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# Tech imperative

Looking beyond ESG investing to reinvent the future

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## About this report

*Tech imperative: Looking beyond ESG to reinvent the future* is a report from The Economist Intelligence Unit, commissioned by E Fund.

In the world of finance, green bonds were introduced to encourage sustainable projects. Environmental, social and governance (ESG) factors have spurred investors to review where their dollars go to ensure they do more good than harm. And impact investing has ratcheted that objective up to fund projects, programmes and organisations that have missions tightly aligned with the Sustainable Development Goals. But what about a more old-fashioned approach of favouring the better mouse trap? Not necessarily the box-ticking exercise of ESG or the policy acrobatics of green bonds, but simply investing in technologies that show promise to decarbonise the environment.

This report, surveying more than 300 large investment funds—including asset managers and asset owners—investigates how these organisations view investment into technologies that mitigate and adapt to climate change, as well as areas they are investing in, and whether the return objectives are framed differently to other investments.

In addition, this study takes wide-ranging desk research and in-depth interviews with experts in the fields of investing, climate and technology into account. Dewi John is the report author and Jason Winquinas is the editor. Our thanks are due to the following interviewees for their time and insights:

- Mark Campanale, founder and executive chairman, Carbon Tracker Initiative
- Stephen Freedman, head of research and sustainability, thematic equities, Pictet Asset Management
- Andrew Gray, director of ESG and stewardship, AustralianSuper
- Pedro Antonio Guazo Alonso, representative of the secretary-general for investments, UN Joint Staff Pension Fund (UNJSPF)
- Carine Smith Ihenacho, chief corporate governance officer, Norges Bank Investment Management (NBIM)
- Adrian Locher, founder and CEO, Merantix
- Julian Poulter, partner, Energy Transition Advisors
- Anne Simpson, director, board governance and strategy, CalPERS

## Executive summary

Humanity has only just proposed to name the current period ‘the Anthropocene’, and thus far it’s not going too well. Greenhouse gas emissions are contributing to climate change, with melting ice caps, increasing intensity of natural disasters and rising sea levels, all indicative of the extent to which human activities impact the environment. We have proven too clever for our own good, possibly polluting ourselves out of the picture. Yet human ingenuity may also offer solutions—such as renewable energy, carbon capture storage (CCS), and plant-based substitutes for animal and oil-derived products. In order to save the day, these technologies need to be of scale. And for that to happen, they need financing.

The Economist Intelligence Unit surveyed investors in Asia-Pacific (APAC), Europe and North America and found those in Asia were the most likely to always consider climate change as a financial risk. Surprisingly, early ESG adopter Europe lags by more than 10 percentage points on this indicator, suggesting that Asia is not only catching up but may also be overtaking the early adopters.

Some 80% of survey respondents say climate change mitigation plays either a significant or moderate role in their tech-investment decisions. This sentiment is most evident in North America, and again lowest in Europe, potentially because of greater tech opportunities available in US markets.

### Hedge fund focus

Hedge funds are a strong pick for targeted cleantech investments. Equity markets are places for incumbent companies, which often have high carbon exposures and limited exposure to sustainable technologies. On the other hand, infrastructure, such as solar and wind, is seen as an asset class with good opportunities, not least in private equity (PE).

Private markets are a more natural terrain for impact investing, as investors in this category tend to have more control over assets. Venture capital is another important avenue for investment funds, although less so on the institutional level, such as pension funds. Nevertheless, tech opportunities from this space have made it into such portfolios because of their size and success—Tesla, an electric car maker, being a prime example.

Survey respondents were also asked about their favoured ways of accessing technology on a 12-month forward view. Their answers show that appetite for public debt could pick up next year, taking the largest share, while hedge funds could see a dip in popularity versus this year.

### Renewables lead

Electricity and heat generation, followed by industry-related investments, represent the lion’s share of existing investment in climate change mitigation across the three regions in this study.

Based on what investors believed were most likely to deliver climate improvements, renewable energy still took the number-one spot. However, CCS has gained considerable attention. More than a third of respondents think that CCS can have a significant environmental impact. However, less than a quarter have invested in it, indicating that there is still some disconnect between aspiration and action.

Buildings, transport and agriculture, despite being major sources of greenhouse gases, have relatively low investment allocations. There are, however, noteworthy variations by region and investor size. European investors were most likely to prioritise renewables. The region is also more hopeful about nascent CCS technologies, closely followed by North America, which also shows favour for investing in work-from-home technologies. APAC's investors, on the other hand, saw more promise in green building and recycling.

## Gaining insight

The challenge facing investors who are looking through a climate lens is increasingly being framed, not as a trade-off between returns and climate, but with uncertainties around policy and technology, which make forecasting transition pathways and the trajectories for each sector difficult. What's more, consciousness of the stakes in backing the wrong technology is suppressing "animal spirits" in these markets. Investors are mindful of the dangers of sinking their cash into expensive white elephants.

New technologies or alternative data sources, deployed internally at investment firms and funds, such as satellite imagery and artificial intelligence (AI) are likely to play key roles on the road ahead—but, like CCS, it's still early days for these.



## Introduction

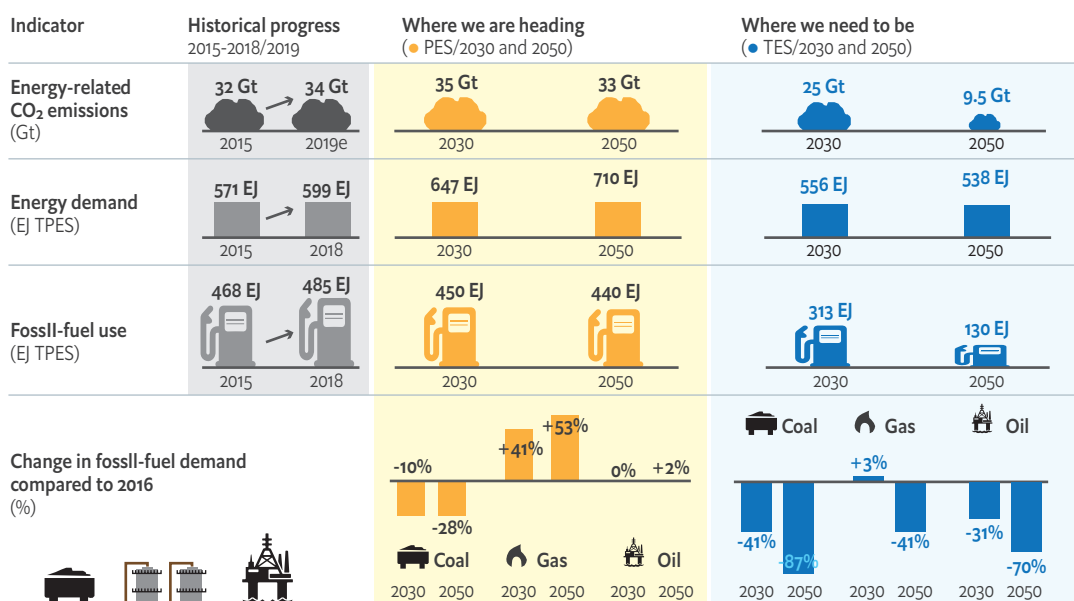
Is human ingenuity the key to the climate change crisis? Since the first industrial revolution, humanity has been accumulating a carbon debt that seems overdue. Can the latest generation of technology—promising a new industrial revolution—settle that debt?

As studies have repeatedly substantiated, human action drives climate change. John Cook et al in a 2016 paper, *Consensus on consensus*, famously reviewed 11,944 abstracts of climate-related research papers, finding that over 90% agreed that human activity is behind the rising temperatures and water levels that are changing our planet.<sup>1</sup> Some academics have taken dispute with the final percentage of consensus but

as the paper itself states: “From a broader perspective, it doesn’t matter if the consensus number is 90% or 100%. The level of scientific agreement on AGW [anthropogenic global warming] is overwhelmingly high because the supporting evidence is overwhelmingly strong.”

However, investors have largely been late to the consensus party. Case in point, according to ClimateWise, a network of insurers and industry service providers, “the insurance industry is responsible for over US\$30trn of global assets under management [AUM], but less than 0.5% of assets invested by the world’s 80 largest insurers are in low-carbon investments that provide solutions to climate

**Figure 1: Energy markets—where we’re going, and where we need to be**  
Indicators and progress for key energy types



Note: TPES = total primary energy supply. e = estimate; Gt = gigatonnes; EJ = exajoules. Based on IRENA scenario analysis.

Source: IRENA.

<sup>1</sup> John Cook et al 2016, *Environ. Res. Lett.*, 11 048002, <https://iopscience.iop.org/article/10.1088/1748-9326/11/4/048002/pdf>

change”.<sup>2</sup> That disconnect will need addressing at some point if climate challenges are going to be met from a business and investment angle.

The Paris Agreement represents a line in the sand, committing signatories to quantifiable targets to limit the average increase in temperature to below 2°C. But as the International Renewable Energy Agency (IRENA) states: “The gap between aspiration and the reality in tackling climate change remains as significant as ever...global energy-related CO2 emissions, despite levelling off periodically, have risen by 1% per year on average over the last decade.”<sup>3</sup>

What may be more worrying, despite asset owners and governments becoming more focused on sustainability, is the fact that the share of renewable energy in global consumption volumes has grown only slightly since 2010, maintaining a level of about 10%.<sup>4</sup>

As American author Upton Sinclair wrote, it is “difficult to get a man to understand something when his salary depends upon his not understanding it”. This may be an apt description of modern finance. Most investment decisions depend primarily on financial returns—leaving inconvenient truths about environmental costs to be overlooked.

“People’s careers and reputations are on the line for going against consensus,” says Julian Poulter of Energy Transition Advisors. “It’s easier to sit on an index and hope you can get out of exposed areas in time.”

### **Climate of change**

For centuries, investors have backed carbon-intensive technology. Now, we look at to what extent, and where, they are getting behind cleantech alternatives. Signs of change are evident. Drivers may come through new regulatory action, initiatives such as the Taskforce on Climate-related Financial Disclosures (TCFD), and a realisation that mitigating technologies aimed at climate change may be a source of returns rather than a drain on them.

As an example, a report from IRENA outlines an energy transition that “would effectively pay for itself, with every dollar spent bringing returns between three and eight dollars”.<sup>5</sup> Irrespective of any views on the relationship between fiduciary duty and planetary impact, this is something that should make all investors sit up and take notice.

The focus of this report is to investigate if investors are taking notice, the extent of this and where they see opportunity.

<sup>2</sup> ClimateWise, The ClimateWise Principles Independent Review 2019, <https://www.cisl.cam.ac.uk/resources/publication-pdfs/climate-wiseprinciples-review-2019.pdf>

<sup>3</sup> IRENA, Global renewables outlook 2020, <https://www.irena.org/publications/2020/Apr/Global-Renewables-Outlook-2020>

<sup>4</sup> Ibid

<sup>5</sup> Ibid

## Mother of invention: the necessity of cleantech

Definitions of climate-change mitigating technologies vary, making their growth difficult to quantify. How should energy companies be categorised? For instance, BP carries out significant research in sustainable technologies but also has more than 30 offshore oilrigs<sup>6</sup> and is among the top ten largest oil and gas companies. Is it better to allocate a market cap proportional to the percentage of capital it apportions to renewables or exclude it as an oil and gas major?

Pedro Antonio Guazo Alonso, representative of the secretary-general for investments of the UN Joint Staff Pension Fund (UNJSPF), is particularly mindful of such questions. “We are interested in any technology that will move the world away from fossil fuels. That can in some instances include remaining invested in fossil fuel companies, where we think they are engaged in important areas of sustainability research.”

“Technology is a bit of a bucket term for many aspects of companies’ transition plans,” says Anne Simpson, director of board governance and strategy at CalPERS, California’s pension fund. “Whether that’s PepsiCo working out how to use satellite technology to monitor weather and irrigation in the sourcing of its sugar or Exxon investing US\$7bn into carbon sequestration technology. However it comes, technology is a vitally important driver. Necessity being the mother of invention, on this as with all else.”

### Sustainability-linked ventures

Many growth areas are in private markets, the hunting ground of PE, debt and venture capital investors. As Adrian Locher, co-founder and CEO of Merantix, an AI-focused tech incubator explains, “We are a venture studio. We identify problems we believe need to be solved. We assemble multidisciplinary teams and spend a lot of time on the validation of ideas and technology. In essence, we build the companies we invest in.”

The electric cars of Tesla and others started in similar incubators and hold great potential for reducing climate threats and increasing portfolio returns. Decoupling transport from combustion could go a long way to decarbonising the environment. Meanwhile, other innovations, such as agri-tech, promise to reduce water use or boost food production without chemicals, while plastic-eating enzymes or transparent solar panels that replace windows are in development—and it’s these kinds of advances that could contribute to a cleaner, cooler planet.

The sustainability track is broad and offers many opportunities. Proxies, such as sustainably oriented indices, are one way to gauge the trend. The MSCI Climate Change index is one example and was “designed to enable investors to holistically integrate climate-risk considerations in their investment process while increasing diversification through a rules-based reweighting methodology”.<sup>7</sup>

<sup>6</sup> As at 2018, Statista, source Rigzone.com

<sup>7</sup> MSCI, Introducing MSCI Climate Change Indexes, <https://www.msci.com/climate-change-indexes>



However, the index's average number of stocks is 2,391, compared with 2,529 for the MSCI ACWI, a broad global equity index. The relative abundance of holdings indicates that the definition of sustainability can be elastic. A better proxy may be MSCI's Global Environment Index, based on the key environmental themes of alternative energy, sustainable water, green building, pollution prevention and clean technology,<sup>8</sup> which includes fewer than 240 stocks. Tesla—which claimed the title of world's most valuable auto name over the summer of 2020 and is one of the world's largest companies by market cap<sup>9</sup>—is, unsurprisingly, the index's top holding. Samsung is sixth. But is this a cleantech stock? The company's investment in battery technology and low-power LEDs might mean it is. Both names are clearly in the consumer tech space; therefore, investors venture into cleantech where they find it.

### Electric cars to hungry enzymes

A recent study from McKinsey estimated that 60% of the world's physical goods could be made using biological means instead of petrochemicals.<sup>10</sup> This encapsulates a variety

of opportunities, from plastic alternatives made with yeast to leather created from mushroom roots instead of methane-producing cattle.

A 2019 study predicted that the market size of green technology and sustainability<sup>11</sup> would climb from US\$8.7bn to US\$28.9bn by 2024, at a compound annual growth rate (CAGR) of 27.1%.<sup>12</sup> This market categorisation, although sizable, excludes the big sustainable-energy plays, which dwarf other technologies in value. Indeed, by one account, renewables now account for about a third of total global energy, with steady investments of about US\$300bn annually over the past five years<sup>13</sup> (Fig 2).

Nevertheless, while certain renewable sectors, such as power generation, are becoming a default cleantech investment option, and the electrification of transport is showing promising signs, "renewables are growing too slowly in major energy-consuming sectors like buildings and industry,"<sup>14</sup> according to IRENA. This is despite the fact that, according to the UN Environment Programme, buildings present the "largest potential for delivering long-term, significant and cost-effective greenhouse gas emission reductions".<sup>15</sup>

<sup>8</sup> MSCI, MSCI GLOBAL ENVIRONMENT INDEX METHODOLOGY, May 2018, [https://www.msci.com/eqb/methodology/meth\\_docs/MSCI\\_Global\\_Environment\\_Index\\_May2018.pdf](https://www.msci.com/eqb/methodology/meth_docs/MSCI_Global_Environment_Index_May2018.pdf)

<sup>9</sup> As at August 28th 2020.

<sup>10</sup> McKinsey, The Bio Revolution Innovations transforming economies, societies, and our lives, May 13th 2020, <https://www.mckinsey.com/industries/pharmaceuticals-and-medical-products/our-insights/the-bio-revolution-innovations-transforming-economies-societies-and-our-lives>

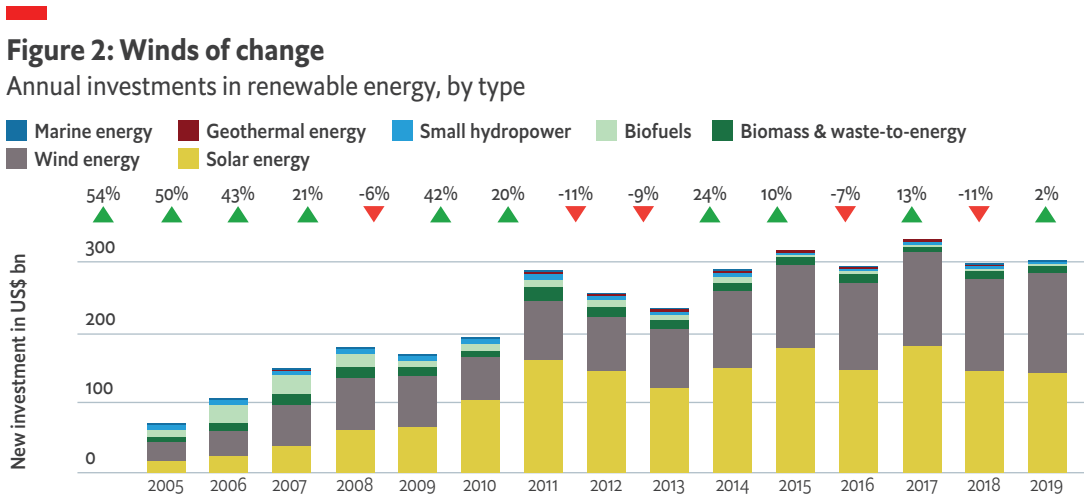
<sup>11</sup> The study defined the market as including carbon footprint management, green buildings, water purification, crop monitoring, soil condition and moisture monitoring, weather monitoring and forecasting, air and water pollution monitoring, sustainable mining and exploration, forest monitoring, water leak detection, and water purification.

<sup>12</sup> ResearchAndMarkets, Analysis on the \$28.9 Billion Green Technology & Sustainability Market (2019-2024), via <https://www.businesswire.com/news/home/20190924005777/en/Analysis-28.9-Billion-Green-Technology-Sustainability-Market>

<sup>13</sup> Global Trends In Renewable Energy Investment 2020, UN Environment Programme, BloombergNEF

<sup>14</sup> IRENA, Global renewables outlook 2020, <https://www.irena.org/publications/2020/Apr/Global-Renewables-Outlook-2020>

<sup>15</sup> UNEP, Technologies for Climate Change Mitigation: Building Sector, 2012, <https://www.uncclearn.org/wp-content/uploads/library/unep223.pdf>



Source: UN Environment, Frankfurt School-UNEP Centre, BloombergNEF.



## What are investors doing?

To gain better insights into how asset owners and institutional investors are approaching climate-related investments, The Economist Intelligence Unit asked organisations how they manage cleantech exposure.

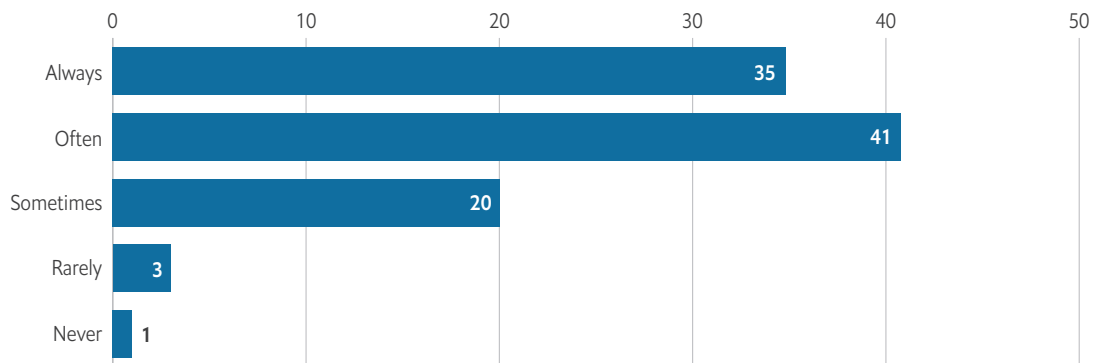
A prominent trend we noted is that investors do generally link climate change and financial risk rather than seeing a trade-off between the environment and returns. Not addressing the former is increasingly seen as a risk to the latter (Fig 3). The overwhelming majority of survey respondents (96%) report that they consider climate change as a source of financial risk in regular investment decisions,

while more than a third say they “always” consider climate change.

“We don’t see climate change and financial returns as being a trade-off,” says AustralianSuper’s director of ESG and stewardship, Andrew Gray. “Having a portfolio geared to the transition to a low-carbon economy is consistent with generating long-term returns.” Ms Simpson of CalPERS agrees: “Our fiduciary duty is not divided—it’s a 7% discount rate and the asset classes play different roles in generating cash, growth and inflation hedge.”

**Figure 3: More often than not**

Survey respondent frequency of considering climate change as a financial risk (% respondents)



Source: The Economist Intelligence Unit.

### Asia leads in climate considerations

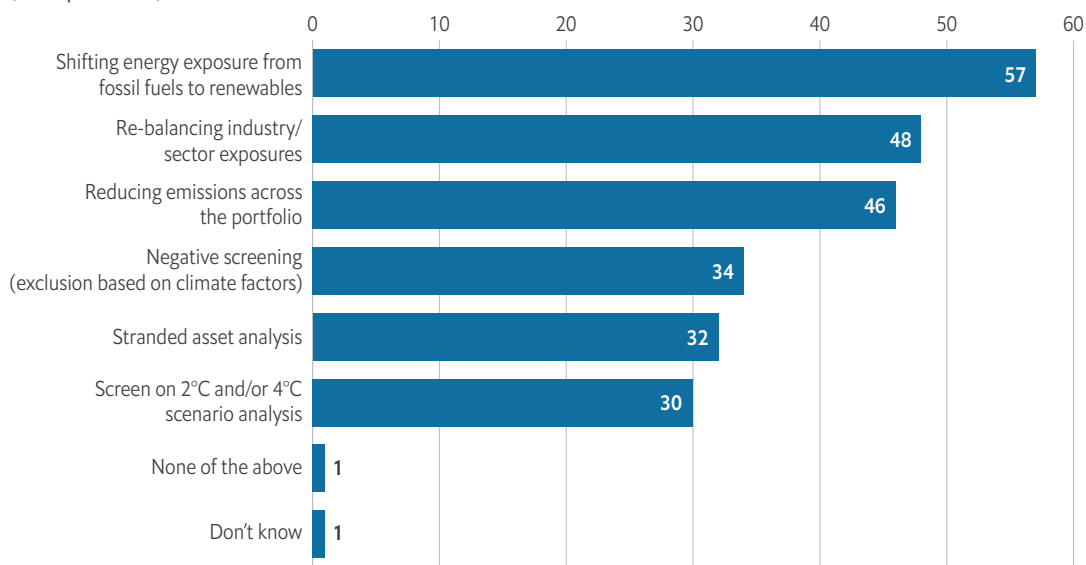
Respondents in APAC were the most likely to “always” consider climate change as a financial risk factor (40% vs 36% for North America

and 29% for Europe). Europe appears to lag in an investment area that the region has historically led in, indicating that other regions may be catching up and could even accelerate beyond the early adopters.

### Figure 4: Pruning fossil fuels

Respondents' methods for balancing returns with climate risks

(% respondents)



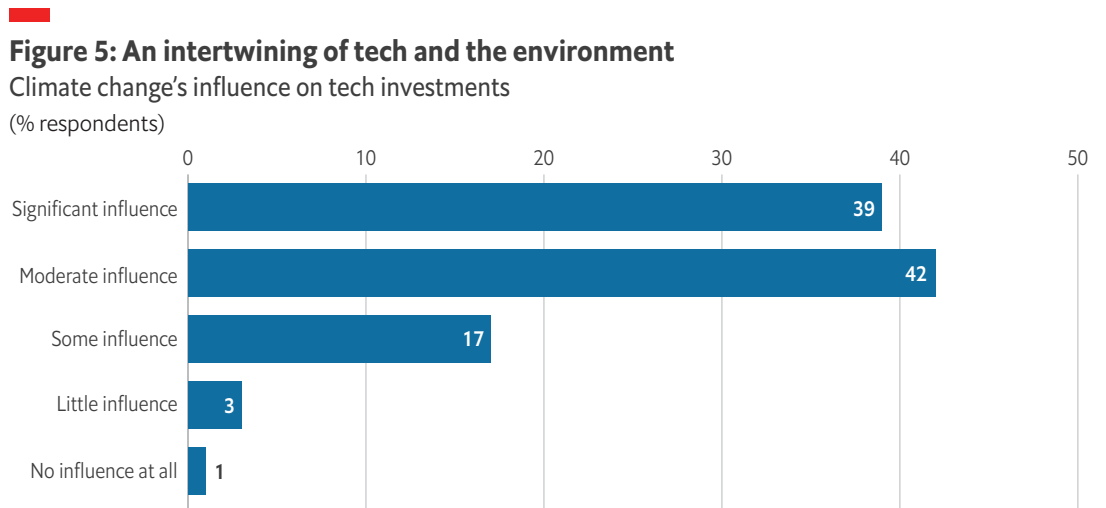
Source: The Economist Intelligence Unit.

Approaches for balancing return objectives against climate change threats are diverse. Shifting energy exposure from fossil fuels to renewables was the most often cited, with more than half of respondents saying they use this approach—particularly in Europe, where 64% of respondents made it a priority. Asia’s investors, on the other hand, were the most likely to favour rebalancing industry and sector exposures (57%).

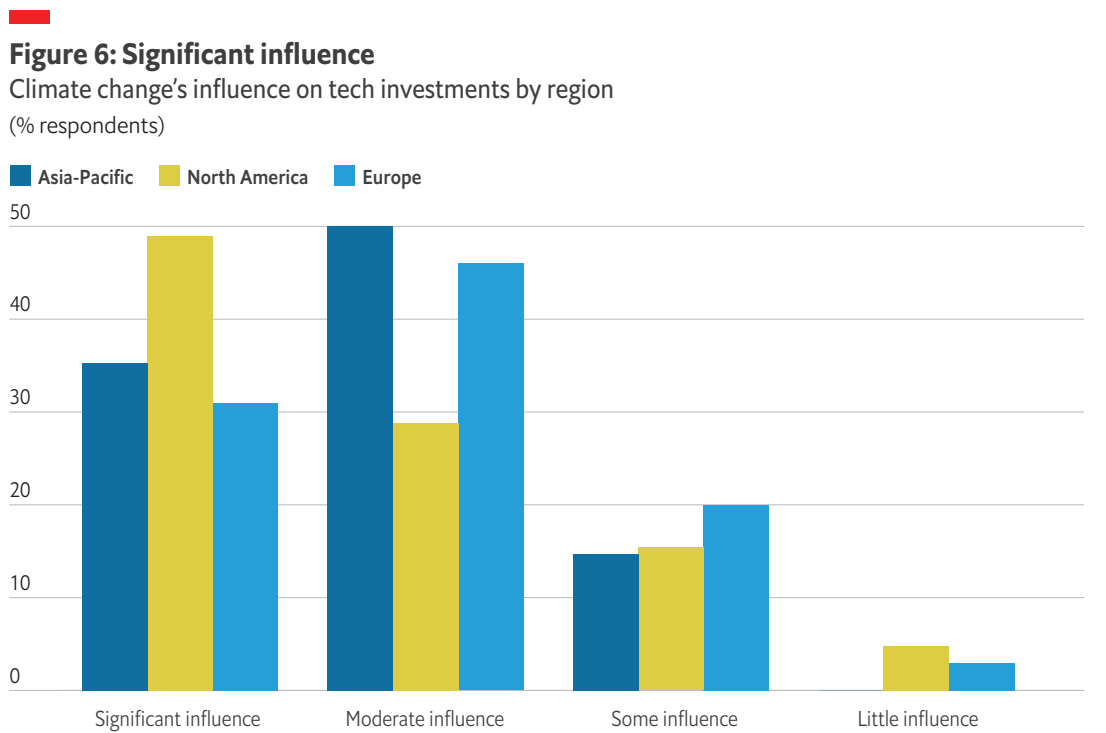
Some 80% of respondents say that climate change mitigation plays either a significant or moderate role in their tech-investment decisions. This rate is the highest in North

America, where 49% cite it as a significant influence, and the lowest in Europe, at 31%. The result is counterintuitive, as Europe is generally held to be the leader in ESG, with the US a laggard.

It’s possible that the US has greater tech opportunities available in its markets, giving investors greater room to manoeuvre. The majority of respondents from North America in the survey sample are also asset owners, which other Economist Intelligence Unit research has indicated generally focus more on climate metrics than do asset managers.



Source: The Economist Intelligence Unit.



Source: The Economist Intelligence Unit.

“We screen our portfolio on an ongoing basis and include climate change in our engagement with companies,” explains Carine Smith Ihenacho, chief corporate governance officer at Norges Bank Investment Management (NBIM). “Even if knowledge and data [are] still at an early stage, an integrated approach makes sense, not least because climate change risks cut across demand, supply, technology, physical and even liability risks.”

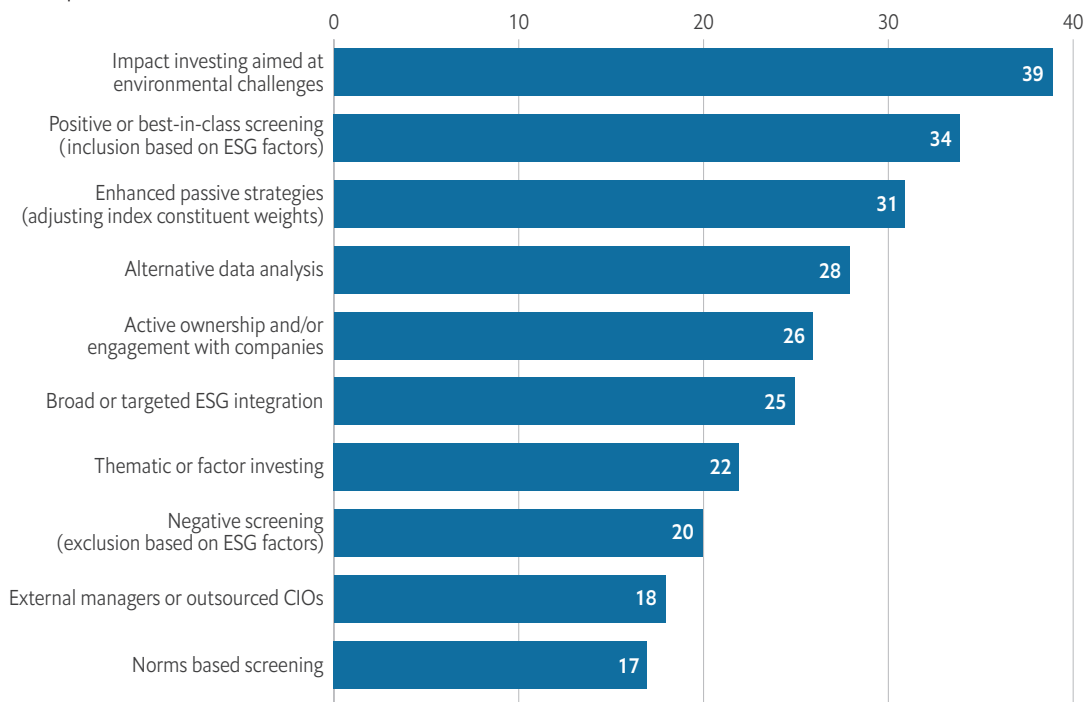
### Impact investing out front

Investors are incorporating climate consideration into their investment processes (Fig 7) in myriad ways. Environmentally focused impact investing was the number one answer, but that could indicate a judgement as much as a method. North Americans led the field here, at 44%. This could be down to the historically higher exposure of these regional

**Figure 7: Spoiled for choice**

How respondents seek climate change mitigation within the investment process

(% respondents)



Source: The Economist Intelligence Unit.

portfolios to PE. Private markets are a natural terrain for impact investing, as the investor can have more control and oversight of the asset.

ESG-based screening comes second, and Steve Freedman, a product specialist in thematic equities at Pictet, a Swiss private bank, says that the “integration of ESG risk rather than actively seeking out solutions to climate change” is still more prevalent with large asset owners.

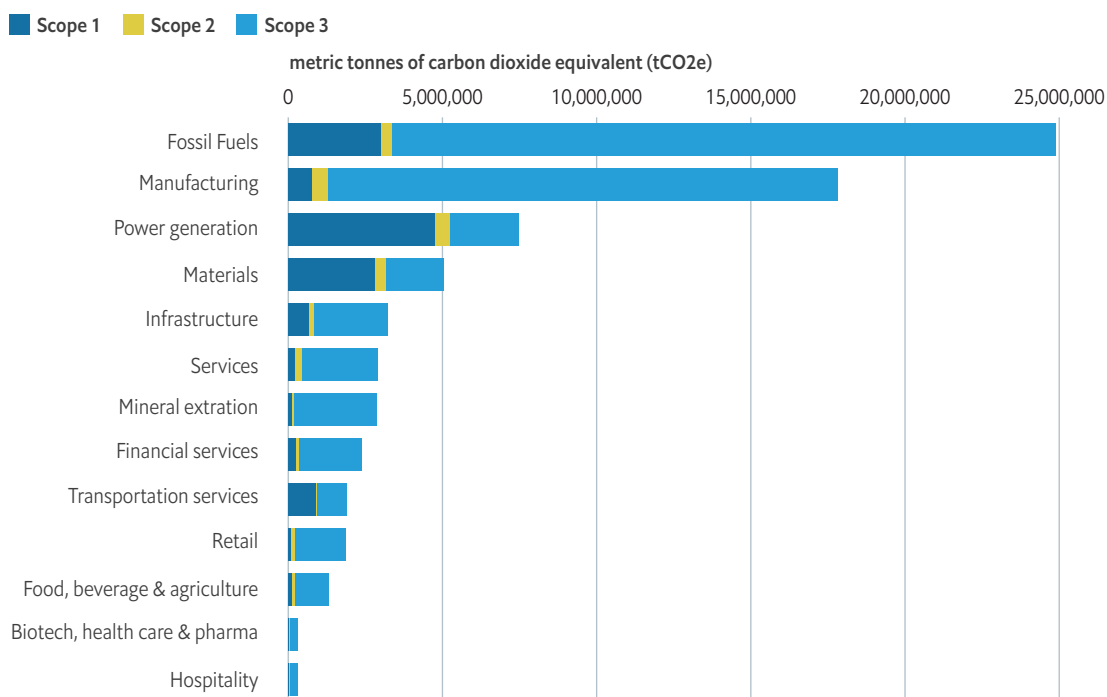
### Alternative data emerging

The survey indicates that alternative data analysis is still nascent, with just over a quarter

of investors selecting it as one of their top approaches to climate-related investing. “More efficient tracking of the impact of these investments would help get more investors on board,” says Mr Freedman. He adds that “while most investors can monitor scope 1 and 2 of greenhouse gas emissions [direct emissions from owned or controlled sources and indirect emissions by the reporting company], fewer track scope 3, which captures the impact throughout the supply chain: data is still incomplete.”

The size of scope 3 emissions (Fig 8), and therefore the importance of measuring them, is huge—dwarfing scopes 1 and 2 in every sector except power generation and materials.

**Figure 8: Plenty of scope**  
Emissions by type and industry sector

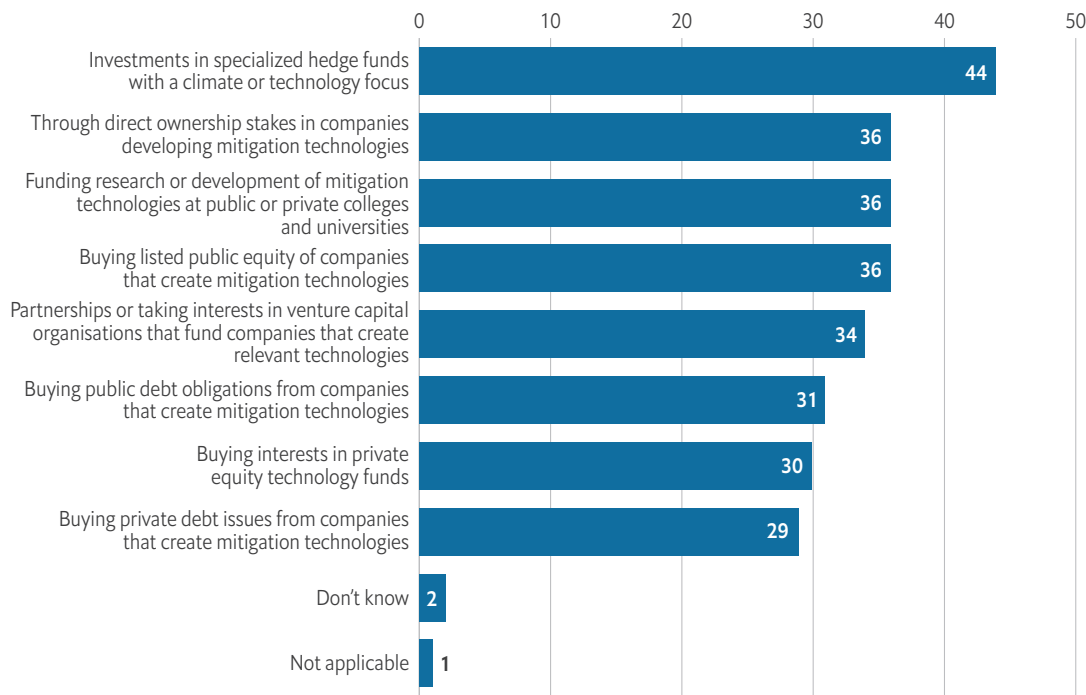


Source: CDP

The emphasis on shifting from fossil fuels to renewables is clearly on target (Fig 4). Although it's not possible to exactly match the main areas investors are focusing on (Fig 11), the data reveal that there is not yet enough direct alignment with high emission industries and investments being made.

Reliable data remain a crucial barrier (Fig 14). Technology—within investment houses—is another way to aid the climate challenge, giving investors a more accurate look at metrics—such as satellite data for deforestation—which currently is often lacking. The situation points to wider use of AI to sort through reams of data that humans would not otherwise be able to process.

**Figure 9: Hedging on climate change**  
How investors access climate-rated technologies  
(% respondents)



Source: The Economist Intelligence Unit.



## Options for investing in climate-change mitigation

Survey respondents selected specialised hedge funds by a reasonable margin, at 44% (Fig 9), as a tactic for gaining exposure to climate-related technologies. This approach was most prevalent in North America, where more than half of respondents sought exposure in this way. Direct ownership was the second most popular answer, at 36%, reflecting a larger trend where PE has picked up interest (likely also due to low interest rates). Despite the US's historical dominance in PE, investors in Asia lead the pack in this category, with nearly 40% claiming to seek exposure this way.

Carbon Tracker's founder and executive chairperson, Mark Campanale, reckons that asset owners are moving primarily into large-scale clean energy infrastructure, "either through private markets or via listed markets such as Orsted. Here, allocations are increasing."

NBIM's Ms Ihenacho reinforces his point, saying: "Our mandate has recently opened for investments in unlisted renewable infrastructure. Our investment strategy in unlisted renewable energy infrastructure will be developed over time."

Mr Campanale also says that venture capital is an important pathway, but with institutional investors such as pension funds less present and corporate investors playing a bigger role. "But tech opportunities in this space have now made it into institutional portfolios because

of their size and success—and Tesla is an example of this," he adds.

## Public versus private routes

Another recent study of sovereign wealth funds and central banks' investment trends found that of those "who actively own climate-friendly assets, most preferred real assets".<sup>16</sup> In our survey, respondents in Asia were the most likely to buy public equity of companies that create mitigation technologies (at 40% vs 37% in Europe and 30% in North America).

The nature of an asset influences the investment route, explains Ms Simpson: "We have specific strategies for each of our asset classes. For example, in our real-estate portfolio we developed a whole underwriting process, which we are finding very beneficial, and in our PE portfolio we engage our managers on climate change." About 18% of CalPERS' private market investments are directly in climate-change solutions, in areas such as renewables, energy efficiency and water storage.

Equity markets are places for incumbent companies, many of which have high carbon exposures and limited exposure to the "clean green upside", reckons Mr Poulter, with few exceptions, such as Tesla and Orsted, a Danish multinational power company. "Equities are therefore not generally a place where you go seeking climate upside," he says. Instead, he tips infrastructure—solar and wind, for example—as an asset class with good upside, and good opportunities in PE.

<sup>16</sup> Invesco, Global Sovereign Asset Management Study, 2020, <https://www.invesco.com/content/dam/invesco/igsams/en/docs/Invesco-Global-Sovereign-Asset-Management-Study-2020-Global.pdf>

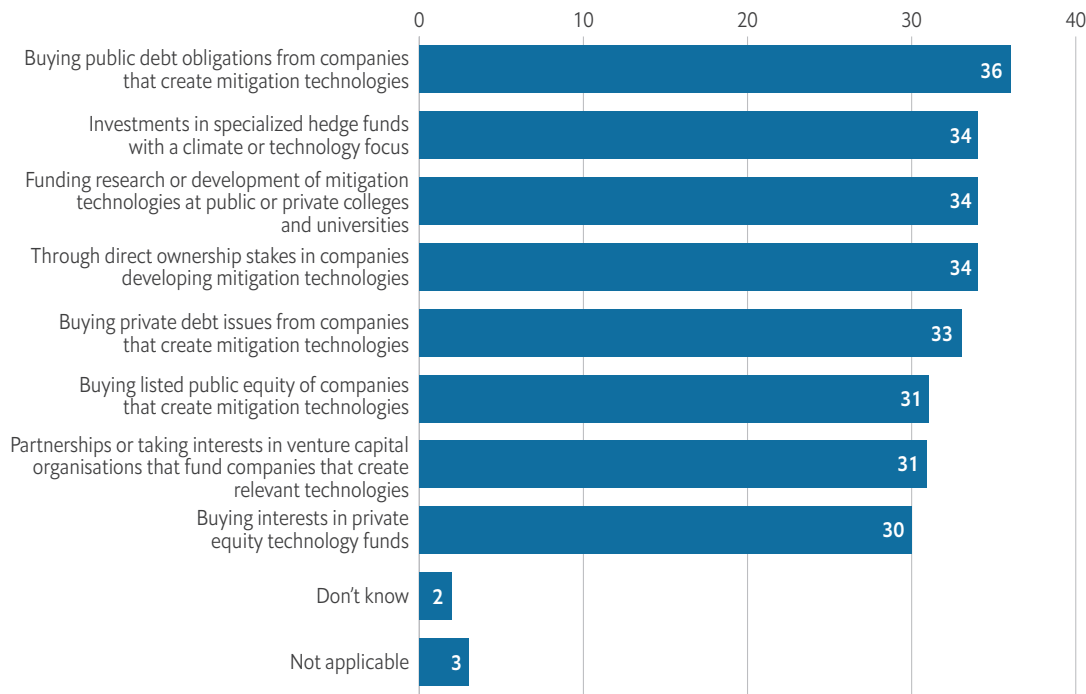
Other key areas, such as negative emissions (CCS, direct air capture, algae blooms, etc) are still in the early stages. These are therefore more under the purview of venture capital, as they are not market ready enough to hit sustainability targets for large investors. Ms Simpson comments that venture capital is not an asset class CalPERS participates in; conversely, Mr Guazo of UNJSPF says, “we don’t have a preference on the asset class and listen to the particular issuers.”

In the survey, changing the outlook to 12 months forward shakes up investors’ leanings (Fig 10). All options come out relatively even, but appetite for public debt looks like it could pick up next year, taking the largest share for the forward view. A significant expected drop in appetite for hedge funds also arises, with Asia’s investors having the smallest appetite for these vehicles across both time periods.

**Figure 10: Buying debt to society**

Expected growth areas of climate-related investment over the next 12 months

(% respondents)



Source: The Economist Intelligence Unit.

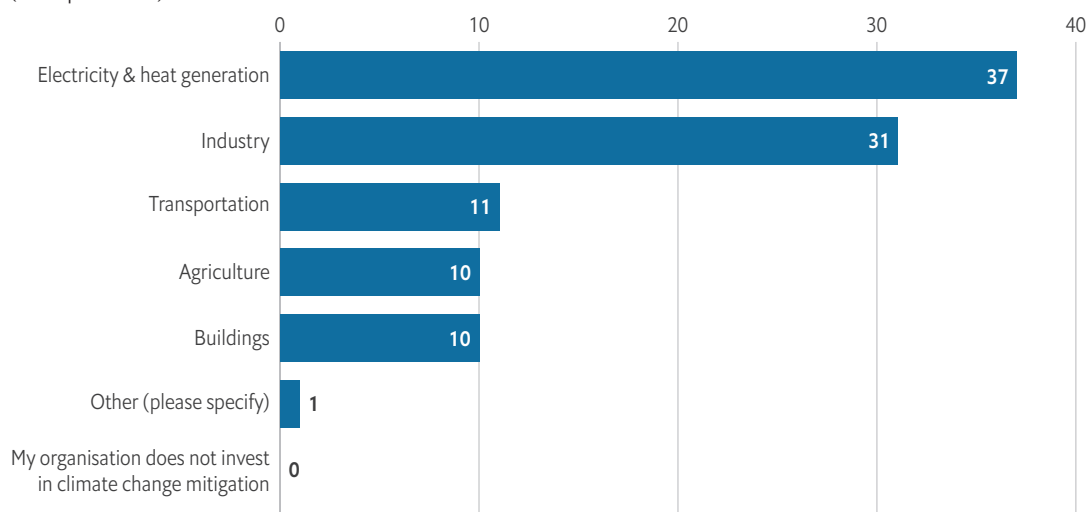
## Technology: where's the opportunity?

Electricity and heat generation, and industry-related investments, represent the lion's share of existing investment in climate change mitigation—observed across all three regions. “We like solar and wind, both onshore and offshore, accessing these areas through public equity and debt, and even PE,” says Mr Guazo, by way of example.

Asset owner AustralianSuper shares this focus on renewables. “We’re obviously looking at wind and solar,” says Mr Gray, “with a watching brief on CCS, although the consensus is that the latter is a less likely solution. Another key area is [power] storage, as one of the main problems with renewables is its intermittency.”

**Figure 11: Investors' biggest tech calls**

Investor exposure to climate-change mitigation by sector  
(% respondents)



Source: The Economist Intelligence Unit.

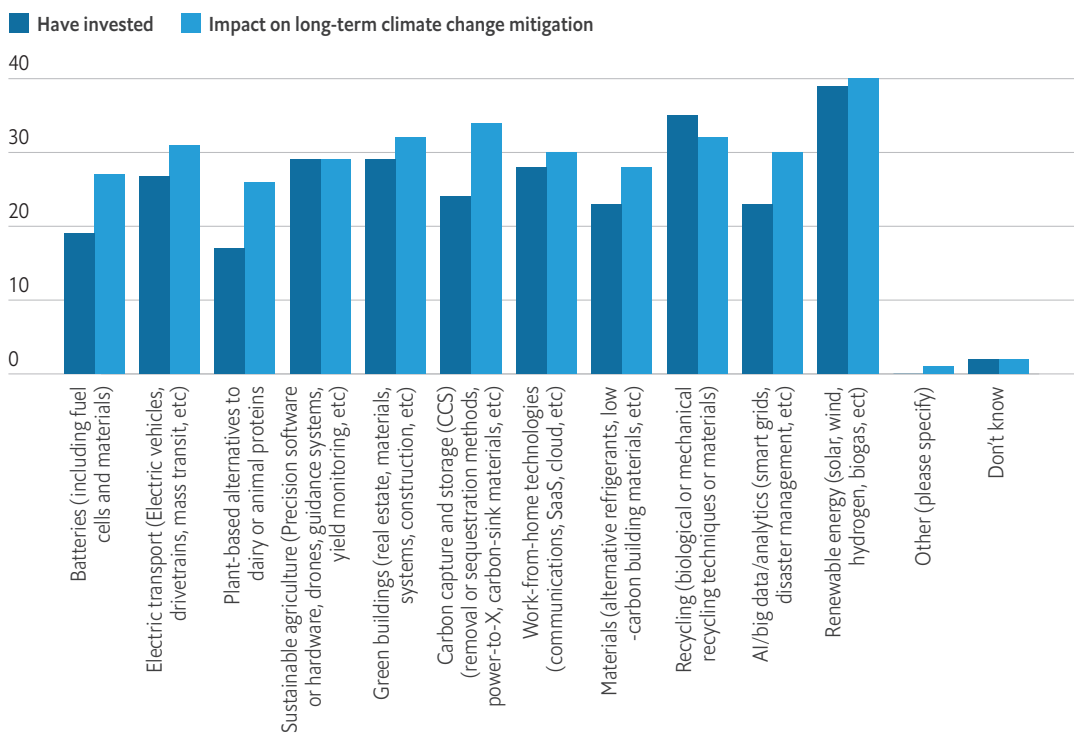
Meanwhile, Ms Ihenacho says the bank is finding opportunities in three main areas: low-carbon energy and alternative fuels, clean energy and energy efficiency, and natural resource management. “Companies must have at least 20% of their business in one of these areas to be included in our environmental universe,” she explains.

### Two-sided equation

When shifting attention to future impacts within a context of more specific technologies that investors actually hold, renewable energy maintains its predominance. Renewables, at near 40%, leads, with recycling following closely after. Sustainable agriculture and green buildings round out the top four.

**Figure 12: The top techs**

Technology themes respondents are invested in and expect to deliver climate impacts  
(% respondents)



Source: The Economist Intelligence Unit.

Batteries were far down the list, at 19%. The survey outcome is significant, as the bottleneck in renewable energy provision is no longer generation, but storage, as noted by AustralianSuper. Mr Poulter notes that, while storage has lagged, it is catching up. However, this is not generally through public markets, but more often through PE. "Allocations here are still relatively low, an exception being the US, where PE allocations tend to be higher," he says.

Looking at rankings, based on what investors believe are the most likely to deliver climate

(rather than financial) returns, renewable energy keeps the top spot. But CCS moves up. More than a third of respondents think that CCS can have a significant impact but less than a quarter have invested in it. This speaks to the newness of the technology.

While the "invested in" versus "positive impact" lists are broadly similar, the percentages captured in the impact list are generally larger. There are a number of reasons for this; the main one being risk. Moreover, there are various dimensions, such as uncertainty over the viability of unproven technology

to liquidity concerns over smaller ventures. What's more, some companies operating in this space will simply be too small for larger funds to consider investing in.

Despite the fanfare and valuation that Tesla garners in markets and media, electric transport (cars, trains, mass transit, etc) was only the fifth most popular technology theme selected in the survey when investors focused on climate change mitigation. However, the smaller investors in the survey (AUM below US\$10bn), picked electric transport as a top play in climate mitigation, tying with CCS.

According to a European Commission report from 2018, the global market growth of electric vehicles is poised for steep growth over the next 20 years. Citing a range of other studies and compiling estimates, the report projects that, under different technology scenarios, electric cars could capture as much as 30% of the global market for all vehicles, reaching up to 900 million units on the road in 2040.<sup>17</sup>

### **Asia builds green as Americans work from home**

Buildings, transport and agriculture, despite being major contributors to climate change, have significantly lower allocations in our survey respondents' portfolios. There are, however, noteworthy variations by region and investor size. Asia's investors showed more interest in green building technology than other regions. Firms with less than USD\$10bn AUM also picked this category at the same rate as renewable energy.

European investors stuck with renewables for impact on climate change (50% vs 38% in North America and 33% for Asia), suggesting that while Europe has largely been seen as a leader in sustainable investing, it is perhaps getting less adventurous in maturity. But the region's hope for CCS—with 40% picking the developing technology for positive impact—also refutes that notion. North America had an impressive 37% picking CCS—the same as the region's selection of work-from-home technologies. Asia's investors, on the other hand, shunned remote working; it was their lowest pick, at 21%. Green buildings (36%) and recycling (35%) were more in Asia's favour.

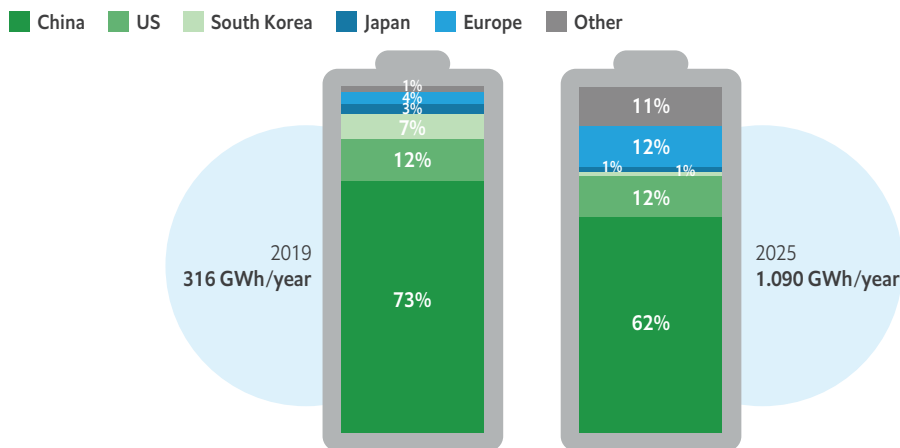
Both large and small investors favour renewables for investment, indicating low risk and low barriers to entry. Mr Campanale cited listed and private clean-energy infrastructure as being the most popular, as these are linked to comparable long-term cash flows, which are attractive to pension funds and endowments. "The next is more climate risk management oriented passive equity mandates. So by size, it's possible to allocate substantial billions to low carbon passives relatively quickly, whereas infrastructure tends to be a 10 year build out play."

Investors in the sub-US\$10bn AUM category were the least likely to opt for battery storage, while plant-based alternatives to animal proteins took the smallest share for their larger peers, suggesting that many operations in that field have valuations that are prohibitively low. Such companies will be venture plays—and many asset owners, CalPERS for example, take a pass on venture

<sup>17</sup> European Commission, Joint Research Centre, *JRC Science for policy report: Li-ion batteries for mobility and stationary storage applications*, 2018, <https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/li-ion-batteries-mobility-and-stationary-storage-applications>

### Figure 13 China’s battery of storage dominates

Lithium-cell manufacturing capacity by location



Source: Bloomberg NEF<sup>18</sup>

capital. Media exposure given to Tesla’s burgeoning spend on battery manufacture notwithstanding, this is a market that is overwhelmingly dominated by China—something set to escalate over the coming years (Fig 13).

#### What drives these selections?

“The questions we’re asked by investors are often driven by news flow,” says Mr Freedman, adding that the European Green Deal, a set of European Commission policy initiatives intended to make the EU climate neutral by 2050, frames much of that current interest. And it’s helping to generate more investor curiosity in green buildings and electric mobility. Another area is hydrogen, both as a fuel for transport and a way of storing energy, although Mr Freedman contends “this is still a technology in its early days; much hydrogen is still created from fossil fuels”.

Plant-based alternatives to dairy or animal protein were even further down the stack, with little more than a quarter of respondents backing it, possibly because it’s perceived as a fledgling technology (or even not as a technology). There is, however, a higher proportion of smaller investors from the survey sample who allocate to this category, which may be because such firms are often in a better position to allocate to smaller enterprises.

Nevertheless, says Merantix’s Mr Locher, “substitution will have the biggest impact [on climate-change mitigation], in such areas as batteries, steel, cement, fuels and food. Food is one of the biggest producers of CO<sub>2</sub>.”

Ms Simpson also highlights “mother nature’s technology—natural carbon sinks—that need protecting, such as from deforestation, where we are engaging companies that are producing

<sup>18</sup> Cited in: <https://www.sc.com/en/feature/accelerating-the-energy-transition-the-next-wave>

commodities like palm oil, that can contribute to [the] loss of these sinks.” Such pressure from large asset-owner investors can help bring change in the processing of vital commodities that might otherwise have a negative impact on climate change.

Typically, during the time of covid-19, work-from-home technologies—relevant for downstream reductions on transport emissions—took fifth place, at 28%. There’s a significant divide between North American and other investors allocating to this option

(35% versus APAC 28% and Europe 20%). Typically, longer commute times in North America’s sprawling communities could have influenced results here versus Europe and Asia’s typically more dense cities.

Lastly, there’s the long-shots—keeping an eye on sectors that everyone would love to see turn positive but no one can yet commit to. “Fusion has the potential to be a gamechanger—intellectually, I’ve got an interest but it’s not something that the scheme itself is invested in,” says Mr Guazo.

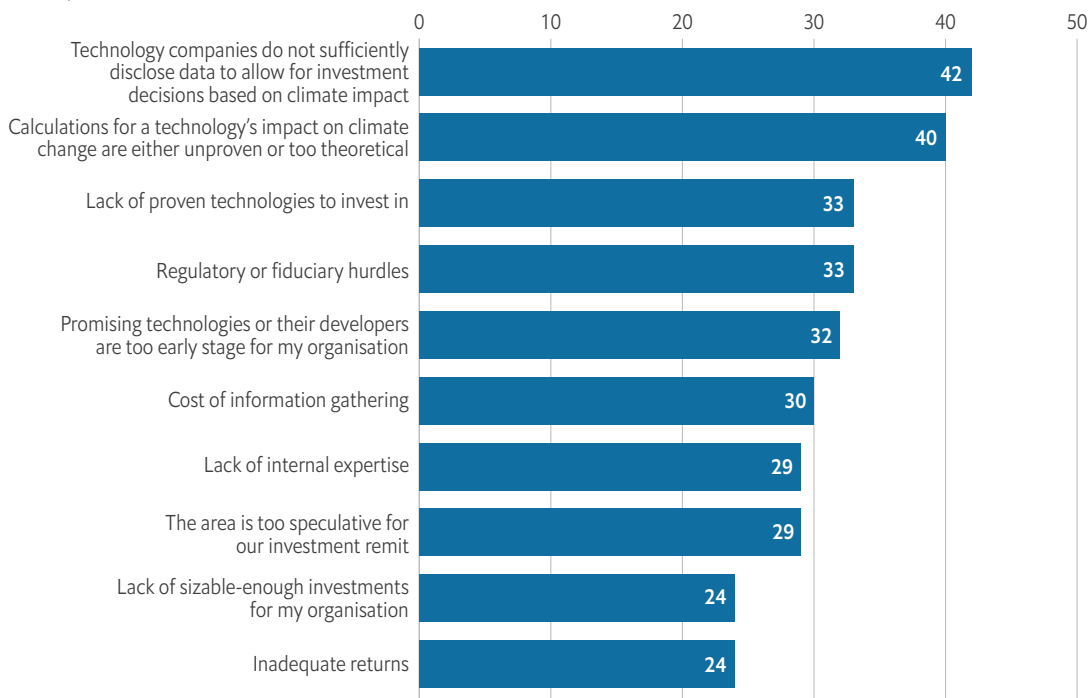


## Obstacles and solutions

Data, particularly its disclosure, are still the biggest block to more sustainable investing. That technology companies do not sufficiently disclose data to allow for investment decisions based on climate impact was seen as a problem fairly evenly across all regions. “Company reporting is a key piece of the puzzle, which is why the TCFD initiative is so important,” says Mr Gray.

Investors find data problematic because, as highlighted in the Sustainable and Actionable report series from The Economist Intelligence Unit on ESG investing, without a globally accepted standard for climate-related disclosures, understanding what is green enough will remain challenging when it comes to investors selecting ESG targets.

**Figure 14: Easier said than done**  
Investor obstacles to climate change mitigation  
(% respondents)



Source: The Economist Intelligence Unit.



Companies issuing debt or equities also generally report difficulties identifying characteristics or materiality of factors related to ESG index inclusion. Indeed, it seems that even the World Bank faces trouble in this department. Data “irregularities” may have affected certain countries’ rankings in two editions of the *Doing Business* report. Consequently, the organisation has suspended publication and is conducting a “systematic review” of previous reports.<sup>19</sup>

### The problem of measurement

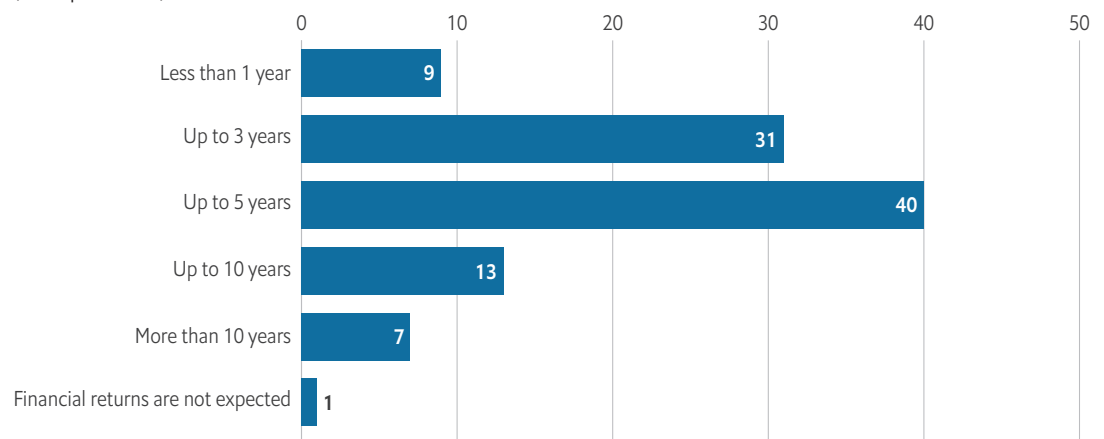
The related issue of not having a way to quantify a technology’s impact on climate change comes as a close second, at 40%.

Following this, the rest of the survey options capture similar response rates in the high 20s to low 30s—from regulatory hurdles to the cost of information gathering. A number of these are linked to data availability or reliability.

“The real problem is not a trade-off between return and climate change, but the uncertainties around policy and technology, which make forecasting those pathways and the trajectories for each sector difficult,” explains Mr Gray. “It’s a modelling problem.”

Consciousness of what’s at stake when backing the wrong horse can be paralysing. “The volume of return at stake is now well

**Figure 15: Many happy returns?**  
Expected time horizons for returns on climate-related investments  
(% respondents)



Source: The Economist Intelligence Unit.

<sup>19</sup> *Financial Times*, World Bank suspends its business climate index over data ‘irregularities’, August 27th 2020, <https://www.ft.com/content/4991f839-6577-4f76-b729-807377e372d4>

understood to be very high, although the markets with the greatest opportunity are also the ones with the greatest uncertainty, so it can be problematic reaching a consensus within an organisation for precisely this reason,” explains Mr Poulter.

Investors are mindful of the dangers of sinking cash into something that turns out to be the cleantech equivalent of Betamax, only to see it get steamrollered by something akin to VHS.

Inadequate returns (24%), on the other hand, is something relatively few investors found troubling, although an asset’s return profile is something to which investors pay close attention.

### How much time?

Most investors hope to see climate dividends in 3-5 years. “Investors in listed equities are typically not prepared to compromise on investment performance, at least over full market cycles, although there may be exceptions to that in private markets,” believes Mr Freedman. This raises the question, given the early stage status of many investments, are they overly optimistic?

North America presented a barbell result with the time-horizon question, with the greatest proportion of investors that demand both the shortest- and longest-term results. The majority of respondents indicated up to five years, although the nature of the investor will doubtless affect time horizons. Pension funds, for example, are in for the long haul.

“Our investment horizon is 15, 20, 30 years, so we can afford to be patient,” says Mr Guazo.

Whether assets are climate change-related or not, UNJSPF seeks a long-term return of 3.5% and can afford to sit on an investment for three decades. “It’s the advantage of being a pension fund; we’re not going anywhere.”

“One of the advantages of being a long-term investor is that we do have an appetite for long-term investments,” agrees Mr Gray in Australia. He adds that “the more certain the cashflows are, the lower the discount rate, and the higher the value of that asset will be. In general, the decision on whether to buy an asset will be a measure of its riskiness and the trajectory of its cashflows.” He cites the example of CCS, seen as an uncertain technology, so not something that his fund would place a high value on, and would therefore expect to have minimal exposure at this point. “We instead monitor it until a point where we see technology breakthroughs in that sector.”

### Big tech

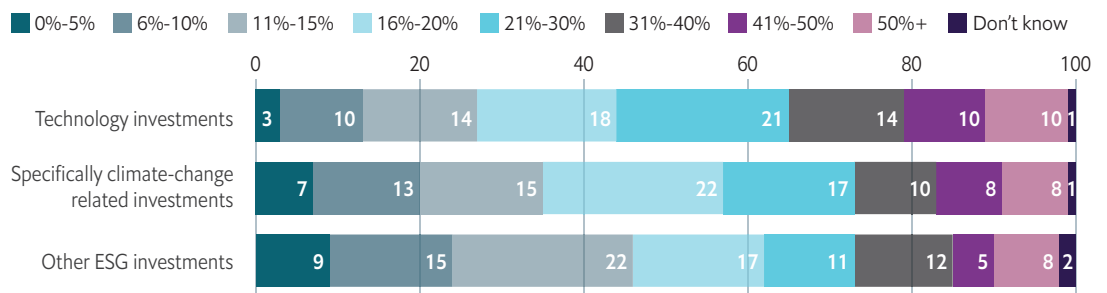
Technology represents a large portion of respondents’ investments, with 34% saying it makes up more than 30% of their portfolios. North American investors, at 48%, were most exposed, with Asia and Europe lagging by more than 10 percentage points each.

ESG also enjoyed significant popularity, with 25% of respondents saying it represents more than 30% of their portfolio. That said, the attitude of ESG allocation is shifting. More and more investors are adopting an approach that sees ESG as being intrinsic to integral risk management across the entire portfolio rather than just an allocation within it.

**Figure 16: Technology represents a large share of investments**

Survey respondent exposures to tech, cleantech, and ESG

(% respondents)



Source: The Economist Intelligence Unit

Investing specifically in climate mitigation was the same, with 25% saying it represents more than 30% of their portfolio. The rate was significantly higher in APAC (26%) and North America (36%) than in Europe (15%). Although Asia as a region has historically been viewed as an ESG laggard, it is also among the most exposed to the effects of extreme weather events resulting from climate change, such as storms and flooding, and large investors in the region have recently shown they are

“motivated by an increasing recognition that their investment decisions have material consequences for their environment and the lives of their beneficiaries”.<sup>20</sup>

It’s also highly possible that investors aren’t making hard and fast distinctions between climate-related and broader ESG investing, something that the lack of clarity in data offerings serves to perpetuate.<sup>21</sup>



<sup>20</sup> The Economist Intelligence Unit, Sustainable And Actionable: A study of asset-owner priorities for ESG investing in Asia, 2019, <https://eiperspectives.economist.com/sustainability/sustainable-and-actionable-study-asset-owner-priorities-esg-investing-asia>

<sup>21</sup> See: [https://www.advisorperspectives.com/articles/2020/08/24/is-esg-research-unreliable?bt\\_ee=jIHmCfX1GiMf18RqdIPO11WbhxXaoMJ5PEkCNbEzX6K2d%2FhawMf38j2Vl4n%2FWpiO&bt\\_ts=1598357523032](https://www.advisorperspectives.com/articles/2020/08/24/is-esg-research-unreliable?bt_ee=jIHmCfX1GiMf18RqdIPO11WbhxXaoMJ5PEkCNbEzX6K2d%2FhawMf38j2Vl4n%2FWpiO&bt_ts=1598357523032)

## Investing in investing

Investors seem to recognise that they have more to do in order to better understand opportunities related to climate change mitigation. Over the coming 12 months, survey respondents say they are very (36%) or extremely (46%) likely to make purchases to add or upgrade capabilities in the area of climate. Regionally, the sentiment is strongest in Asia, where 53% of respondents chose “extremely likely”.

Tracking climate risks in particular demands new technology. Investors have expressed frustration in this regard, for example with ESG data. Depending on companies to self-report or on ratings agencies that offer closed systems doesn’t provide a market advantage or even reliable results in some cases.

New ways to track climate risks is a fast-growing area, as Professor Ben Caldecott of the University of Oxford pointed out in *The Economist* earlier this year.<sup>22</sup> He highlighted how high-resolution satellite imagery means that it’s now possible to monitor deforestation, supply chains and oil spills, for instance. Satellite imagery is also being used “to fill in some disclosure gaps—for example, by allowing emissions to be geolocated to specific industrial facilities.”<sup>23</sup> The *Oil Adequacy Index*, from The Economist Intelligence Unit, likewise, uses satellite data to track conditions in the global oil market.

“Ursa Space Systems, a New York-based satellite data and analytics firm, has been tracking the impact of the coronavirus pandemic on global oil inventories, providing its customers with weekly reports on 11,000 oil-storage tanks observed with synthetic-aperture radar satellites.”<sup>24</sup> Hedge funds, in particular, subscribe to such feeds to bolster their niche. And, as stated earlier, such specialised funds are the primary way institutional investors, especially asset owners, say they implement investment into climate change mitigation (Fig 9).

As more satellites launch, those data feeds are likely to become more prolific and wider used. Allied Market Research predicts that commercial satellite imaging will grow at a market CAGR of 11.2% from 2019 to 2026.<sup>25</sup>

Web scraping, via machine learning (ML) and AI, is another area investors highlight as a new information source that can uncover news patterns or metadata to help identify conditions or events that align with an investment thesis.

The ability to quantify impact through these various means is vital, Mr Locher argues, “because what you cannot measure, you cannot manage. We see a lot of potential in a lot of different areas: agriculture, mobility, urban planning—how cities will work in the

<sup>22</sup> *The Economist*, Carbon offsetting is essential to tackling climate change, May 2020, <https://www.economist.com/briefing/2020/05/21/carbon-offsetting-is-essential-to-tackling-climate-change>

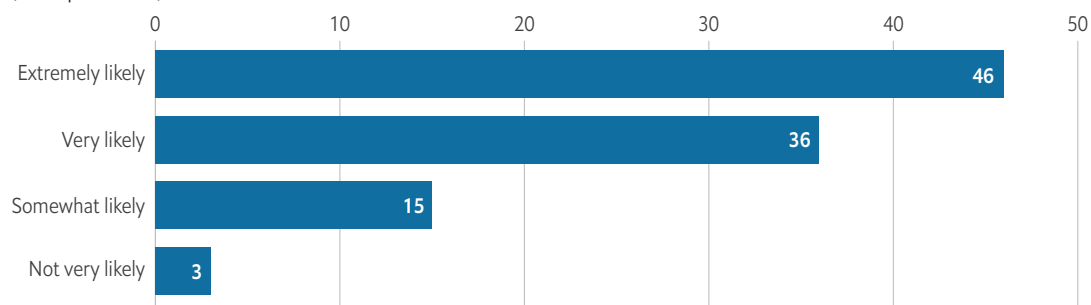
<sup>23</sup> Euromoney, ESG data – mind the gaps, August 27th 2020 <https://www.euromoney.com/article/b1n3cxdqbjmkl3/esg-data-mind-the-gaps?copyrightInfo=true>

<sup>24</sup> International Banker, How satellite imagery is helping hedge funds outperform, June 26th 2020, <https://internationalbanker.com/brokerage/how-satellite-imagery-is-helping-hedge-funds-outperform/>

<sup>25</sup> Allied Market Research, Commercial Satellite Imaging Market Outlook - 2026, August 2019, <https://www.alliedmarketresearch.com/commercial-satellite-imaging-market>

**Figure 17: The inside story**

Internal investment at institutional investors to improve climate related analysis (intended technology purchase or upgrade in the next 12 months)  
(% respondents)



Source: The Economist Intelligence Unit.

future,” all of which Merantix is focused on with its AI and ML technologies.

As new technologies gain acceptance in the financial world, they influence the type of talent investment firms need. The two issues go hand in hand. A recent industry study finds “significant gaps are beginning to appear between existing and required capability”<sup>26</sup> in the area of ESG for large asset owners seeking to internalise skills. But those firms that are

able to attract and retain such talent should be well positioned.

“Those asset owners who have in-house investment functions, such as ABP and Aviva Investors, are ahead of the game,” explains Mr Poulter. He adds that they have the flexibility to act early, as opposed to those reliant on external managers, who have to renegotiate a huge number of contracts and agreements with their agents and investment managers.

<sup>26</sup> Invesco, Global Sovereign Asset Management Study, 2020, <https://www.invesco.com/content/dam/invesco/igsams/en/docs/Invesco-Global-Sovereign-Asset-Management-Study-2020-Global.pdf>

## Conclusion

Large asset owners' investments in climate change technologies have gone from minority plays around the fringes of portfolios just a few years ago to fully permeating many, if not most, portfolios.

Institutional investors have moved from early stage climate change strategies, such as negative screening, to a positive focus on technologies that either mitigate or adapt to this phenomenon. A modern inclination to consider climate in all investments likely plays a major role.

However, there is a mismatch between the framing of portfolio risk—the cornerstone of institutional investment strategies—and broader environmental risk. In other words, many technologies that have the potential to address the low-carbon transition within the timeframe set out by the Paris Agreement are viewed as too early stage and risky for significant capital allocations from market-making firms such as asset owners.

The renewable energy sector therefore captures most large-investor exposure. Concurrently, interest is growing in related areas such as battery storage and green buildings. With these relatively mature technologies, the most commonly stated return horizon was 3-5 years, which is realistic given the maturity of the sector. Whether the timeline holds for nascent technologies such as CCS and enzyme-based technologies is debatable, and likely explains investors' significantly lower exposures. There is, in short, still a gap between societal needs and portfolio risk.

While the direction of sustainable tech investing is positive, more needs to happen in terms of the technologies that investors back—and use in-house—if Paris Agreement targets are to be met.

"A number of things are needed to shift the dial significantly," believes Mr Locher. "The first step is raising awareness. Another is policymaking and regulation. The third, which I believe will be the most important, is the availability of new substitute technologies. That will be the real gamechanger."

"The climate transition depends on many things," says Ms Ihenacho, "human ingenuity and new technologies [are] front and centre."

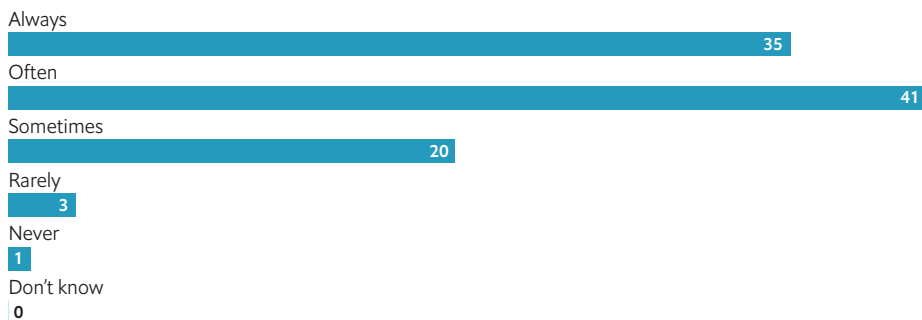
## Key takeaways

1. Climate risk is a mainstream investment concern: 96% of survey respondents consider climate change as a source of financial risk in investment decisions, with more than a third “always” considering climate change in decisions.
2. Renewable energy is the most promising technology for survey respondents both in terms of returns and the environment.
3. CCS technologies hold great interest for asset owners and managers, but only small firms are yet willing to invest in it.
4. A trade-off between financial and environmental returns is becoming less of a concern. Uncertainties around policy and technology are bigger obstacles for investors when it comes to both tech- and climate-related investments.
5. Climate change mitigation is a long-term investment proposition and therefore aligns with the investment goals of large asset owners such as pension funds.
6. Data are the ever-present challenge, with both tech and climate thematics, be it a matter of collecting, managing or analysing. Asset owners and managers are both investing heavily in their own capabilities in this area.

## Appendix

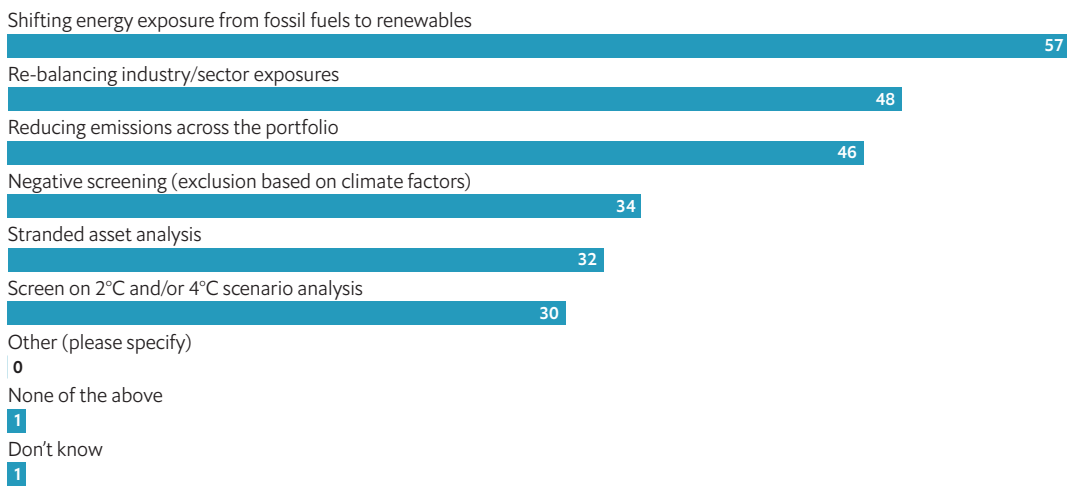
### Q1. How often does your organisation consider climate-change as a source of financial risk in regular investment decisions (eg stranded assets)? Select one.

(% respondents)



### Q2. How does your organisation balance portfolio risk/return with climate change considerations? Please select up to three.

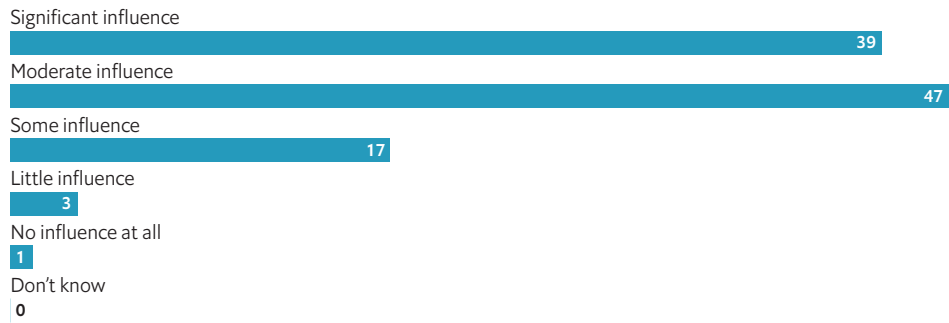
(% respondents)





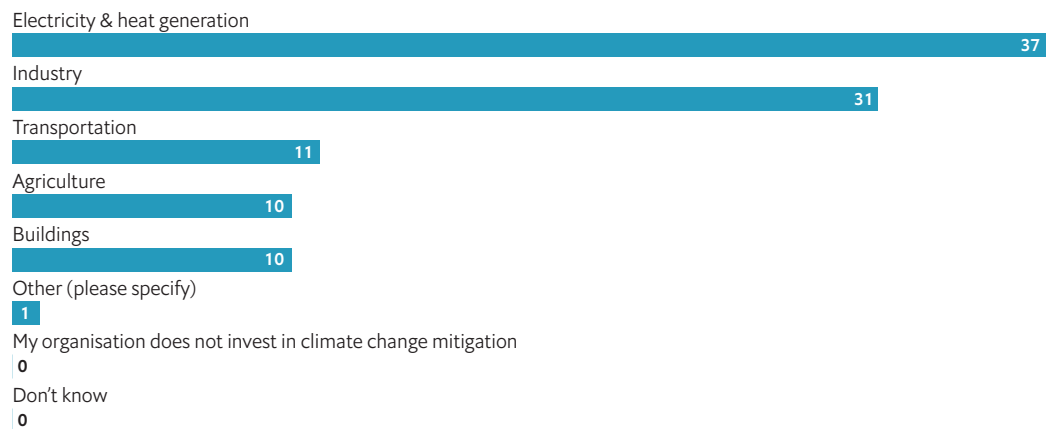
**Q3. Are your organisation's investments in technology companies influenced in any way by investing in climate change mitigation?** Select one.

(% respondents)



**Q4. Considering your organisation's existing investment in climate change mitigation, which of the following industries/sectors do you believe represents the largest share?** Select one.

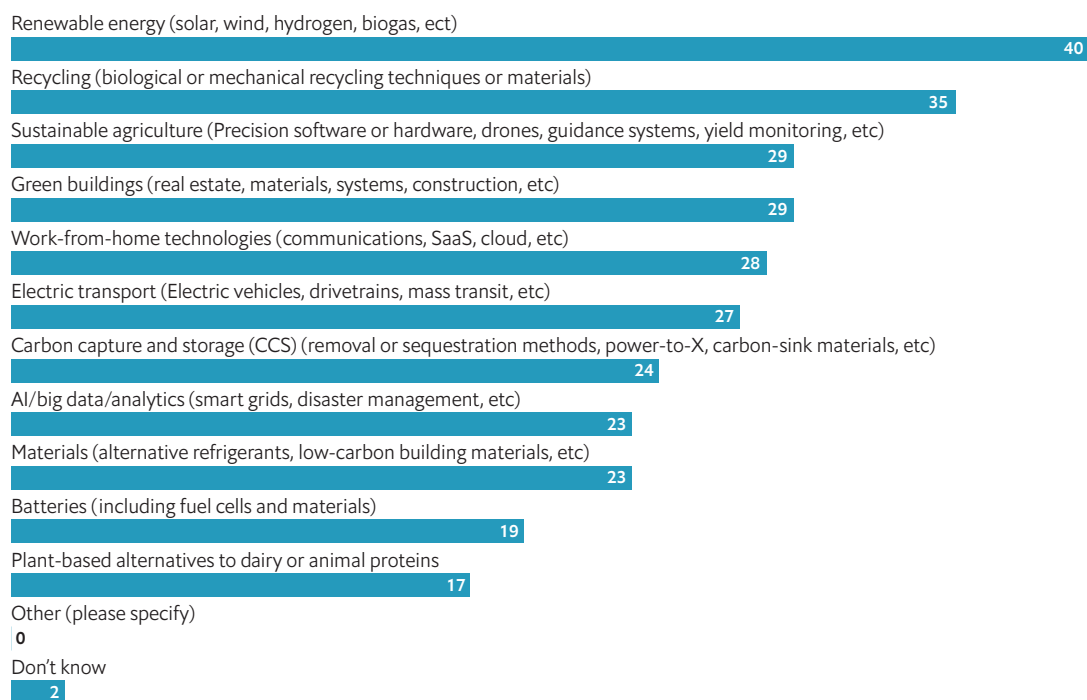
(% respondents)



**Q5a. Which of the following technology themes have you invested in?**

(Please select top three.)

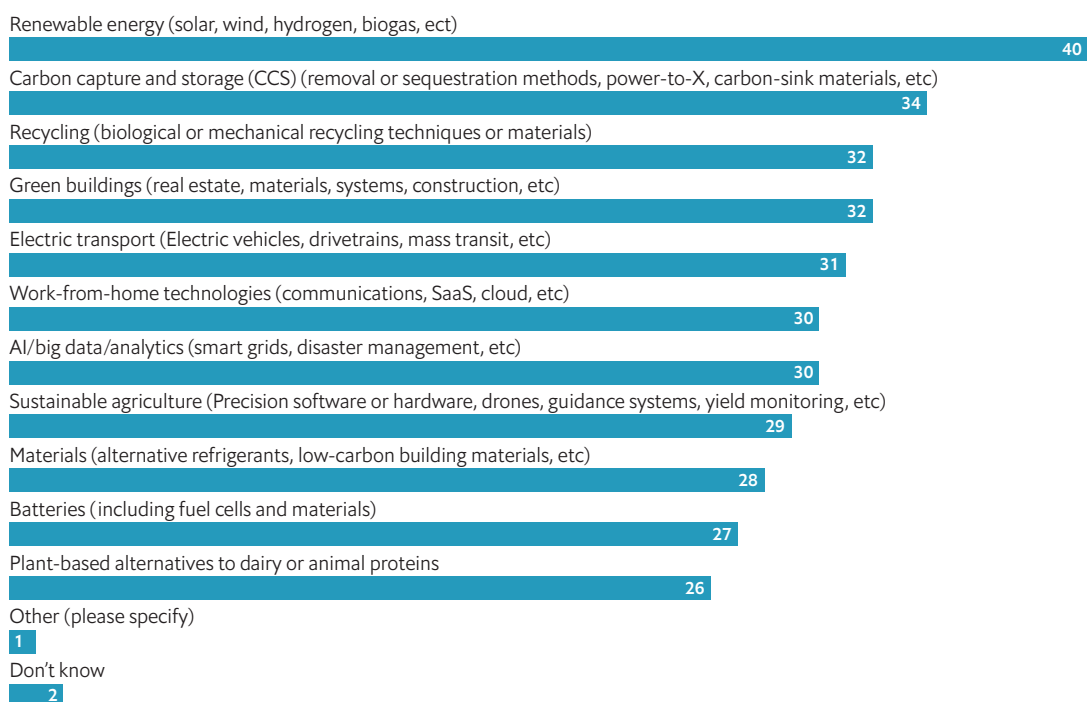
(% respondents)



**Q5b. Which of the following technology themes are most likely to have a positive impact on long-term climate change?**

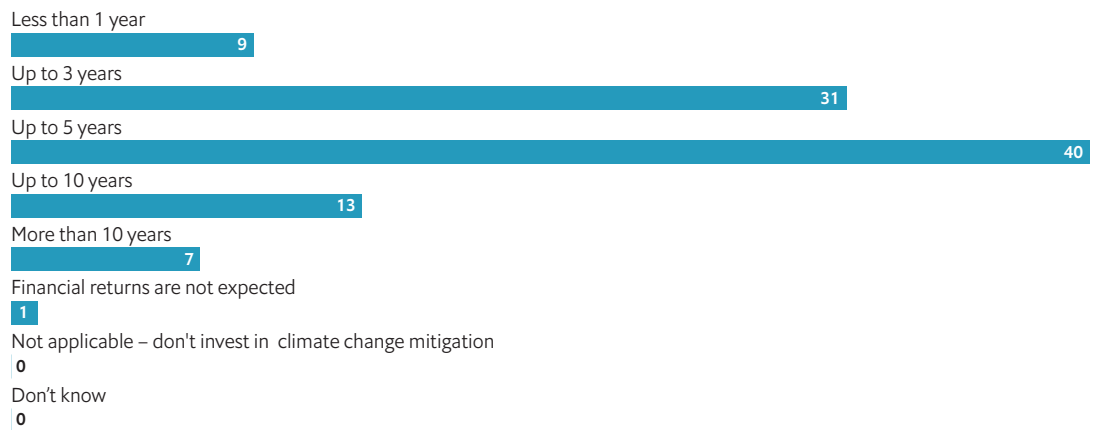
(Please select top three.)

(% respondents)



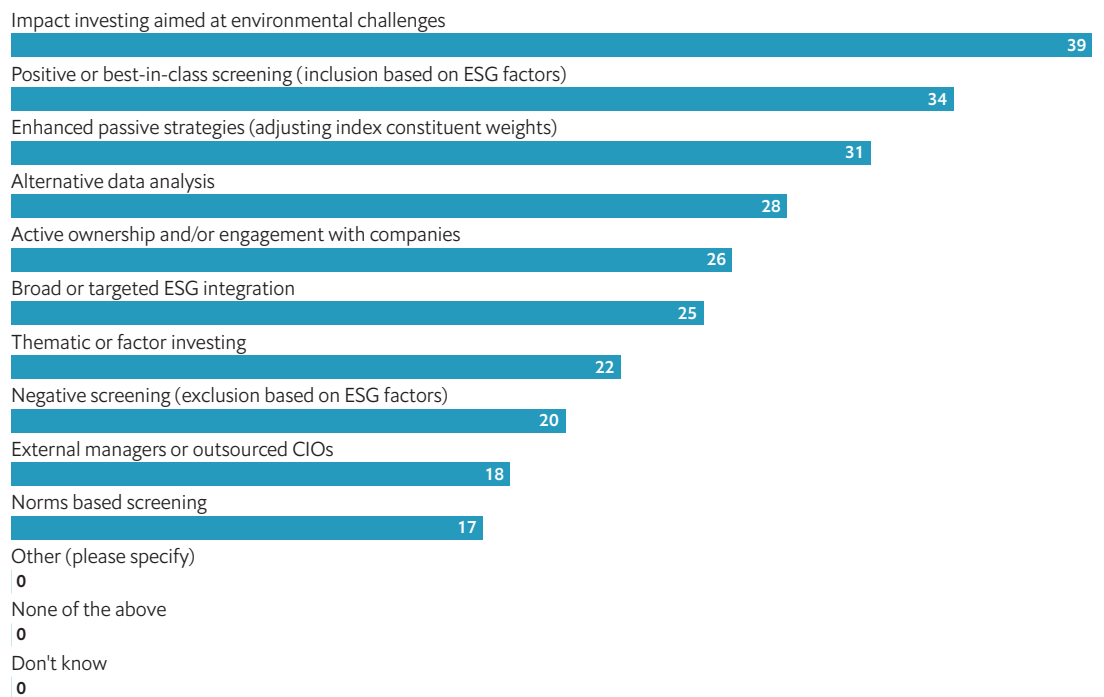
**Q6. On what time horizon does your organisation expect to see financial returns from any investments into climate-change mitigation?** Select one.

(% respondents)



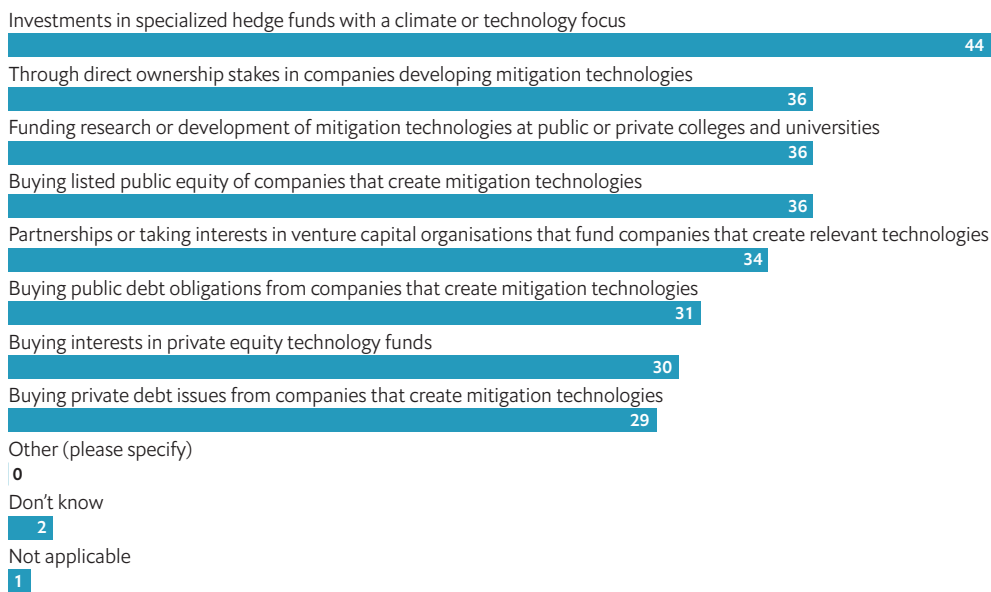
**Q7. Which of the following best describe how your organisation incorporates climate-related issues into the investment process?** Please select up to three.

(% respondents)



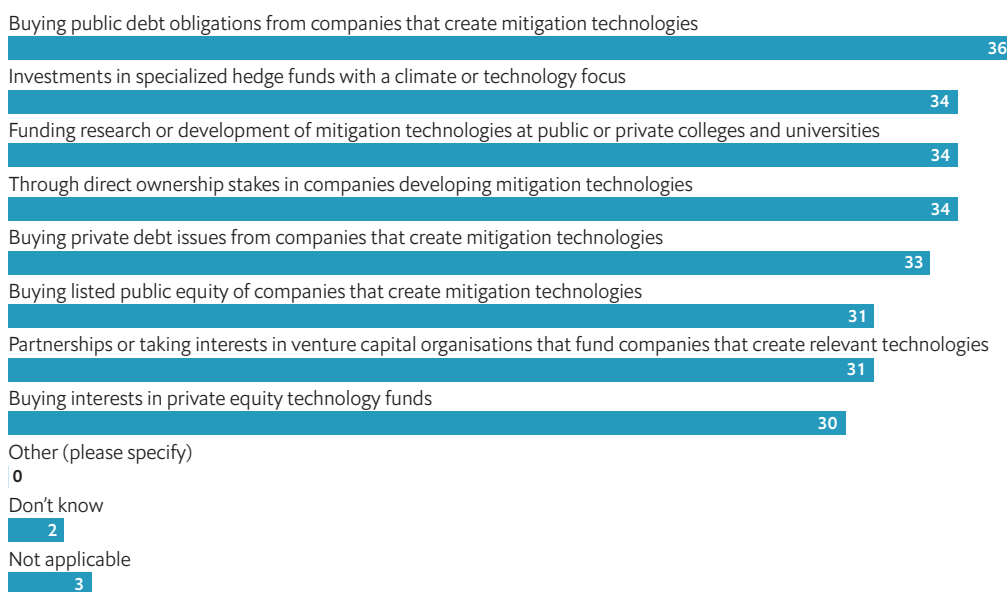
**Q8a. Of the following investment options, which does your organisation most often implement specifically with investment into climate change mitigation?** Please select up to three in each column.

(% respondents)



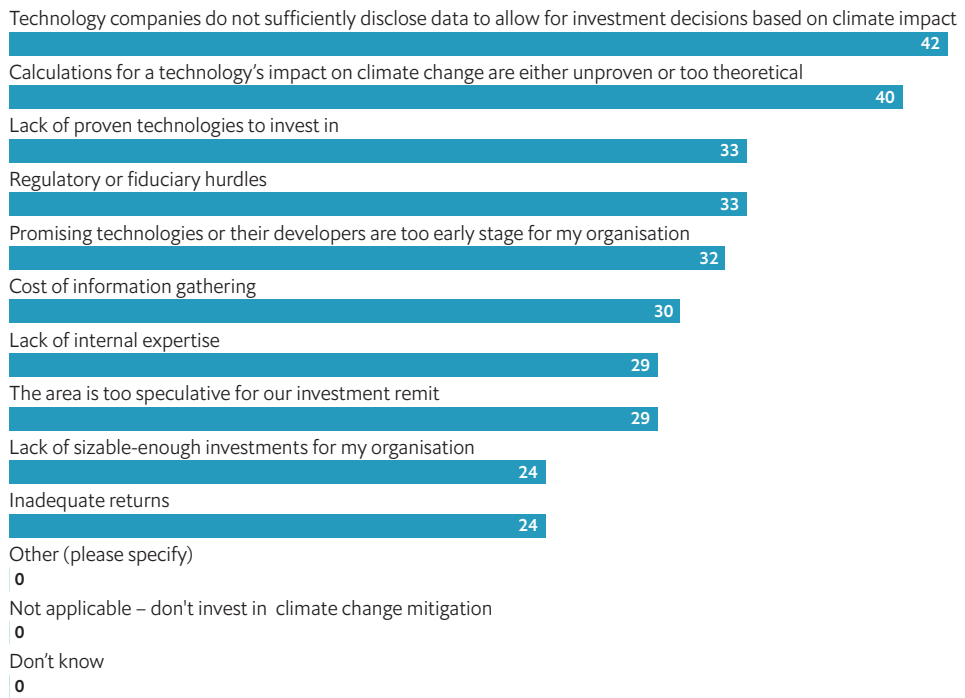
**Q8b. Which do you expect to increase in the next 12 months?** Please select up to three in each column.

(% respondents)



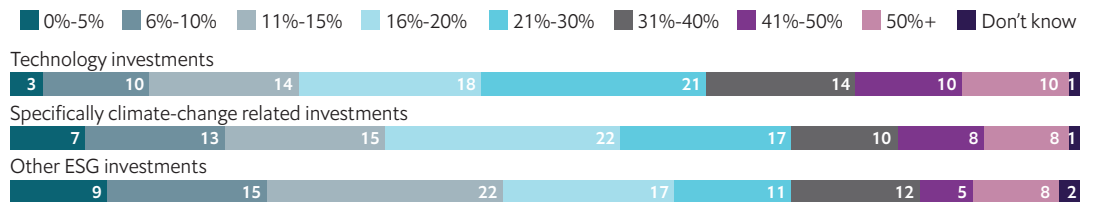
**Q9. Which of the following best describes the top obstacles your organisation faces in investing in climate-change mitigation technologies?** Please select all that apply.

(% respondents)



**Q10. Broadly, about what per cent of your organisations overall portfolio do you believe represents investments (debt, equity or ownership stakes) in technology themes, climate-change related themes or other ESG themes today?** Please select one for each.

(% respondents)



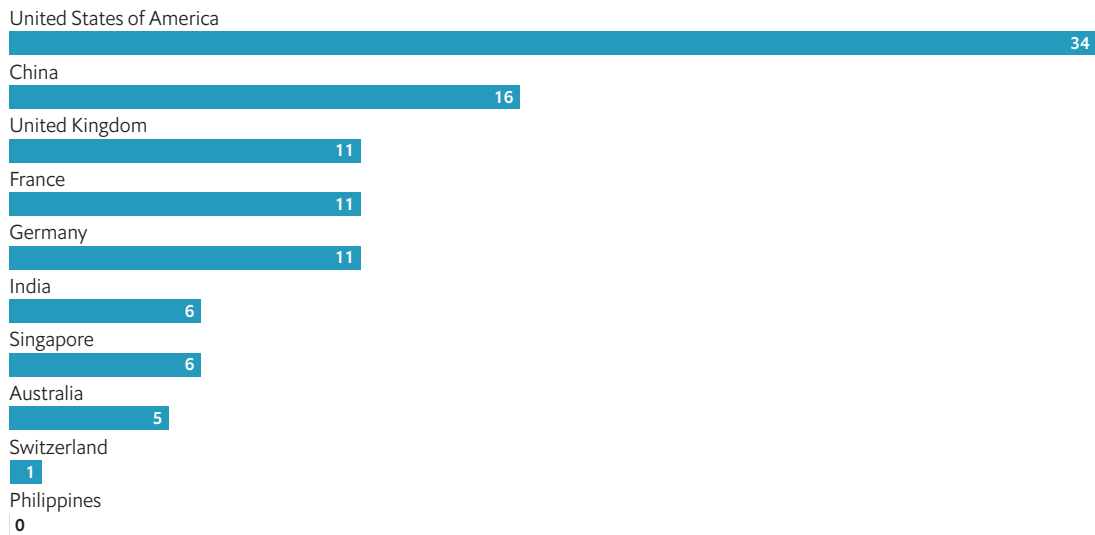
**Q11. Within the next 12 months, will your organisation make internal technology purchases or upgrades with a goal of improving capability on climate-related investments? (Eg risk management systems, alternative data)?** Select one.

(% respondents)



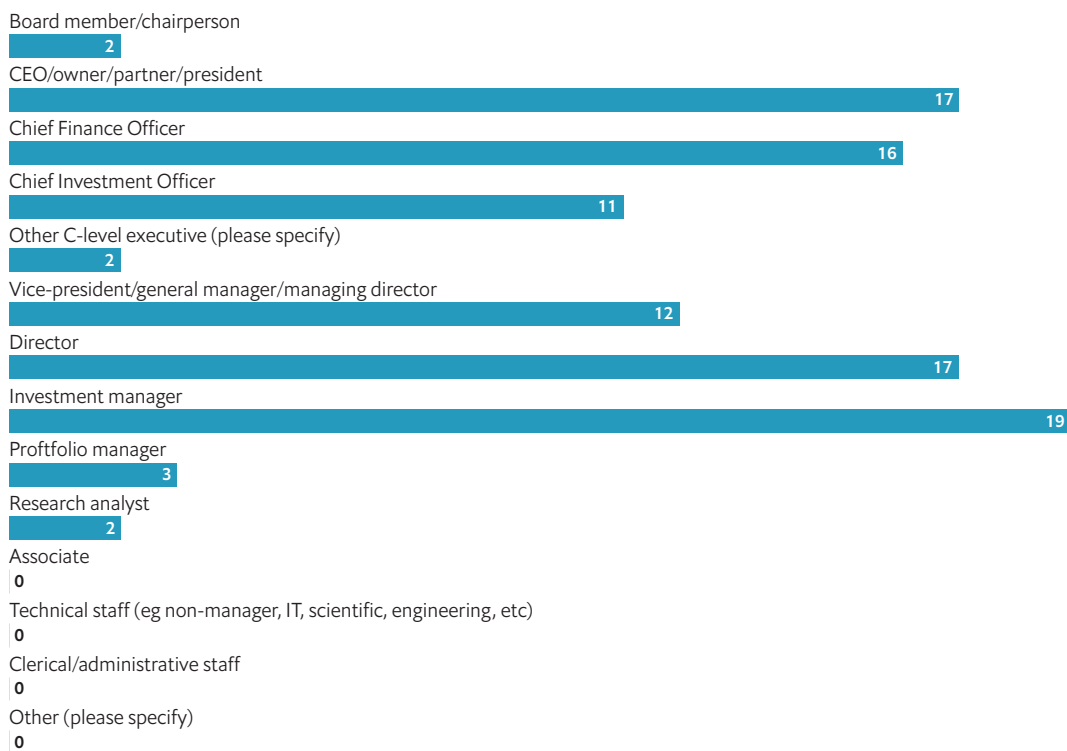
**D1. In what country are you personally located?** Select one.

(% respondents)



**D2. Which of the following best describes your job title?** Select one.

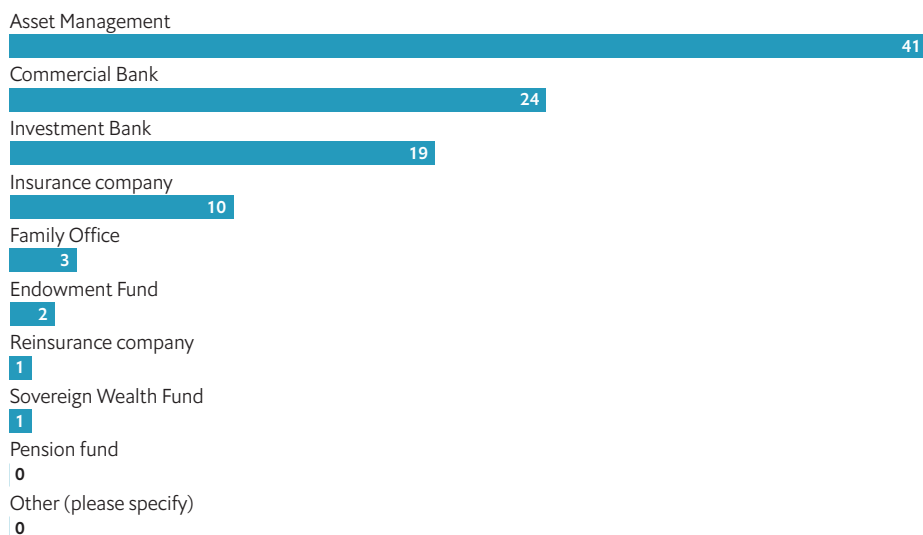
(% respondents)



**D3. Which of the following most closely describes the organisation you currently work for?**

Select one.

(% respondents)



**D4. Which is closest to your firm's assets under management (AUM) in US dollars?** Select one.

(% respondents)

Less than \$1bn

0

\$1bn to less than \$10bn

14

\$10bn to less than \$50bn

18

\$50bn to less than \$100bn

24

\$100bn to less than \$500bn

16

\$500bn to less than \$1tn

16

\$1tn or more

13

Don't know

0





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