP, HSBC

2. Power generation

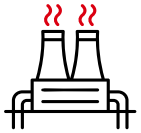
Power generation is the highest emitting sector – at 26.2% of total GHGs and within that, 35.4% of CO2 emissions. This sector has also received the most attention in driving decarbonisation, with increasingly cost-efficient, scalable alternatives and emerging technologies to fossil fuel combustion.

Leading the transition:

Nuclear fission spins turbines with steam to generate electricity. This is the second largest source of low-carbon power (29% of total in 2018).

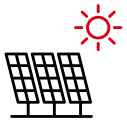
Hydroelectric plants use water and gravity to produce power. This energy source is widely used in Brazil, China and the U.S.

Biomass, such as scrap lumber and other organic matter, can be used as combustion fuel for electricity. This energy source is expected to increase 25% in the years 2019-2024.[2]



Geothermal power uses subterraneous energy that heats water and spins turbines.

Wind rotates turbines, thus generating electricity. The structures can be built offshore (on seabeds) or onshore (on land) and a significant number have been installed in recent years.



Solar energy is used in more than 100 countries in large scale. Solar heat can also be used to generate steam from water, producing energy in downstream processes.

Emerging technologies

Green hydrogen is produced from water via renewable energy sources. It has potential to displace fossil fuels, used as a carbon-free gas in turbines to generate electricity.

Energy storage can enable electricity to be stored until needed, increasing the potential for more intermittent renewables (such as solar and wind) to be included in the energy mix.

Ammonia has a higher energy density and is easier to transport than hydrogen gas. It is seen as more practical for energy transportation, storage and use for power generation.

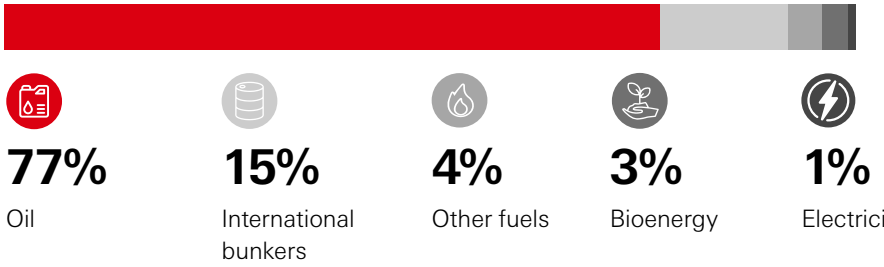
Carbon capture and storage technologies capture carbon waste during power generation (e.g. from fossil fuels) and reduces CO_2 emissions from reaching the atmosphere.

[2] IEA, HSBC

3. Transport

Transport uses oil and its derivatives, containing carbon as majority component, for 77% of its fuel consumption. Bunkers – the heavy, residual oil left over from refining processes – account for another 15%. Oil alone already makes up for 92% of total transport fuel, leaving electricity, bioenergy and others as minority alternatives (see Figure 1).

Figure 1: Transport fuels in 2019



Technological advance and supportive policy for **automobiles** are catalysing energy transition. Electric vehicles (EV) are the clear leader to replace burning oil in combustion engines. New EV registrations saw record highs in 2020 (e.g. Germany at +263% and France at +202%), with the positive momentum continuing into 2021. Additionally, more than 350 EV models will be launched globally through to 2025.

Heavy goods vehicles (HGVs) are responsible for 27% of GHGs in transport. Energy alternatives for HGVs include natural gas, battery-electric, hydrogen fuel cells and biofuels from sugar crops. Other large vehicles such as buses account for 4% of transport emissions. Government policies can support deployment of low-carbon buses, especially with subsidies to help overcome cost barriers.

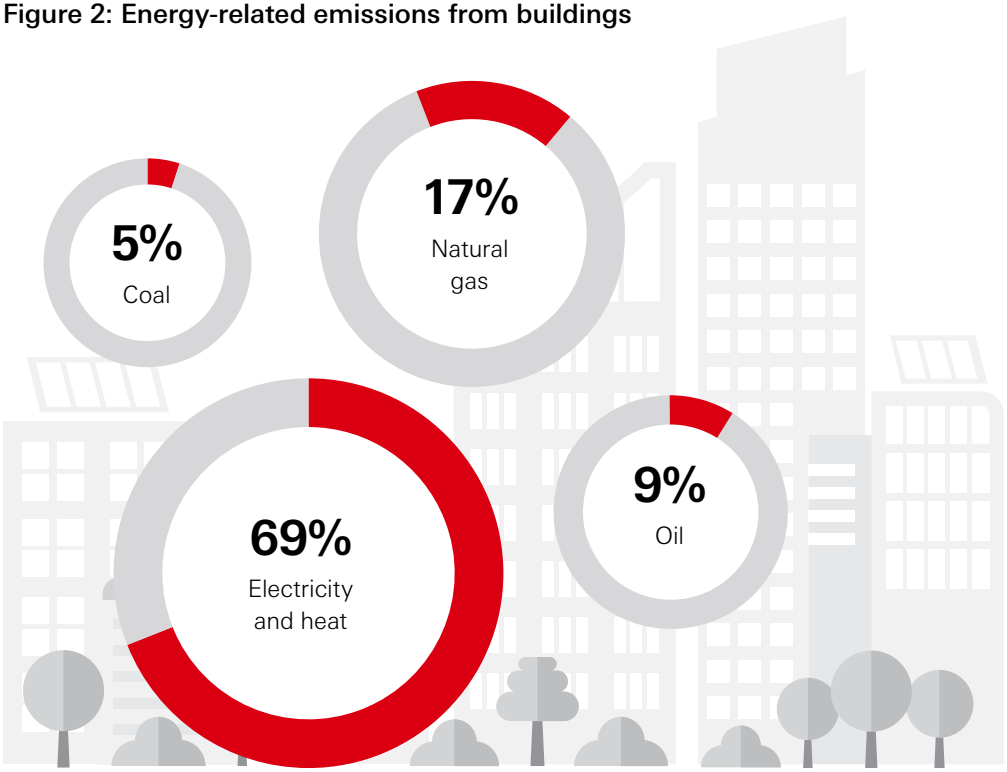
In 2017, **aviation** accounted for 12% of GHGs in transport. Growth in flying had earlier led to increased emissions, and while improving fuel efficiency was beneficial, it was insufficient to offset the outputs from air traffic demand. As a result, aviation emissions were still rising in absolute terms through to 2019.

4. Buildings

Buildings account for 30% of global primary energy consumption for heating/ cooling, utilities, and appliances. The attributes to emissions are comprised of electricity and heat, natural gas, oil and coal (see Figure 2).

To achieve energy efficiency, measures can be introduced from the building's design and construction phase. Areas of opportunity include the building envelope (i.e. insulation, façade, roof, and glass), building materials, heating equipment and appliances. Environmental regulation has also made buildings more efficient globally, and we expect more to come as the sector is increasingly a focus in meeting Paris Agreement targets.

Figure 2: Energy-related emissions from buildings



Source: IEA, HSBC

5. Industrials

Industrial activities account for 21% of global emissions. This is a complex and diverse sector, covering metals and mining, oil & gas, cement, gases and chemicals. Multiple pathways are necessary for decarbonisation, with materials efficiency, recycling, electrification and hydrogen all playing a role.

Decarbonisation pathways are diverse – energy efficiency has been a larger focus so far, via higher levels of heat integration, updating equipment and utilities, smart process control and monitoring, and predictive maintenance. Some electrification may be underway, and we are yet to see build-out of carbon capture and clean hydrogen deployment in the sector.

Mining consumes energy use from burning fossil fuels – typically oil derivatives for machinery. Methane (CH_4), a by-product of coal mining, is a highly potent greenhouse gas that is emitted into the atmosphere.

For **oil & gas**, emissions and energy transition are increasingly important. A large part of emissions happen in the consumption, majority via transport as well as for chemicals as feedstock. Some companies have made ambitions to cut carbon intensity in energy supply mix, or even become net carbon neutral.

Chemicals are is a significant consumer of fossil fuels. Production of primary chemicals, transformed into products such as plastics and fertilisers, is energy intensive, accounting for nearly 67% of the sector's total energy consumption.

6. Conclusion

As the world shifts towards the ambitious targets of the Paris Agreement, technological innovation and energy efficiency deployed across major pathways can help reduce major sources of emissions. Investment in specific technologies can increase the rate at which emissions can descend towards net zero. While 2050 is only a generation away, many radical changes can take place in terms of politics, policies, economics and technological advances. Investors should take note of emerging developments aimed at lowering emissions, as they will play a key role in decarbonisation efforts and to limit global warming.

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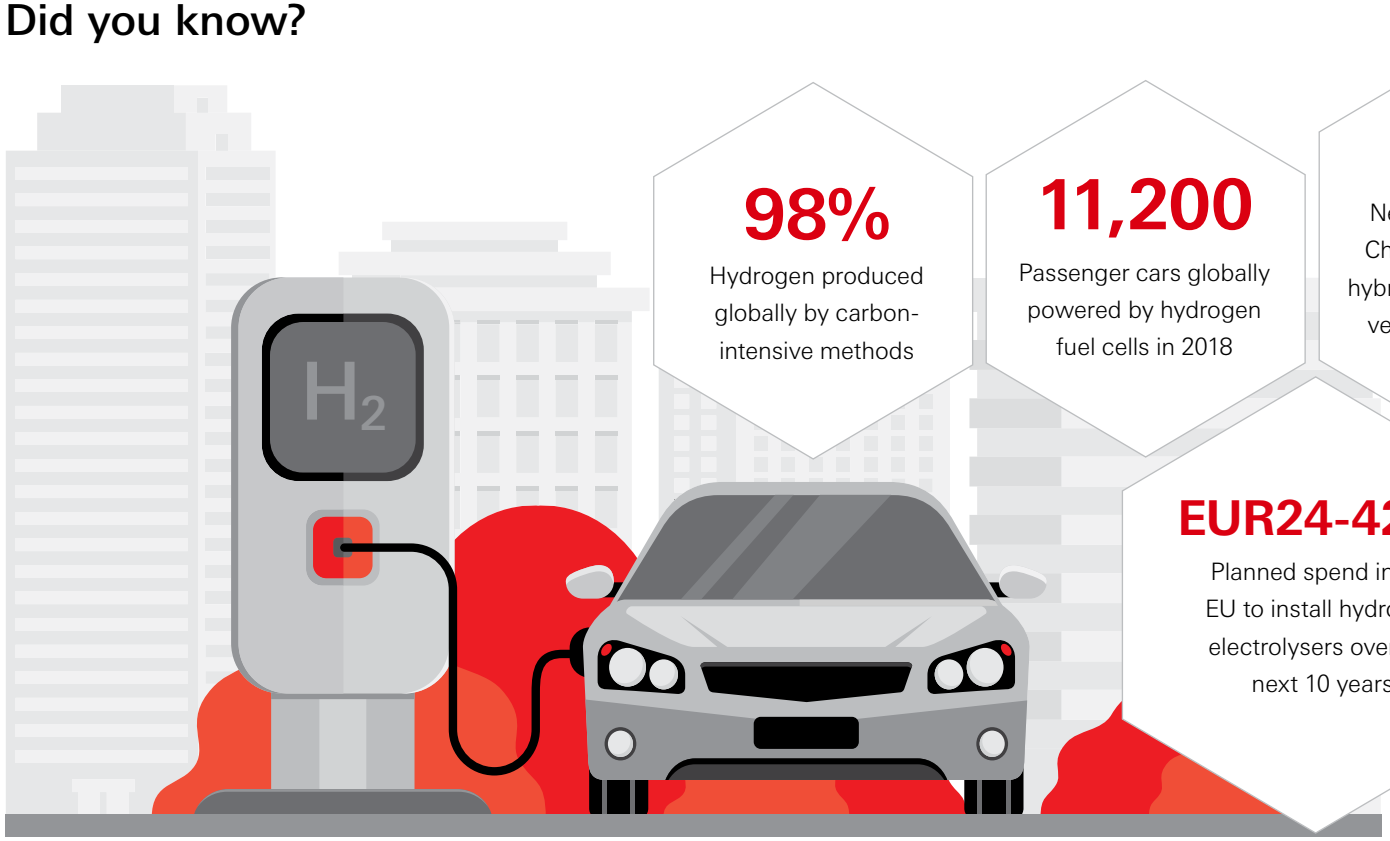
The rise of 'green' hydrogen

Hydrogen is set to play a more significant role as efforts to combat climate change becomes more urgent. It is abundant as an element and has great potential as a zero-emission fuel. In particular, 'green' hydrogen, a pure form of hydrogen produced via renewable energy sources, emits no carbon dioxide when converted into electricity.

In this issue of #WhyESGMatters, we look at how increased demand for hydrogen use across sectors, declining renewable energy costs, and favourable government policies are all providing support for the growth prospects of 'green' hydrogen. We explore how these advancements are elevating the profile of hydrogen in consumers' everyday life.

Did you know?



98%
Hydrogen produced globally by carbon-intensive methods

11,200
Passenger cars globally powered by hydrogen fuel cells in 2018

20%
New car sales expected in China from electric, plug-in hybrid and hydrogen-powered vehicles (up from 5% now)

18%
World energy demand forecast to come from hydrogen by 2050

EUR24-42bn
Planned spend in the EU to install hydrogen electrolysers over the next 10 years

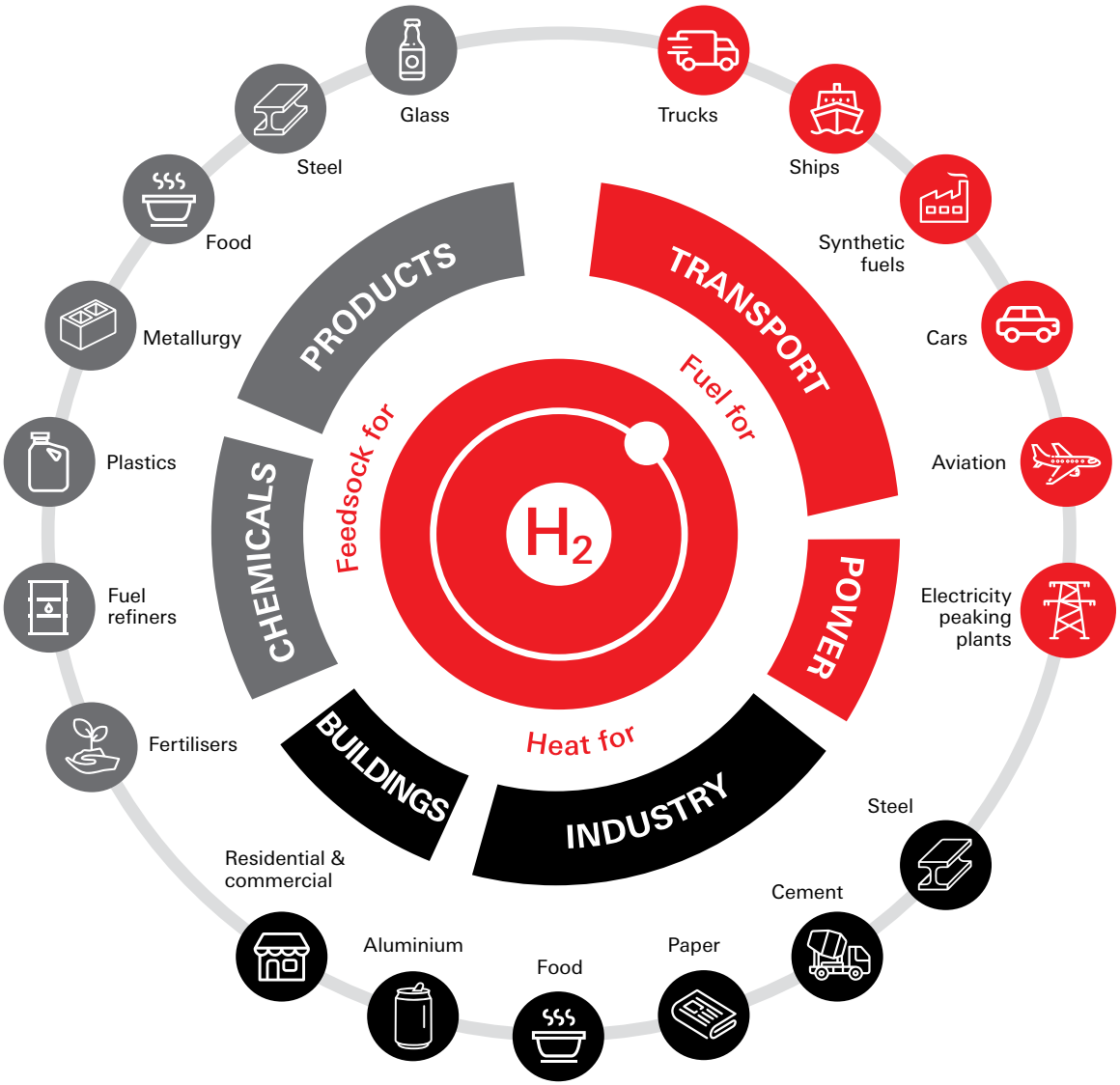
6.4%
Annual growth forecast for hydrogen demand through 2050

Source: EU Hydrogen Strategy, Hydrogen Council, The State Council of the PRC, HSBC estimates

1. Hydrogen's role in energy transition

Hydrogen is a versatile, non-toxic and lightweight gas that can be stored, transported and converted in clean power. More importantly, it has the potential to decarbonise a wide range of sectors. We believe the key to hydrogen's success will most likely be tied to its adoption beyond the power sector in feedstock for chemicals and end products, fuel for transport, and heat for buildings and heavy industries (see Chart 1).

Chart 1: A clean-green economy: Hydrogen can feed into a range of applications if produced on a large scale



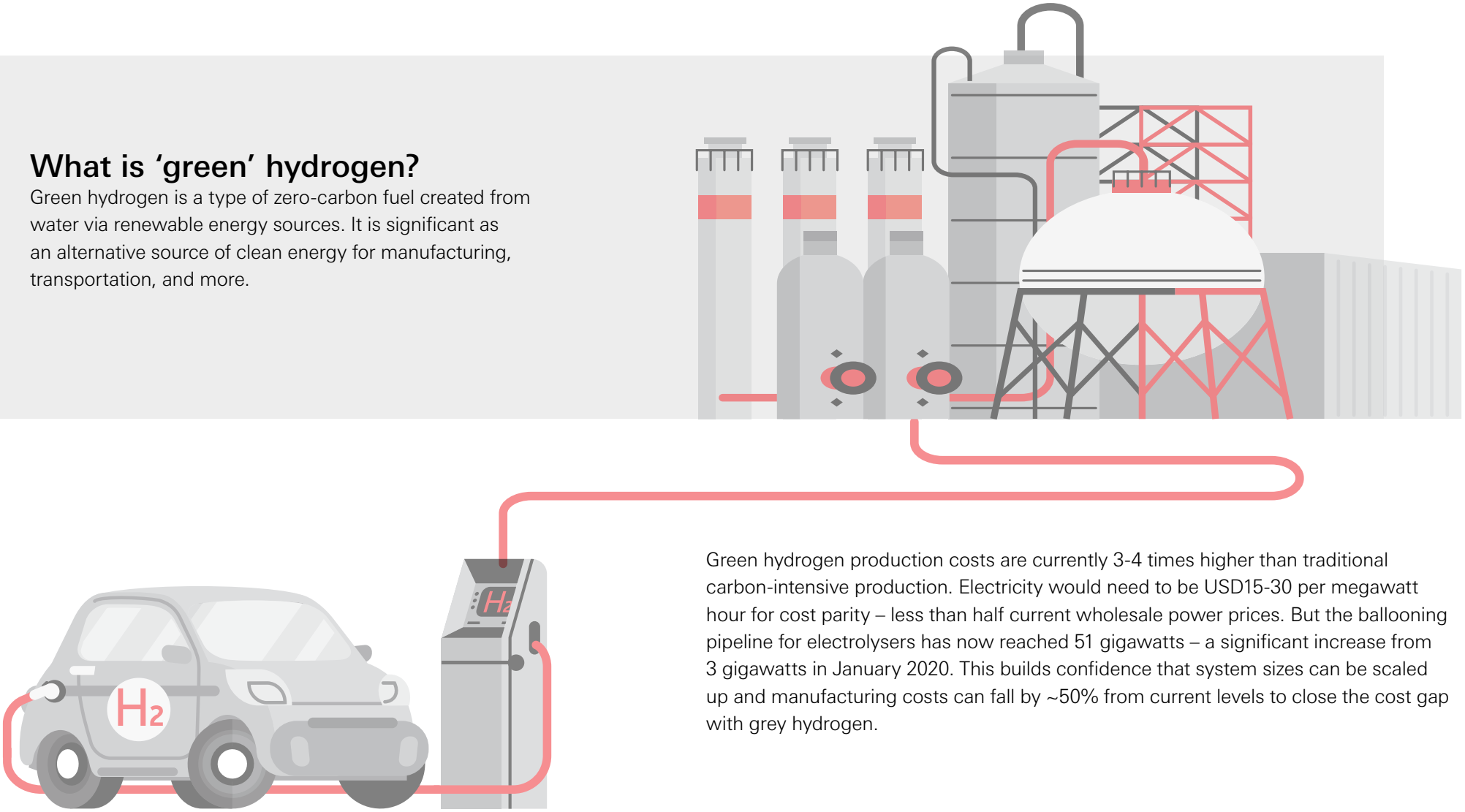
Source: BNEF, Element Energy, HSBC

Hydrogen: from grey to green

Hydrogen's potential can only be realised if its production first becomes carbon-free. Approximately 98% of pure hydrogen produced globally today is generated via carbon-intensive methods, using a natural gas or coal feedstock (so called 'grey' hydrogen). The remaining 2% of global hydrogen is produced via electrolysis, a chemical reaction that cracks water into its constituent parts: hydrogen and oxygen. If the electric current is powered by a renewable energy source, e.g. solar or wind, the end result is clean or 'green' hydrogen.

What is 'green' hydrogen?

Green hydrogen is a type of zero-carbon fuel created from water via renewable energy sources. It is significant as an alternative source of clean energy for manufacturing, transportation, and more.



Green hydrogen production costs are currently 3-4 times higher than traditional carbon-intensive production. Electricity would need to be USD15-30 per megawatt hour for cost parity – less than half current wholesale power prices. But the ballooning pipeline for electrolysers has now reached 51 gigawatts – a significant increase from 3 gigawatts in January 2020. This builds confidence that system sizes can be scaled up and manufacturing costs can fall by ~50% from current levels to close the cost gap with grey hydrogen.

2. The rising demand for hydrogen

The Hydrogen Council, a global advisory body to foster long-term clean energy transition, expects global hydrogen demand to reach 546 million tonnes by 2050. This is up from 70 million tonnes today with a 6.4% annual growth rate. We expect incremental demand for green hydrogen to stem from a variety of sectors, which could pose investment potential.

Industrials

Hydrogen can be applied as a raw material for industrial usage. Around 52% of demand comes from the oil refining sector where it is used for desulphurisation, or the removal of harmful sulfur compounds that could be released into the environment. This reinforces hydrogen's role as a critical component of 'clean fuels'. Another 42% of demand is for the production of ammonia, a basic agricultural fertiliser, and other chemicals. Hydrogen use in the chemicals sector should expand while steelmakers and other industries are set to become new users.

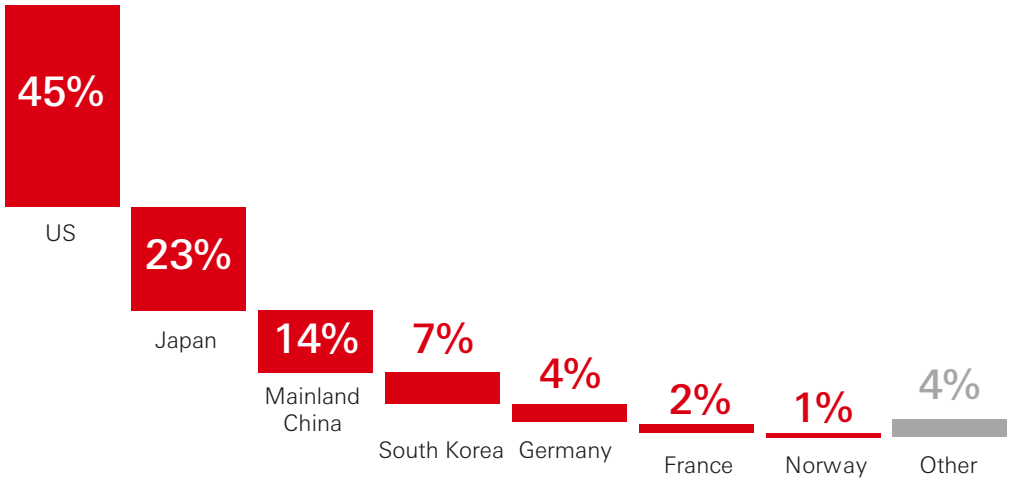
Utilities

Utility companies are considering green hydrogen as a clean alternative for natural gas as coal usage falls. Hydrogen can be blended into the existing grid so households don't need to upgrade appliances, which avoids the potential for any major structural transformation. It can also be injected into existing gas distribution to dilute the overall carbon footprint by up to 15%, with limited infrastructure investment needs.

Transport: Passenger cars

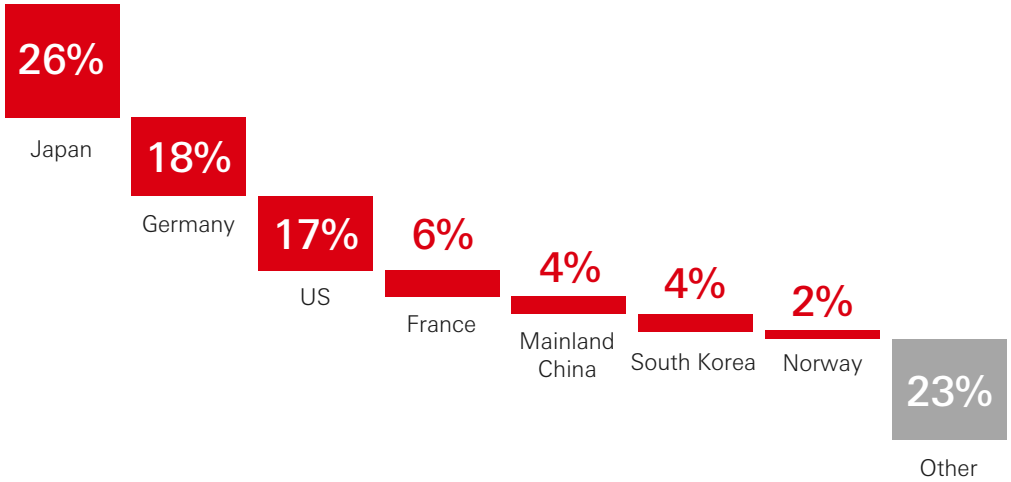
Hydrogen offers an alternative to battery-powered electric vehicles. A fuel cell and an on-board compressed hydrogen tank provide the power. But, to date, most electric-car makers have chosen battery power, with hydrogen part of a longer-term strategy. Only Toyota, Hyundai and Honda have commercial hydrogen-powered fuel cell electric vehicles in the passenger vehicle market, although Mercedes-Benz recently began leasing plug-in hybrid electric cars with a fuel cell. At the end of 2018 there were only 11,200 fuel cell passenger cars, compared to 5.1 million battery electric vehicles. Refer to geographical breakdowns in Charts 2 and 3.

Chart 2: Fuel cell passenger car stock breakdown by country, 2018



Source: IEA, HSBC

Chart 3: Hydrogen refuelling infrastructure breakdown by country, 2018

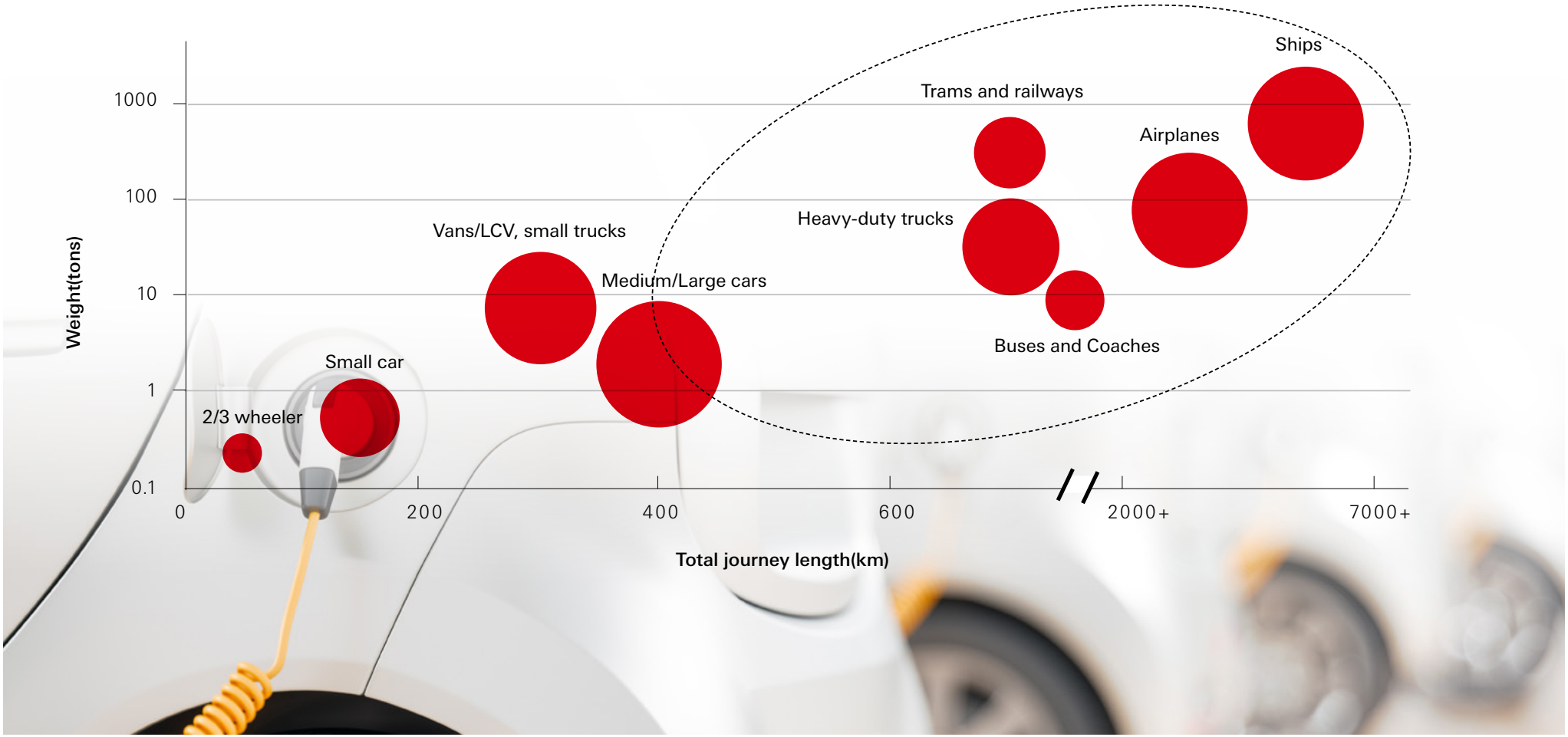


Source: IEA, HSBC

Transport: Heavy-duty vehicles

The promise of hydrogen in heavy-duty transport segments is rapidly developing. Its high energy density and shorter refueling times make it more attractive than batteries for long-distance transport (see Chart 4). In April 2020, Daimler and Volvo announced a EUR1.2bn joint venture to develop and produce fuel cell systems for trucks, buses and coaches, which we believe is the most significant development thus far towards commercialising hydrogen for heavy-duty commercial vehicles. Hydrogen buses and trucks are also gaining traction in China – where they account for over 95% of hydrogen vehicles.

Chart 4: Hydrogen fuel cells more suitable for heavy transport applications (trucks / trains / ships / airplanes etc.)



Source: FCH hydrogen roadmap Europe

3. Policy support for green hydrogen

We believe policy support is essential to driving investments in green hydrogen. Support has historically been strong in Asian markets such as Japan and South Korea, with rising momentum in other parts of the world. We look at recent policy developments in within regions that have continued to support the development of hydrogen.

Europe

The European Union regards hydrogen as a key driver for their post COVID-19 recovery. A formal hydrogen strategy was enforced in July 2020 and includes firm targets for green hydrogen production by 2024 and 2030. A number of EU member countries have since adopted national strategies to promote and develop hydrogen in their respective economies, driving further granularity on targets.

UK

The UK Department of Business, Energy and Industrial Strategy announced a plan to invest EUR22m in the national rollout of hydrogen to cut emissions. Local bus authorities are also demanding more action on clean air, and cutting particulates which are harmful to human health, linked to higher levels of cardiovascular and respiratory problems.

US

In July 2020, the Democratic presidential campaign unveiled their Plan for Climate Change and Environmental Justice. This includes commitment to electrolysing technologies for cost-effective green hydrogen production with fossil fuels by 2030. The US has also set a target of USD1m Fuel Cell Electric Vehicles (FCEVs) and 1,000 refueling stations by 2030. To help achieve this, the California government has announced consumer rebates ranging from USD4,500-7,000 on FCEVs.

China

In November 2020, the State Council of China forecasted that national sales of electric, plug-in hybrid and hydrogen-powered vehicles would rise to 20% of overall new car sales by 2025 (vs 5% from today). The State Council also advocates for technological improvements, construction of more efficient electric vehicle charging networks and greener vehicles in support of the world's largest automobile market.

4. Conclusion

Investors can expect the demand for green hydrogen across sectors and geographical regions to take off in the 2020s as global projects leveraging on the element increase in scale. Facing pressure to decarbonise, the most significant opportunities will come from oil and gas companies, which are also uniquely positioned to support green hydrogen production at a more cost efficient scale.

A strong pipeline for electrolyser projects could also provide the scale to substantially reduce production costs. But government support is still necessary and policy makers in Europe, Asia and other regions are aligning supportive policies for climate ambition. We expect hydrogen to become fully industrialised by 2030.

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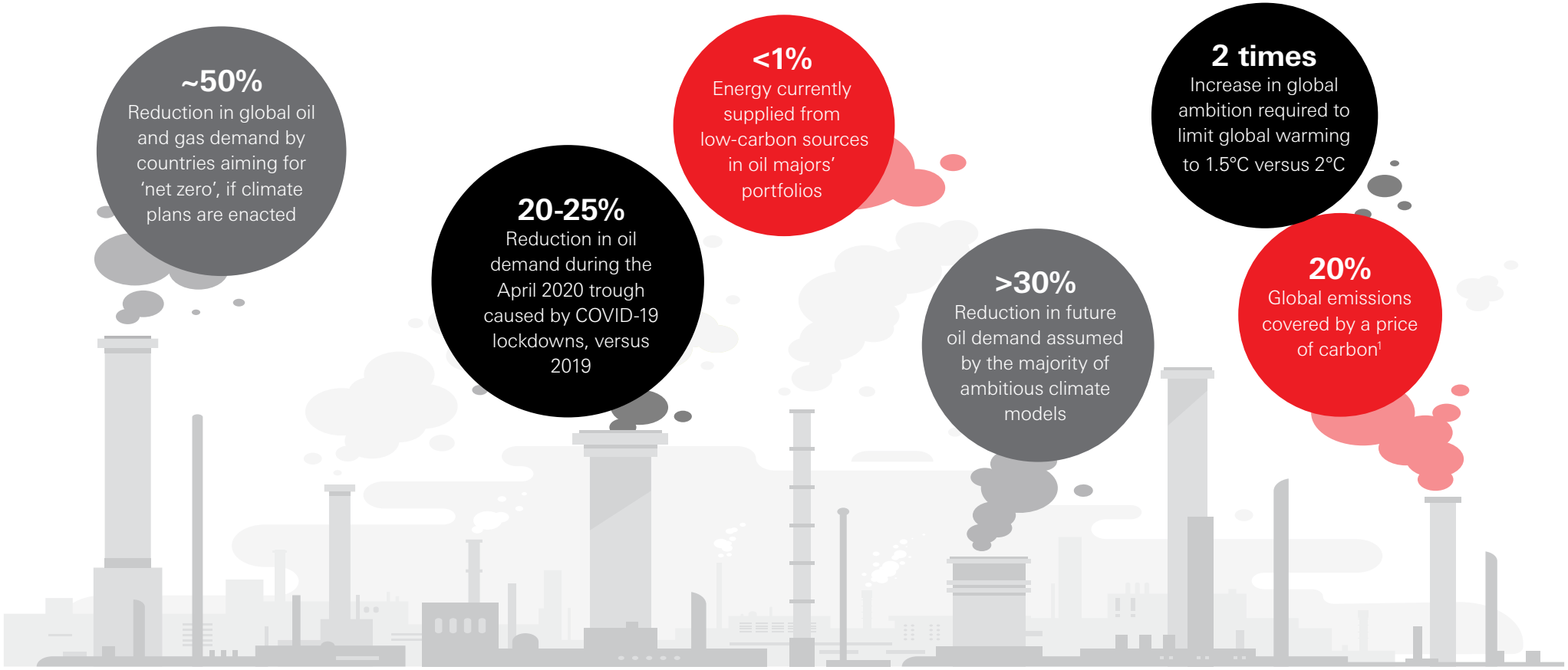
The path to 'net-zero' emissions

Against a backdrop of major disruption for global oil & gas markets due to COVID-19, the issue of the energy transition and climate has continued to rise up the agenda. Meanwhile, the consequences of global warming from increasing greenhouse gas (GHGs) emissions continue to be felt through extreme weather events such as floods, storms, droughts, and bushfires. Therefore, managing the transition to cleaner energy is likely to be the defining issue for the oil companies in the coming years.

We look at how Big Oil companies' climate ambitions are shifting in favour of net-zero emission strategies. We also discuss the progress of emerging market oil companies towards low-carbon energy production.



Source: US Energy Information Administration, International Energy Agency, Global CCS Institute, World Bank, HSBC

1. A price on carbon is a cost applied to carbon pollution to encourage polluters to reduce the amount of greenhouse gases they emit into the atmosphere.

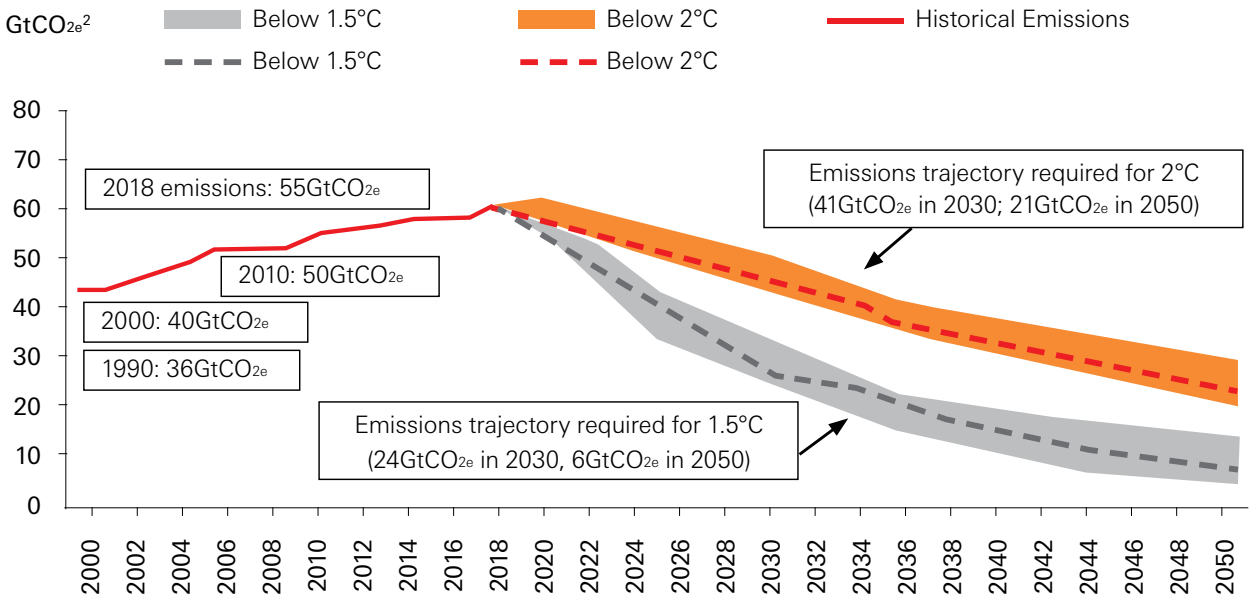
1. What is 'net zero' and why is it topical?

Moving to 'net zero'

The latest climate science (from the UN's climate science body) tells us that emissions need to be reduced significantly and eventually hit 'net zero' (see Box 1) if we are to limit global warming to within 1.5°C and stave off the most severe consequences of climate change. This requires a rapid shift of direction to that of a much lower carbon trajectory (Chart 1).

Box 1: Net zero', or carbon neutrality, means balancing the sources of emissions - such as fossil fuel combustion - with the sinks - such as forests and carbon removal technologies - so that the net impact on atmospheric concentrations of carbon dioxide and other GHGs is effectively zero.

Chart 1: The global emissions trajectory must change significantly downwards



GtCO2 means Gigatonnes of Carbon Dioxide

Emissions are still rising although at a modestly slower growth rate.....

… this means that any delay to policy requires even deeper cuts to get back 'on track

Source: Emission Gap report 2019

2. $GtCO_{2e}$ is an abbreviation of "gigatonnes of equivalent carbon dioxide" i.e. billions of tonnes of CO_{2e} (which is a simplified way to put emissions of various greenhouse gases on a common footing by expressing them in terms of the amount of carbon dioxide that would have the same global warming effect.)

Net-zero pledges on the rise

In 2021, a number of countries/regions announced plans to go net zero by mid-century including the European Union (by 2050), China (by 2060), South Korea (by 2050) and Japan, which in October 2020 brought forward its carbon-neutral pledge to 2050. In his climate plan (see Box 2), Joe Biden pledged for the US to also be net zero by 2050, with power generation to be net zero by 2035. Current pledges mean that around two-thirds of global emissions and 75% of world GDP could be set for full decarbonisation by mid-century.

Businesses too are responding with their own climate pledges. One example is Microsoft, which is seeking to become carbon-neutral by removing its entire historical corporate emissions footprint through measures to reduce its carbon dioxide and remove additional atmospheric CO2. But with emissions from fossil fuel energy (oil, gas and coal) accounting for around two-thirds of the total globally, oil & gas companies are key to the energy transition. Some of these companies have made public long-term ambitions to drastically cut the carbon intensity of their energy supply or even to become net zero.

Box 2: Key pledges in Joe Biden's Climate Plan

- **'Net zero' emissions by 2050** – significant as the US accounts for ~15% of global CO2 emissions and ~20% of global oil & gas production.
- **Zero-carbon electricity system by 2035** – by increasing investment in renewable power, and leveraging existing nuclear and hydropower capacity. Carbon capture is likely an important factor in natural gas's future role in a decarbonised electricity grid (see Chart 2).
- **Decarbonisation of transport** – the largest source of US emissions (see Chart 3). Plans include development of US electric vehicle market, new fuel economy standards for internal combustion engine vehicles, zero-emissions buses by 2030, and promoting advanced biofuels use in planes and ships.
- **Aggressive limits on methane emissions** – for new and existing oil and gas operations, potentially reversing a recent US Environmental Protection Agency regulatory loosening.
- **Climate-focused financial regulation** – such as increasing disclosure on climate risks and carbon emissions from public companies and high emitters such as oil & gas.
- **Aim for 'green' or zero-carbon hydrogen to reach cost parity** – with 'grey' hydrogen that is produced from shale natural gas. Green hydrogen is currently ~3x more expensive than grey.
- **Tax incentives for carbon capture, use and storage projects and possible carbon pricing policies targeting emitters** and a potential border carbon tax similar to those proposed in the European Union.

Chart 2: US electricity generation by fuel, 2019

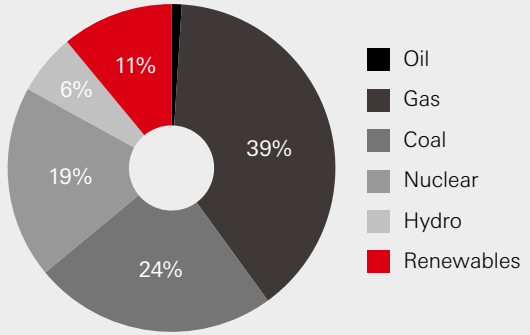
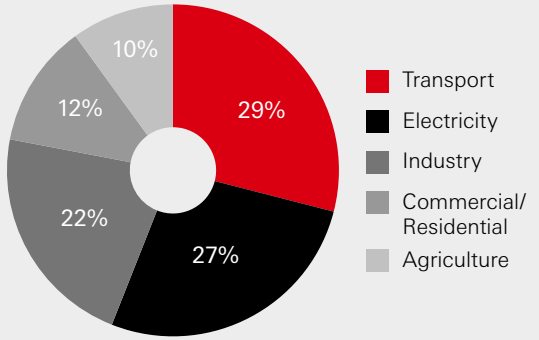


Chart 3: 2018 US emissions by end use



Source: US EIA, HSBC estimates

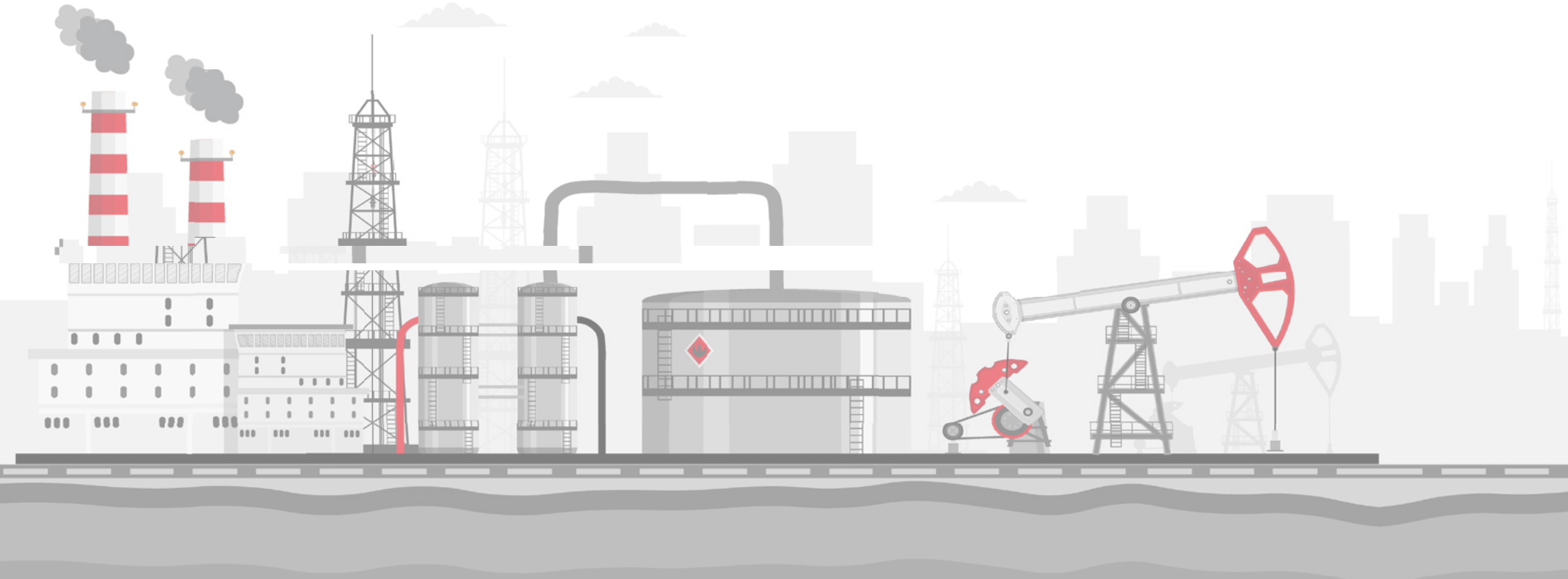
2. How is Big Oil responding?

A recent wave of Big Oil climate strategy announcements means ambitions are raised across the board to decarbonize in Europe, with US companies now further behind. We look at the nature of these long and short-term plans laid out by Big Oil companies to meet climate aims.

Long-term plans

The six European oil majors, for example (BP, Eni, Equinor, Shell, Repsol and Total), now all plan for their operations to be net zero by 2050 or earlier. These companies also have long-dated strategies that cover the total lifecycle of carbon emissions, including those from downstream customer activities (such as transportation) as well as their own production. Strategies to reduce emissions include a range of approaches, such as lowering emissions from the energy supply, new absolute emission reductions targets, investment in new energies, actions on specific sources of GHG emissions (e.g. natural gas flaring or methane leaks), and deploying technologies at scale (carbon capture and storage, biofuels, and renewable energy).

Climate ambition for US oil majors currently lags behind that of their European counterparts, and despite Mr. Biden's climate plans, we do not think overnight change is likely. However, two large US-based producers – ConocoPhillips and Occidental – recently announced 'net zero' emissions aims, firsts for US operators, indicating some level of change is underway.

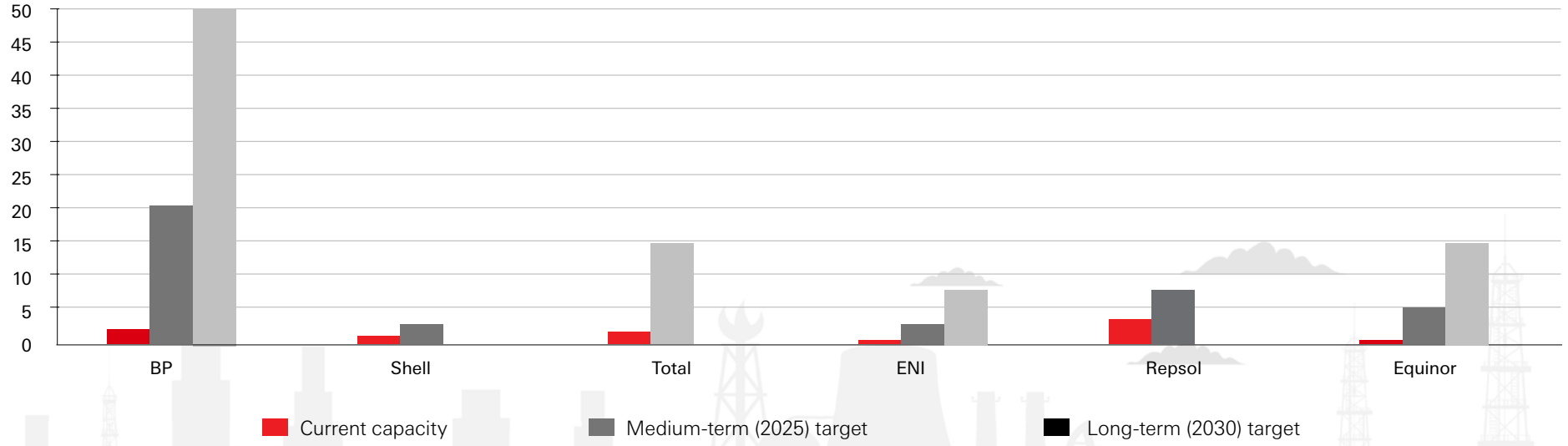


Shorter-term milestones

Visible change in the energy mix will likely be gradual given the long-term nature of the strategies, and indeed, a majority of companies do not even have shorter-term (e.g. 2025/30) milestones against their 2050 ambitions. But some institutional investor groups still are pushing to see long-term net-zero plans backed up by meaningful emissions reductions within five years.

However, some company ambitions are set to fundamentally change the shape of significant industry players within 10 years. BP, for example, has laid out 2025/30 markers towards its 2050 aims which entail a ~40% cut in oil & gas volumes and aggressive build-out of renewable energy (see Chart 4) – both of which imply an aggressive, and unprecedented, redeployment of capital.

Chart 4: Oil Major renewable energy targets (gigawatts)



Source: Company data, HSBC

3. The emerging market role in oil & climate

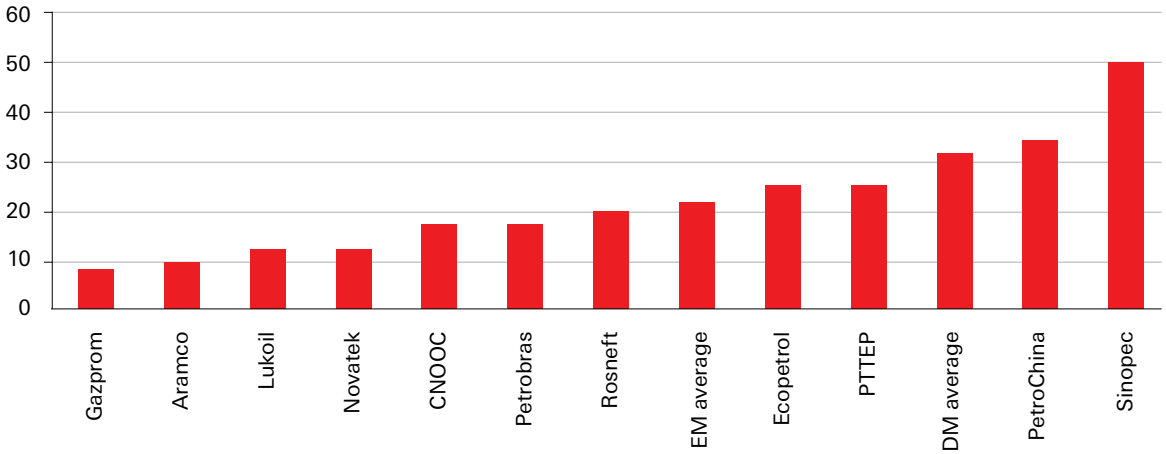
We now shift focus to emerging market (EM) oil and gas operators by looking at a sample of 13 companies (see Chart 5) that collectively account for ~30% of global oil & gas production in 2020. Our grouping of companies includes the world's largest oil exporters and natural gas producers, among others:

CNOOC (China), Ecopetrol (Colombia), Gazprom (Russia), Lukoil (Russia), Novatek (Russia), ONGC (India), PetroChina (China), Petrobras (Brazil), PTTEP (Thailand), Reliance Industries (India), Rosneft (Russia), Saudi Aramco (Saudi Arabia), Sinopec (China)

Less transformational change

We found, in general, EM producers are planning for less transformational change in the coming decades than some of their developed market (particularly European) peers, with the most common approaches being a combination of upstream (i.e. exploration and production) emissions efficiency and increasing gas in the production mix. This is a set of measures favoured by European majors around five years ago and is the current strategy of some large US majors. However, disclosure on climate-related information topics is also improving in EM companies, but is not without gaps in places – such as downstream emissions reporting.

Chart 5: Upstream emissions intensity (kg CO_{2e} per barrel oil equivalent production)



- Upstream emissions generally refer to the extraction process (extraction, processing, handling, transportation), while downstream emissions refer to what happens after the oil has left the pipeline and is consumed by its end-users.

Source: Company data, HSBC estimates

Broader implications

We also note that EM producers can, importantly, be accountable to differing stakeholders (shareholders or state ownership) or have more ingrained relationships with state objectives – e.g. directly contributing to national finances, energy policy goals or climate objectives. For example, as the world's largest energy importer, China's recent announcement of its intention to reach net carbon neutrality by 2060 could spell significant change for not only Chinese producers but also oil & gas exporters to the Chinese market.

4. Conclusion

The move towards net-zero emissions is gaining traction from shareholders, policy makers and civil society to combat the effects of global warming. More major oil and gas companies, particularly in Europe, have made public long-term ambitions to drastically cut the carbon intensity of their energy supply mix, or even become net zero – signalling the potential for significant future changes in their nature. The energy transition poses challenges, but also opportunities for those that can successfully transition while enhancing shareholder value.

The ESG impacts of Virtual Reality

COVID-19 is increasingly acting as a catalyst for society to explore ways of functioning without physical movement. Virtual reality (VR) is key to this evolution, as it allows us to interact with others on a daily basis to work, educate and entertain, all from a remote location. This emerging technology also raises a number of environmental, social and governance (ESG) implications, from a reduction in travel, social inclusion and a power usage.

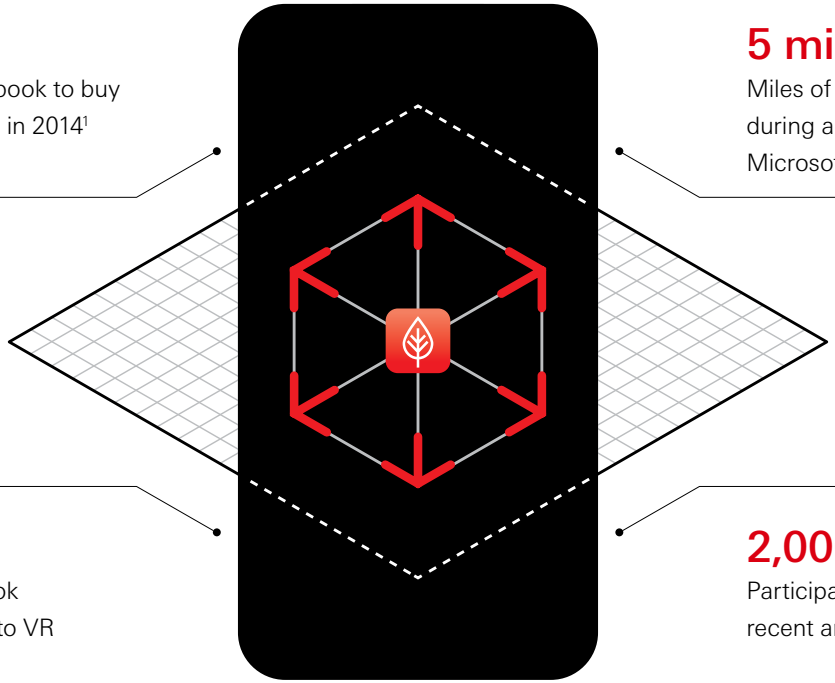
We look at how the pandemic is providing a platform for virtual reality to thrive, we discuss a number VR applications that could change the way we live in the years to come and we examine the related ESG implications of this technology.

Did you know?

USD2bn
Price paid by Facebook to buy VR start-up Oculus in 2014[1]

5 million
Miles of travel saved during a recent conference in VR by Microsoft[4]

70
Number of artists that performed in MelodyVR's 'Wireless Festival', streamed in 360 VR[2]



5%
Employees in the European Union who regularly work from home[5]

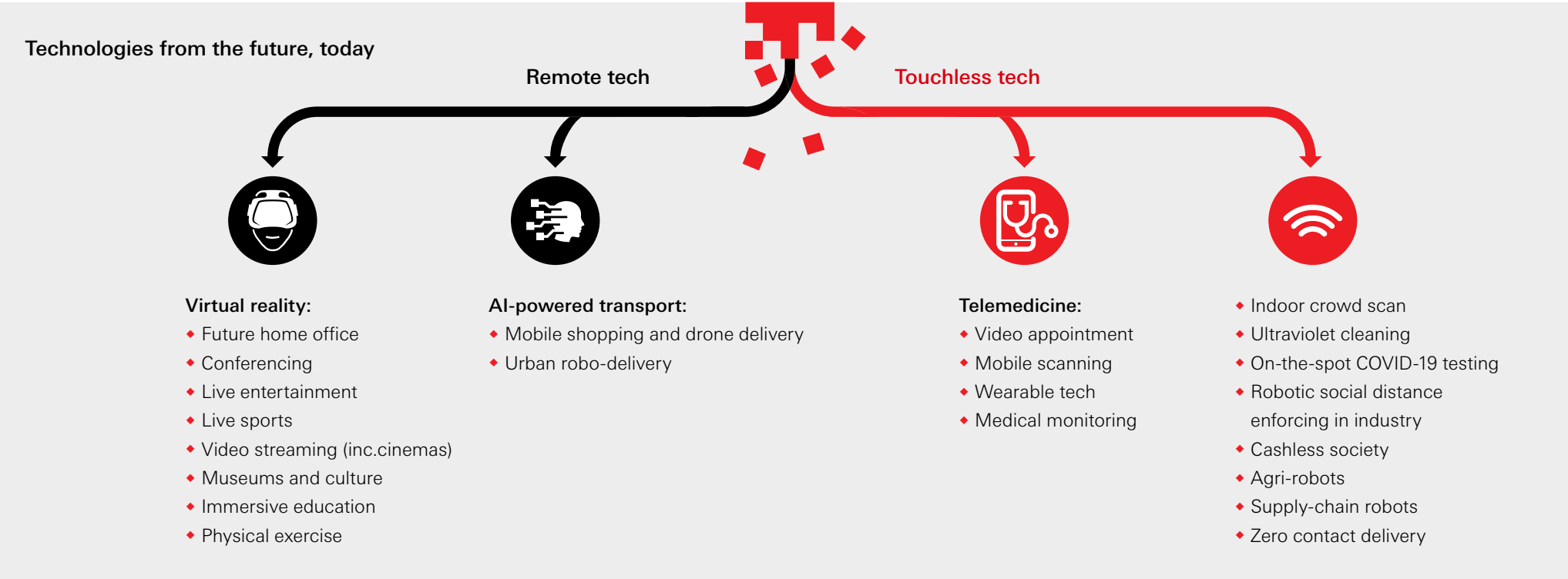
1 billion
Users that Facebook CEO aims to get into VR technology[3]

2,000
Participants that joined HTC's recent annual conference in VR[6]

1. Facebook, March 2014
2. Morning Star, July 2020
3. BBC News, Oct 2017
4. Forbes, March 2020
5. Eurostat, April 2020
6. Morning Star, July 2020

1. The rise of Virtual Reality

The advent of decentralised technologies (see chart below) over the past few decades has meant that one could work, be educated, find entertainment, buy things, or have access to healthcare from anywhere in the world. The pandemic is accelerating these trends and we can see the possibility of these technologies becoming growth stories in the age of living with COVID-19.



What is VR?

One such decentralised technology is Virtual reality (VR), which we believe holds much promise to be the next mass commercialized platform for communication and interaction across large distances. VR will be used to build new worlds and replicate the sense of "presence", of being somewhere else within these new digital realms. This may now seem more appealing to consumers to try than a few months ago, replacing physical visiting of places or seeing people.

VR could fundamentally change the way we work, educate and entertain ourselves. This technology would not have been possible without the rise of the internet but we propose that VR could be even bigger, in terms of how it affects our lives, how it may affect the way society is structured and the way the economy works.

2. VR applications showing glimpses of the future

We believe that VR technologies will be used to augment a whole set of industries such as work, travel, education and entertainment. They will be the next stage of evolution in a trend of doing activities virtually, but in a more immersive way that mimics reality better. We discuss a number of VR applications below which we think will grow over the coming decade:

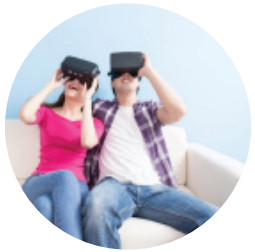
Work/travel

Conferences from 2D to 3D: Companies have been utilizing VR technologies to host conferences, improving user experience from a simple 2D stream. Microsoft, for example, recently hosted an education summit in VR, with 170 speakers and 2,000 participants over six days. The company says this took 9,000 cars off the road and saved 5 million miles of travel compared with holding a physical conference.

The future home office: Small homes mean working from home (WFH) can be difficult, due to lack of space: VR can make this easier. Facebook's VR team recently showed how remote work might operate using VR by overlaying virtual screens on reality. The company's CEO Mark Zuckerberg says that "VR and augmented reality (AR) is all about giving people remote presence".[7]

Education

Immersive education: Online education for schools and universities had become the only way to continue the term during the pandemic, often through online lessons. We are beginning to see VR applications being designed for education too and could be the next stage of remote or in-class education. In addition, there are VR platforms that hold lectures and talks, which could be useful for universities.



Entertainment

Live entertainment: Musicians including John Legend and David Guetta have used VR technology (through MelodyVR and Oculus venues) to broadcast live events over earlier in 2020. We believe that live entertainment streaming technology may well progress to become fully immersive over the coming decade, blending live-action and computer-generated imagery (CGI).

Live arena and stadium sports: NextVR, a company recently acquired by Apple, has in the past used its technology to livestream sports such as NBA games from courtside into VR. During the FIFA Men's World Cup in 2018, a number of broadcasters such as the BBC streamed it in VR, making viewers feel like they were in the stadium. We think that VR live sports has potential to gain in popularity in a post pandemic world.

Going to the movies: According to a survey by Morning Consult, 52% of moviegoers say cinemas should change with the times and embrace digital premieres.[8] This could bode well for the future of movies premiering in VR. Netflix and Amazon Video already have VR apps, while Paramount and Lionsgate have arrangements to show movies with VR companies. Content platform owners, such as Apple, could also get involved, especially if they release a VR headset.

7. "Facebook teases a vision of remote work using augmented and virtual reality", The Verge, May 2020
8. "Moviegoers split over theatre owners' feud with Universal", Hollywood Reporter, May 2020

Example: a brief history of VR products by Facebook/Oculus*

Facebook is one example of a company investing into VR technology. In 2014 they bought the Kickstarter funded VR start-up Oculus VR for a reported USD2bn while Mark Zuckerberg has set a very ambitious goal of wanting to get a billion people into this new potentially paradigm-shifting platform. Since the acquisition Facebook has continued to make improvements to its hardware portfolio (through their Reality Labs subsidiary), the company recently announced a number of products in this direction (see Table 1).

Table 1: A brief history of VR products by Facebook/Oculus

VR headset	Release date	Comments
DK1 – Development kit 1	March 2013	The DK1 was meant as a developer kit for game makers who wanted to either port or create new native VR games.
DK2 – Development kit 2	July 2014	The DK2 went onto sell over a 100,000 units according to one of the founders of Oculus back in 2015. It was a 'six degrees of freedom' (6DoF) tethered headset which required a fairly high-end PC. It used a sensor attached to the PC to track the users head movements.
Oculus Rift (CV1) – Consumer version 1	March 2016	The Oculus Rift was the first consumer-ready VR headset by Facebook/Oculus. Like the DK2, it was also a tethered 6DOF headset which required a high-powered PC. The Rift started the trend of Oculus products which could be used via Facebook login details, beginning the integration of Oculus into Facebook.
Oculus Go	Consumer – May 2018 Enterprise – April 2019	The Oculus Go was the first VR headset that was easy for a novice to buy and use without any technical expertise or additional equipment. For the 2018 FIFA World Cup, one could download an app to watch the games in VR, from the perspective of a private box on the half-way line or behind the goal. One could see sports streaming as one of the potential big apps and experiences for VR in the future to take it mainstream.
Oculus Quest	Consumer – May 2019 Enterprise – April 2019 Oculus Quest 2 – October 2020	The Quest is the first fully wireless 6DoF headset by Oculus with inside-out tracking using 4 built-in cameras, meaning no external sensors required. It works in a seated position and also as standing room-scale device, with a virtual guardian letting you know the boundaries of the room. Quest has pass-through technology, which brings the real world into your headset. This mild form of augmented reality (AR) is used to set up the headset and warns the user when moving outside guardian region. The Quest is powered by Snapdragon 835 Mobile VR Platform. Developers can port their titles from the Rift to the Quest by optimising their graphics. Facebook's Oculus for Business will provide bulk purchases and support of Quest devices starting in 2019.
Oculus Rift S	May 2019	The Rift S is the next iteration of the original Oculus Rift from the headset from 2016. It requires connection to a PC with a graphics processing unit (GPU). It is compatible with Oculus Rift titles but uses inside-out tracking like the Quest so that it requires no external sensors. Facebook partnered with Lenovo to manufacture the Rift S due their expertise in manufacturing Window Mixed Reality (WMR) headsets and the Lenovo Mirage Solo with Google.

Source: HSBC, Facebook/Oculus VR

*Not an exhaustive list. The information provided does not constitute investment advice, financial advice, trading advice, or any other sort of advice.

3. The ESG impacts of VR

As VR continues to emerge, it naturally raises a number of ESG implications, from a reduction in travel to social inclusion and an increase of power requirements from a growth of data and connectivity in society.

VR could help lower transport emissions

The most obvious advantage of the long-term VR success is the ability to eliminate or significantly reduce the need to commute or travel, the largest slice of our carbon footprint. Whilst not a perfect replacement, many in government, business, academia, and civil society may consider whether face-to-face meetings are absolutely necessary or whether they can be held virtually.

…and energy consumption

But whether that would mean less energy will be consumed in aggregate is questionable as VR server farms will still consume significant amounts of energy, but it is likely that our energy needs change substantially in a VR-driven world.

VR helps increase social inclusion

The more immersive VR becomes, the more "real" social interactions will seem. This will have implications for a number of industries. For example, entertainment activities (concerts, amusement parks etc.) will continue to exist – there will always be a premium price paid for the "real" thing – but it is possible that the many will be happy to "attend" or participate in an event from the comfort of their own home using VR technology.

VR is also to likely have a positive impact on the elderly by allowing them to participate in activities that otherwise would not have been possible, thus making them feel less isolated. Suppose an elderly individual is unable to venture outdoors for even something as simple as a walk, due to ill health. The outside world can be replicated in VR and experienced from the comfort of the home, easing the homebound isolation the elderly might otherwise experience.

4. Conclusion

VR technologies may have seemed a long way off in terms of widespread public adoption a few months ago, but the pandemic has given a platform for these technologies to flourish. Since VR is a newly emergent field that is significantly different to existing mediums in society, the extent of the social and health implications are still to be fully understood. This is uncharted territory for society. Today VR falls outside the regulations radar, but we believe this space could see more government oversight.

With the speed to development now quicker than ever, technologies that allow businesses and individuals to operate in a more socially-distant way should continue to rolled out. The application of VR has already shown how we can possibly operate virtually such as in work, travel, education and entertainment, whilst the positive impact of VR on ESG will also play a crucial role in people's investment decision makings.

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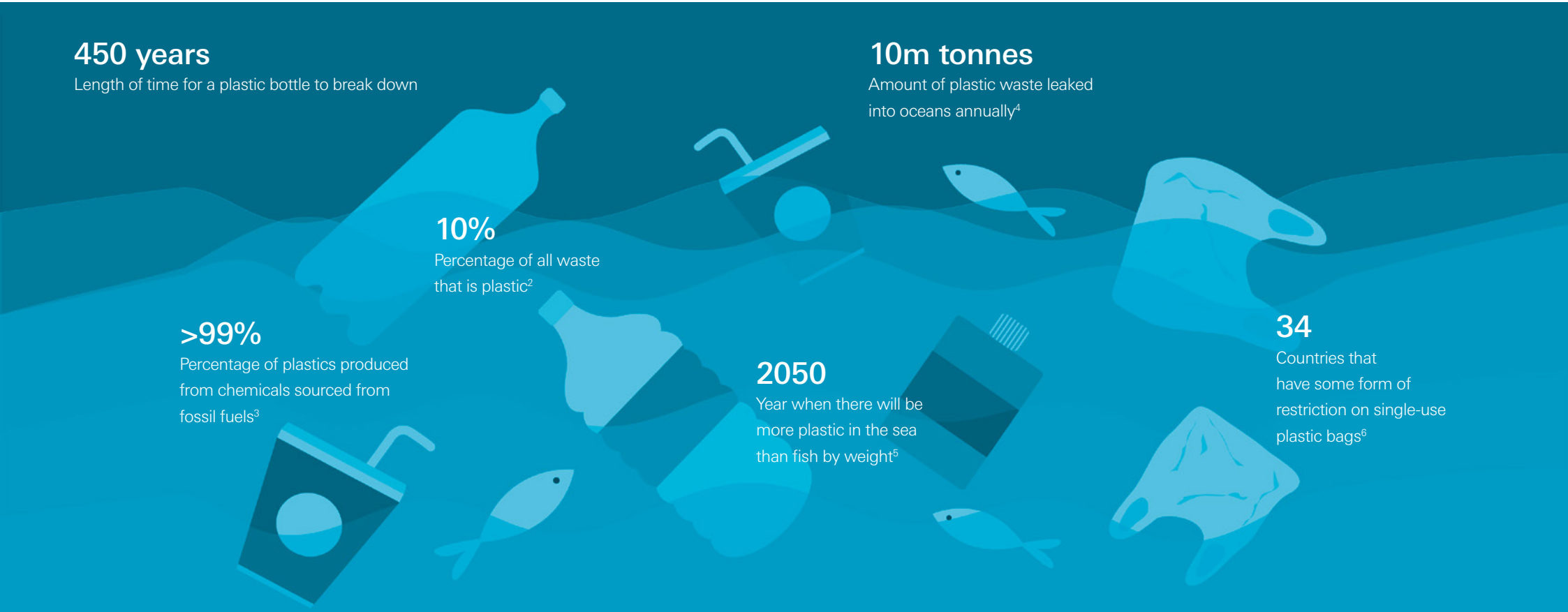
Finding solutions to plastic pollution

Plastic pollution has become one of the major environmental challenges of our time. Solving the problem is far more complex than introducing single-use plastic bans. Recycling needs to increase and waste management procedures need to improve. China's ban on plastic waste imports should spur other countries to enhance their own waste treatment processes[1]. Alternative routes, for example plant-based plastics, also need to develop in terms of technology and scale to be viable solutions.

We highlight why investors should understand changing societal attitudes towards plastic demand and how business could be impacted. We look at the exposure of sectors to the plastic theme along with how certain companies may gain competitive advantages.



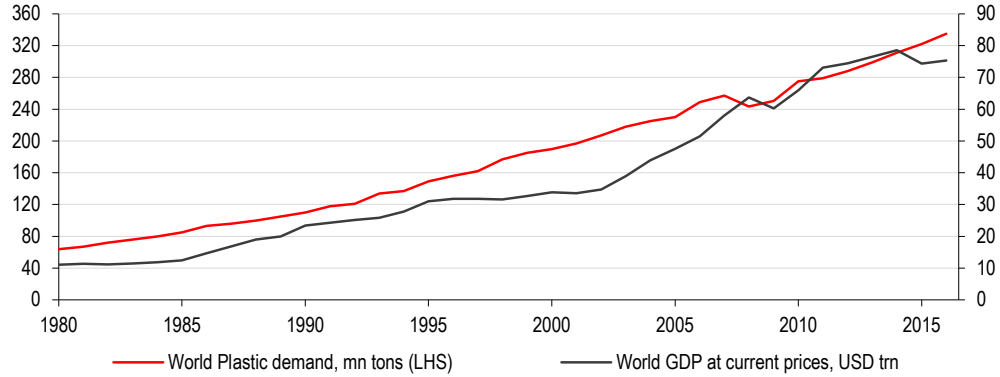
Source:
1. Announced through World Trade Organisation in 2017
2. World Bank
3. Plastics Europe
4. HSBC estimates
5. Ellen McArthur Foundation
6. United Nations (2018)

1. Plastic and why we need it

Ever since plastic was invented in 1907, it has made our lives easier, cheaper and more convenient by helping to reduce food waste, cut vehicle emissions (by making cars less heavy), improve building insulation etc. So useful is the material that plastic production is outstripping GDP growth by a multiplier of 1.2-1.5x, putting long-term plastic demand growth at 3.5-4%, Chart 1.

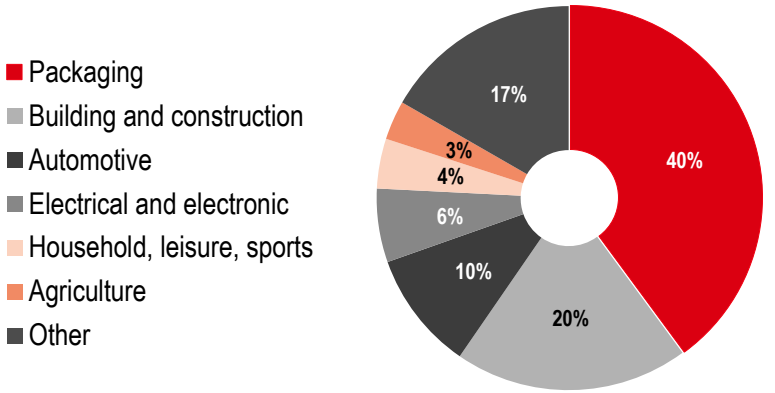
As shown in Chart 2, packaging is the is the main use of plastic in Europe, accounting for 40% of the total, given its non-degradable, cheap and lightweight properties that are not only useful but that also offer potential environmental and/or efficiency benefits, e.g. minimizing food waste. The construction and building, and automotive sectors are the next heaviest plastic users.

Chart 1: Plastic demand vs GDP growth



Source: PlasticsEurope, IMF

Chart 2: Packaging, construction and transport are the most common plastic uses



Note: Distribution of EU28+NO/CH plastics converter demand by segment, 2016. Source: PlasticsEurope

The problem with plastic

But plastic has a major disadvantage – it can take hundreds of years to break down. Far too little is recycled and far too much leaks into the natural environment. Soil is being contaminated and rivers and seas are being choked by a rising tide of waste. Marine life is being harmed, and the food chain disrupted. Human health may be at risk.

Plastic production is outstripping GBP growth by 1.2-1.5x

Packaging, construction and transport are the biggest users of plastic

Plastic takes hundreds of years to break down and causes numerous environmental problems

2. Finding solutions to plastic pollution

The plastic lifecycle

Source
Oil & Gas

>99%
of plastics are produced from chemicals sourced from fossil fuels

6%
of total oil supply used for plastic production

Plastic production uses as much oil as the aviation sector

Production
Chemicals

>8.3bn
tonnes of virgin plastics produced to date and...

...6.3bn
tonnes of waste generated

Regional production breakdown

Use
Autos, Beverages, Retail & Others

Cosmetic products contain between 1 and 90% plastic

European consumption by sector

End of life
Rcycling & Cap Goods

Source: HSBC Plastics Europe, Statista, Ellen McArthur Foundation, British Plastics Federation, UNEP, Jambeck et al. *Europe (EU28+2)

3. Solving the issue

The solution to plastic waste will be neither easy nor quick. We look at four possible answers are below.

- **Single-use plastic bans:** this will not be enough to address the plastics issue alone and the environmental impacts of the alternative materials we are switching to using under the bans should be examined.
  - We estimate an EU-wide ban on 10 single-use plastic items would impact less than 2% of global plastic demand
  - Organic cotton bags need to be reused 149 times to lower environmental costs to those of a single-use plastic bag[7]

- **Recycling infrastructure needs to be improved:** current infrastructure struggles to collect, sort, process and recycle efficiently due to: different types of plastic, the presence of contaminants (adhesives, food waste, etc.) and small format packaging.
  - China's recent move to limit imports of plastic waste has forced many countries to treat waste domestically. We believe this may lead to company and state upgrades in recycling techniques.
  - Only 10-15% of plastic waste is recycled
  - 25% of collected plastic cannot be recycled currently due to contaminants[8]

- **Plastic waste-to-energy:** this can help eradicate plastic waste while also producing fuel, electricity or bio-char used in farming. If done correctly, this process produces fewer emissions than through incineration. Global uptake is low, likely for technology and cost reasons.
  - In 2016, under 3% of power generation came from waste to energy generation

- **Alternatives routes:** plant based plastic, enzymes that consume plastic waste and closed-loop recycling systems (manufactured goods recycled into the same product) are promising in theory, but in these early stages they appear constrained by scale, cost and/or technology.
  - Replacing 3% of the global plastics market with corn-based plastic would use 5% of the global corn market

It is going to be hard to find a solution to plastic pollution. There is not yet an alternative that is as cheap to produce and as useful as plastic, and which at the same time is less environmentally harmful.

Single-use plastic bans alone may not be enough

Recycling infrastructure needs improvement to handle greater volumes

Plastic-waste-to-energy can help turn waste into energy

Alternative solutions are at early stages and face constraints

7. Danish Environmental Protection Agency, 2018
8. World Bank, 2017

Source: IEA, HSBC

4. Sectors that benefit from reducing plastic waste

Solutions to the plastic problem could have wide-ranging impacts on a number of companies and industries in which they operate. We highlight three key examples of these industries below.

Reducing plastic bags and single-use plastic can lower total costs for food retailers1.5x

Food retailers

Food retailers are the forefront of efforts to reduce plastic. Although some plastic used by retailers plays a role to protect food quality, reduce waste, and keep costs and prices low, attention has turned to the reduction of plastic bags and single-use plastic.

In the UK, for example, retailers now charge 5p for plastic bags. This has caused usage to fall dramatically, whilst lowering total costs for retailers. There are now discussions to raise this charge to 10p.

Retailers are also looking at ways to reduce single-use plastics, which can have the added benefit of lowering costs. We believe many are making good progress, moving towards a circular model where plastics are recycled and/or made of compostable packaging.

Increasing usage of refillable bottles can help differentiate beverage companies

Beverages

Beverage companies may face rising consumer plastic awareness, brand rejection and the risk of plastic bottle taxes if they do not reduce plastic usage.

Key global beverage companies (e.g., Coca-Cola and Pepsi) have so far focused on increasing recycling efforts and improved bottle and packaging collection. However, we believe reducing plastic through more wide-spread use of refillable bottles can further differentiate companies in the minds of consumers. Bottlers in Latin American seem to have made the most progress on this front.

Environmental legislation has been a key driver of the waste management industry

Waste management

According to the World Bank, 10% of all waste is plastic. The waste-to-energy market could therefore play an important role in mitigating plastics waste with the added benefit of energy production.

Environmental legislation has been a key driver for the waste management industry. In the UK, for example, it has transformed the waste industry into a multi-product, multi-process industry compared to collection and landfill disposal historically

5. Conclusion

Plastics production is seeing strong growth, outpacing GDP growth by 1.2-1.5x. However, rising public concern from negative environmental impacts has put plastic pollution in the spotlight as never before. Methods to address the plastic problem include single-use plastic bans, increased recycling, plastic waste-to-energy and alternative routes, such as plant based plastics, all of which could have profound impact on the way businesses operate and how investors allocate funds.

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