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BlackRock:

- Sustainable and transition investing trends in European wealth portfolios 2023
- 2024 Global Outlook Grabbing the wheel: putting money to work
- Investment perspectives. Mega forces – Low-carbon transition, November 2023. Emerging markets: financing the transition
- Investment perspectives. Sustainable and transition investing, July 2023. Tracking the low-carbon transition
- Mega forces –Low-carbon transition. Climate resilience: an emerging investment theme
- Global perspectives on investing in the low-carbon transition. Survey of 200 institutional investors

FOR PROFESSIONAL CLIENTS/QUALIFIED INVESTORS/QUALIFIED CLIENTS ONLY.

BlackRock.

Sustainable and transition investing trends in European wealth portfolios

2023

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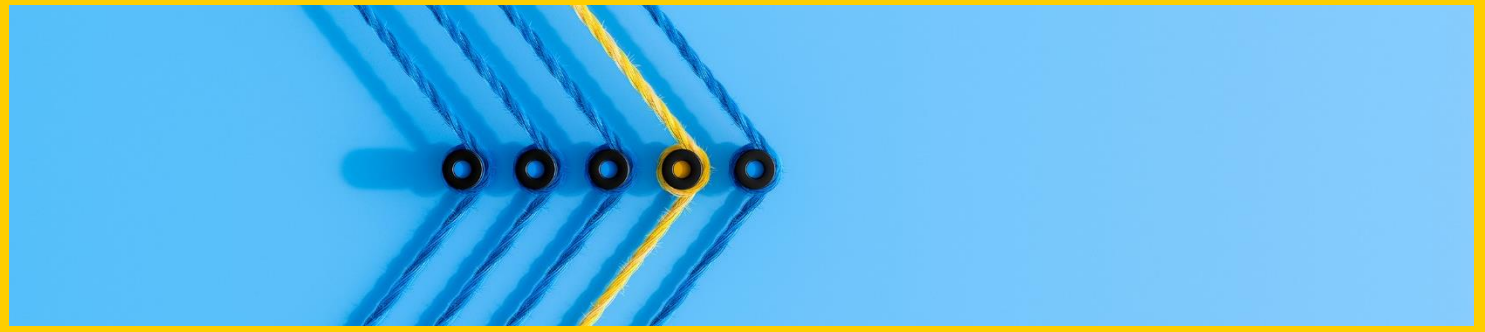
Foreword



Throughout spring 2023 the BlackRock Portfolio Consulting team partnered with 176 clients in EMEA (private banks, retail banks, and asset managers) for an annual review of their portfolio construction practices relating to sustainability and the transition to a low-carbon economy. Our analysis encompasses:

01. **A survey of our clients' preferences on sustainable and transition investing,** including qualitative insights on their investment approaches.

02. **An analysis of clients' model portfolios through the lens of Aladdin** (BlackRock's risk management platform), providing quantitative insights on their current sustainable and transition positioning, and how this has shifted vs. portfolios participating in our study last year.

03. **Specific views that our portfolio consultants have gathered through day-to-day client interactions** when helping investors align their portfolios towards their sustainability and transition objectives.

Key findings

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01

Two-thirds of surveyed investors are planning to decarbonise their portfolios. Defining the approach towards transition investing, assessing the impact on risk/return outcomes and aligning to transition opportunities emerge as the biggest challenges and opportunities.

02

Surveyed investors see the percentage of SFDR Article 8/9 funds in the portfolio as one of the most important criteria to classify a portfolio as sustainable. Meanwhile the implementation of MiFID II sustainability requirements is still in early stages.

03

SFDR Article 8 and Article 9 products have continued to gain an increasing share of both sustainable and traditional portfolios participating in the study – despite performance fluctuations in 2022.

Please note, the following results are based on the sample we collected and, therefore, should not be seen as fully representative of the Continental Europe Wealth industry. Sample biases will be linked to the specific client choices as well as the sample size of portfolios and surveys collected in each region. Source: BlackRock, August 2023.

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01.

Two-thirds of surveyed investors are planning to decarbonise their portfolios. Defining the approach towards transition investing, assessing the impact on risk/return outcomes and aligning to transition opportunities emerge as the biggest challenges and opportunities.

- **66% of surveyed investors flagged portfolio decarbonisation as a current or future area of focus.** Indeed, the portfolios participating in our study this year have lower average carbon emissions intensity and implied temperature rise vs. our 2022 sample. This can be explained by the fact that many clients have started considering portfolio carbon level when building investment propositions as well as by the progression that companies themselves and the whole ecosystem are making towards decarbonization.
- **However many investors we work with struggle to define their approach to transition investing and lack tools to assess the impact of decarbonisation on portfolio risk/return characteristics.** We have deployed new technology towards helping investors define their transition approach, selecting decarbonisation targets and assessing their current portfolio against them while at the same time remaining aligned with investor's risk, tracking error and sector/country allocation parameters.
- **We also see investors wanting to position their portfolios toward strategic and tactical opportunities presented by the transition to a low-carbon economy.** No size fits all, yet a practical way to help investors position their portfolio towards transition opportunities over the strategic horizon can be using BlackRock climate-aware capital market assumptions (CMAs) that factor in BlackRock Investment Institute's Transition Scenario ('BIITS').
- **Aligning a portfolio towards low-carbon transition will be a multi-year journey** as new investment opportunities and products emerge, new climate analytics becomes available and companies' reporting improves. A number of investors are partnering with us to assess their portfolio alignment towards transition on a regular basis.

02.

Surveyed investors see percentage of SFDR Article 8/9 funds in a portfolio as one of the most important criteria to classify a portfolio as 'sustainable'. Meanwhile the implementation of MiFID II sustainability requirements is still in early stages.

- **The most important criteria investors use to classify a portfolio as 'sustainable' are through the percentage of SFDR Article 8/9 funds in the portfolio, followed by environmental, social, and governance (ESG) score above a certain threshold, and screening out exposures to controversial businesses, our survey shows**. Notably, metrics related to MiFID II sustainability requirements – such as the percentage of Sustainable Investments[1] (SI) or alignment to Principal Adverse Impacts ('PAIs') – have been less popular among respondents.

- **Overall, we see a lot of investors taking a wait-and-see approach when it comes to the implementation of the latest MiFID II sustainability requirements.** Our survey showed that 34% of respondents have not yet completed a full assessment of their own clients' SI preferences and 39% have not defined a percentage SI target. The vast majority of the interviewed clients (71 out of 112) have not started measuring alignment to PAIs (this could be partly driven by challenges related to PAI data coverage). Anecdotally, some investors say the implementation is proving complex and requires significant investments in governance changes, data availability and monitoring.

- **In order to meet MiFID II sustainability requirements, respondents preferred to make use of the percentage SI commitment,** as opposed to aligning product commitments to PAIs, our survey shows. The majority of investors said that they can have products that do not meet the desired percentage SI threshold as long as the whole portfolio percentage SI threshold is met. The average min. percentage SI of sustainable portfolios participating in the study was 14%.

- **The most popular PAIs, based on our survey, were Greenhouse Gas Emissions (PAI 1-6) and Social and Employee Matters (PAI 10-16)**, with 22% and 15% survey respondents, respectively, stating they are measuring alignment against these PAIs. Looking a the average PAI alignment of the portfolios within our sample, we, indeed, observed that alignment to PAIs 1-6 and PAI 10-16 was the highest.

1. 'Sustainable investment' is defined by the Sustainable Finance Disclosures Regulation (SFDR). See appendix for full definition.

03.

SFDR Article 8 and Article 9 products have continued to gain an increasing share of both sustainable and traditional portfolios participating in the study – despite performance fluctuations in 2022.

- **The majority (80%) of survey respondents said that 2022 performance dynamics of sustainable strategies has not changed their appetite towards sustainable investing.** This is in line with what we have observed in the actual portfolios participating in the study – in 161 sustainable-focused portfolios the share of Article 8/9 products reached 81% of all fund holdings (up from 55% in 2022). Even in the 112 traditional portfolios in our sample this year 45% of all fund holdings were Article 8/9 (up from 37% in 2022).

- **The increase in the share of SFDR Article 8/9 products was observed across asset classes** vs. our 2022 portfolio sample. In particular, the share of Article 8/9 funds rose to 70% in equity and 65% in fixed income (vs 49% and 46% respectively in 2022), to 75% in multi-asset (vs 28% in 2022) and to 25% in alternatives (vs 17% in 2022). 73% of the cash funds in our 2023 portfolio sample were Article 8. Notably, there was a decrease in Article 9 relative to Article 8 funds vs. our 2022 sample which could be partly driven by the 2022 re-classification of many products due to amendments to Article 9 criteria in the EU regulation.

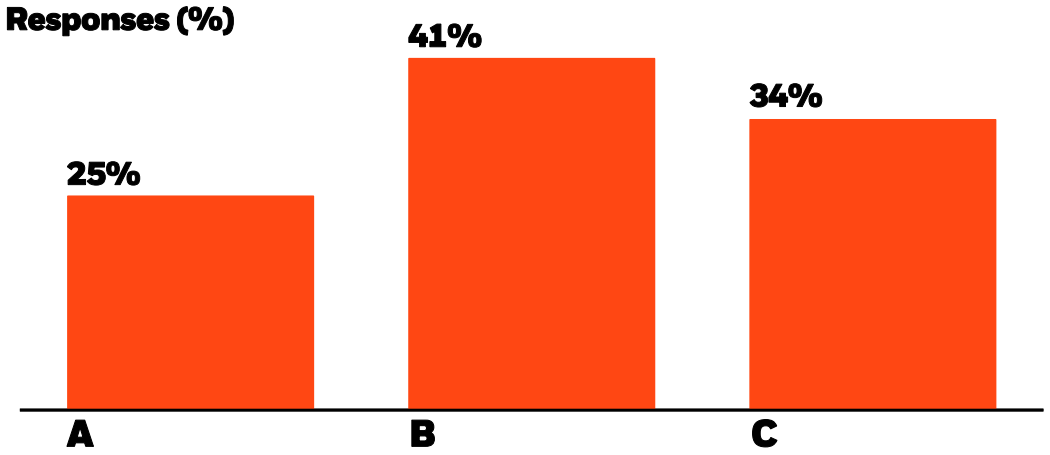
- **The majority (72%) of survey participants are not planning to replace their traditional benchmarks with sustainable ones. Given the current market uncertainty related to inflation and growth outlook, this brings to the forefront the need for ongoing monitoring of active risk of sustainable propositions relative to their benchmarks.** Investors often ask us to help assess the level of active risk of their sustainable portfolio vs. the benchmark – as well as the drivers behind it. Some investors want us to support them in reducing this risk by using ESG optimised strategies or by adding regional/sector funds to their portfolio to better align its regional/sector profile relative to the benchmark.

01

Two-thirds of surveyed investors are planning to decarbonise their portfolios. Defining the approach towards transition investing, assessing the impact on risk/return outcomes and aligning to transition opportunities emerge as the biggest challenges and opportunities.

66% of surveyed investors are planning to decarbonise their portfolios – and for 38% of them portfolio decarbonisation is already a focus right now. Indeed, the portfolios participating in our study this year have **lower average carbon emissions intensity and implied temperature rise** vs. our 2022 sample (see Chart 01 below).

When asked if, in their sustainable propositions, investors would be open to invest in an **Article 6 fund that gives exposure to high emitting companies that have credible decarbonisation targets, the opinions were split evenly:** ~43% of respondents said 'Yes', while the same share of respondents said 'No' (see Q. 12 in Annex).

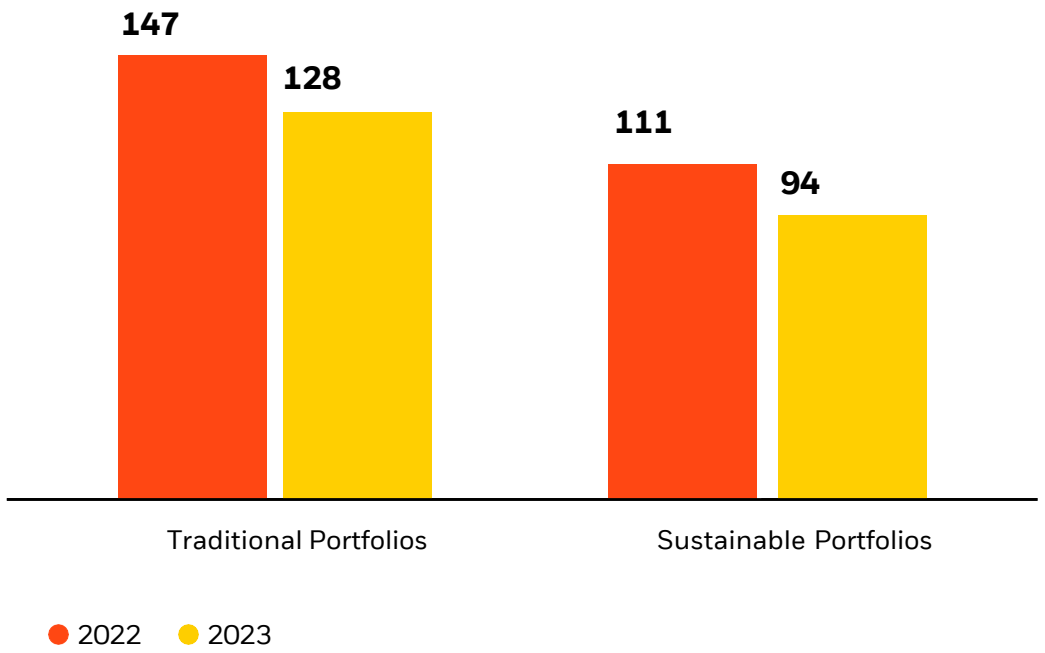


Q. How much of a focus are decarbonisation targets within your portfolio?

A	It is a focus
B	Not a focus yet – but I am planning to decarbonise my portfolio in the future
C	I am not planning to decarbonise my portfolio

Survey results are based on responses provided by 112 clients in Europe ex UK. The survey responses were collected in Q2 2023.

Chart 01 | **Carbon Emission Intensity (CO2 t/Sales)**



Based on 273 portfolios and 112 survey responses from investors in Europe ex UK. 2022 data based on 2022 Sustainability Research results. *Classification of a portfolio as sustainable or non-sustainable was provided by clients or, if such guidance was missing, was based on Morningstar SFDR classification.

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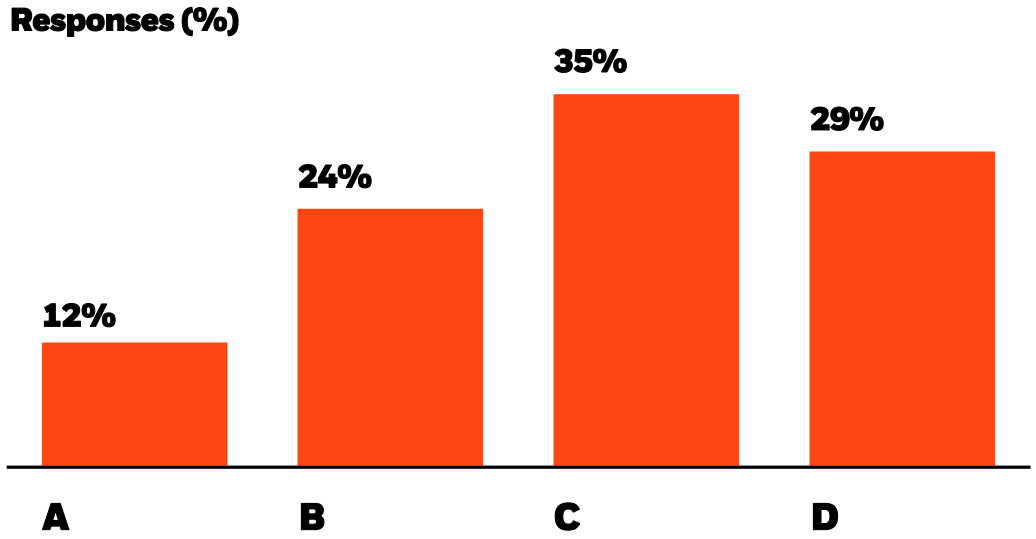
Many investors we work with struggle to **define their approach to transition investing,** and 35% of respondents to our survey said they **lack tools to assess the impact of decarbonisation on portfolio risk/return characteristics.**

Our Portfolio Consulting team, in partnership with BlackRock Sustainable & Transition Client Solutions team, help investors **defining their transition approach, selecting decarbonisation targets and assessing their current portfolio against them**. The journey involves the definition of a strategy to make progress towards portfolio decarbonisation targets while at the same time **remaining aligned with investor's risk, tracking error and sector/country allocation parameters**.

Q. How confident are you on the possibility to meet decarbonisation targets together with financial objectives of your portfolio?

A	I will likely need to trade-off some of the portfolio's financial objectives to meet decarbonisation targets
B	I am equipped to achieve both financial and decarbonisation targets
C	I do not have the tools to monitor the impact of decarbonisation efforts on my financial objectives
D	Not planning to decarbonise my portfolio

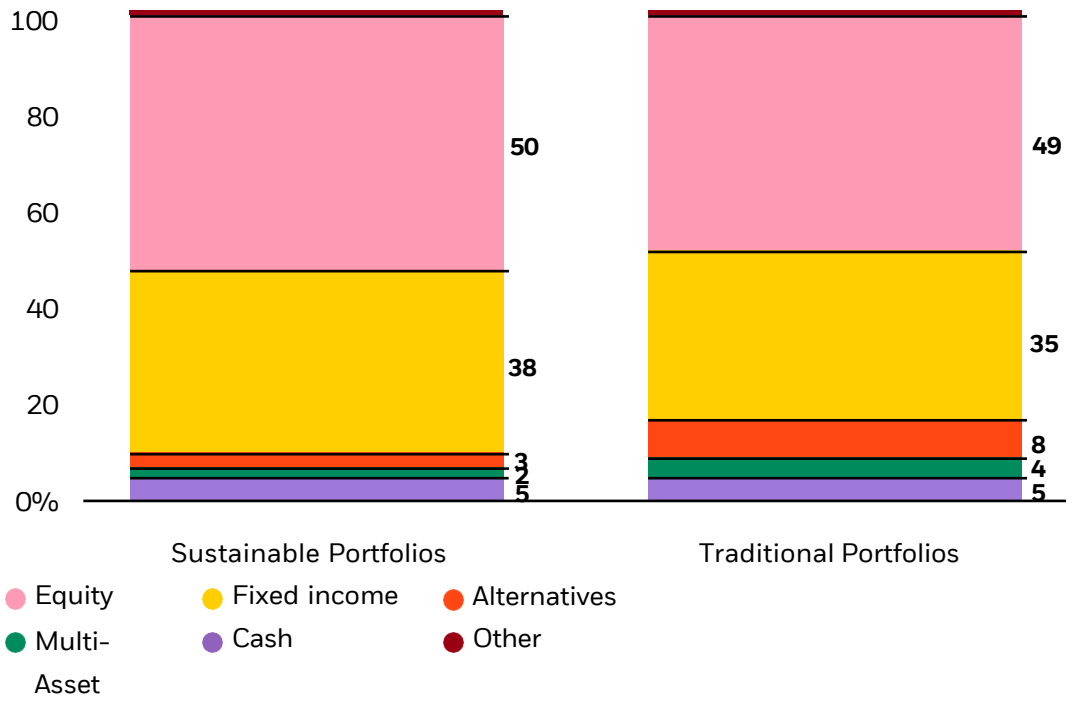


Source: BlackRock, as at 30 July 2023. Based on 273 portfolios and 112 survey responses from investors in Europe ex UK. 2022 data based on 2022 Sustainability Research results.

Based on our daily client interactions, we see a growing interest from investors to position their portfolios towards strategic and tactical opportunities presented by the transition to a low carbon economy. Tactically, we support investors in **navigating available transition-focused alpha-seeking and index products** and assessing the impact of implementing these in the portfolios in a risk-controlled way. Over the strategic horizon, we help investors position their portfolio towards transition opportunities leveraging **BlackRock climate-aware capital market assumptions that factor in BlackRock Investment Institute's Transition Scenario ('BIITS')**

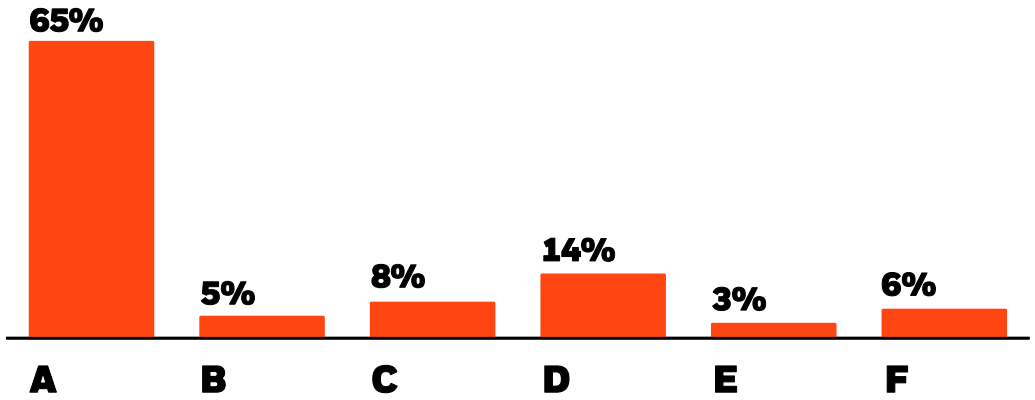
If we compare the average allocation of portfolios participating in the study this year (see Chart 02 below) with BlackRock's Strategic Asset Allocation for Wealth built using the climate-aware CMAs (see next slide), we observe **a lower allocation to fixed income and private markets and a higher allocation to cash.** When interviewed in Q2 2023, **65%** of our survey respondents stated that they were **not planning making changes to their strategic asset allocation**, while **14%** said they were planning to **increase their government bond allocation** and **8% their credit exposures.**

Chart 02 | Asset Allocation Overview



Source: BlackRock, as at 30/07/2023. Based on 273 portfolios and 112 survey responses from investors in Europe ex UK.

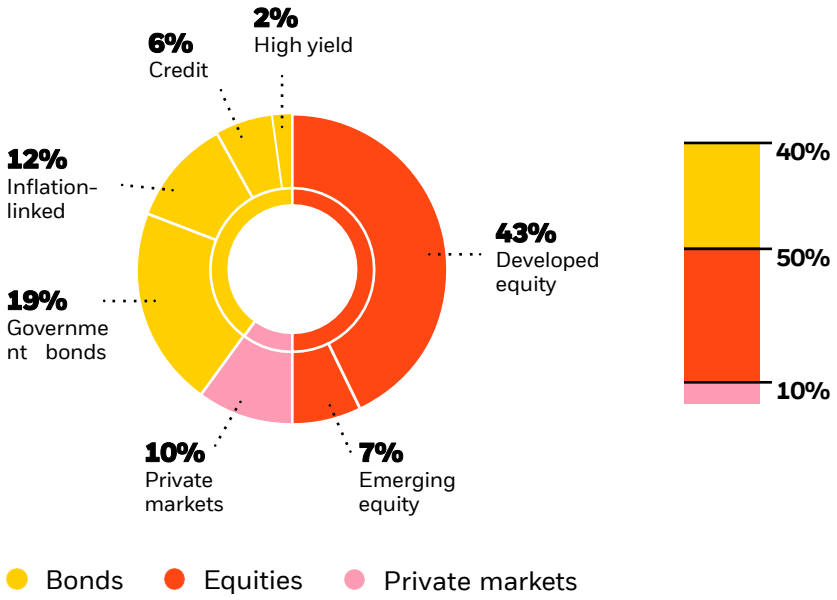
Responses (%)



Q. Are you planning to adjust your strategic asset allocation ('SAA') off the back of recent market developments? (please select all that apply)

A	No
B	Yes – increase my equity allocation
C	Yes – increase my credit allocation
D	Yes – increase my government bond allocation
E	Yes – increase my alternatives allocation
F	Yes – increase my cash allocation

Chart 03 | Case Study: Euro Area High Net Worth Strategic Asset Allocation based on BlackRock Climate Aware Capital Market Assumptions



Criteria	Description
Base currency	Euro
Investment objective	Maximise return for given level of risk
Risk target	9.2% volatility
Investment opportunity set	Long-only investments across global and private markets
Investment horizon	10 years

Parameter	Value
Expected SAA return range excluding alpha, net of fees	5.5 – 7.9%; Central return estimate: 6.7%
Contribution from net alpha	0 - 0.7%
Expected SAA return range including alpha, net of fees	5.5% - 8.6%
Return estimate assuming bottom half of outcomes	3.85%

Past performance is not a reliable indicator of current or future results. This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise – or even estimate – of future performance.

Sources: BlackRock Investment Institute, with data from Refinitiv Datastream and Bloomberg, August 2023. Data as of 30 June 2023. The expected returns range is based on the 25th and 75th percentile of our simulated return pathways. The return estimate assuming bottom half of outcomes shows how the asset allocation may perform in adverse economic outcomes. It is derived by considering only the bottom-half of our simulated return pathways and applying the weighted average of expected returns from this set to the asset allocation mix. For assets without indices (private markets), we have assumed top-quartile performance. The allocation shown above does not represent any existing portfolio, and as such, is not an investible product. The construction of the hypothetical asset allocation is based on criteria applied with the benefit of hindsight and knowledge of factors that may have positively affected it's performance, and cannot account for risk factors that may affect the actual portfolio's performance. The actual performance may vary significantly from our modelled CMAs due to transaction costs, liquidity or other market factors. Indexes are unmanaged, do not account for management fees and one cannot invest directly in an index. We use BlackRock proxies for selected private markets because of lack of sufficient data. These proxies represent the mix of risk factor exposures that we believe represents the economic sensitivity of the given asset class.

BlackRock, as at 30/07/2023. Based on 273 portfolios and 112 survey responses from investors in Europe ex UK.

Spotlight

Aligning a portfolio towards low carbon transition will be a multi-year journey as new investment opportunities and products emerge, new climate analytics becomes available and companies' reporting improves.
A number of investors are partnering with us to assess their portfolio alignment towards transition on a regular basis in the coming years.

Putting the transition into practice – **how you can prepare your whole portfolio for the low-carbon transition, leveraging our support along the journey:**

01. **Define the target and assess your portfolio against it**

Assess your portfolio's potential decarbonisation path – and put it in the context of a range of climate metrics (e.g. Implied Temperature Rise, Low Carbon Transition Score, alignment to UN SDG 13 'Climate action[1])

Set long-term targets and identify near-term targets in the context of other portfolio objectives.

02. **Design a transition strategy**

Evolve your portfolio to improve the relevant climate metric and meet any other portfolio objective through:

- Product substitutions
- Optimisation of portfolio holdings
- Strategic asset allocation review

03. **Implement and monitor**

Implement changes with index, factor, and alpha-seeking strategies.

Monitor your portfolio against your near-term and long-term targets on an annual basis[2] and engage with companies where needed.

1 SDG 13: Climate Action – Take urgent action to combat climate change and its impacts (Source: https://sdgs.un.org/goals/goal13) **2** Carbon metrics are updated annually when companies report their emissions. It is important to review the numbers annually to ensure you are on track to meet your objectives and take action where necessary.

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02

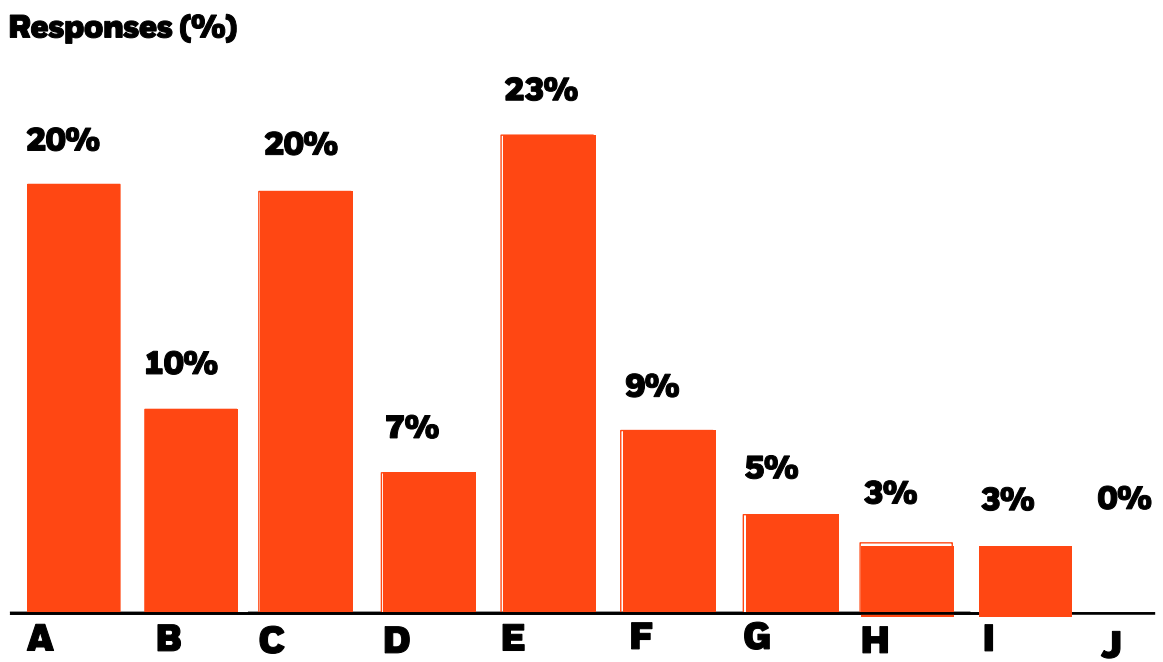
Surveyed investors see percentage of SFDR Article 8/9 funds in a portfolio as one of the most important criteria to classify a portfolio as ‘sustainable’. Meanwhile, the implementation of MiFID II sustainability requirements is still in early stages.

The most important criteria investors use to **classify a portfolio as 'sustainable' are percentage of SFDR Article 8/9 funds in the portfolio, followed by environmental, social, governance (ESG) score above a certain threshold, and screening out exposures to controversial businesses, our survey shows**. Notably, metrics related to MiFID II sustainability requirements – such as percentage of Sustainable Investments ('SI') or alignment to Principal Adverse Impacts ('PAIs') – have been less popular among respondents.

When asked about what the minimum allocation requirement to SFDR Article 8/9 products in their sustainable propositions, **36% of survey respondents stated they do not have a specific threshold**, while 41% confirmed they have a threshold **equal or higher than 70%** (see Q. 09 in Annex) **.** We clearly see the latter in the portfolios we have collected for this study – sustainable portfolios in our sample had an 81% allocation to Article 8/9 products, showing a sharp increase vs last year (when the percentage of Article 8/9 products in sustainable portfolios was 55%).

Q. I What are the most important criteria that you use to classify a portfolio as 'sustainable'? Select up to 3 criteria:

A	Environmental Social Governance score above a certain threshold
B	Climate metrics assessment (Carbon Emission Intensity, Low Carbon Transition Score, Portfolio temperature)
C	Screening out exposures to controversial businesses
D	Alignment to UN Sustainable Development Goals
E	SFDR classification (% of Article 8/Article 9 funds in the portfolio)
F	% of Sustainable Investments ('SI') as per SFDR or EU taxonomy definitions
G	Alignment to Principle Adverse Impacts
H	Local regulations and labels
I	All of the above
J	None of the above



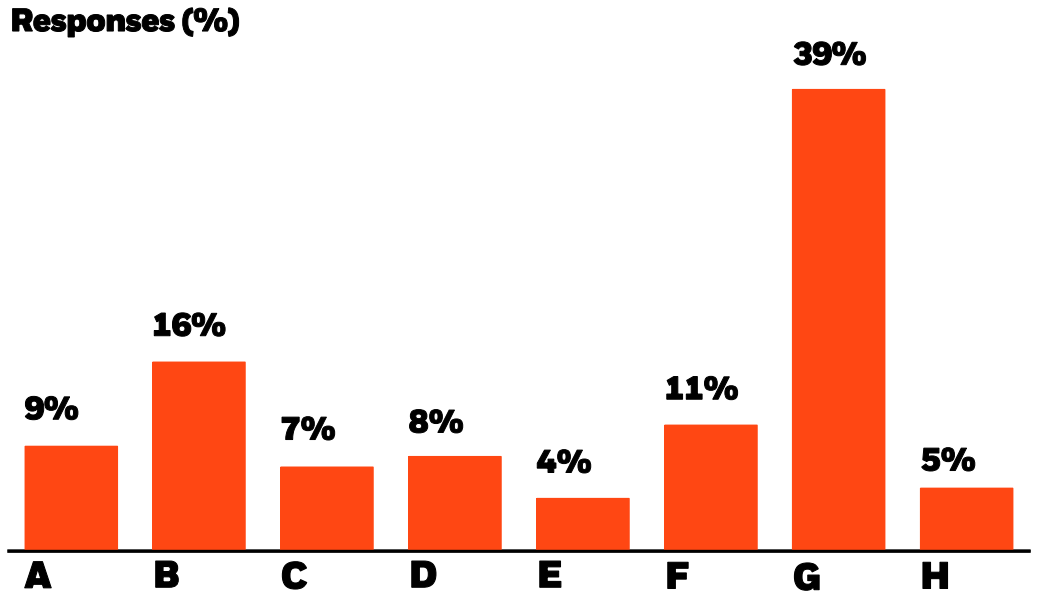
Source: BlackRock, as at 30 July 2023. Based on 273 portfolios and 112 survey responses from investors in Europe ex UK. 2022 data based on 2022 Sustainability Research results.

Overall, we see many investors taking a wait-and-see approach when it comes to the implementation of the latest MiFID II sustainability requirements. Our survey showed that 34% of respondents have not yet completed a full assessment of their own clients' SI preferences (see Q. 05 in Annex) and 39% have not defined a percentage SI target. The vast majority of the interviewed clients (71 out of 112) have not started measuring alignment to PAIs (See Q. 07 in Annex). The latter could be partly driven by challenges related to PAI data coverage.

Anecdotally, some investors say the implementation is proving complex and requires significant investments in governance changes, data availability and monitoring. Furthermore, the data quality will need to improve to allow a proper monitoring of MiFID II metrics, given the high % of funds where disclosures are not available today.

Q. What % of Sustainable Investments ('SI') under SFDR are you targeting in your sustainable propositions?

A	Above 90%
B	70% to 90%
C	50% to 69%
D	30% to 49%
E	20% to 29%
F	10% to 19%
G	I don't have an SI target for my sustainable propositions
H	I don't have a sustainable proposition



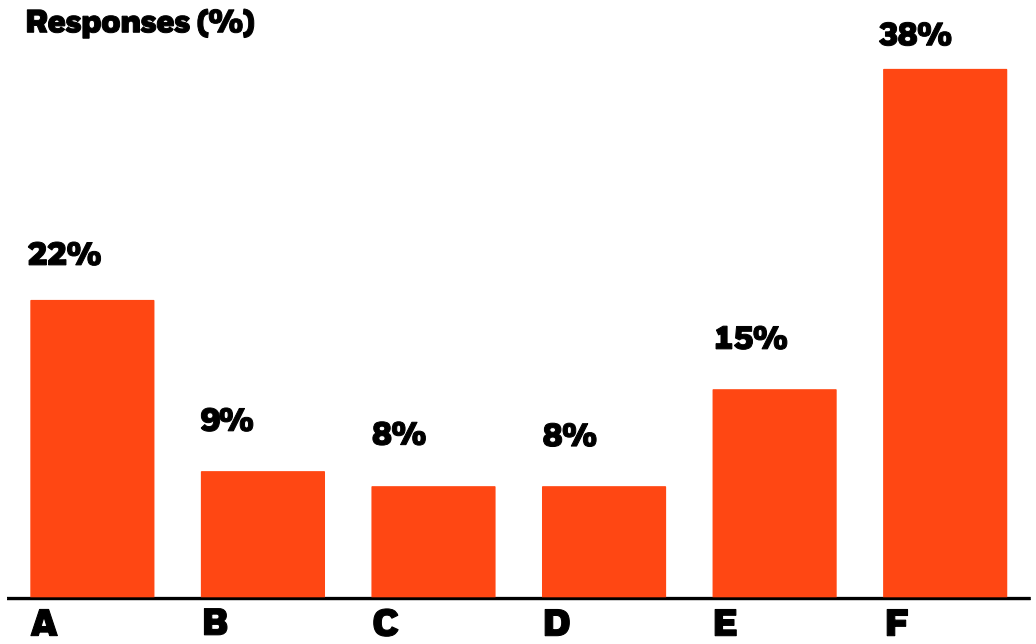
In order to meet MiFID II sustainability requirements, respondents preferred to make use of the % SI commitment, as opposed to aligning product commitments to PAIs, our survey shows. The majority of investors said that they can have products that do not meet the desired % SI threshold as long as the whole portfolio % SI threshold is met. The average min. % SI of sustainable portfolios participating in the study was 14%.

The most popular PAIs, based on our survey, were Greenhouse Gas Emissions (PAI 1-6) and Social and Employee Matters (PAI 10-16), with 22% and 15% survey respondents, respectively, stating they are measuring alignment against these PAIs. Looking at the average PAI alignment of the portfolios within our sample, we, indeed, observed that alignment to PAIs 1-6 and PAI 10-16 were the highest.

Our Portfolio Consulting team can help investors assess the min percentage of Sustainable Investing and PAI alignment at portfolio level – alongside other portfolio sustainability characteristics – help investors navigate a range of products to increase it and implement the selected products in the portfolio, keeping alignment with portfolios risk/return objectives.

Q. Which PAI are you measuring alignment to? Select all that apply:

A	Greenhouse Gas emissions (PAI 1-6)
B	Biodiversity (PAI 7)
C	Water (PAI 8)
D	Waste (PAI 9)
E	Social and Employee matters (PAI 10-16)
F	I haven't started measuring alignment to PAI



Source: BlackRock, as at 30 July 2023. Based on 273 portfolios and 112 survey responses from investors in Europe ex UK. 2022 data based on 2022 Sustainability Research results.

03

SFDR Article 8 and Article 9 products have continued to gain an increasing share of both sustainable and traditional portfolios participating in the study – despite performance fluctuations in 2022.

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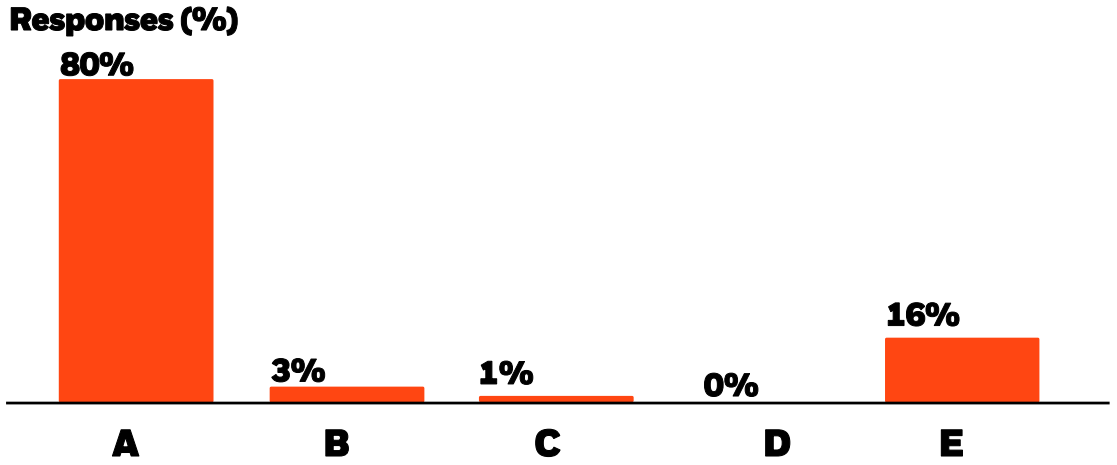
The majority (80%) of survey respondents said that **2022 performance dynamics of sustainable strategies has not changed their appetite towards sustainability.**



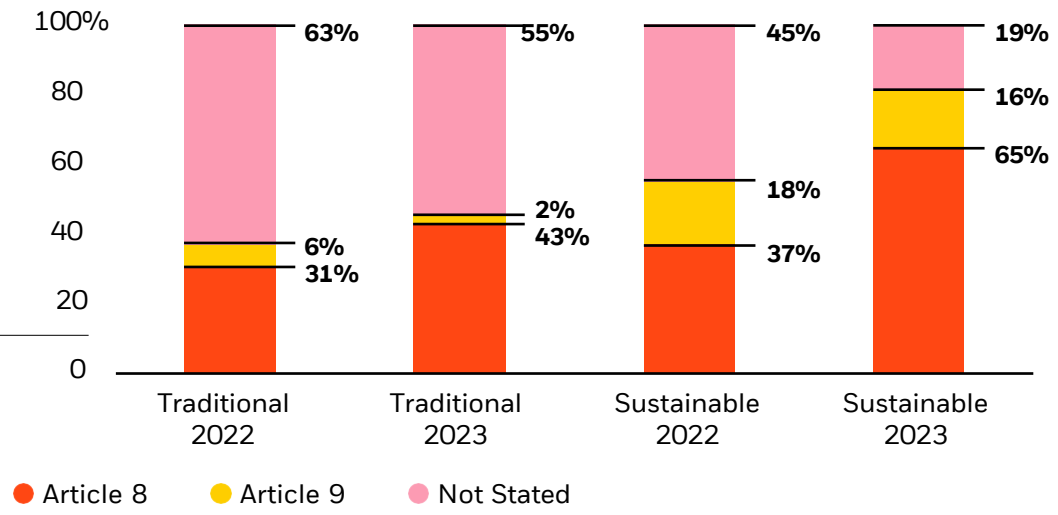
Q. How has your approach to Sustainability changed on the back of 2022 performance dynamics of sustainable strategies? (please select all that apply)

A	My approach to sustainability has not changed (I am still interested in sustainability and haven't changed strategy)
B	My approach to sustainability has not changed (I am still not interested in sustainability)
C	I am re-introducing exposures to sectors or styles that were excluded/underweighted due to sustainable screenings
D	I am no longer screening out high carbon emitting sectors, but picking companies that are reducing their carbon emissions within these sectors
E	I am increasing my allocation to sustainable thematics strategies

This is in line with what we have observed in the portfolios participating in the study – **in our sample of 161 sustainable-focused portfolios the share of Article 8/9 products reached 81% of all fund holdings** (up from 55% in 2022).

Even **in the 112 traditional portfolios** in our sample this year, **almost half of all fund holdings were Article 8/9** (up from 37% in 2022).

Chart 04 | **% of SFDR products held in portfolios**



Notably, there was **a decrease in Article 9 relative to Article 8 funds vs. our 2022 sample which could be partly driven by the 2022 re-classification of many products** due to amendments to Article 9 criteria in the EU Regulation.

Source: BlackRock, as at 30 July 2023. Based on 273 portfolios and 112 survey responses from investors in Europe ex UK. 2022 data based on 2022 Sustainability Research results.

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Relative to portfolios participating in our study in 2022, **the increase in the share of SFDR Article 8/9 products was observed across asset classes** in our total portfolio sample. In particular, the share of Article 8/9 funds rose to 70% in equity and 65% in fixed income (vs 49% and 46% respectively in 2022), to 75% in multi-asset (vs 28% in 2022) and to 25% in alternatives (vs 17% in 2022). 73% of the cash funds in our 2023 portfolio sample were Article 8.

The share of Article 8/9 products was even more significant in sustainability-focused portfolios participating in our study this year.

Chart 05

2023 total portfolios: share of Article 8/9 funds per asset class

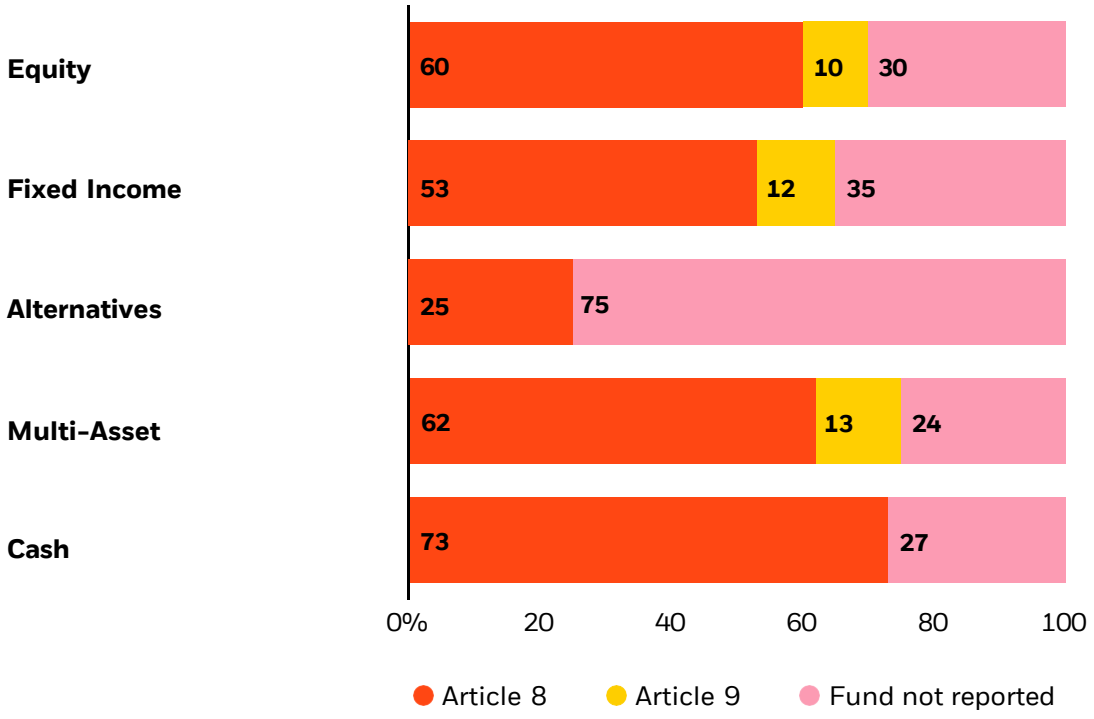
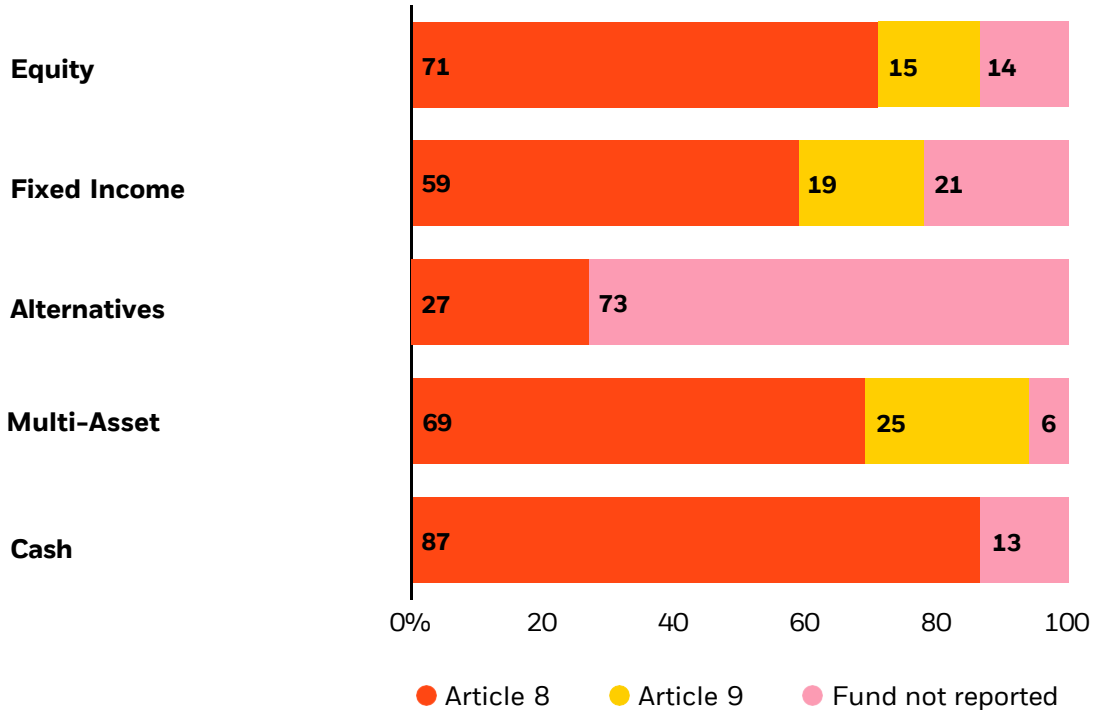


Chart 06

2023 sustainable portfolios: share of Article 8/9 per asset class



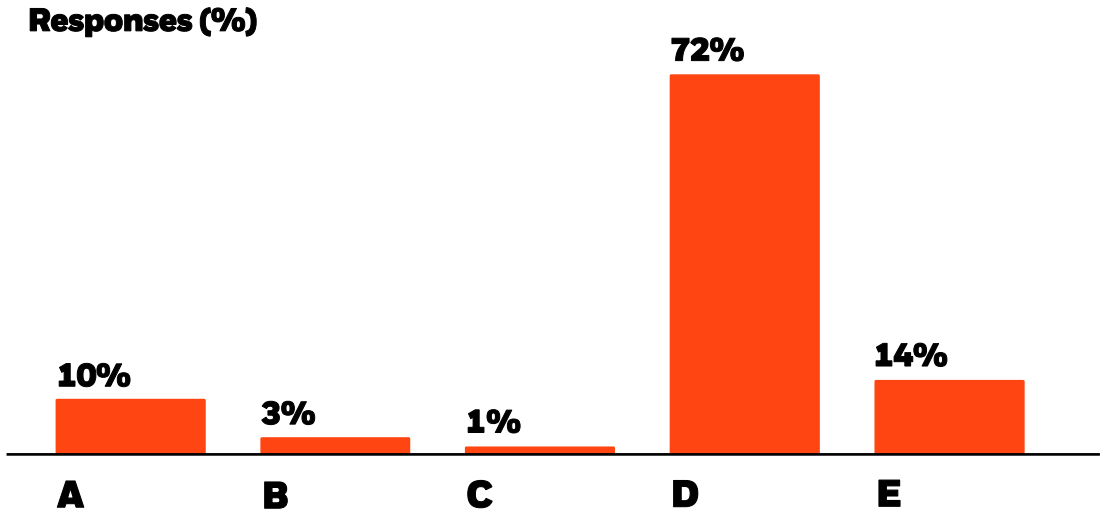
Source: BlackRock, as at 30 July 2023. Based on 273 portfolios and 112 survey responses from investors in Europe ex UK. 2022 data based on 2022 Sustainability Research results.

The majority (72%) of survey participants are **not planning to replace their traditional benchmarks with sustainable ones.** Given the current market uncertainty related to inflation and growth outlook, this brings to the forefront the need for **ongoing monitoring of active risk of sustainable propositions relative to their benchmarks.**

Investors often ask us to help **assess the level of active risk of their sustainable portfolio vs. the benchmark – as well as the drivers behind it**. Some investors want us to support them in **reducing this risk by using ESG optimised strategies or by adding regional/sector funds to their portfolio** to better align its regional/sector profile relative to the benchmark.

Q. Are you planning to change your benchmarks from traditional to sustainable versions?

A	Yes, across both equity and fixed Income benchmarks
B	Yes, but only equity benchmarks
C	Yes, but only fixed income benchmarks
D	No, prefer to keep traditional benchmarks
E	My benchmarks are already sustainable



Source: BlackRock, as at 30 July 2023. Based on 273 portfolios and 112 survey responses from investors in Europe ex UK. 2022 data based on 2022 Sustainability Research results.

Index products accounted for around 30% of the portfolio composition within both traditional and sustainable portfolios. The largest share of index products was seen within equities (39% of sustainable portfolios and 35% of traditional ones), followed by fixed income (26% within sustainable portfolios and 32% within traditional ones).

The **average ESG Quality Score of sustainable portfolios in our sample was 7.2**, while the score of the traditional portfolios was 6.8.

Chart 07 | 2023 Portfolios: Implementation Vehicle

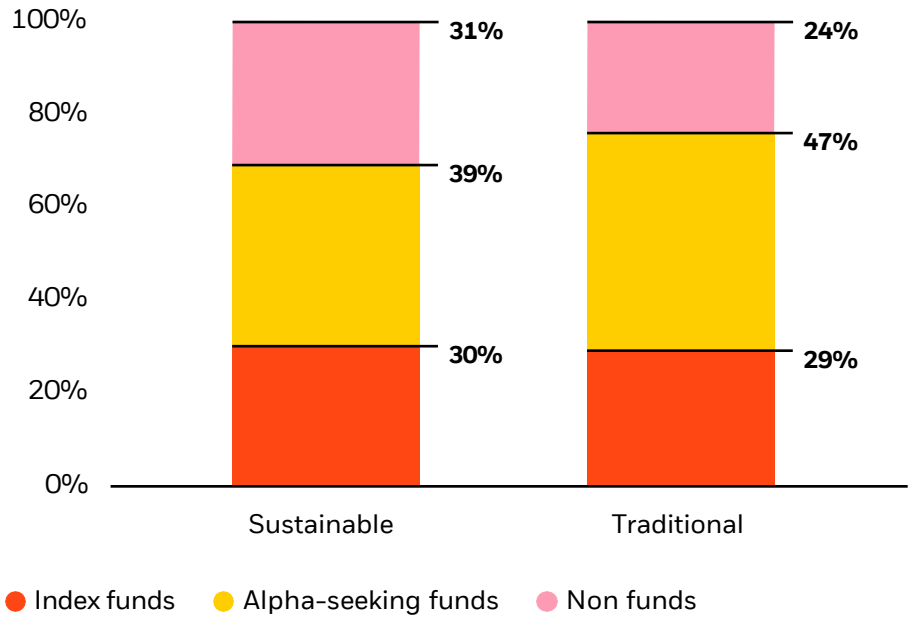
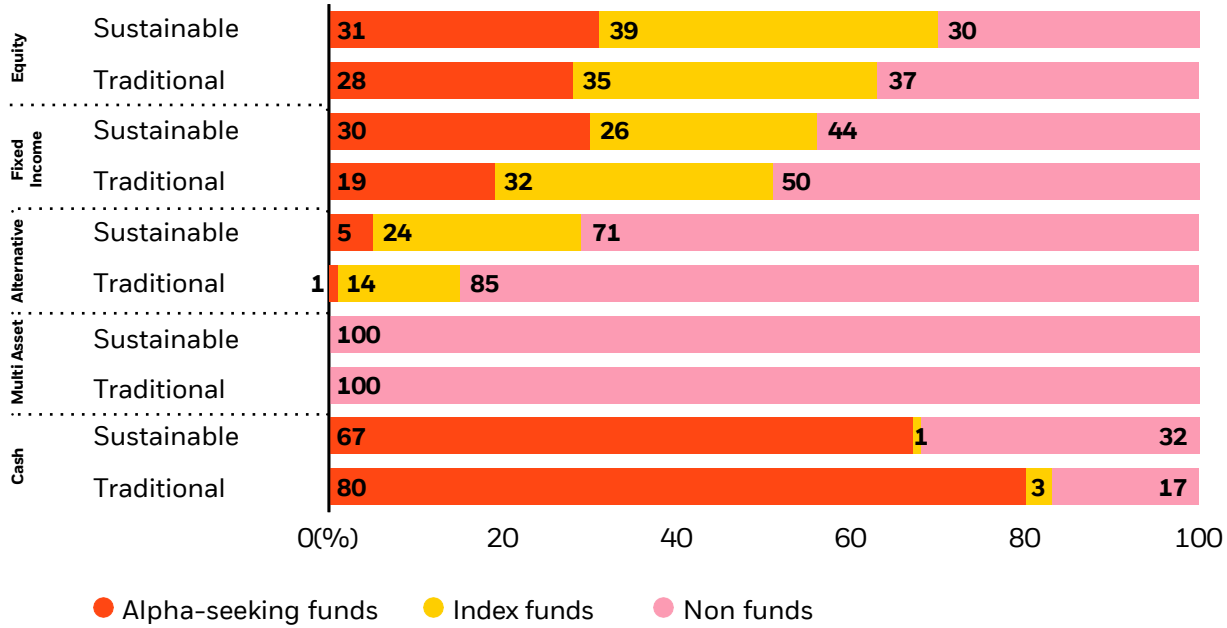


Chart 08 | Implementation Vehicle by Asset Class



Source: BlackRock, as at 30/07/2023. Based on 273 portfolios and 112 survey responses from investors in Europe ex UK. 2022 data based on 2022 Sustainability Research results.

Appendix

Study Participants and Survey Results

EIIiH0923E/S-3094427-22/32

2023 edition | Participants

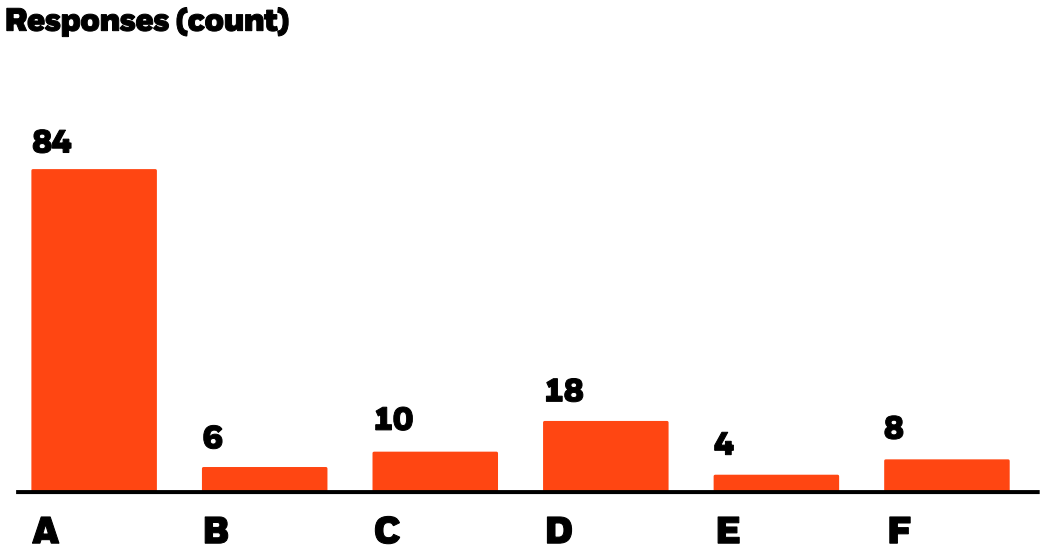
Country	# Clients	# Portfolios	...of which sustainable*
Austria	14	29	19
BeLux	18	25	13
Central and Eastern Europe	31	43	14
France	12	25	21
Germany	10	20	14
Iberia	10	10	4
Italy	17	24	11
Netherlands	15	24	15
Nordics	30	30	17
Switzerland	19	43	33
Grand Total	**176**	**273**	**161**

Source: BlackRock, as at 30 July 2023. Based on 273 portfolios and 112 survey responses from investors in Europe ex UK. 2022 data based on 2022 Sustainability Research results.
*Classification of a portfolio as sustainable or non-sustainable was provided by clients or, if such guidance was missing, was based on Morningstar SFDR classification.

Q.01

Are you planning to adjust your strategic asset allocation ('SAA') off the back of recent market developments? (please select all that apply)

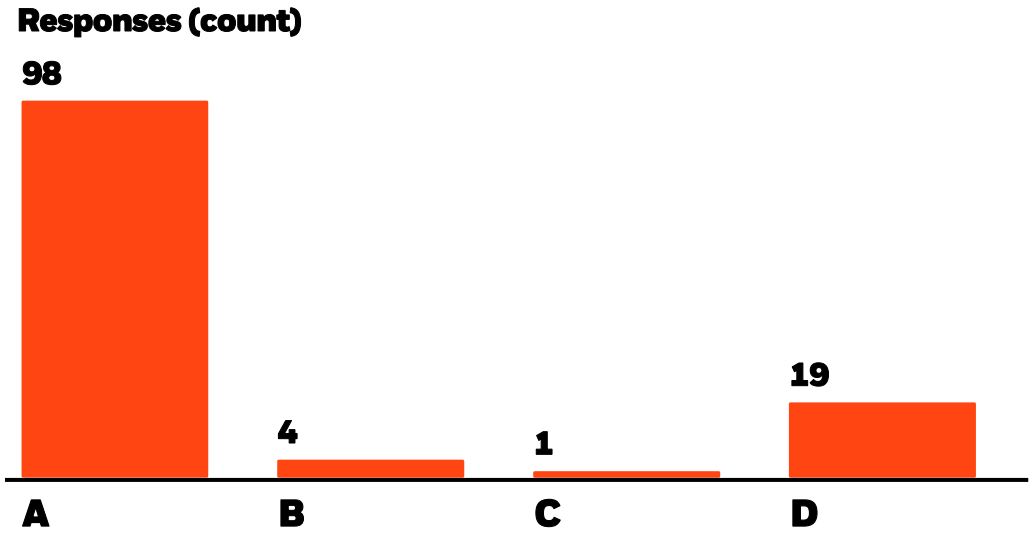
A	No
B	Yes - increase my equity allocation
C	Yes - increase my credit allocation
D	Yes - increase my government bond allocation
E	Yes - increase my alternatives allocation
F	Yes - increase my cash allocation



Q.02

How has your approach to sustainability changed on the back of 2022 performance dynamics of sustainable strategies? (please select all that apply)

A	My approach to sustainability has not changed (I am still interested in sustainability and haven't changed strategy
B	My approach to sustainability has not changed (I am still not interested in sustainability)
C	I am re-introducing exposures to sectors or styles that were excluded/underweighted due to sustainable screenings
D	I am no longer screening out high carbon emitting sectors, but picking companies that are reducing their carbon emissions within these sectors
E	I am increasing my allocation to sustainable thematics strategies

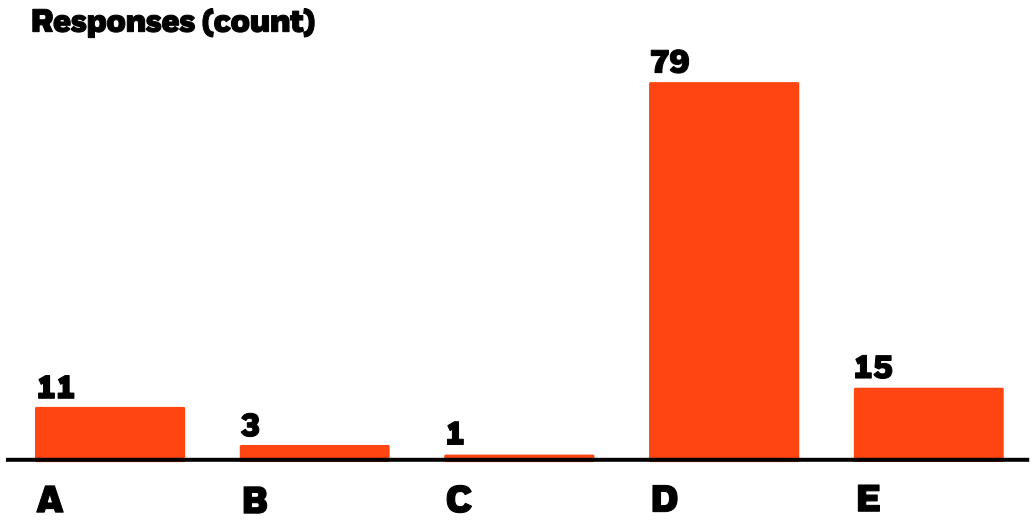


Survey results are based on responses provided by 112 clients in Europe ex UK. The survey responses were collected in Q2 2023.

Q.03

Are you planning to change your benchmarks from traditional to sustainable versions?

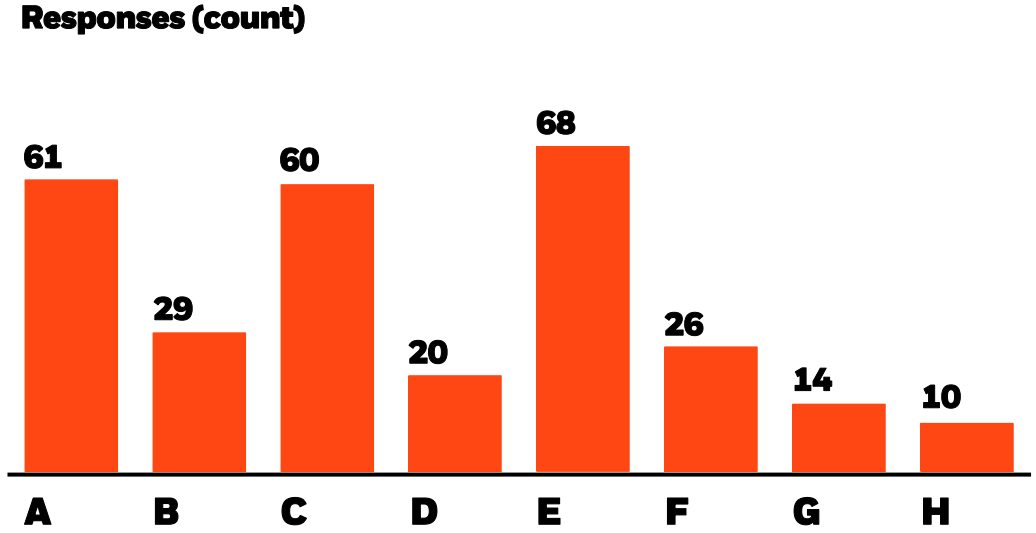
A	Yes, across both equity and fixed Income benchmarks
B	Yes, but only equity benchmarks
C	Yes, but only fixed income benchmarks
D	No, prefer to keep traditional benchmarks
E	My benchmarks are already sustainable



Q.04

What are the most important criteria that you use to classify a portfolio as 'sustainable'? Select up to 3 criteria:

A	Environmental Social Governance score above a certain threshold
B	Climate metrics assessment (Carbon Emission Intensity, Low Carbon Transition Score, Portfolio temperature)
C	Screening out exposures to controversial businesses
D	Alignment to UN Sustainable Development Goals
E	SFDR classification (% of Article 8/Article 9 funds in the portfolio)
F	% of Sustainable Investments ('SI') as per SFDR or EU taxonomy definitions
G	Alignment to Principle Adverse Impacts
H	Local regulations and labels
I	All of the above
J	None of the above

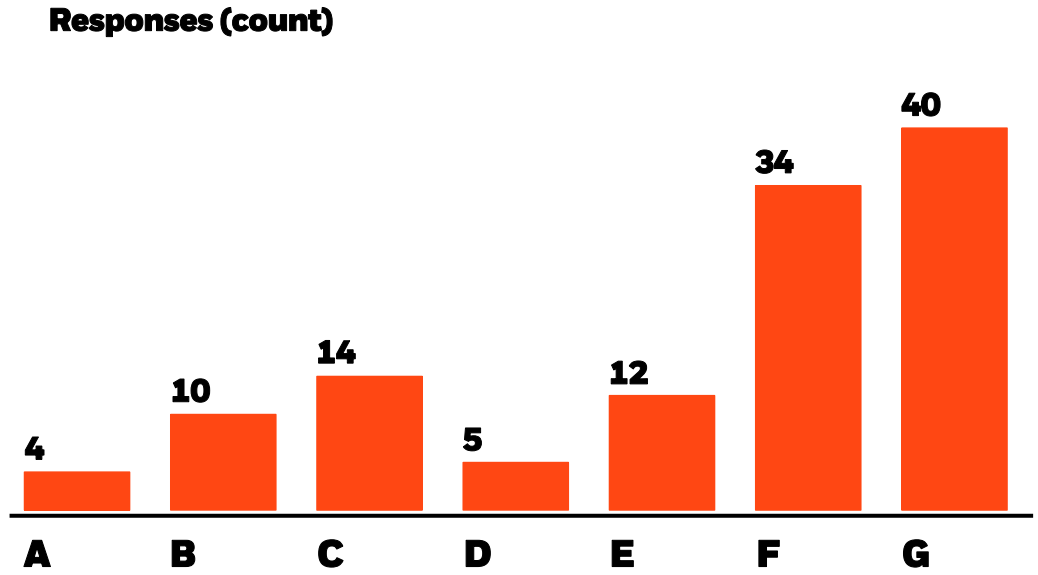


Survey results are based on responses provided by 112 clients in Europe ex UK. The survey responses were collected in Q2 2023.

Q.05

What proportion of your clients have expressed a preference for Sustainable Investments when asked?

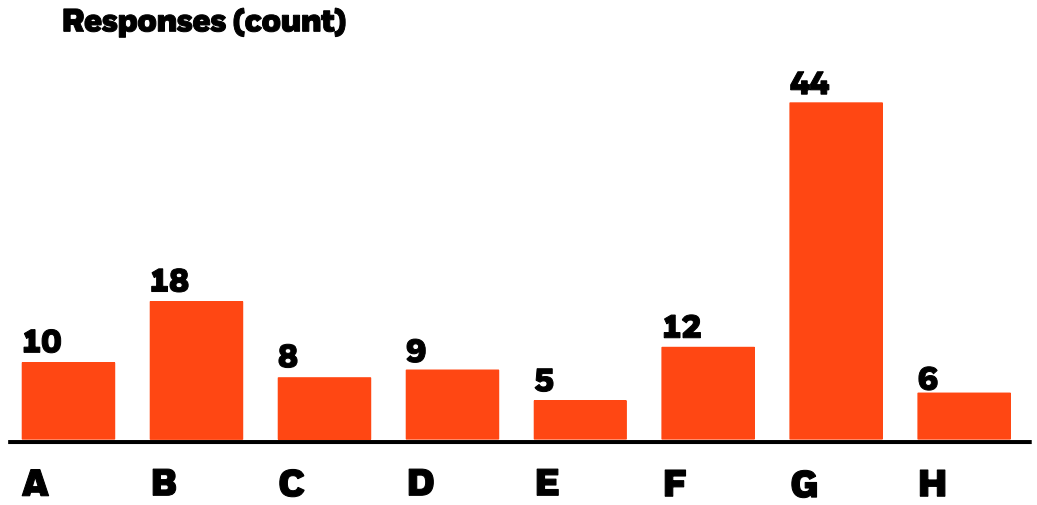
A	70% to 100%
B	50% to 69%
C	30% to 49%
D	20% to 29%
E	10% to 19%
F	Less than 10%
G	We have not done a complete assessment yet



Q.06

What % of Sustainable Investments[1] (SI) under SFDR are you targeting in your sustainable propositions?

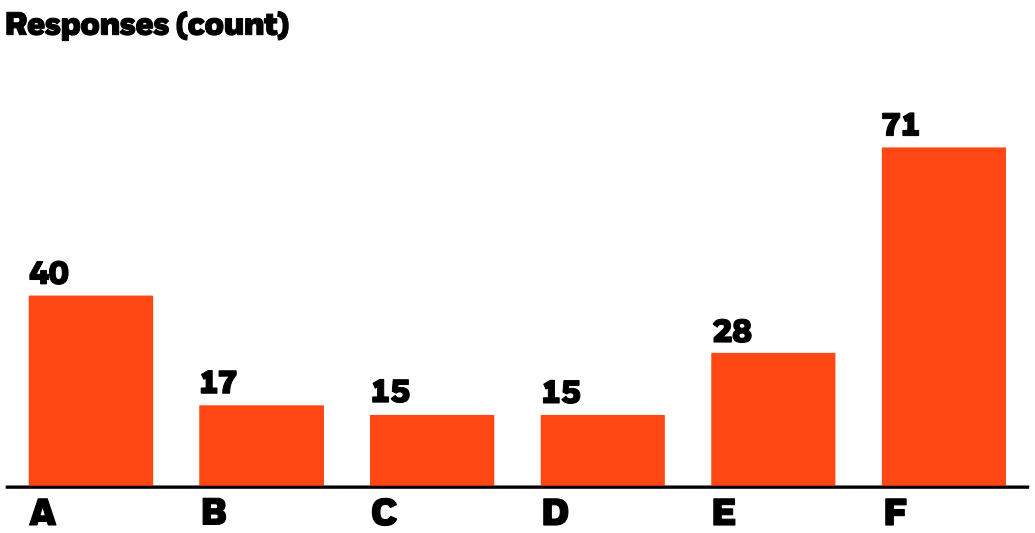
A	Above 90%
B	70% to 90%
C	50% to 69%
D	30% to 49%
E	20% to 29%
F	10% to 19%
G	I don't have an SI target for my sustainable propositions
H	I don't have a sustainable proposition



Survey results are based on responses provided by 112 clients in Europe ex UK. The survey responses were collected in Q2 2023.

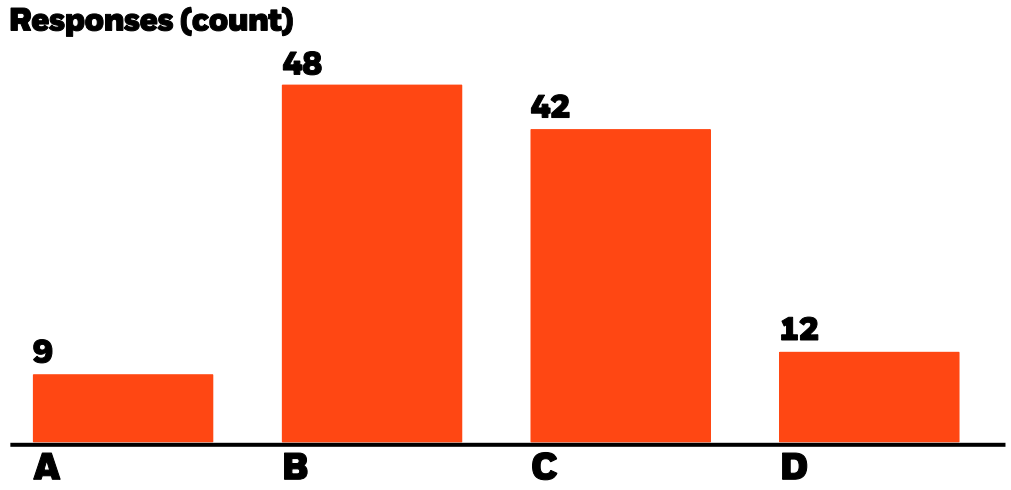
Q.07 Which PAI are you measuring alignment to? Select all that apply:

A	Greenhouse Gas emissions (PAI 1-6)
B	Biodiversity (PAI 7)
C	Water (PAI 8)
D	Waste (PAI 9)
E	Social and Employee matters (PAI 10-16)
F	I haven't started measuring alignment to PAI



Q.08 How are you planning to reach the desired % of Sustainable Investments ('SI') in your sustainable propositions?

A	Each product held in my portfolio should meet the desired % Si threshold
B	I can have products that don't meet the desired % Si threshold as long as my whole portfolio % SI threshold is met
C	I don't have an SI target for my sustainable propositions
D	I don't have a sustainable proposition



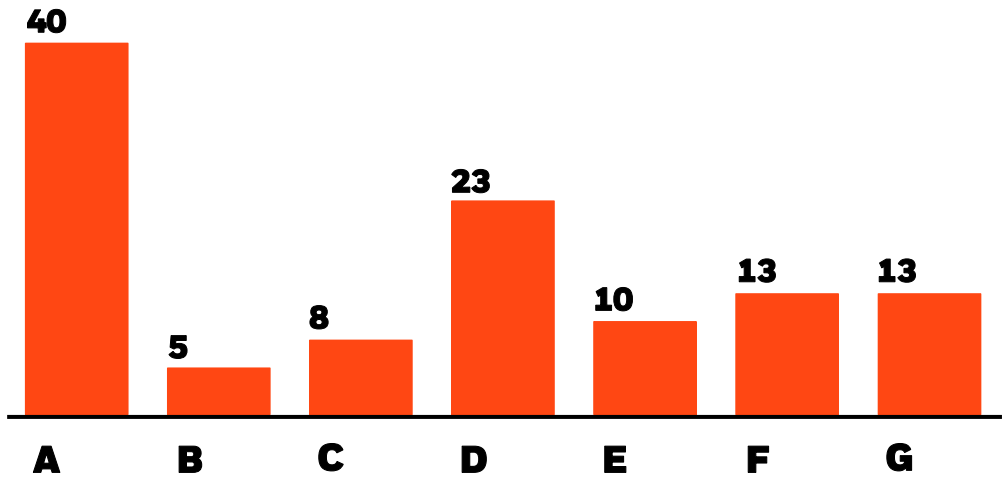
Survey results are based on responses provided by 112 clients in Europe ex UK. The survey responses were collected in Q2 2023.

Q.09

What is the minimum allocation requirement to SFDR Article 8/9 products in your sustainable propositions?

A	There is no specific requirement
B	More than 30%
C	More than 50%
D	More than 70%
E	More than 90%
F	100%
G	I don't have a sustainable proposition

Responses (count)

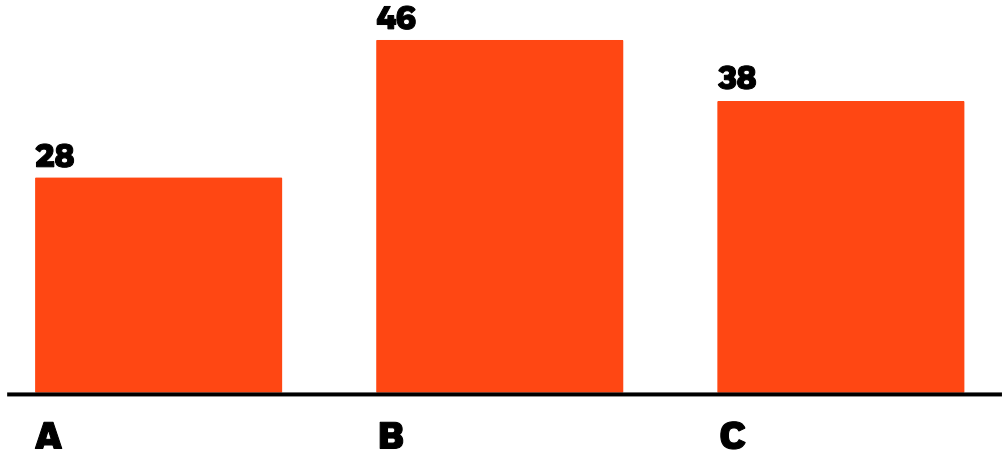


Q.10

How much of a focus are decarbonisation targets within your portfolio?

A	It is a focus
B	Not a focus yet - but I am planning to decarbonise my portfolio in the future
C	I am not planning to decarbonise my portfolio

Responses (count)

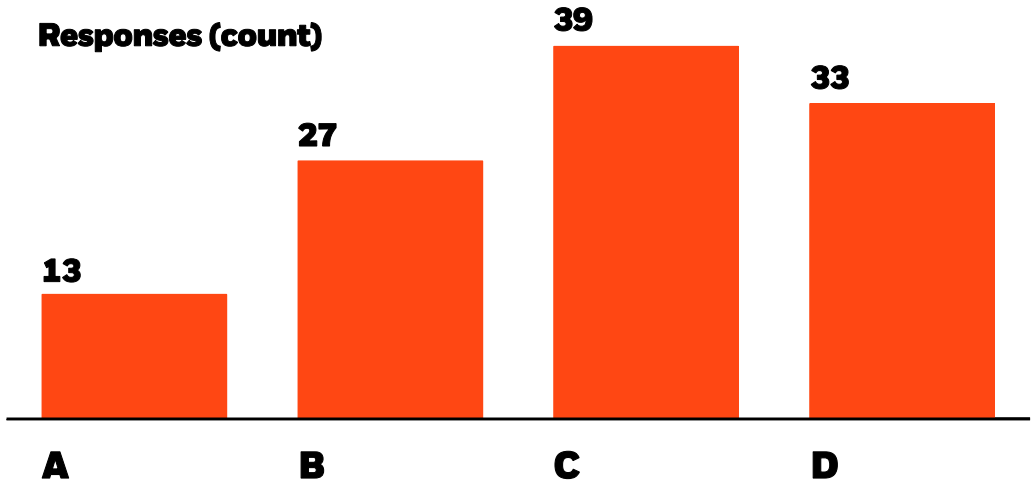


Survey results are based on responses provided by 112 clients in Europe ex UK. The survey responses were collected in Q2 2023.

Q.11

How confident are you on the possibility to meet decarbonisation targets together with financial objectives of your portfolio?

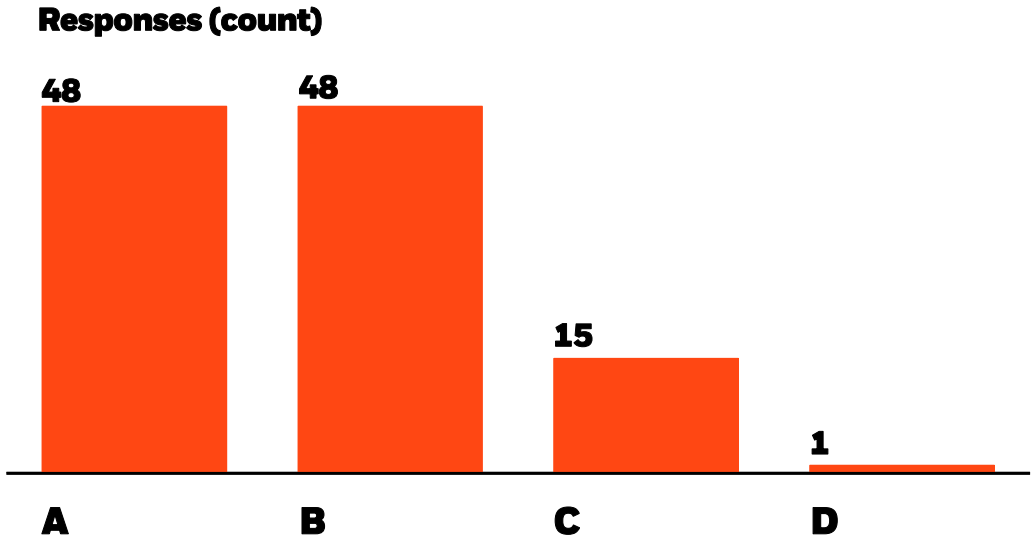
A	I will likely need to trade-off some of the portfolio's financial objectives to meet decarbonisation targets
B	I am equipped to achieve both financial and decarbonisation targets
C	I do not have the tools to monitor the impact of decarbonisation efforts on my financial objectives
D	Not planning to decarbonise my portfolio



Q.12

In your sustainable propositions, would you be open to invest in an Article 6 fund that gives exposure to high emitting companies that have credible decarbonisation targets?

A	Yes
B	No
C	I don't have a sustainable proposition



Survey results are based on responses provided by 112 clients in Europe ex UK. The survey responses were collected in Q2 2023.

1. Under SFDR, 'Sustainable investment' means an investment in an economic activity that contributes to an environmental objective, as measured, for example, by key resource efficiency indicators on the use of energy, renewable energy, raw materials, water and land, on the production of waste, and greenhouse gas emissions, or on its impact on biodiversity and the circular economy, or an investment in an economic activity that contributes to a social objective, in particular an investment that contributes to tackling inequality or that fosters social cohesion, social integration and labour relations, or an investment in human capital or economically or socially disadvantaged communities, provided that such investments do not significantly harm any of those objectives and that the investee companies follow good governance practices, in particular with respect to sound management structures, employee relations, remuneration of staff and tax compliance. Source: Article 2 in Regulation (EU) 2019/2088 of the European Parliament and of the Council of 27 November 2019 on sustainability-related disclosures in the financial services sector (Text with EEA relevance).

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2024 Global Outlook

Grabbing the wheel: putting money to work

BlackRock

BlackRock Investment Institute

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Contents

The new regime of greater macro and market volatility has resulted in greater uncertainty and dispersion of returns. We believe an active approach to managing investment portfolios will carry greater rewards as a result. This is a sea change from relying on the one-and-done asset allocations that worked so well during the Great Moderation, the long period of stable growth and inflation. That period is over. We believe this is a time to grab the investing wheel – and seize the opportunities the new regime has on offer.

Higher rates and greater volatility define the new regime. It's a big change from the decade following the global financial crisis. Ever-expanding production capacity allowed central banks to stabilize economies and shore up growth through loose monetary policy. That helped suppress macro and market volatility, and stoked bull markets in both stocks and bonds. Investors could rely on static, broad asset class allocations for returns – and gained little advantage from differentiated insights on the macro outlook.

Today, we think the flipside is true. Production constraints abound. Central banks face tougher trade-offs in fighting inflation – and can't respond to faltering growth like they used to. This leads to a wider set of outcomes, creating greater uncertainty for central banks and investors.

There's a temptation to interpret the new regime by taking a classic business cycle view of the current environment, we believe. Markets are swinging between hopes for a soft landing and recession fears as a result. This misses the point: the economy is normalizing from the pandemic and being shaped by structural drivers: shrinking workforces, geopolitical fragmentation and the low-carbon transition. The resulting disconnect between the cyclical narrative and structural reality is further stoking volatility, we believe.

Seemingly strong U.S. growth actually reflects an economy that's still climbing out of a deep hole created by the pandemic shock – and tracking a weak growth path. What matters most, in our view, is that the environment implies persistently higher interest rates and tighter financial conditions. Financial markets are still adjusting to this new regime, and that's why context is key for *managing macro risk*, our first theme.

We think macro insights will be rewarded in the new regime. Greater volatility and dispersion of returns create space for investment expertise to shine, as detailed in our second theme – *steering portfolio outcomes*. This involves being dynamic with indexing and alpha-seeking strategies, while staying selective and seeking out mispricings.

One way to drive portfolio outcomes is by *harnessing mega forces* – our third theme. These are five structural forces we see driving returns now and into the future. They have become important portfolio building blocks, in our view.

Our bottom line for 2024: Investors need to take a more active approach to their portfolios. This is not a time to switch on the investing auto pilot; it's a time to take the controls. It's important to be deliberate in taking portfolio risk, in our view, and we expect to deploy more risk over the next year.

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Context is everything

Multiple times in 2023, market hopes have been revived that the U.S. economy can achieve a soft landing – or inflation getting back to the Fed's 2% target without a recession. What's fueling those hopes?

In contrast to other major economies, the U.S. grew at a robust clip in the third quarter of 2023. Core inflation has fallen sharply. And nearly 7 million new jobs have been created since January 2022 – a phenomenal pace of jobs growth compared with a typical economic expansion. See the chart top right.

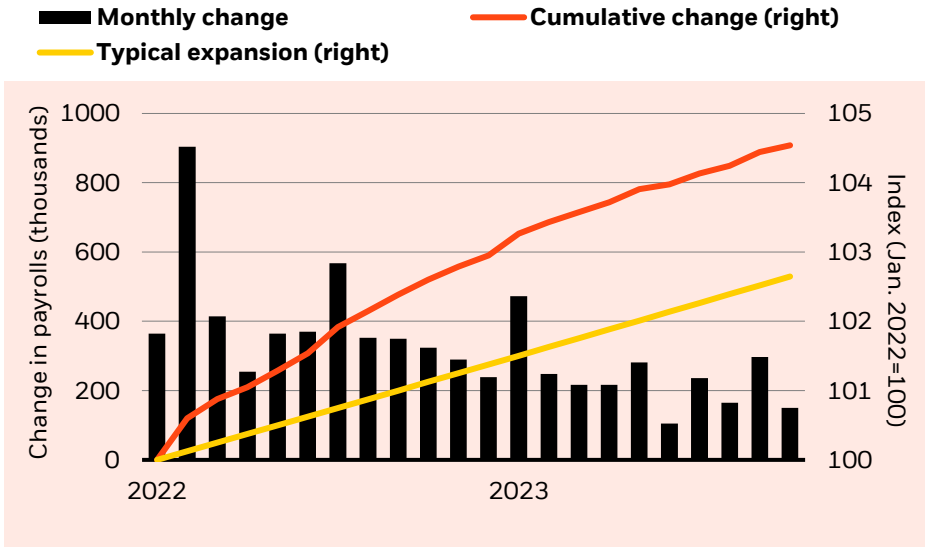
But zoom out and look at the bigger picture (chart below right): The economy has just been climbing out of the pandemic hole:

- Some 22 million jobs were lost when the pandemic struck. Strong job gains since then largely reflect the recouping of those lost. The level of employment is well below the track we would have expected to be on before the pandemic.
- Looking at broader economic activity, the U.S. economy has grown by less than 1.8% a year, on average, since the pandemic. That's well below the trend we would have expected pre-pandemic – and well below where the consensus and Federal Reserve had expected. That's nothing to be excited about.
- This resulted in even with more muted growth, historically low unemployment and higher inflation.

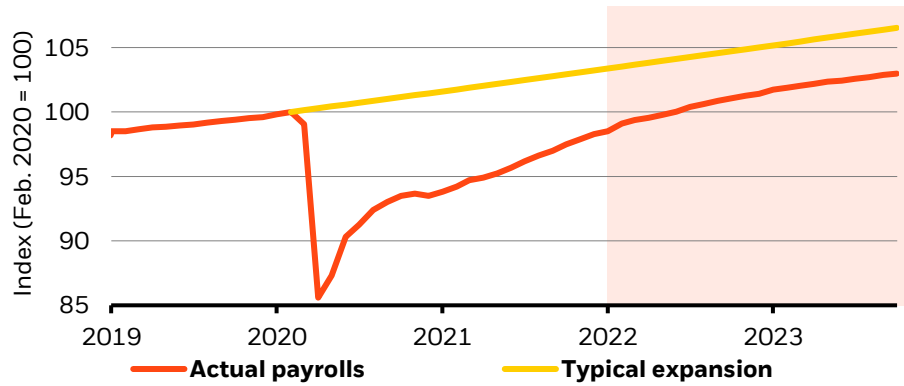
Our bottom line: Something has changed – and it's structural in nature. We are on a weaker growth path and got here with more inflation, higher interest rates and much higher debt levels. The upshot for investors? We think the key is to focus on how the economy and markets are adjusting to the new regime. Adopting the typical cyclical playbook may be misguided.

Strong employment gains...

U.S. payroll changes vs. typical expansion, 2022-2023 and 2019-2023



...but still climbing out of a deep pandemic hole



Source: BlackRock Investment Institute, U.S. Bureau of Labor Statistics, with data from Haver Analytics, December 2023. Notes: The charts show U.S. nonfarm payrolls. The orange lines show the actual level of total nonfarm payroll employment indexed to two different start dates: in the upper chart, January 2022=100 and in the lower chart February 2020=100. The yellow lines in both charts show hypothetical payroll employment as if the economy had continued to grow at the average rate observed during U.S. post-1945 expansions. The black bars in the upper chart show actual monthly payroll gains (in thousands) since January 2022.

BIIM1223U/M-3266814-3/16

Structural shift

Markets have been flip-flopping between hopes for a soft economic landing and fears of yet higher rates that ultimately result in recession. This has created volatility, as the chart shows.

The U.S. economy has been navigating two large shocks, in our view. The first was the pandemic. Over the past two years, most new jobs created have been due to the restart of activity after shutdowns.

A shift in consumer spending drove up inflation by creating a mismatch between what people wanted to buy and what the economy was set up to produce. That mismatch is now resolving, and inflation has been falling as a result.

As the effects of the pandemic shock recede, the effects of the second, more structural one are becoming clearer: A worker shortage has emerged, as a growing share of the U.S. population ages into retirement.

That's why unemployment is at historic lows – even though U.S. growth has averaged well below its pre-Covid rate. See page 3.

The workforce is growing more slowly in Europe and China, too, and it's one of several long-term production constraints we think will prevent many economies from growing at their pre-pandemic pace without sparking renewed inflation.

Rising production costs in a fragmenting world will also push up inflation across major economies over the longer term, in our view. And the transition to a low-carbon economy is creating price pressures as the energy system is being rewired.

This means central banks face a tough trade-off. If they want to stop inflation resurging, they will need to keep policy tight. We think policy rates are poised to settle well above pre-pandemic norms. Ultimately, we see central banks living with higher inflation amid hefty government spending and debt loads.

Our bottom line: This is a regime of slower growth, higher inflation, higher interest rates – and greater volatility.

Yield swings on short-term surprises

Sensitivity of U.S. 10-year yield to economic surprises, 2003-2023

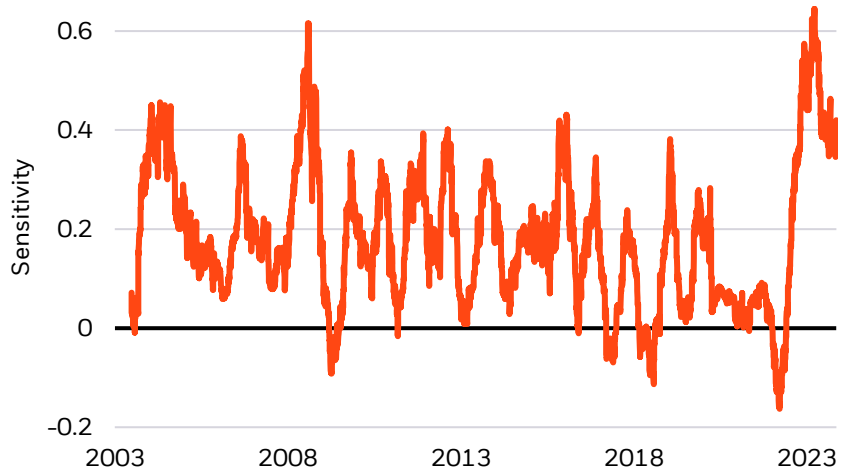


Chart takeaway: *Data surprises are driving the sharpest, sustained swings in U.S. 10-year Treasury yields of the past two decades. We believe this reflects greater uncertainty from investors still trying to view the economy through the lens of a typical business cycle.*

Source: BlackRock Investment Institute, with data from LSEG Datastream, December 2023. Notes: The chart shows how sensitive the U.S. 10-year Treasury yield is to economic surprises. This is calculated by using regression analysis to estimate the relationship between U.S. 10-year Treasury yields and the Citi Economics Surprise Index over a rolling six-month window. The sensitivity is how closely movements of the U.S. 10-year Treasury yield align with fluctuations in the Citi Economics Surprise Index, relative to how much the Surprise index itself varies. This analysis is only an estimate of the relationship between the 10-year Treasury yield and economic surprises. Past performance is no guarantee of future results.

If central banks want to stop inflation from resurging, we think they will need to keep holding back economic activity with higher policy rates.

BIIM1223U/M-3266814-4/16

Managing macro risk

This is a regime shift, not about whether a recession happens. So it doesn't make sense for investors to wait for the macro environment to improve, in our view. We think investors should seek to neutralize macro exposures or – if they have high conviction – be deliberate about which exposures they take.

We see more scope to outperform the market now than in the less volatile Great Moderation. Production constraints abound. Central banks face tougher trade-offs in fighting inflation and can't respond to faltering growth like before. We think this leads to a wider dispersion of views.

For example, analyst estimates of future S&P 500 equity earnings are more dispersed now than before the pandemic, according to LSEG data. See the chart. They are having a harder time reading the earnings outlook. So macro insight is likely to be more rewarded.

Still, we think investors need to be alert to risks around macro exposures in the new regime.

First, markets are slowly adjusting to structurally higher inflation and policy rates, but it is uneven. U.S. 10-year yields surged to 16-year highs around 5%, for example. But most DM equity earnings yields haven't risen much. This adjustment matters more than if a technical recession occurs, in our view, and keeps us cautious on broad exposures.

Second, structurally lower growth and higher rates pose a problem for ballooning U.S. government debt. If borrowing costs from higher yields stay near 5%, the government could spend more on interest payments than Medicare in a few years. This increases the long-run risk of higher inflation as central banks become less aggressive on inflation.

We also see a rise in term premium, or the compensation investors demand for the risk of holding long-term bonds. This, plus our expectation of more yield volatility, keeps us tactically neutral and strategically underweight long-term U.S. Treasuries. Our largest strategic overweight is instead to inflation-linked bonds.

Adjusting to new regime

Dispersion of U.S. equity analyst earnings estimates, 1995-2023

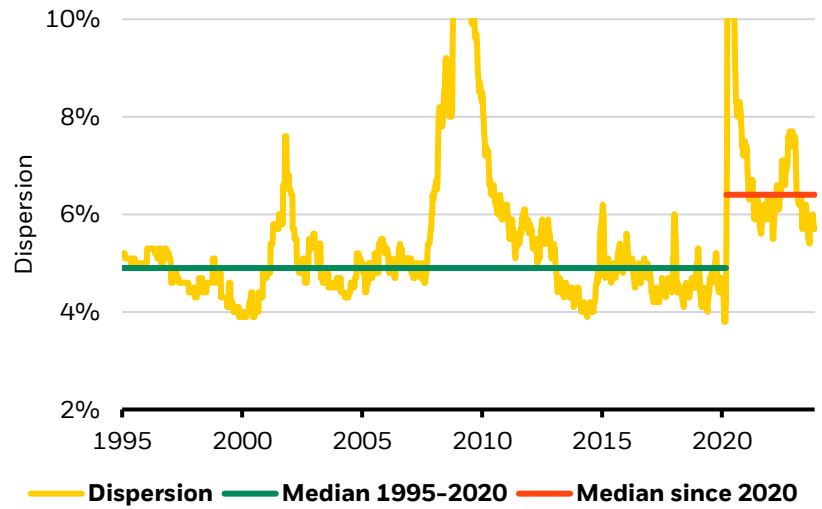


Chart takeaway: *During the Great Moderation, analyst views of expected company earnings were much more grouped together outside of major shocks. Now they are more dispersed, showing that an environment of higher inflation and interest rates makes the outlook harder to read.*

Source: BlackRock Investment Institute, LSEG Datastream, December 2023. Notes: The chart shows the aggregate standard deviation of analyst earnings estimates for S&P companies. The green line shows the median from 1995 to end January 2020, the orange line shows the median since February 2020

The macro outlook is more uncertain. Exposures to macro risk can be punished as well as rewarded, so we think investors should be deliberate about which exposures they take.

BIIM1223U/M-3266814-5/16

Steering portfolio outcomes

Heightened volatility and dispersion call for an active approach to managing portfolios, in our view.

Structurally higher policy rates should eventually mean higher returns on all assets. But not all asset valuations have adjusted, we think. And static exposures to broad asset classes are unlikely to deliver the risk-adjusted returns they did during the Great Moderation's bull markets in both stocks and bonds.

We see alpha, or above-benchmark returns, playing a bigger role in the new regime – and believe a more dynamic portfolio approach is warranted when cash offers attractive returns.

What if you were able to accurately predict U.S. equity sector returns with perfect foresight? Acting on this hypothetical ability more frequently would have paid off much more since 2020 (see the right bars in the chart) than in the four years prior left bars). The upshot? Good insight, acted upon in a timely manner, has yielded greater rewards than buy-and-hold strategies since 2020.

Investors can also thrive in the new regime by getting granular with portfolio allocations. For example, returns on short-term Treasuries have outpaced those on long-term bonds since mid-July 2023, according to LSEG data, as investors started to demand compensation for taking long-term interest rate risk. Lastly, dispersion of returns has risen in the new regime. This means security selection is likely to be more impactful, in our view. We see a wide arsenal of tools and strategies to help outperform static portfolios. Investors can blend indexes to build core allocations, implement alpha ideas and hedge risk.

Our bottom line: Investment expertise is likely to give portfolios an edge in the new regime.

> **"Mega forces and the macro: these are inspirations, not constraints, in finding alpha."**

Raffaele Savi
Global Head of BlackRock Systematic

More dynamic

Hypothetical impact of rebalancing on U.S. equity returns

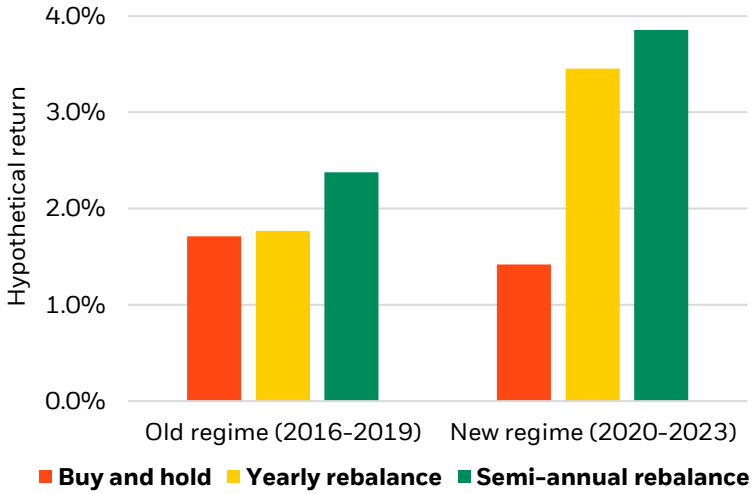


Chart takeaway: *Taking a more dynamic investing approach in in the new regime would have likely outperformed a buy-and-hold strategy to a much greater extent than before the pandemic.*

Past performance is not a reliable indicator of future performance. Index returns do not account for fees. It is not possible to invest directly in an index. Source: BlackRock Investment Institute, MSCI with data from Bloomberg, December 2023. Notes: The chart shows monthly U.S. equity returns – based on the MSCI USA – in the old and new regime under three scenarios: keeping the holdings unchanged (buy-and-hold), yearly rebalances and semi-annual rebalances. The rebalances optimize the portfolio for returns, diversification and risk with perfect foresight of equity sector returns in the MSCI USA index. This analysis uses historical returns and has been conducted with the benefit of hindsight. Future returns may vary and these results may not be the same other asset classes. It does not consider potential transaction costs that may detract from returns. It also does not represent an actual portfolio and is shown for illustrative purposes only.

We believe the new regime rewards an active approach to portfolios. We don't see one-and-done strategies working as in the past.

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Harnessing mega forces

We think mega forces are another way to steer portfolios – and think about portfolio building blocks that transcend traditional asset classes. They stand out as drivers of corporate profits on their own, in our view, and so could offer potential opportunities that may be uncorrelated to macro cycles.

These forces are already reshaping markets. Take **digital disruption and artificial intelligence** (AI). The chart to the right illustrates the outperformance of U.S. tech relative to the broader market this year. We think this reflects how quickly markets embrace such fundamental shifts in the market outlook.

We think the winners and losers can broaden the AI tech stack. When incorporating this mega force into our tactical views, it can push up our stance on DM equities closer to neutral even if the macro backdrop isn't rosy. See pages 8 and 14.

That's just one example of why we think harnessing mega forces will enable investors to outperform simple, static allocations.

The far-reaching consequences of mega forces create new investment opportunities – and markets can be slow to price them in.

Capital pressures on banks are opening a path for private credit and non-banks to fill the lending void – part of the **future of finance**. Private credit can be an illiquid asset class not suitable for all investors.

Aging populations in major economies are poised to limit how much countries can produce and grow – depending on how they adapt in **demographic divergence**.

Climate resilience is emerging as a new investment theme within the **low-carbon transition**, in our view. As climate damages mount, we are seeing increased demand for solutions that help economies prepare for, adapt to and withstand climate hazards, and rebuild after damages. See page 9.

We see **geopolitical fragmentation and economic competition** driving a surge of investment in strategic sectors like tech, energy and defense. See page 10.

Mega force at work

S&P tech sector vs. S&P 500 performance, 2023 year-to-date

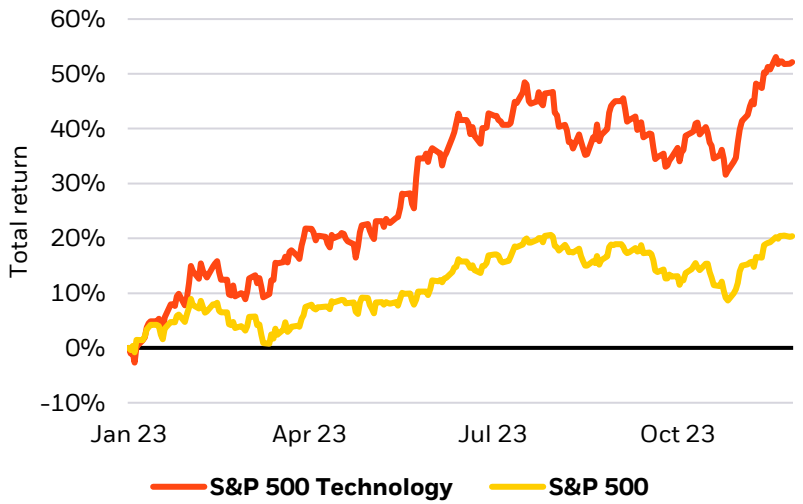

Chart takeaway: *Investor enthusiasm for AI and digital tech has offset the drag of rising yields. That has pushed U.S. tech stocks to easily outshine the broader market in 2023.*

Past performance is not a reliable indicator of future results. Index returns do not account for fees. It is not possible to invest directly in an index. Source: BlackRock Investment Institute, with data from LSEG Datastream, December 2023. Notes: The chart shows the total year-to-date returns in U.S. dollar terms for the S&P 500 Technology sector (orange line) and the S&P 500 index (yellow line).

Mega forces are key drivers of the new regime, affecting the long-term growth and inflation outlook and creating shifts in profitability. We see them as a source of return now and far into the future.

BIIM1223U/M-3266814-7/16

AI: intelligence revolution

Advances in computing hardware and deep learning innovations led to an inflection point for AI in late 2022. We think advances from here are likely to be exponential as innovation snowballs.

Yet tracking investment opportunities across geographies and sectors comes with high uncertainty. The technology "stack" – layers of technology built on top of each other that enable further innovation — may offer a roadmap to help assess the investment opportunities. See the chart.

The bottom layer (in orange in the schematic) covers cloud infrastructure and chips – the building blocks. The second layer (in yellow) covers models, data and data infrastructure. The last layer – in white – comprises the apps that harness the innovation. We think we are somewhere between the first and second layers, with the last one likely coming next. We see the entire tech industry – led by a handful of large tech firms – pivoting their business focus to AI.

That suggests we may be just at the cusp of this intelligence revolution, in our view. Implications likely go beyond the near-term focus on productivity gains. Our early research shows a potential positive correlation between a pickup in AI patents and broad earnings growth.. We also find that investors are ascribing a rising economic value to these patents. Yet not all patents lead to profitable enterprises, and their future value is highly uncertain.

We're overweight the AI theme in DM stocks on a six-to-12-month horizon. We see the tech sector's earnings resilience persisting and expect it to be major driver of overall U.S. corporate profit growth in 2024.

> **"AI is a major positive – both for earnings growth and productivity."**

Simona Paravani-Mellinghoff
Global CIO, BlackRock Multi-Asset Strategies & Solutions

The AI technology stack

BlackRock view of tech need to develop AI applications, December 2023

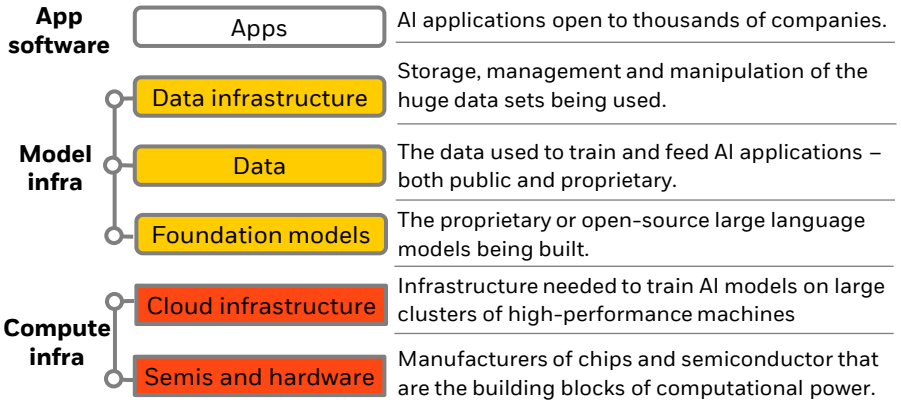

Chart takeaway: *We see investment opportunities moving up the stack as technology evolves – from hardware manufacturers to digital and data infrastructure and ultimately to applications.*

Source: BlackRock Investment Institute, December 2023. Notes: The schematic shows the technologies we think will be needed to develop AI applications. Each layer builds on the one preceding as technologies get "stacked" on top of one another, enabling further innovation. The schematic is for illustrative purposes only and intended as a guide based on what we know today. As the AI ecosystem evolves, some categories may be replaced by newer ones. References to securities are shown for illustrative purposes only and should not be construed as investment advice or a recommendation to buy or sell.

We think the overarching race to build the smartest machines is akin to a revolution – like the industrial and information revolutions of the past.

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Investing in climate resilience

The low-carbon transition is one of the five mega forces playing out in markets today. We launched the BlackRock Investment Institute Transition Scenario to help investors navigate its risks and opportunities, with a focus on the energy transition. This is not just about identifying opportunities in renewables; traditional energy companies can also outperform, especially when there are supply-demand mismatches.

The energy transition tends to get the headlines, but we see a related theme becoming an important investment story: climate resilience. This is the ability to prepare for, adapt to and withstand climate hazards, and to rebuild after climate damage. Think early monitoring systems to predict floods, air conditioning to cope with heatwaves, or retrofitting buildings to better withstand extreme weather. With climate damages set to keep mounting in coming years, it will take extensive investment to build society's resilience to them.

Just how big will those damages be? It's hard to put a number on the impact on human health and well-being. The quantifiable economic damage is growing fast, as the chart shows. We already see demand growing for products and services that build climate resilience. Markets may be underappreciating how this can become a mainstream investment theme over time.

In our recent paper, we divide this theme into three sub-themes: assessing and quantifying risks, managing risk and rebuilding physical infrastructure. That helps us build a framework to identify opportunities that cut across sectors, such as industrials and technology, and asset classes.

"We see opportunities in climate resilience solutions offering flood, fire and drought resistance."

Olivia Markham
Portfolio Manager, Thematic and Sectors, BlackRock Fundamental Equity

Real physical damages mount

U.S. events with inflation-adjusted losses of $1 billion, 1985-2023

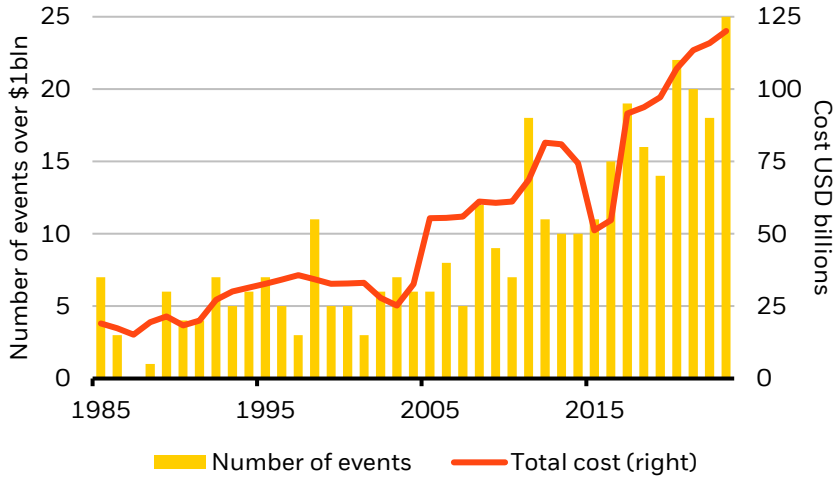

Chart takeaway: *The number of climate-related events with damages totaling more than $1 billion has steadily increased over the past roughly three decades. The U.S. hit a record number of such events just nine months into 2023.*

Sources: NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2023), December2023. Notes: The bars (yellow) show the number of climate events with losses greater than US$1 billion. The data include droughts, flooding, severe storms, hurricanes, wildfires, winter storms and freezes. The orange line shows the total cost as a 10-year rolling average. The data are adjusted for inflation using 2022 dollars. All currency figures are in U.S. dollars.

Markets may be underappreciating the prospects for climate resilience to become a mainstream investment theme over time, we think.

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Deepening fragmentation

Cascading crises have accelerated global fragmentation and the rise of competing geopolitical and economic blocs, in our view. Our BlackRock Geopolitical Risk Indicator is elevated – see chart – suggesting markets are paying more attention than before.

Should investors hunker down as a result – and keep their investments close to home? We don't think so. The new mantra of resilience over economic efficiency may raise costs – but also presents opportunities. Countries like Vietnam and Mexico could benefit from the diversification of supply chains, in our view. And we see opportunities in the Gulf states, India and Brazil. They are pursuing ties with multiple blocs and have valuable resources and supply chain inputs.

In this more competitive world, we expect a surge of investment in strategic sectors like tech, energy, defense and infrastructure. We also see opportunities in firms with expertise in managing and reducing cybersecurity risks.

War in the Middle East, ongoing conflict between Russia and Ukraine, and structural competition between the U.S. and China mean increased geopolitical risks. The number of volatile situations worldwide is the highest in decades, according to the UN. And 2024 is set be the biggest election year in history, with more than half the world population voting. We see the U.S. and Taiwan elections as particularly significant.

Navigating this new world order isn't necessarily about avoiding risks or positioning for specific events, in our view, but about whole portfolio strategies that aim to both seize its opportunities and mitigate risks.

> **"Repeated shocks are driving long-term, structural changes in the world order."**

Tom Donilon
Chairman, BlackRock Investment Institute

Paying more attention

BlackRock Geopolitical Risk Dashboard, 2018-2023

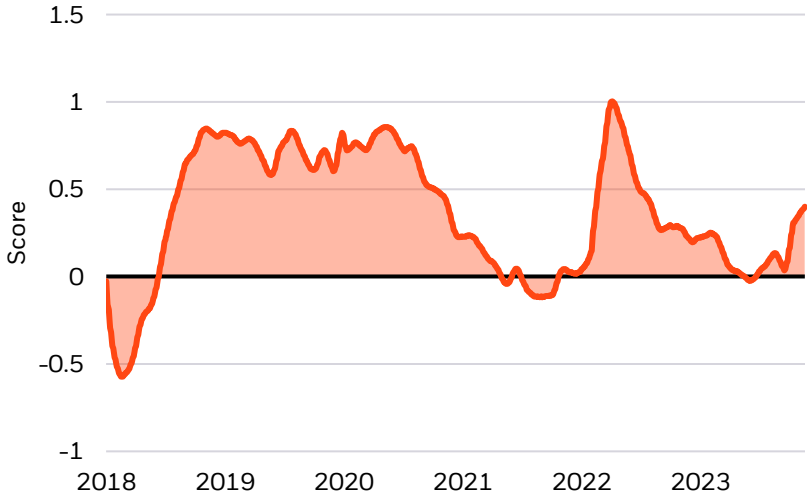

Chart takeaway: *Market attention to geopolitics has hit its highest this year, according to our BlackRock Geopolitical Risk Indicator.*

Source: BlackRock Investment Institute. December 2023. The BlackRock Geopolitical Risk Indicator (BGRI) tracks the relative frequency of brokerage reports (via LSEG) and financial news stories (Dow Jones News) associated with specific geopolitical risks. We adjust for whether the sentiment in the text of articles is positive or negative, and then assign a score. This score reflects the level of market attention to each risk versus a 5-year history. We assign a heavier weight to brokerage reports than other media sources since we want to measure the market's attention to any particular risk, not the public's.

The rewiring of economic ties along geopolitical lines is set to accelerate. We are focused on the investment opportunities this creates.

BIIM1223U/M-3266814-10/16

Moving away from home

We see greater dispersion of returns unfolding across global markets, creating opportunities for investors who look beyond their home markets. We get selective across regions and countries, assessing valuations, earnings prospects and what's in the price.

Take Japan. We think 2023 was a pivotal year for the country. We upgraded Japan twice this year on appealing valuations, earnings growth, and as corporate reforms aimed at boosting shareholder take root. It remains our strongest DM equity view. Investors are latching on, partly explaining the broad market's surge this year.

Under the hood, a more nuanced move is unfolding. The chart shows the outperformance this year of companies that sit at the low end of price-to-book ratios – a reflection of investors getting in front of more value-enhancing measures coming at such firms. We still see overall valuations as attractive. One risk is potentially tighter monetary policy – and why we prefer to take equity risk without hedging for currency.

We have maintained a broad preference for emerging market (EM) assets over DMs. EMs are not disconnected from global growth, so selectivity is important, in our view.

Mega forces may offer abundant EM equity opportunities. India's system of digital payments bodes well for the future of finance there. We believe it could pave the way for a credit boom as banks adapt lending. We think the low-carbon transition presents an important opportunity for Latin America, especially for countries that hold large reserves of key resources like copper and lithium. And U.S. companies bringing operations and production closer to home could benefit countries like Mexico.

> **"Japan and India are among the beneficiaries from global fragmentation."**

Belinda Boa
CIO of Emerging Markets, BlackRock Fundamental Equity

Reforms take root

Japan: equity relative performance by price-to-book ratio, 2023

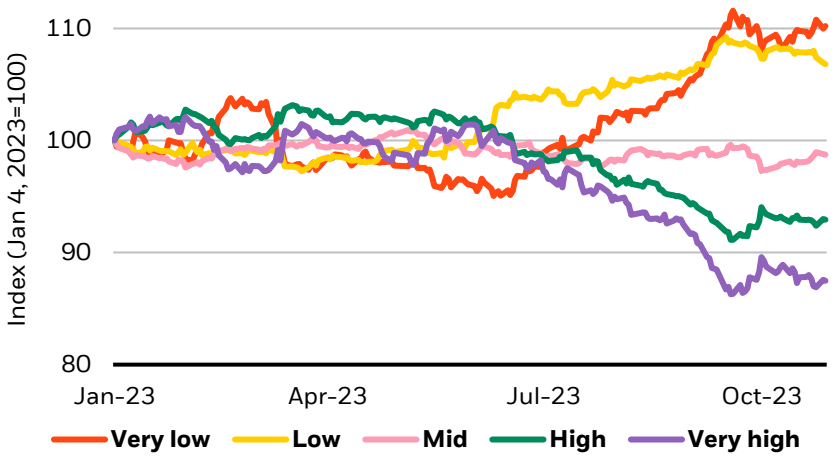

Chart takeaway: *Shares of Japanese firms with low price-to-book ratios have outperformed as investors anticipate such companies will double down on steps to boost shareholder value.*

Past performance is no guarantee of future results. Source: BlackRock Investment Institute, with data from QUICK and Daiwa. December 2023. Notes: The chart illustrates the year-to-date rebased performance of the TOPIX index constituents, grouped into five buckets based on their price-to-book (P/B) ratios. The process of grouping involves arranging the constituents in ascending order by their P/B ratios and then dividing them into five market-cap-weighted buckets, ensuring each bucket represents an equal segment of the market's total capitalization. For example, the "Very low" bucket comprises constituents with lowest P/B ratio. The buckets are rebalanced monthly.

Selectivity across geographies is an important layer of our playbook that aims to achieve above-benchmark returns in the new regime.

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Real estate opportunities

We think inflation will be structurally higher and see real estate and infrastructure playing a key role in strategic portfolios as a result. Why? Some real asset values or cash flows are linked to measures that correlate with inflation – think property prices or rental income.

But the macro matters here too. Low interest rates – previously a benefit to returns – have given way to structurally higher financing costs. The question now: how much is in the price today? We had expected valuations for core real estate to adjust to rising interest rates and financing costs – leading us to turn cautious on the asset class in June 2022.

Valuations have adjusted – but we think there's more to go. Capitalization (cap) rates – the ratio of a property's income to its price – are the commonly referenced valuation metric for real estate. As rates and yields surged, we expected cap rates for both private and public real estate to rise, too.

The reality? Cap rates for U.S. core real estate funds have moved less than publicly traded real estate investment trusts (REITs). See the chart. We think this shows public markets better reflect the new backdrop.

Cap rates at the aggregate level aren't the full story given large dispersion across geographies, sectors and strategy types. Plus, the nature of the underlying assets is why they differ in their relative attraction. U.S. REITs invest in a wider array of properties than core real estate funds, such as data centers and healthcare. That means some REITs could be more resilient to a weaker economy – and is why it's key to go beyond a simple mantra of buying real estate in inflationary times.

Our bottom line: Some public real asset prices have adjusted more than some private counterparts. Capturing the opportunities requires selectivity, understanding what's in the price and having the agility to shift between real assets at a granular level, in our view.

Private lags public

Real estate capitalization rates, 2017-2023

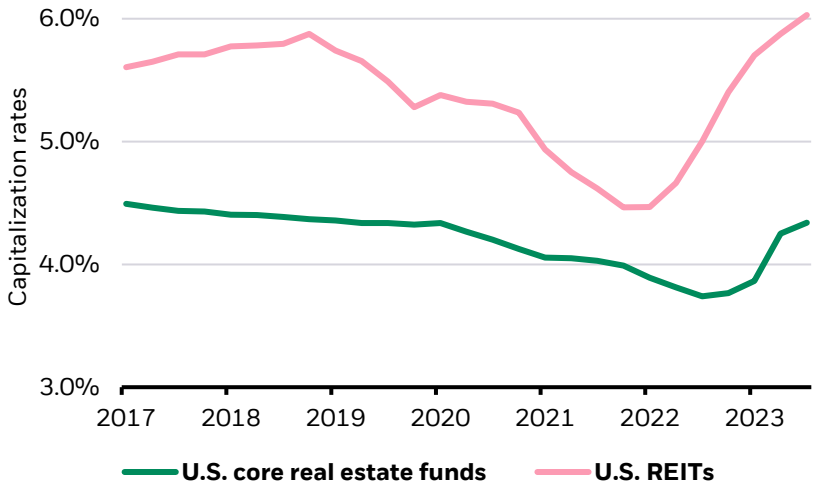


Chart takeaway: *Real estate investment trusts (REITs) valuations have reacted to rising interest rates faster and further than private real estate. We think that makes publicly listed REITs more attractive relative to private real estate.*

Sources: BlackRock Investment Institute, NCREIF and Greenstreet, December 2023. Notes: The chart shows historical capitalization rates (green line) and REITs (pink line). Past performance is no guarantee of future results.

Real estate valuations have adjusted differently to the new regime. We think structurally higher inflation should benefit real assets in strategic portfolios longer term.

BIIM1223U/M-3266814-12/16

Behind the views

Explaining our approach to tactical asset allocation

Broad and static investment solutions won't take you as far in this new regime as in the past, in our view. We think it calls for selectivity and granularity instead. We further extend our investment playbook to include alpha.

Broad asset allocation

We start by determining asset allocations based on our assessment of the macro outlook on a tactical horizon of six to 12 months – and what's in the price. We then implement our portfolio views across broad exposures to asset classes.

We are in a new regime of greater macro and market volatility. We don't think broad asset classes will deliver the same returns as before when central banks were loosening policy and spurring joint bull markets in stocks and bonds.

Implications

- We stay underweight DM equities
- We stay overweight short-term bonds
- We stay underweight high-grade credit

Alpha and granularity

We then assess exposures that are outside the macro allocations – what we call macro-neutral exposures. This can include alpha and granular views in sectors and countries.

We see alpha opportunities for potential returns where broad asset class or macro returns are less attractive. We think the uncertainty of the new regime may reward insights on the macro environment. We also narrow down regional, sectoral and industry preferences and opportunities, with the aim of producing above-benchmark returns.

Implications

- We see potential alpha in DM and EM equities
- To get granular, we like sectors such as technology and financials

Harnessing mega forces

We factor in the effects of mega forces – powerful, structural forces that transcend the macro backdrop. We believe many are already starting to drive returns and corporate profits – and go beyond asset classes.

Implications

- We stay overweight the DM artificial intelligence theme

This material represents an assessment of the market environment at a specific time and is not intended to be a forecast of future events or a guarantee of future results. This information should not be relied upon by the reader as research or investment advice regarding any funds, strategy or security in particular. The statements on alpha do not consider fees. Source: BlackRock Investment Institute, December 2023.

Dynamic and nimble

Our core conviction is that investors need to be more dynamic with portfolios in the new regime. The one-and-done approach to asset allocation simply won't work as it did before.

We have updated how we present both our tactical and strategic views to focus on where we have the strongest conviction on both time horizons – but with an emphasis on staying nimble and getting granular. We also break down how we now build on our macro view at the asset class level to incorporate a view of where we see potential return opportunities outside of such broad exposures.

On a tactical horizon, our overall macro view would keep us underweight DM equities as a standalone because we expect growth to stay stagnant with persistent inflation, prompting central banks to keep policy rates higher for longer. But we find greater alpha opportunities in DM stocks. When incorporating the AI theme and alpha, our overall view is more neutral on U.S. equities. See the example on the right. We stay positive on Japan as laid out on page 11. And we keep favoring the AI theme in DM stocks.

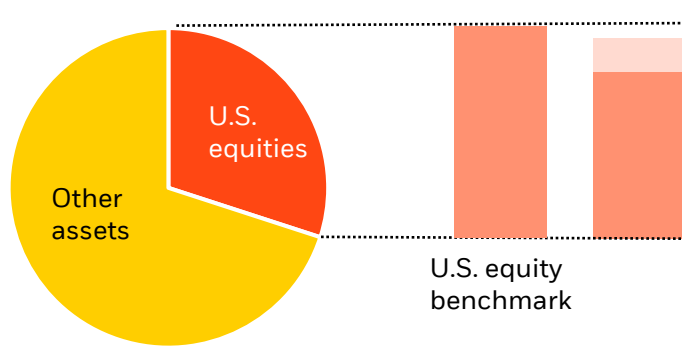
Strategically, it is more of an income story. Our inflation view keeps us maximum overweight inflation-linked bonds. We still like income within private markets. And within DM government bonds, we still prefer short- and medium-term maturities.

Big calls

Our highest conviction views on tactical (6-12 month) and strategic (long-term) horizons, December 2023

Tactical	Reasons
DM equities	• Our macro view keeps us underweight, but we see the AI theme and alpha potential has taken us closer to a neutral view. See below.
Income in fixed income	• The income cushion bonds provide has increased across the board in a higher rate environment. We like short-term bonds and are now neutral long-term U.S. Treasuries as we see two-way risks ahead.
Geographic granularity	• We favor getting granular by geography (see page 11) and like Japan equities in DM. Within EM, we like India and Mexico as beneficiaries of mega forces even as relative valuations appear rich.
Strategic	**Reasons**
Private credit	• We think private credit is going to earn lending share as banks retreat – and at attractive returns relative to credit risk.
Inflation-linked bonds	• We see inflation staying closer to 3% in the new regime than policy targets, making this one of our strongest views on a strategic horizon.
Short- and medium-term bonds	• We overall prefer short-term bonds over long term. That's due to more uncertain and volatile inflation, heightened bond market volatility and weaker investor demand.

Deep dive of including the mega force overweight on overall U.S. equity view



We are underweight broad U.S. equities. But our AI theme has taken us closer to neutral.

Note: Views are from a U.S. dollar perspective, December 2023. This material represents an assessment of the market environment at a specific time and is not intended to be a forecast of future events or a guarantee of future results. This information should not be relied upon by the reader as research or investment advice regarding any particular funds, strategy or security.

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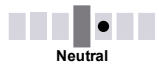
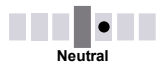
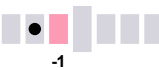
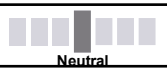
Tactical granular views

Six- to 12-month tactical views on selected assets vs. broad global asset classes by level of conviction, December 2023

Our approach is to first determine asset allocations based on our macro outlook – and what's in the price. The table below reflects this. It leaves aside the opportunity for alpha, or the potential to generate above-benchmark returns. The new regime is not conducive to static exposures to broad asset classes, in our view, but it is creating more space for alpha. For example, the alpha opportunity in highly efficient DM equities markets historically has been low. That's no longer the case, we think, thanks to greater volatility, macro uncertainty and dispersion of returns. The new regime puts a premium on insights and skill, in our view.

Equities	View	Commentary
U.S.		We are underweight the broad market – still our largest portfolio allocation. Hopes for rate cuts and a soft landing have driven a rally. We see the risk of these hopes being disappointed.
Europe		We are underweight. The ECB is holding policy tight in a slowdown. Valuations are attractive, but we don't see a catalyst for improving sentiment.
UK		We are neutral. We find attractive valuations better reflect the weak growth outlook and the Bank of England's sharp rate hikes to fight sticky inflation.
Japan		We are overweight. We see stronger growth helping earnings top expectations. Stock buybacks and other shareholder-friendly actions are positives. Potential policy tightening is a near-term risk.
DM AI mega force		We are overweight. We see a multi-country, multi-sector AI-centered investment cycle unfolding, likely supporting revenues and margins.
Emerging markets		We are neutral. We see growth on a weaker trajectory and see only limited policy stimulus from China. We prefer EM debt over equity.
China		We are neutral. Modest policy stimulus may help stabilize activity, and valuations have come down. Structural challenges such as an aging population and geopolitical risks persist.

Underweight | **Neutral** | **Overweight** ● Previous view

Fixed income	View	Commentary
Short U.S. Treasuries		We are overweight. We prefer short-term government bonds for income as interest rates stay higher for longer.
Long U.S. Treasuries		We are neutral. The yield surge driven by expected policy rates has likely peaked. We now see about equal odds that long-term yields swing in either direction.
U.S. inflation-linked bonds		We are neutral. We see higher medium-term inflation, but cooling inflation and growth may matter more near term.
Euro area inflation-linked bonds		We are underweight. We prefer the U.S. over the euro area. We see markets overestimating how persistent inflation in the euro area will be relative to the U.S.
Euro area govt bonds		We are neutral. Market pricing reflects policy rates in line with our expectations and 10-year yields are off their highs. Widening peripheral bond spreads remain a risk.
UK gilts		We are neutral. Gilt yields have compressed relative to U.S. Treasuries. Markets are pricing in Bank of England policy rates closer to our expectations.
Japanese govt bonds		We are underweight. We see upside risks to yields from the Bank of Japan winding down its ultra-loose policy.
China govt bonds		We are neutral. Bonds are supported by looser policy. Yet we find yields more attractive in short-term DM paper.
Global IG credit		We are underweight. Tight spreads don't compensate for the expected hit to corporate balance sheets from rate hikes, in our view. We prefer Europe over the U.S.
U.S. agency MBS		We are overweight. We see agency MBS as a high-quality exposure in a diversified bond allocation and prefer it to IG.
Global high yield		We are neutral. Spreads are tight, but we like its high total yield and potential near-term rallies. We prefer Europe.
Asia credit		We are neutral. We don't find valuations compelling enough to turn more positive.
EM hard currency		We are overweight. We prefer EM hard currency debt due to higher yields. It is also cushioned from weakening local currencies as EM central banks cut policy rates.
EM local currency		We are neutral. Yields have fallen closer to U.S. Treasury yields. Central bank rate cuts could hurt EM currencies, dragging on potential returns.

Past performance is not a reliable indicator of current or future results. It is not possible to invest directly in an index. The statements on alpha do not consider fees. Note: Views are from a U.S. dollar perspective. This material represents an assessment of the market environment at a specific time and is not intended to be a forecast or guarantee of future results. This information should not be relied upon as investment advice regarding any particular fund, strategy or security.

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Investment perspectives
Mega forces – Low-carbon transition
November 2023

Emerging markets: financing the transition

Emerging markets are pivotal to the global transition to a low-carbon economy. Reforms to plug the shortfall in investment could present both opportunities and risks for investors.

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Summary

- The global transition to a low-carbon economy is one of five mega forces sweeping markets and economies. We see emerging markets (EM) playing a decisive role in this transition. Why? **We estimate EM economies will account for over half of energy demand and carbon emissions by 2050. We believe this means the shape and speed of EM transitions will in large part define the speed and shape of the global transition.**
- The consequences of a changing climate will be even more acute for EM than for developed markets (DM), in our view. We think several structural factors set EM countries apart from DM economies in the transition: **stronger growth in energy demand, a higher cost of capital to finance the transition, a larger share of hard-to-abate emissions – or those that can't be easily reduced by low-carbon technology – and greater exposure to physical climate damage.**
- These factors, plus the greater investment risk perceived broadly in these economies, mean **transition-related investment in EM will likely be notably lower than what they need** across a range of scenarios, in our view. Recent trends back this up: aggregate low-carbon investment in EMs excluding China and Russia has held flat while it has accelerated in DM and China. We estimate annual EM investment needs could be between 17-24 times higher than recent public commitments from DMs for climate finance, or public or private investments aimed at decarbonizing the economy or funding adaptation and resilience to physical climate change.
- **We think closing the gap would require significant public sector reforms and private sector innovation, resulting in greater "blending" of public and private capital – or blended capital.** Reforms being discussed include evolving the mandates and toolkits of multilateral development banks and public financial institutions like the World Bank.
- As proposed reforms take shape, **we see the potential for private capital to find new investment opportunities as part of filling the EM climate financing gap.** For example, the drive for public reforms and private innovation could create new private market infrastructure opportunities or increase the pool of green bond issuance by EM countries.
- Progress on these fronts could accelerate the most-likely path of our BlackRock Investment Institute Transition Scenario (BIITS) – yet they remain a key source of uncertainty. We examine the sensitivity of our base case transition view through two hypothetical scenarios: an accelerated case where reforms are assumed to lower the EM cost of capital and indirectly increase EM climate policy ambition, and one with an assumed persistent economic drag in EMs due to ongoing sluggish financing flows.
- **In our upside case, we find successful reforms could see low-carbon investment in EM increase, on average, by an additional U.S.$200 billion a year – or U.S.$4 trillion overall – above our base view of a major increase in investment between 2030-2050.** We find this may result in faster decarbonization in EM. **Yet if reform efforts prove less durable or effective than in our base case, we see investment levels reduced by roughly U.S.$50 billion a year, along with lower economic growth, lower energy demand and a more divergent global transition.**
- We identify six challenges that could slow EM transitions through a macroeconomic drag: persistent macroeconomic risks, the economic ripple effects of shifting priorities of public financial institutions, risks to EM national climate commitments, the limited balance sheets of multilateral development banks (MDBs), a lack of available projects, and growing spreads between policy rates and rates of expected return on investments.

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Structurally different transitions

In our 2021 paper *The Big Emerging Question*, we first set out why emerging markets (EM) are critical for the global transition to a low-carbon economy – yet face a sizeable shortfall of capital investment to fund the shift. We build on this with the help of the BlackRock Investment Institute Transition Scenario (BIITS) – our analytical framework to help assess, on behalf of our clients, how the low carbon transition is most likely to play out, based on what we know and expect today. The modelling that underpins the BIITS is based on assumptions we see as realistic today and is informed by the views of BlackRock's portfolio managers. It focuses on what is most likely to occur, rather than on what anybody thinks should happen or a specific outcome. We exclude China from our classification of EM in this paper because we believe it has greater capacity to self-finance its transition. We also exclude Russia as we don't see it receiving sizable transition-related foreign investment due to its invasion of Ukraine.

We acknowledge that EMs are historically least responsible for greenhouse gas emissions, most vulnerable to the physical risks of climate change, and least financially prepared to adapt to them. We also recognize the incredible diversity across EM economic structures, industries, and the outlook for future growth and decarbonization. Yet we see four structural differences that we believe distinguish their transitions from developed markets (DM) – and influence financing needs and likely flows.

First, **technology and energy system fundamentals:** Industrializing nations with strong growth and booming populations typically host more energy-intensive sectors, with a higher energy intensity of GDP and faster growing energy demand, according to the BIITS. We believe this combination of factors means EM countries may retire emitting assets more slowly, as new energy infrastructure is typically adding to total capacity to help meet growing needs rather than replacing high-carbon asset with low carbon ones. As a result, we believe EMs are most likely to make up a rising share of global energy needs and carbon emissions under a wide range of feasible transition speeds. See chart.

Climate policy-driven divergence. Unlike most DMs, many EMs lack the leeway to enter the green subsidy race or fund costly infrastructure projects, in our view. We see EM governments facing increasingly complex tradeoffs between decarbonization efforts versus energy access and security. Why? Macro effects of the transition: higher near-term energy prices, central banks holding policy tight amid persistent inflation, and escalating climate-related damages.

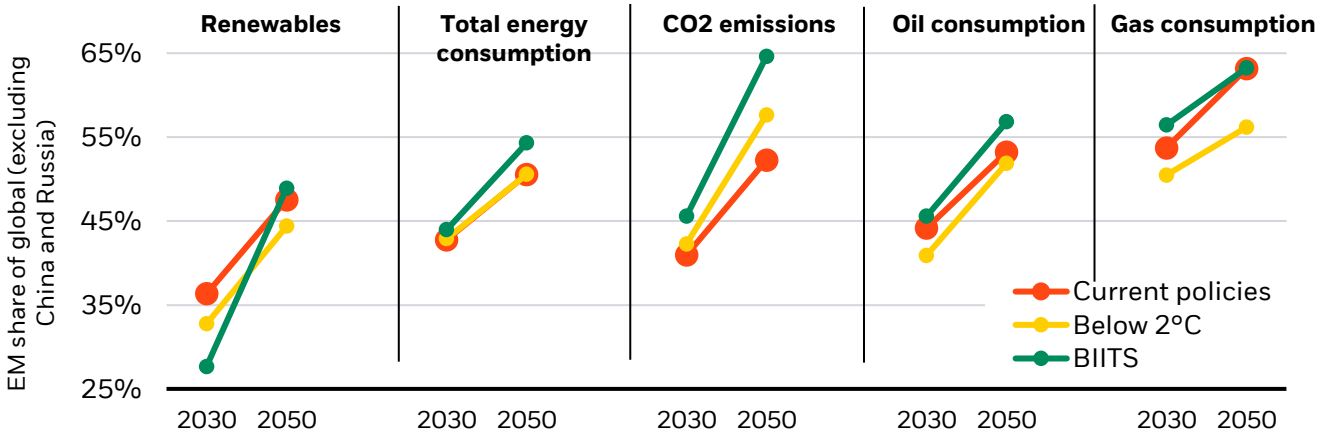
Investor preferences. Absent substantial reforms, we expect persistently higher costs of capital and technology in EM, mainly due to persisting real and perceived country and default risks.

Physical climate damage: Most climate scenarios, including the BIITS, expect EM to bear the larger share of expected climate-related GDP losses in coming decades. Why? Many EM countries are in tropical latitudes that are vulnerable to adverse climate events, such as floods, droughts or hurricanes. A high reliance on climate-sensitive sectors like agriculture is also a factor. These potential GDP losses may come from reduced productivity and the destruction of physical assets and infrastructure, and do not account for other important dimensions like wealth and well-being.

These four structural differences are intertwined. For instance, we see mounting loss and damage from physical climate change feeding into global climate negotiations and policy. They also underpin key uncertainties around our view of the speed and shape of the global transition. We see the scaling up of investments in EM low-carbon infrastructure as one of today's biggest challenges for capital markets – a view shared by the International Energy Agency, the IMF and the G20. Yet it has direct ramifications on the quantity and split of physical and transition risks and opportunities globally.

EM pivotal role in the transition

Emerging market share of global energy use excluding China and Russia, 2030 vs. 2050



Forward looking estimates may not come to pass. Source: BlackRock Investment Institute, Intergovernmental Panel on Climate Change (AR6), International Energy Agency (IEA), Inevitable Policy Response, Network for Greening the Financial System (NGFS), BP; November 2023. Note: The chart shows the average share of global for EM excluding China and Russia for each variable in 2030 and 2050 across a range of scenario providers listed in the sources. The dark orange lines show the trajectory of estimates based on a scenario that assumes no further changes to current climate policies. The yellow lines show estimates "below 2°C," a group of scenarios that involves levels of climate policy that have a high likelihood of limiting warming to 2°C or less.

Capital shortfall persists

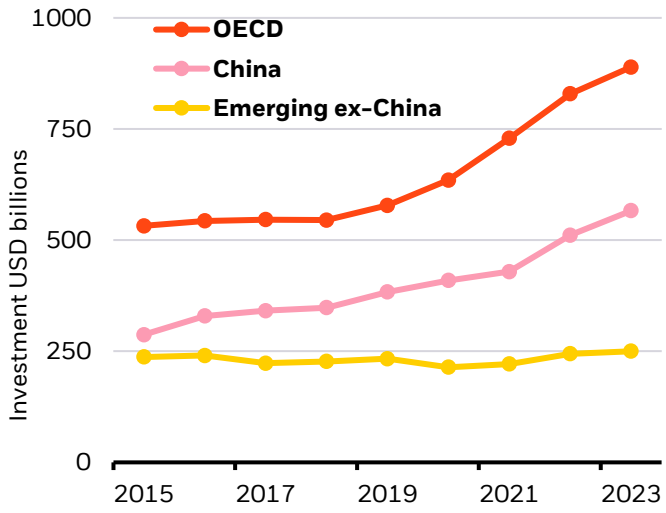
Private infrastructure investment in low and middle-income countries has declined over the last 10 years, World Bank data from 2022 show. Volumes in 2021 were less than half those in 2012 – and less than a third of that was in the energy sector. And yet global investments in the low-carbon transition began to rapidly accelerate in 2021, rising from a five-year average of U.S.$1.2 trillion in 2020 to an estimated U.S.$1.7 trillion this year, according to the IEA. This difference is because nearly all growth in low-carbon transition investment has been in the U.S., Europe and China – most EM regions have seen very little growth. Some have even seen declines. See the chart on the left below. IEA data show annual clean energy investment in EM has flatlined since at least 2015, hovering around U.S.$250 billion per year.

Why? First, we think EM countries are perceived as riskier on issues of governance, rule of law and streamlined business processes. Whether justified or not, this inflates risk premiums and reduces the pool of available capital. Foreign exchange risk can also be a deterrent. For instance, when the local currency weakens, revenues from local projects lose value in foreign currency terms. Hedging against this risk can be costly. And many EM countries are inherently vulnerable to climate risk given their geography – and typically also lack the physical infrastructure and financial resiliency to withstand those risks. This has led to a lack of insurance for such investment projects against physical damage – and makes such investment riskier and costlier to finance.

We think transition investment needs across EM are enormous – and not close to being met. Based on today's investment trends, this shortfall will likely persist no matter how quickly or slowly the transition accelerates. The average annual investment needed to avoid the worst impacts of climate change are between 17-24 times higher than recent estimated public commitments to climate finance in EMs, based on a comparison of data from the OECD (in right chart below) and the IEA. Committed public and directly mobilized private climate finance by OECD governments has risen since 2013 and may have reached the goal of U.S.$100 billion annually two years late, according to preliminary estimates by the OECD. This investment has been concentrated in decarbonization rather than in climate adaptation or resilience projects. See the chart on the right below.

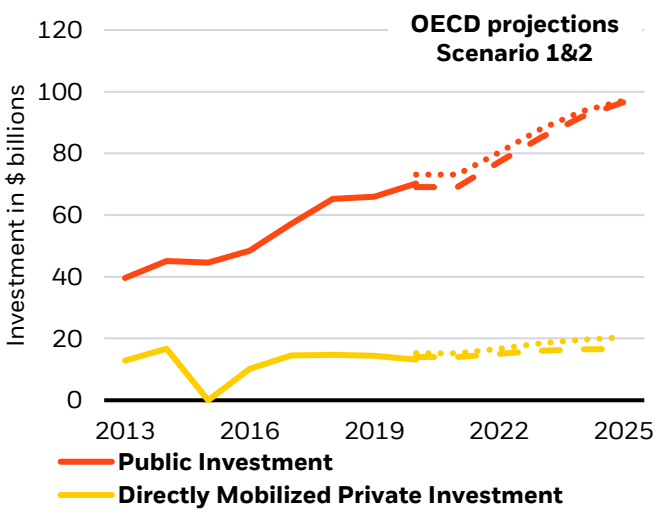
We think public funding has been ineffective in mobilizing private capital at scale – and that's where the multilateral development banks (MDBs) and public financial institutions can play a key role, in our view. They provide financial and technical support to EM countries to strengthen economies and reduce poverty. The chart on the right below again shows relatively flat levels of private capital even as public investment commitments rise. Existing grants or loans are too targeted on funding individual projects, we think. That capital would be better used, in our view, to mitigate risks more broadly and crowd in private investment. In 2022, the MDBs mobilized just $0.80 of private capital for every $1 of MDB climate-related investments in low-to-middle income countries, according to joint self-reporting. The lack of fiscal space also plays a role, in our view. High levels of public debt in many EM countries makes attracting foreign direct investment into energy or climate resilience sectors more difficult, we think. Closing the EM financing gap to address these challenges would require some reform and innovation, in our view, as we discuss on the following page.

DM and China lead clean energy investments
Annual clean energy investment, 2015-2023



Source: BlackRock Investment Institute, IEA; November 2023. Note: The chart shows annual clean energy investment across three regional groups. Per IEA groupings, advanced economies include the OECD member countries, Bulgaria, Croatia, Cyprus, Malta and Romania; emerging economies are the rest of the world, excluding China. Values in USD as of 2022.

Mobilized private investment lags
EM public vs. private climate finance investment



Forward looking estimates may not come to pass. Source: BlackRock Investment Institute, OECD; November 2023. Note: The chart shows OECD estimates of historical and projected public and directly mobilized private climate finance investments. The latter are private investments that would not have occurred were it not for the public investment deployed alongside it. The OECD presents two scenarios for 2021-25: one where countries and MDBs deliver on climate finance commitments (resulting in higher values); the other includes delays due to factors like macro conditions and capacity constraints.

Closing EM financing gaps

EMs are likely to bear the brunt of climate-related GDP losses, as we noted on page 3 – and this risk to growth, trade and investment can ripple through the global economy, in our view. This adds urgency to addressing the shortfall in EM climate finance. We think structural reforms of the MDBs are a key piece of the financing puzzle. Several reforms are already under consideration. Should a critical mass occur, we think they would foster a blending of public and private capital that could greatly boost funding for EM climate projects. We see near-term investment opportunities as a result.

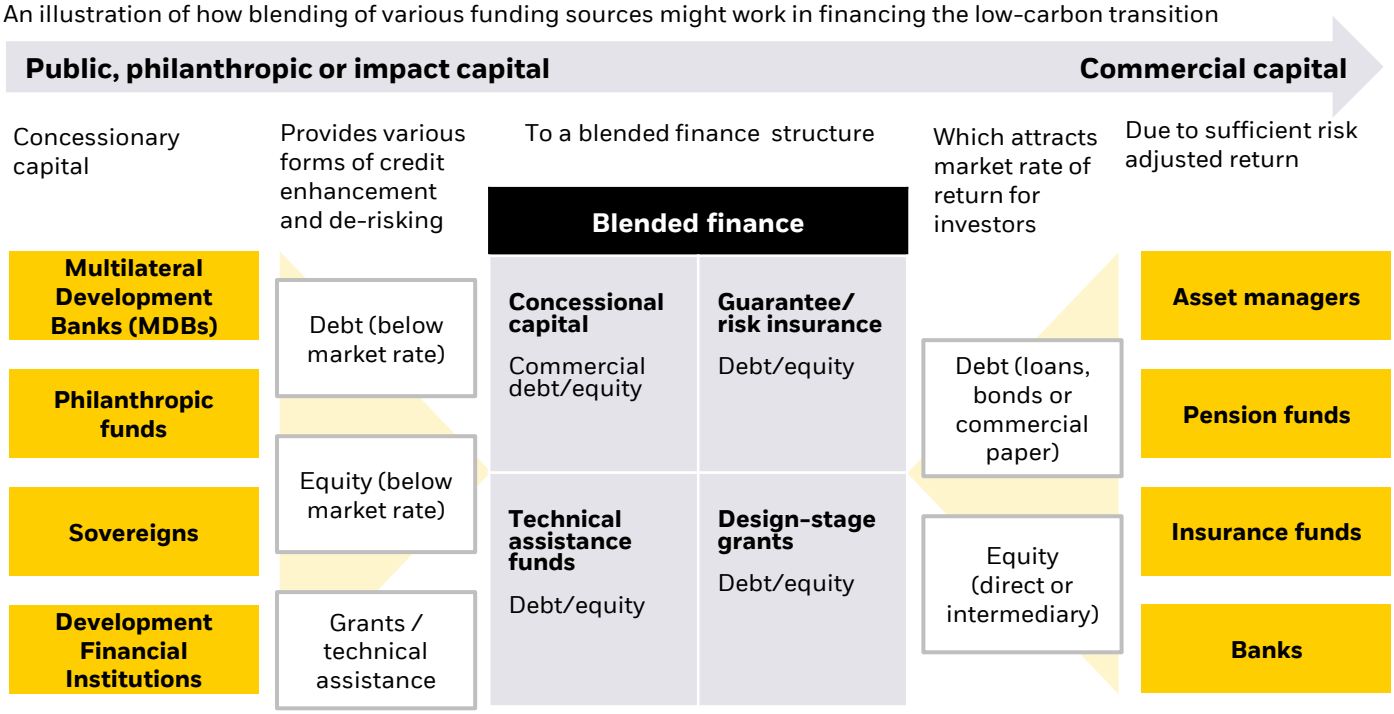
Modern challenges for MDBs – like climate change and pandemics – are inherently cross-border and complex. That makes them different from the challenges they were designed to address at their creation, such as helping crisis-hit economies, alleviating poverty and promoting economic development. We see two key shifts needed for these institutions to play a bigger role in the low-carbon transition. First, we think their role needs to evolve to facilitate private financing and backstop initial losses on EM infrastructure investments, particularly climate-related projects. This is partly about recognizing that economic development will depend on a stable climate. Second, their toolkits need to move beyond tackling country-level crises to addressing these interconnected, global challenges. These institutions could significantly amplify financing through formal capital increases or tweaks to reserve rules.

Tight limits on shareholder government budgets suggest MDBs will face pressure to mobilize meaningfully more private sector capital, in our view. Doing so ultimately requires them to increase risk-burden sharing with private investors. A crucial element, in our view, is callable or hybrid capital, or guarantees from government shareholders that can absorb losses in adverse scenarios. Progress here is well underway. According to think tank ODI, such modifications could enable MDBs to commit an additional $500 billion to $1 trillion without jeopardizing their AAA credit ratings. Further, new reserve rules could allow MDBs to raise capital from other types of clients. MDBs participating in more AAA-rated bond issuance could crowd in private capital on the other side of the balance sheet. Attractive yields with low perceived risk could be compelling in the new macro and market regime. Other avenues for expansion could involve hedging against currency risk or diversifying MDB models to broaden the range of clients, both sub and supranational.

Private innovation and blended finance will be crucial in closing the EM funding gap, we think. An illustration of blended finance in practice is below. For example, private institutional investors have co-invested in vehicles that fund low-carbon initiatives alongside public or philanthropic (concessional) capital, aiding the transition. They have also engaged in debt-for-nature or debt-for-climate swaps, helping governments refinance debt at a lower cost and use the savings for nature conservation or emission reductions. An as-of-yet untried approach is a "puttable green bond." Here a MDB backs individual bonds using an embedded put option – or the agreement to buy a bond from the holder – instead of guaranteeing entire portfolios. That means the MDB would step in to buy the bonds if their price falls to a preset level, not necessarily its original one. This would cut issuer borrowing costs. Through blended finance, MDBs can efficiently use their balance sheets to steer capital into a “sweet spot” of risk and return, leading to a scale-up of transition finance.

The blended finance landscape

An illustration of how blending of various funding sources might work in financing the low-carbon transition



For illustrative purposes only. Source: BlackRock Investment Institute and Convergence, November 2023. Note: The schematic shows how the process of blended finance, where capital from public entities blends with private investment – and incentivizes it through various forms of credit enhancement and de-risking – may work in practice. For illustrative purposes only. Examples of blended finance structures listed in grey boxes are from https://www.convergence.finance/blended-finance

Investment implications

We see public reforms having two key types of investment implication: their effect on the overall speed and shape of the transition and related physical climate change, and on investment opportunities in EM. We think the current drive for reform is likely to mean many EM countries decarbonize notably faster. That would directly affect our central estimate of the global transition pathway as mapped in the BIITS. See the bottom-left chart.

Below we test the sensitivity of our core outlook using two hypothetical scenarios. First, we stretch our assumptions about the impact of public reforms and private innovation on the effective cost of capital for low-carbon infrastructure projects and how a fall in the cost of finance in turn could affect climate policy ambition and stringency. Second, we assess the impact of an assumed drag on EM economic growth and climate policy associated with persistently sluggish finance flows. In both scenarios, we do not directly model the effects of specific reforms or investment amounts but construct a plausible scenario with a mix of factors that could have the combined effect we aim to gauge.

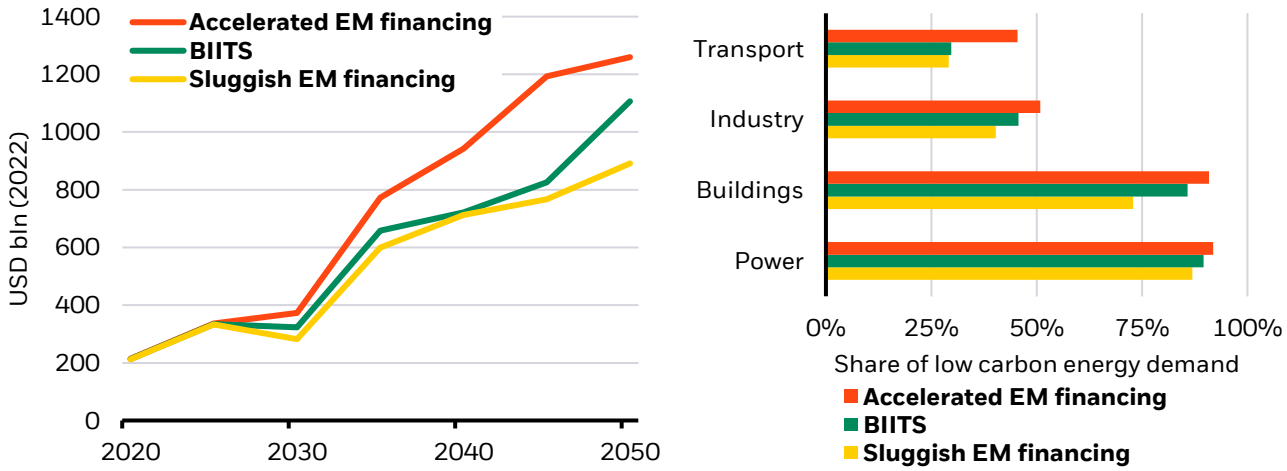
Our base case outlook sees a significant rise in EM low-carbon energy infrastructure investment, potentially tripling by 2040 and reaching $1.1 trillion annually by 2050. In an upside scenario, we anticipate a further $200 billion yearly from 2030 to 2050, totaling nearly $4 trillion – a 25% increase on our base case. This surge would boost the share of low or no-carbon energy in total EM demand by 2.5% by 2050 versus our current projections. First movers would likely benefit from this long-term growth, in our view. Conversely, a scenario of stagnant investment sees a 4.5% annual drag on economic growth, with an overall 6% reduction in the share of low or no-carbon energy use by 2050. Post-2030 investments could drop by an average of $50 billion yearly, resulting in a total reduction of over $1 trillion. Such a scenario may lead to greater global economic fragmentation and a more divergent transition. See charts below.

With these reforms, we expect public financial institutions to more effectively facilitate private climate investment in EMs, potentially unlocking new investments in tangible assets like low-carbon power, transport and industry infrastructure, as well as climate resilience projects. These reforms could enable these institutions to increase project transparency, supporting larger initiatives. Yet investors who can assume these risks and meet their liquidity requirements may find attractive opportunities. We also expect these reforms to have indirect effects through investments that improve domestic institutions and governance. Increased investment could help reduce EM sovereign debt levels and risk premia in countries where climate risk looms large. This could, in turn, have the virtuous effect of improving fiscal outlooks and pushing down the cost of capital for infrastructure projects, in our view. While such private market investments offer diversification, they're complex and not suitable for all investors.

What are the most promising opportunities? The greatest potential for accelerated transitions is in high-growth, high-emission EM countries like India, Indonesia, Brazil and South Africa, in our view. Here, country-specific programs such as the Just Energy Transition Partnership are already making headway. By contrast, less developed, low-emission countries may see more funding for adaptation and climate resilience than for decarbonization. While vital, there's a risk that funders in such markets overlook other goals, such as boosting access to cheaper energy and powering industrial growth with increased energy supplies. We see opportunities for blended finance, in particular where public and private capital jointly invest in sectors burdened by high commodity or foreign exchange risks, but also where the success rate for developing projects can be low, or where technology or political risks are high.

Assessing different EM financing scenarios

Levels of investment in low carbon energy supply and sectoral decarbonization progress by scenario



Source: BlackRock Investment Institute, November 2023. Notes: The left chart shows different scenarios for investment in low-carbon energy supply in EMs (excluding China and Russia) in the low-carbon transition relative to our base case scenario. In the accelerated EM financing scenario, we see an acceleration of flows into EM to help finance the transition that then has positive knock-on effects on climate policy, share of low-carbon energy versus high carbon and carbon emissions. The sluggish EM financing scenario represents a case where finance for EM transitions remains sluggish, with knock-on effects for economic growth and policy ambition in EMs, resulting in slower decarbonization and less low-carbon investment. The right chart shows the share of low carbon energy demand we see by EM sector in these scenarios. Forecasts may not come to pass.

Challenges and risks

The success and efficacy of public reforms and the true scale of the market for private innovations is highly uncertain. Precedent in recent years suggests that reforms and capital increases will be more muted than most expect. The more bearish growth scenario presented on page 6 represents the hypothetical growth shock from reduced flows of capital to EM and resulting changes in energy demand and energy investment from our base case. If substantive reforms do not materialize, investment opportunities in low-carbon energy infrastructure will be more limited, and EM transitions will be slower and more divergent from DMs and between different EM countries. This could mean more physical climate risk and damages for all economies, but especially EM countries, possibly slowing growth even further. We identify six broad challenges and risks that could impact our expectations:

Persistent macroeconomic risks: MDBs can't do it all, in our view. We think EM governments themselves still need to further improve transparency, governance, ease of doing business and fiscal stability to attract more private capital.

Ripple effects of MDB shift: One unintended consequence of reforms could be the inherent de-prioritization of other development objectives, we think. We also see a risk that the poorest nations get left behind as MDBs skew their attention to middle-income countries where the return on investment is likely to be greater in terms of economic development and equality. Poorer countries, which have lower emissions to begin with, may also get left behind if MDBs focus too much on decarbonization, at the expense of other development objectives like health, education, sanitation and climate adaptation.

Risks to climate commitments: If flows do not increase substantially, many EM countries may be unable to meet their national climate policy commitments, known as Nationally Determined Contributions (NDCs). Some 72% of EM NDCs are fully or partially conditional on receiving adequate international climate finance, according to ClimateWatch as of November 2023. See the chart. This may be hindered by perceptions of heightened sovereign credit risk. And it may result in increased physical risk for all portfolios, in our view.

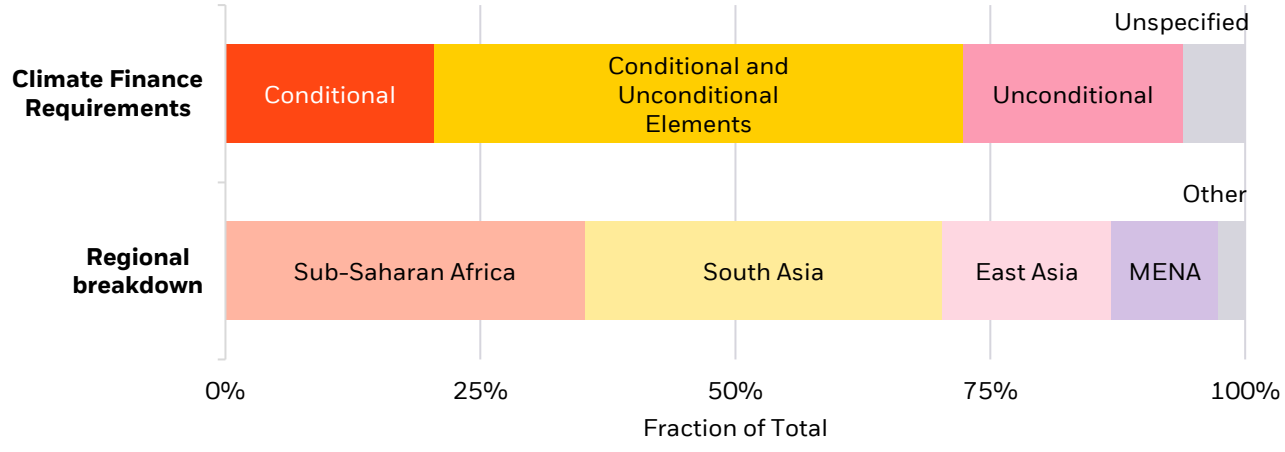
Limited balance sheets of MDBs: MDBs have a critical role but comprise a relatively small part of the solution, we think. If the balance sheets of all the MDBs were fully devoted to decarbonization and climate resilience, they would still comprise less than 4% of the finance needs to avoid the worst effects of climate change, according to the World Bank. Finite public climate finance can increasingly be deployed in more targeted ways to increase the mobilization of private money, in our view.

Lack of available projects: Even if EM climate finance increases dramatically, we think the scale and volume of infrastructure projects looking for capital is constrained. Capital needs for some projects can be too small for large institutions to finance cost effectively due to high overheads and other issues – and too disparate to aggregate into portfolios, we find. Blended finance instruments to support technical assistance and project preparation may help, in our view.

Growing spreads between policy rates and hurdle rates: Private sector hurdle rates, or the minimum rate of return for a project to be profitable, have not closely tracked policy rate changes, a University of Chicago study shows. That could limit how effective blended finance platforms are at quantifying and bridging the gap, in our view.

Breaking down climate finance

Share of country climate pledges conditional on finance – and breakdown of finance requested by region



Source: BlackRock Investment Institute, ClimateWatch; November 2023. Note: The chart shows the share of country climate pledges that are contingent on finance (top bar) and the breakdown of finance by region, as requested in each country's nationally determined contributions (bottom bar). MENA refers to Middle East and North Africa. "Unspecified" climate finance requirements are those where the NDC does not say whether it is conditional on receiving adequate climate finance or not. In the regional breakdown, "other" = other EM regions that are not listed. See https://www.climatewatchdata.org/ndcs-explore for more.

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Investment perspectives
Sustainable and transition investing
July 2023

Tracking the low-carbon transition

We introduce the BlackRock Investment Institute Transition Scenario. It's our framework for tracking the transition to a low-carbon economy – one of several mega forces sweeping markets – to help assess the investment opportunities and risks it may bring.

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Introduction

The transition to a low-carbon economy is among a handful of major structural shifts that we see rewiring economies, sectors and businesses. These mega forces, which also include the rise of artificial intelligence and geopolitical fragmentation, are unfolding in decades to come – and are already playing out in markets today. Their effects create complexity, risk and opportunity for companies and investors. Robust research and continuous tracking of these mega forces is necessary, in our view, to assess probable outcomes and help guide investment decisions.

We have created the BlackRock Investment Institute Transition Scenario (BIITS), powered by Aladdin® technology: a research-based, analytical forecast of how the low-carbon transition could unfold. Its value is not in the forecast itself, but how it can be used as a compass to help investors navigate the transition's risks and opportunities. It will not dictate how BlackRock invests client assets. It is the client's choice whether to include the BIITS view into their own investment processes as we recognize views on the transition differ. The BIITS can help inform that choice.

The BIITS focuses on what is most likely to occur – rather than on what anybody thinks should happen or a specific outcome. We have based its key assumptions on rigorous research, and the input of BlackRock's portfolio managers and other experts. The low-carbon transition's speed and shape are highly uncertain. The BIITS cannot capture all the transition's drivers and all the ways physical climate events affect the economy and markets. We approach this process with humility, knowing we may be wrong about some aspects. We aim to monitor how the transition unfolds and plan to recalibrate our views accordingly.

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Summary

- **The transition to a low-carbon economy is one of several mega forces reshaping markets, in our view.** Others include technological innovation, geopolitical fragmentation and aging populations. These structural shifts require in-depth research and constant tracking to help guide investment decisions. We have built the BlackRock Investment Institute Transition Scenario (BIITS) to help assess, on behalf of our clients, how the low-carbon transition is most likely to play out, based on what we know and expect today.
- **We track the low-carbon transition to evaluate investment opportunities relative to what markets have priced in.** The BIITS offers investors a compass to help navigate the transition's risks and opportunities - and should not be relied upon as the sole guide. It's our clients' and portfolio managers' choice whether to use it in their investment processes; we recognize views on the transition differ.
- **The low-carbon transition is a series of profound shifts playing out over decades, reshaping production and consumption and spurring vast capital investment.** We expect adoption of low-carbon energy sources to reach tipping points across regions and sectors when their relative costs fall below those of incumbent sources and when barriers to adoption are low. We distinguish a range of potential catalysts and sticking points that will determine if or when those tipping points are reached.
- **The low-carbon transition is highly uncertain.** Developing a view necessarily requires making key assumptions on how policy, technology and consumer and investor preferences will likely evolve over the coming decades. We plan to adjust as we learn more. Our methodology and assessment of the low-carbon transition's effects are inherently incomplete and highly uncertain, especially further out in the future. We derive our estimates from the models and data sources described on pages 13-16 and caution they may not come to pass.
- **The BIITS distinguishes transition fast lanes, where high levels of decarbonization are likely by our modeling horizon of 2050.** It sees the majority of fast lanes in developed markets (DMs) due to lower costs and a greater share of easier-to-decarbonize sectors. The BIITS places global power generation in a fast lane, and expects it to more than double by 2050 (page 6). It expects regions and sectors that are not in the fast lanes, such as carbon-intensive industry, to face uncertainty due to currently higher costs of capital and technology (pages 7-8).
- **We expect a major capital reallocation, with investment growing rapidly in some areas.** The BIITS estimates investment in the energy system is likely to increase to US$3.5 trillion a year this decade, up from US$2.2 trillion in recent years, and US$4.5 trillion by the 2040s (page 9). It estimates low-carbon investment will account for up to 80% of the total by that time, up from around 60% now. This shows capital investment in higher-carbon sectors is still relevant now and in the future, in our view. Some higher-carbon investments could face transition risk, but we think this can be managed by prudent planning, including diversification.
- **The BIITS expects the low-carbon transition to contribute to inflationary pressures over the next decade via an increasing cost of energy and the capital spending surge** (page 10). How much inflation? That depends on how much central banks lean against it by raising interest rates. The longer-term inflation outlook is more benign. We could see inflation easing as energy prices come back down because of a switch to cheaper renewable energy sources. It could even reverse and become a deflationary force and an economic boost if energy prices fall enough.
- **We see climate resilience emerging as a key investment theme.** The BIITS estimates extreme weather and other climate-related physical damages to economic growth could detract more than 5% from economic activity by 2050 (page 11). It expects most of these losses to occur regardless of how the low-carbon transition unfolds. The transition's speed is likely to become key to mitigating damages only beyond 2050, in the analysis.

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BII Transition Scenario

The transition to a low-carbon economy is unfolding along with other major structural shifts, such as aging populations, accelerating technological innovation, the primacy of geopolitical outcomes over economic ones and a fast-evolving financial architecture. These mega forces all require robust research and continuous tracking to gauge probable outcomes and help guide investment decisions. We focus on what we think is *most likely* to transpire – rather than take a view of what anybody thinks *should* happen.

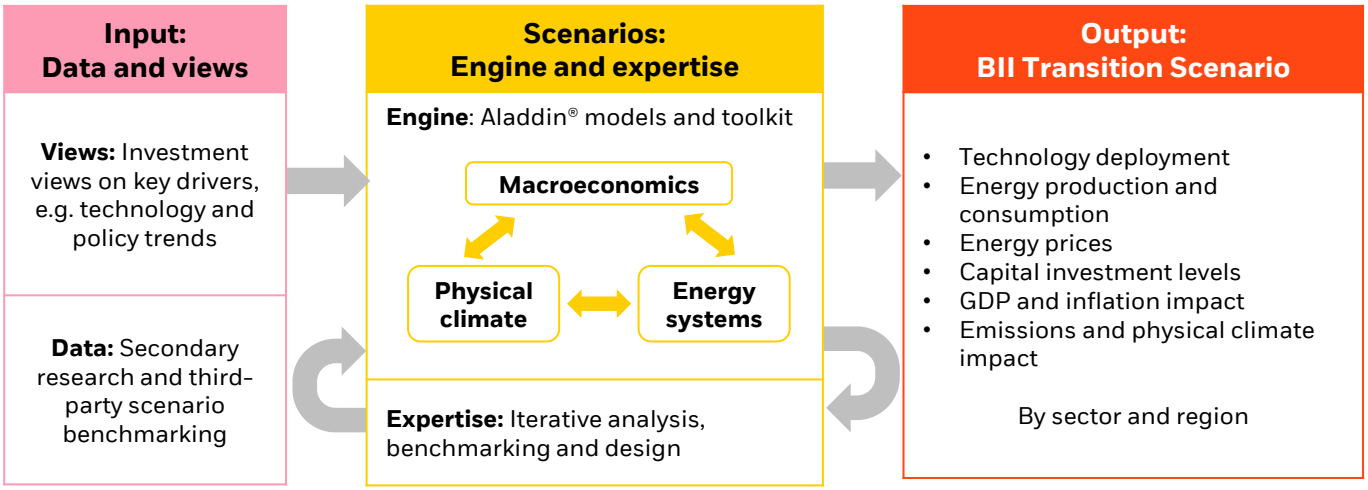
We expect ripple effects across the global economy, rewiring where revenues and profits are generated across sectors and companies. The pace of change is highly uncertain. That creates complexity, risk and opportunity for companies and investors alike. We believe continuous and systematic evaluation is needed to estimate these changes and assess their implications, rather than rely on periodically available third-party analysis or scenarios that chart a path to a specific outcome, such as net-zero emissions by 2050.

The schematic below outlines how the newly created BIITS, powered by Aladdin® technology, generates insights. Specifically, here is what it is – and what it is not:

- It's our input-driven forecast of how the transition will likely unfold across technologies, sectors and regions – based on assumptions we see as realistic today and informed by the views of BlackRock's portfolio managers. The appendix on pages 13-17 details our estimates, model methodology, underlying assumptions and limitations.
- It's built on a suite of proprietary models that aim to represent the interactions between macroeconomic indicators, evolving energy system mechanics and physical climate feedbacks. It expects economic activity to shift as the cost of higher-carbon energy is likely to rise relative to alternatives, but it also seeks to account for barriers to that.
- It was developed with the help of contextual scenario comparisons, third-party research, feedback from external experts and internal review.
- It is not designed, by its nature, to capture dynamics for individual companies and assets – or assess their opportunities and risks. The BIITS results need to be seen in the context of what's priced in by markets. See page 11. It's meant to be a compass to navigate the low-carbon transition, and cannot be relied upon as the sole guide.
- It can be updated to reflect new developments in policy, technology, and consumer and investor preferences, as well as test real-time shocks. This is necessary as the low-carbon transition is highly uncertain (pages 5 and 12).

Our bottom line: The BIITS aims to help investors navigate the low-carbon transition. It will ultimately feed into the BlackRock Investment Institute's long-term economic and asset return expectations and BlackRock's risk management technology. Will it dictate how BlackRock invests clients' assets? No. The BIITS is a research-based, analytical forecast. BlackRock's portfolio managers can use it as they do other analytics: to stress-test potential scenarios and to bring clarity to their investment processes. And it is the client's choice whether to include the BIITS view into their own investment processes as we recognize views on the low-carbon transition differ.

The making of the BlackRock Investment Institute Transition Scenario (BIITS)
How views, data and model inputs deliver BIITS insights, July 2023



Sources: BlackRock Investment Institute and Aladdin Sustainability Analytics, July 2023. Notes: To produce BlackRock Investment Institute Transition Scenario (BIITS) insights, we turn our views and research (left box) into quantitative inputs for our scenarios modeling (middle box; more details on page 14) to create the BIITS insights (the right box). BlackRock's Aladdin® platform is a financial technology platform designed for institutional use only and is not intended for end investor use. Secondary research and third-party sources used include energy data, scenario data, market intelligence, and energy research providers. See a list of data sources on page 16. For illustrative purposes only. Subject to change without notice.

When are tipping points reached?

The low-carbon transition isn't a single trend but rather a complex series of structural shifts in energy, materials, food and land usage toward a low-carbon world. The BIITS's scope is the global energy system – and it sees much of this system moving at different speeds across regions and sectors (pages 6-8).

Our view is shaped by the big technology and energy transitions of the past. Tipping points and rapid adoption have taken place when new technology was perceived to offer greater benefits and ease of use than existing options, relative to their cost. Past examples include electricity supplanting kerosene and cellphones elbowing out landlines.

Tipping points are countered by non-cost sticking points to adoption. They could include policies such as trade protectionism or supply bottlenecks. It is the balance of economic catalysts and the pervasiveness of barriers that we believe ultimately determines the low-carbon transition's speed across regions and sectors.

Tipping points emerge when the relative costs of new technologies fall below that of incumbent ones and where barriers to adoption are minimal, in our view. When they occur, we expect tipping points to result in a steep, S-curve adoption. This is a period of exponential growth soon after the tipping point, which flattens out as adoption becomes more widespread. This has implications for the speed of the low-carbon transition in sectors and regions – and for the revenue and earnings projections of affected companies, both incumbents and challengers.

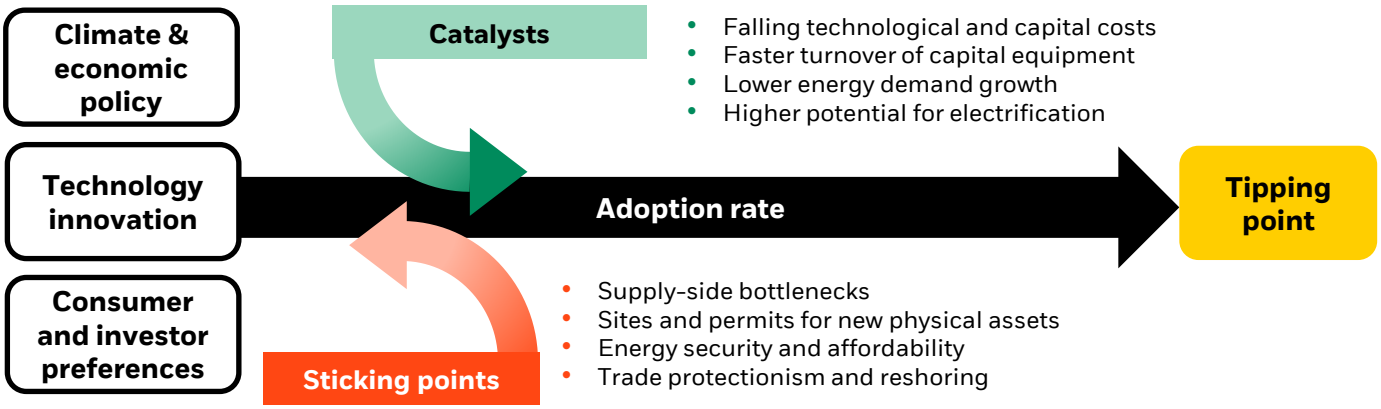
Tipping points are influenced by three main drivers, as the schematic below shows. First, technology innovation can significantly lower costs and broaden options. Second, government policy can influence costs through taxes or subsidies and indirectly through regulatory standards. Third, consumer and investor preferences shape adoption directly through demand and indirectly through the cost of capital different producers face.

The BIITS places about 40% of global energy-related emissions in a fast lane, where a tipping point has been reached or is likely to be reached in time to achieve high levels of decarbonization by 2050. This includes solar and wind in the power sector and light-duty electric vehicles in transport. The BIITS estimate is based on the model outputs and sources listed on pages 14 and 16, and is in line with analyses from others such as IEA, Systemiq and WRI et al.

In other sectors and regions – where low-carbon technologies face poorer economics or more barriers –The BIITS expects a slower, uneven low-carbon transition and more persistent demand for higher-carbon fuels. Decarbonization could move slowly at first, with tipping points coming later, once low-carbon energy reaches cost parity. That could come through a combination of government policy (low-carbon subsidies or carbon taxes), technological innovation or institutional reforms that lower financing costs. Early adopters may demand new technology before it is at price parity, as seen in many other cases of technology adoption.

In total, the BIITS expects these mechanics to result in a multispeed transition – with uneven progress between sectors and regions. This multispeed nature changes the transition's macroeconomic implications, including the effects of physical climate change (page 10). Understanding the investment implications of the transition requires a view on both the timing of tipping points and whether markets have already priced them in (page 11).

Catalysts and barriers determine tipping points in the low-carbon transition
Our view of the factors that may accelerate or slow adoption of low-carbon energy sources



Sources: BlackRock Investment Institute, July 2023. Notes: The schematic summarizes the BIITS's views of the three main drivers (left) that influence the relative cost of low-carbon energy sources as well as catalysts and barriers hindering their adoption. Tipping points happen, in our view, when relative costs fall below that of incumbent energy sources, and barriers are few or removed. Reshoring is bringing back a business that relocated abroad to the country where it was originally located. For illustrative purposes only. Subject to change without notice.

Key assumptions on uncertain transition

Developing a view of how the transition will unfold and when tipping points are reached requires making assumptions on how technology, policy as well as consumer and investor preferences are likely to evolve over the coming decades. The table below outlines some of the key assumptions that inform the BIITS..

We have based these assumptions on rigorous research and the input of BlackRock's portfolio managers, but we have greater confidence in some than others. We have approach this effort with humility, knowing we may be wrong about some aspects – and we aim to monitor the transition outlook over time and plan adjust our views accordingly.

Policy: There's a strong likelihood of some additional policy support for the low-carbon transition in DMs through 2030, in our view. We expect policy support to expand more rapidly afterward, driven by increased physical climate damages to economic activity and reduced costs of low-carbon technologies. Climate policy developments are intersecting with the rise of green industrial policy in DM countries, in our view. Examples are the Inflation Reduction Act in the U.S. and the Green Deal Industrial Plan in the European Union. We view these as likely to push down costs of low-carbon technologies. EM climate policy, on the other hand, is more uncertain, in our view. Why? It's connected to the availability and cost of capital to finance EM transitions, in our analysis. This is dependent on the highly uncertain reform of multilateral lending institutions.

Technology: We expect the costs of mature low-carbon technology to keep falling as economies of scale and new innovations unfold. We can't predict whether or when breakthrough innovation such as fusion energy or new carbon capture processes might disrupt the energy system. We do see the potential for them to do so in coming decades.

Consumer and investor preferences: The BIITS expects a gradual but uneven shift toward sustainable products, services and assets. For example, it assumes consumers will prefer electric vehicles (EVs) over gasoline-powered cars over time. We think some trends are more likely than others. We have higher confidence, for example, that investor preferences will increase the spread in financing costs between lower- and higher-carbon assets.

Global competition for the supply of traditional and low-carbon energy is crucial to the transition's path, in our analysis. Why? It affects the relative costs and security of energy supply. In oil markets, we expect market concentration to move toward national oil companies and OPEC+ producers, following existing trends. We could also see more clean tech manufacturing away from China in DMs, spurred by DM industrial policy. But we don't expect supply chain concentration for critical minerals to change meaningfully this decade, barring a breakthrough or major discovery.

Overall, we assume mostly equal chances of upward or downward revisions on barriers. This applies in particular to factors such as trade policy and geopolitics and the reform of multilateral development banks.

We think upward revisions are more likely than downward ones when it comes to our expectations for drivers: technology innovation, falling costs and rapid adoption. Our reasoning: Forecasts tend to underestimate innovation and its impact. Upward revisions would likely translate into a transition accelerating faster than our current view. This could help stave off some of the cascading effects of a changing climate, particularly in the latter half of the century.

Views informing the BIITS

Our assumptions on the drivers of the low-carbon transition and our level of confidence around them, July 2023

Driver	Higher confidence	Lower confidence
Policy	Policy ambition grows slowly until 2030. It accelerates after, yet lags in EM. Green industrial policy globally drives demand for climate tech. Russia limits exports of gas to Europe and exports to China. Material shifts in global trade flows.	Pace and mechanism of the evolution of EM climate policy. OPEC+ reaction. Climate litigation risk. Geopolitical fragmentation.
Technology	Costs of mature technologies keep declining. Supply chain issues constrain development and scaling of some key technologies.	Unforeseen breakthroughs in energy technology such as fusion, natural hydrogen or the next shale.
Consumer and investor preferences	A tectonic shift in consumer and investor preferences toward sustainable products and assets. The spread in financing costs between low- and higher-carbon assets widens.	Reform of multilateral banking institutions drives down EM financing costs.

Source: BlackRock Investment Institute, July 2023. Note: The table lists the drivers we believe to be crucial in the low-carbon transition and an indication of our confidence in selected components of these drivers. **This material represents an assessment of the market environment at the time of publication and is subject to change. Forward looking estimates may not come to pass.**

Transformation of global energy demand

Electrification and decarbonization are set to create a shift in the global energy system, in our analysis. Electrification replaces fuel use with electricity. Decarbonization eliminates carbon dioxide emissions. Replacing an internal combustion engine vehicle with an electric one is electrification. Decarbonizing the miles driven by that car requires charging it with low-carbon power sources. We use the combined share of low-carbon power generation and fuels such as hydrogen and biomass to track the transition's progression. See the dotted area in the left chart below.

The BIITS estimates that lower-carbon energy sources will make up more than half of total global energy demand by 2050, up from an estimated fifth now. See the light yellow and green bars in the left chart below. We think much of the increase will occur due to electrification in the buildings and transport sectors, coupled with decarbonization of the power sector. The shift is primarily driven by falling costs, in our view, supported by policy in many countries. Research from the IEA and Lazard, among others, see renewables as the cheapest source of new power already.

The BIITS expects global power demand to grow 2.5-fold by 2050 and expects power generation to be low-carbon by over 90% then. The reason: The BIITS estimates that more than 80% of new power capacity will likely be low-carbon over the modeling horizon. We also see climate and industrial policy incentives supporting low-carbon fuels like biofuels and hydrogen. We think those could play a role in heavy industries and shipping but see their share of final energy demand in 2050 staying modest at about 15%.

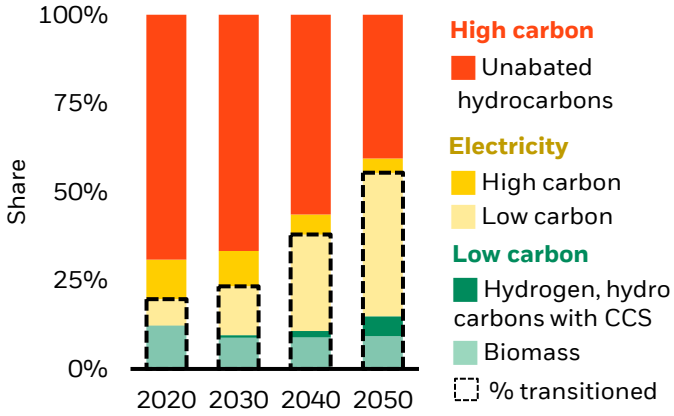
Where does this leave unabated higher-carbon fuels? These are fuels not paired with carbon capture or storage. The BIITS expects them to make up about 45% of global total final energy demand by 2050 (the red and dark yellow bars in the left chart below), with relatively small changes before 2030. The BIITS expects oil and gas to dominate that share of higher-carbon fuels. It expects a rapid decline in the use of coal in the 2030s and 2040s. One reason: low-cost renewable power takes market share in power generation. See the bottom right chart below.

We see oil and gas playing a role throughout the transition, with demand starting to gradually decline by around 2030. We expect the slide from the peak will be slow as decarbonization in DMs is offset by rising emerging market (EM) energy demand. Demand could be resilient in sectors where there are no economically viable alternatives yet. Examples are sectors that are difficult to electrify, like aviation. Long-term energy storage, high-heat industrial processes and petrochemical inputs all make use of hydrocarbons that are not yet easily replicated with low-carbon solutions.

Minerals are fundamental to the transition, in our analysis. Demand for copper – a key material used in electric grids – is poised to double or triple by 2030 from today's levels, according to a March 2022 IEA study. Surging demand for minerals could likely cause bottlenecks – and potentially slow parts of the transition. Copper shortages are likely to be severe because of the rapid growth of electricity generation we expect, the age of existing electric grids and the long lead times for developing new copper mines. Tight supplies of nickel and lithium could hamper the electric battery supply chain. Yet innovations such as sodium ion batteries could change the composition of demand for mineral inputs without affecting our expectations for the rise of EVs and stationary batteries in the power sector.

Shifting global energy mix

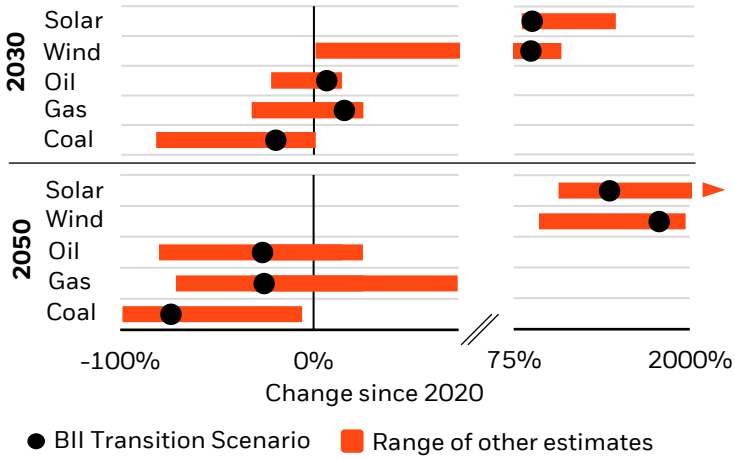
BIITS estimate of final energy demand, 2020-2050



Sources: BlackRock Investment Institute and Aladdin Sustainability Analytics. July 2023. The BIITS estimate is based on the model outputs and sources listed on pages 14 and 16. The chart shows estimates of the sources of global energy demand between 2020-2050. For instance, it expects electricity generated from low-carbon sources (light yellow) to become the dominant energy source by 2050 replacing unabated hydrocarbons (red) – or hydrocarbon use with no provision for carbon capture or storage (CCS). Biomass is organic material from plants and animals. **Forward-looking estimates may not come to pass.**

More solar and wind

BIITS estimate of energy changes by 2030 and 2050



Sources: BlackRock Investment Institute and Aladdin Sustainability Analytics, July 2023. Third-party data used to derive the estimates are listed on page 16. The chart shows our estimate of the change in the source of global energy production in 2030 and 2050 relative to third-party estimates we use as a benchmark. See the "Benchmarking" section on page 13 for specific benchmarks used. **Forward-looking estimates may not come to pass.**

Low-carbon transition: regions

The BIITS estimates the low-carbon transition will likely accelerate more quickly in DMs than EMs, even as individual countries will experience unique transition pathways. Why? It expects policy and consumer/investor preferences to help accelerate a decline in costs and more rapid adoption of low-carbon technologies in DMs. This is driven by factors including lower costs of capital, older higher-carbon assets more likely to be retired, and a lower share of hard-to-abate, or high-cost, emissions due to deindustrialization. The result: tipping points could arrive sooner.

Green industrial policy – or policies aimed at environmental goals – in DM countries is a key factor in our assessment. It is likely to push down the cost of low-carbon technologies – both established and emerging – and accelerating cost advantages over incumbent technologies. Incentives for low-carbon energy sources, sometimes uncapped, could push trillions of dollars or euros of public funds into the energy system. Some DM policy incentives could divert finance to other parts of the global economy. EMs face more barriers broadly – and structurally different transitions than DMs.

Two main catalysts drive the divergent transition speeds between DMs and EMs, in our analysis: cost of capital and demand growth. First, EMs typically face persistently higher cost of capital such as higher borrowing rates. See the left chart below. The reason: perceived country and default risks. Second, industrializing nations with strong growth and booming populations have a bias toward more energy-intensive sectors, with a higher energy intensity of GDP and more energy demand growth. This means EMs have a greater share of slower or uncertain sectors. See the middle chart below. EM energy demand is surging from relatively low per-capita levels today. See the right chart below.

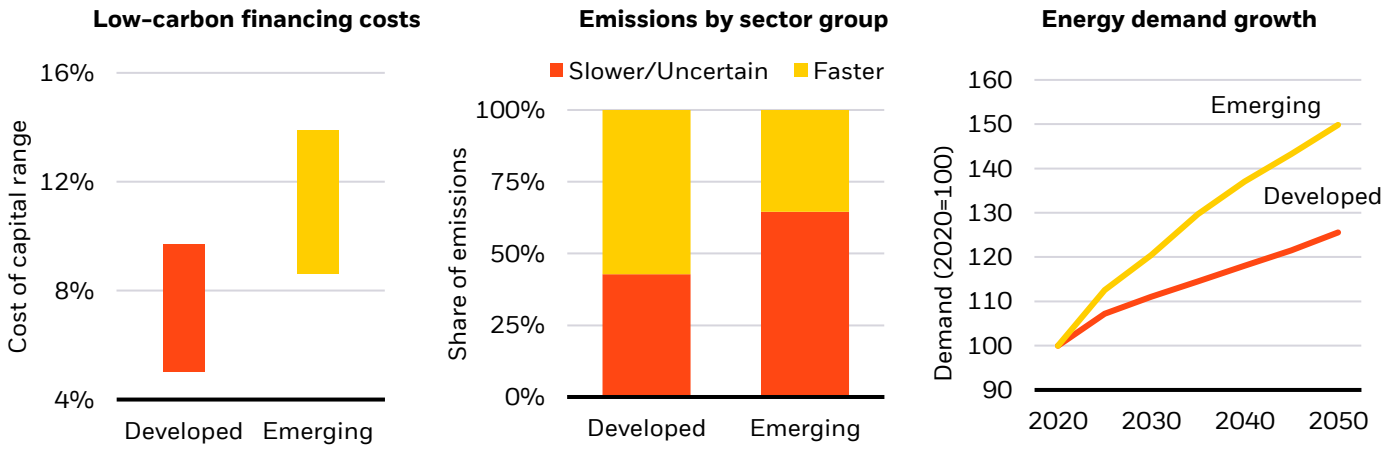
Barriers also may stem from trade protectionism that limits access to low-carbon technology or creates costly supply-side bottlenecks. Plus EMs each face different development, security, climate and demographic challenges – showing the overlap between different mega forces. For example, many of the world's 46 least developed countries are projected to double in population by 2050, according to the United Nations World Population Prospects report. Finally, EMs are likely to bear the brunt of physical climate change, with the BIITS showing the lion's share of global climate damage to economic activity by 2050 occurring in EMs. See page 10. We expect this to bolster climate resilience, or the ability of regions or companies to effectively manage climate-related risks, as a key investment theme in EMs.

Many EMs lack the fiscal space, in our view, to enter the green subsidy race or bear the high costs for big infrastructure projects. We think that could reinforce the divergence between DM and EM transitions. Potential reform of multilateral development banks could limit that divergence by enabling more transition financing to flow from DMs to EMs. Similarly, structural reforms within EMs could create more attractive investment conditions. These potential EM outcomes may decide the overall speed of the low-carbon transition.

A final note: Our models examine some 16 geographical regions, but we are using the broad DM and EM groupings here to identify overarching trends. This misses the nuanced considerations that could affect the timing and pace of the low-carbon transition at the region or country level. For example, EMs contain both middle income and developing economies, with very different risk profiles and costs of capital. And China's position in the low-carbon transition is unique. Its robust clean-technology industry and fast adoption are likely offset by its sheer size and share of emissions, heavy industrial base and dependence on coal, in our view.

Low-carbon transition dynamics more favorable in DMs than EMs

Cost of capital, emissions by sector group and demand growth by region



Sources: BlackRock Investment Institute and Aladdin Sustainability Analytics, July 2023. Notes: Left chart: Cost of capital is represented as the average of weighted average cost of capital for mitigation technologies in our model, divided regionally by DMs and EMs. Middle chart: Slower/uncertain are sectors with hard-to-abate emissions that are not expected to achieve substantial decarbonization by 2050. Right chart: Energy demand growth is represented as a regionally indexed value of aggregate energy demand on a per capita basis divided by DMs and EMs. **Forward-looking estimates may not come to pass.**

Low-carbon transition: sectors

Which sectors will likely see dramatic changes? We zero in on four that have accounted for the lion's share of energy-related C02 emissions: power, transport, buildings and industry (Minx et al, 2021). That makes them critical to the low-carbon transition. Each is transitioning at its own speed. We derive the BIITS estimates below and throughout this publication from the models and data described on pages 13-16, and caution they may not come to pass.

Power: The BIITS expects rapid electrification to translate in a fast-growing power sector. It estimates electric power will grow about 2.5 times, with relatively small divergence between DMs and EMs. See the left chart below. The reason: The costs of renewables and energy storage is likely to decline further, in our view. The BIITS expects remaining higher-carbon power by 2050 to be used as baseload generation by some regions or to balance variable renewable power.

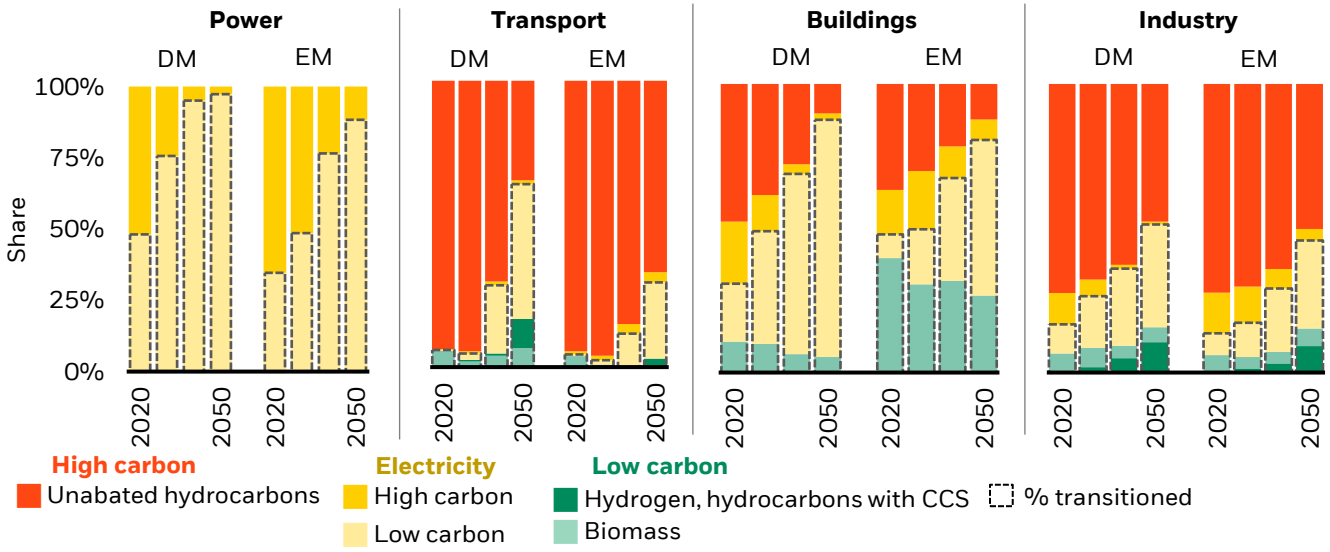
Transport: Sub-sectors here – road, shipping and aviation – are likely to see large differences in transition speed. The BIITS expects nearly all new light-duty vehicles to be electric by 2050, up from less than 4% in 2020. Our reasons: technological advancements and policy, including restrictions on the sale of internal combustion engine vehicles. At least 16 countries, the EU bloc and 10 U.S. states have announced or plan to announce such bans, according to the IEA. The low-carbon transition of heavy-duty vehicles, aviation and shipping could take more time, with full decarbonization likely only after 2050, in the BIITS view. Overall, it sees electricity and low-carbon fuels meeting almost 40% of total transport energy demand in 2050, versus just 5% in 2020. This varies regionally, with about 60% estimated to decarbonize in DMs versus about 30% in EMs. See the second chart below.

Buildings: This sector could transition faster than others. The BIITS expects buildings globally to be on track to have less than a fifth of energy demand met by higher-carbon fuels by 2050. The reasoning: increased energy efficiency as well as use of electricity and low-carbon fuel. It expects growth in the electrification of heating (via heat pumps, for example) over this period. Why? Installation and other costs are likely to decline from "learning by doing," or increased knowledge and efficiencies that come when people perform new activities. Policy also is set to play a role: Selected locales already restrict gas heating and appliances. The BIITs estimates buildings in both DM and EM to reach high levels of low-carbon use by 2050, making for a smaller divergence than in transport. See the third chart below.

Industry: This sector is likely to transition more slowly than buildings, largely due to limitations on the technical viability and cost-competitiveness of low-carbon solutions. The BIITS expects only modest declines in higher-carbon fuel usage by 2050. Electricity could grow its share to 35% by then, but the BIITS estimates unabated hydrocarbons could still meet around half of demand. Hydrogen and carbon capture and storage (CCS) could achieve scale in the 2040s – and maybe earlier on faster-than-expected innovation. The BIITS expects the share of hydrocarbon usage to fall to about half by 2050. See the fourth chart below. And it only sees steel production likely achieving large-scale transition only in the 2040s as EM adopts low-carbon methods. In DMs, the BIITS expects industry use of higher-carbon fuels to start declining this decade. It expects the usage to grow in EMs, peaking in 2030 and then phasing out more slowly. Energy demand from industry is dominated by EMs, so we expect the lion's share of higher-carbon demand in 2050 to be there.

Shrinking role of carbon

Estimated shift in power production and energy use in key DM and EM sectors, 2020-2050



Source: BlackRock Investment Institute, Aladdin Sustainability Analytics, July 2023. Notes: The charts show the BIITS estimates of how decarbonization and electrification may play out in selected sectors within DMs and EMs through 2050. The left chart shows how the BIITS expects power generation in DMs and EMs to evolve with low carbon sources (light yellow) gradually taking a larger share of overall electricity production. The next three charts show how the BIITS estimates energy use based on energy source will evolve in three key sectors transport, buildings and industry. For instance, the BIITS expects transport in DMs to shift from using over 90% unabated hydrocarbon, or fossil fuels, to just 35% by 2050. For EMs that shift is to roughly 70%, the BIITS estimates, from a similar starting point as DMs. **Forward-looking estimates may not come to pass.**

Capital investment on the way

The BIITS expects capital investment into the energy sector to grow to an average of US$4 trillion per year through 2050, an increase from recent average investment levels of US$2.2 trillion a year. See the left chart below. This includes investment in both supply – oil and gas extraction and processing, renewable power plants, electricity transmission and distribution – and demand: automobiles, factory equipment and building energy equipment.

These investments are new capital expenditures (capex) and a reallocation from higher- to lower-carbon capex over time. The BIITS, for example, estimates annual investment in power grids to double by 2030 amid demand growth. It estimates overall investment in the energy system to grow to about US$3.5 trillion a year this decade, initially balanced between higher- and lower-carbon. The BIITS expects the pace to pick up to about US$4.5 trillion a year by the 2040s, with over 80% in low-carbon capex. Higher-carbon investments could become stranded assets, or investments that no longer are able to generate a return if the low-carbon transition were to move faster than we expect. We think these risks can often be managed by prudent planning, including developing low-cost, low-carbon assets that can be retro-fitted.

The BIITS's overall capex estimate is equivalent to more than 2% of global GDP in 2025. The BIITS expects it to moderate to around 1.75% of global GDP by 2050 as renewable and other technology costs decline and the global economy grows. Policy is a key driver of this, we believe, even as many outcomes are possible. Policymakers could provide incentives for low-carbon investment (tax subsidies for renewables as part of the global race for clean tech leadership) and disincentives for higher-carbon use (carbon pricing). Some of these may lead to inefficient use of capital, and could favor certain sectors and companies. Yet we find the incentives overall are likely to accelerate the low-carbon transition – even beyond the borders of the countries providing the incentives.

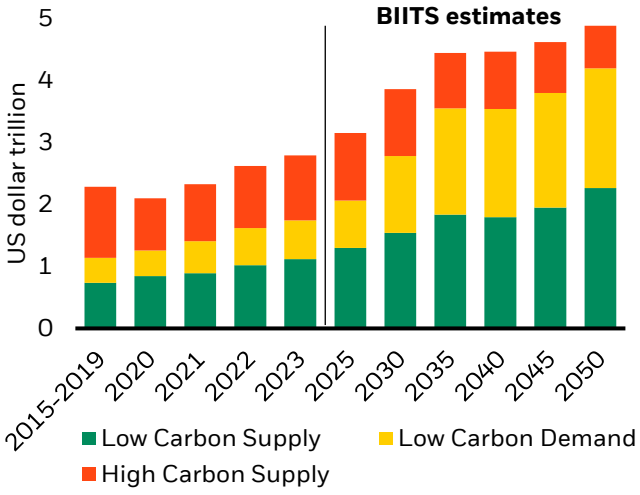
The scope of the BIITS's estimates is limited to energy supply and demand. It expects additional transition-related investment in critical minerals and metals as well as in agriculture, forestry and land use. Demand for critical minerals is likely to at least double by 2040, according to estimates by the IEA and others. See right chart below.

The BIITS's investment estimate differs from others for four key reasons:

1. Estimates differ due to accounting standards. Some account for an entire electric vehicle, for example, while others only count the electric drivetrain and battery pack.
2. Methodologies differ in scope. Some include the agricultural sector or the mining sector, while others don't.
3. We're relatively bullish on technology cost reductions, meaning that the BIITS assumes the overall investment amount in later years is lower than might otherwise be the case.
4. Many existing estimates assume a transition speed consistent with a temperature or emissions *goal*, whereas the BIITS takes into account the *likely* path of the low-carbon transition.

Investment on the way

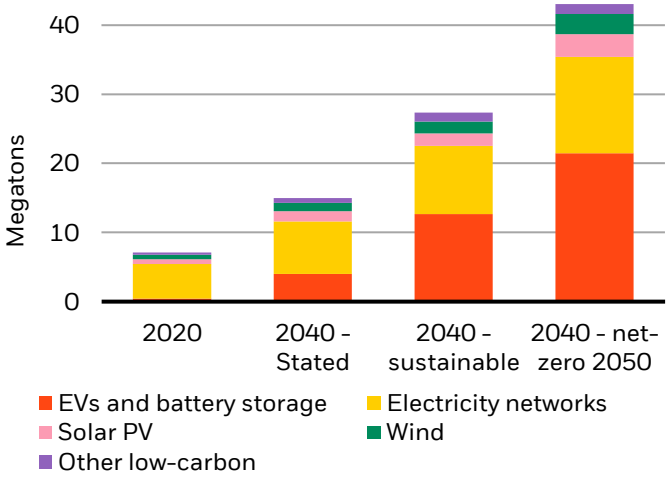
Estimated annual energy sector capex, 2015-2050



Forward-looking estimates may not come to pass. Source: BlackRock Investment Institute and Aladdin Sustainability Analytics, with IEA data, June 2023. Notes: The chart shows the estimated breakdown of capital investment needs – both supply and demand – and the split between high- and low-carbon investments. Amounts are based on U.S. dollar values in 2020. Historical data and estimates through 2023 are based on IEA data. BIITS investment estimates start in 2025.

Minerals needed

Mineral demand for clean energy, 2020 vs. 2040



Forward-looking estimates may not come to pass. Source: BlackRock Investment Institute, with IEA data, July 2023. Note: The charts show the IEA's estimates of demand for selected minerals in 2040 vs. demand in 2020 in three scenarios. The "stated" scenario considers how energy supply evolves without additional steering from policymakers by 2040; The "sustainable" is based on 2040 climate commitments made by governments up to October 2021; and the "net-zero 2050" considers capacity additions needed by 2040 to achieve net zero emissions by 2050. See https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/mineral-requirements-for-clean-energy-transitions

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Effects on inflation and growth

The BIITS expects the low-carbon transition to contribute to higher energy costs and inflation over the next decade. It also sees a capex surge and additional government spending pushing up activity and adding to inflation pressures. Normally, higher energy costs would depress economic activity and offset some inflation pressures. We expect the expected capex surge to offset this effect in the transition. See the left chart below.

Higher energy costs present central banks with a difficult choice. Keeping inflation close to their targets entails higher interest rates, not only to offset the investment surge but also to squeeze economic activity to dampen non-energy price pressures. We expect central banks to have a tight policy bias in the years ahead, a sea change from their structural loosening stance during the "Great Moderation" period of steady growth and inflation. We expect the effect to be magnified in EMs because of their higher average cost of capital, as the left chart shows. If the transition were to accelerate, we expect the inflationary pressures to be higher and the trade-off to be sharper still.

Beyond this decade, the inflation and growth outlook is more uncertain. The supply shock is likely to ease as energy prices come back down because of a switch to cheaper renewable energy sources and lower operating costs. It could even reverse and become deflationary, resulting in an economic boost if energy prices fall enough. The BIITS currently does not capture the potential inflationary effects of physical damages: possible scarcity of commodities and food that results in higher prices.

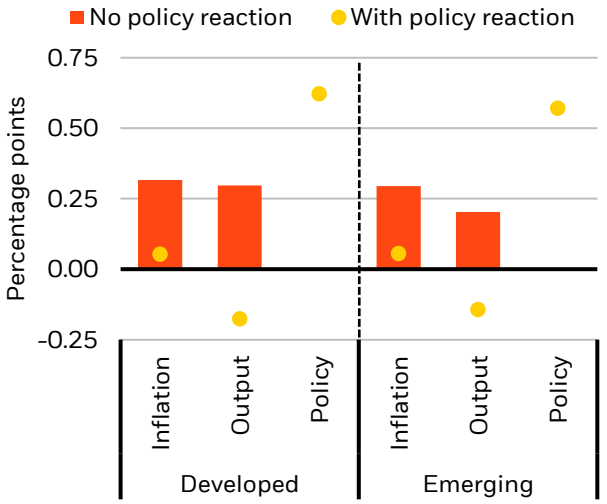
The BIITS expects growth effects to be increasingly dominated by extreme weather events and other climate-related physical damages over time, rather than by transition-related factors. It sees such damages increasing to mid-century and beyond as average global temperatures rise through 2050. The BIITS estimates damages to GDP could amount to more than 5% of annual GDP by 2050. See the right chart below. This takes into account lost output from lower productivity due to a less stable climate, and more frequent destruction of infrastructure and equipment in extreme weather events (Burke et al, 2018). The BIITS estimates most of the expected GDP loss will occur regardless of how quickly the low-carbon transition progresses from here as some level of emissions is inevitable until near mid-century.

The BIITS expects EMs to bear the major share of climate-related GDP losses. Why? Many EM countries are located in tropical latitudes that are vulnerable to climate-related damages. Other reasons include a high reliance on climate-sensitive sectors like agriculture and low resilience to extreme weather events.

The speed of the transition determines the extent of damages further ahead, we believe. Keep in mind that the effects of physical climate change are non-linear. This makes them difficult to predict, especially further out in time. If the world passes more critical warming thresholds, we could see a substantial increase in both climate damages to the capital stock in the economy and the uncertainty around physical climate effects.

Inflation pressure = higher policy rates

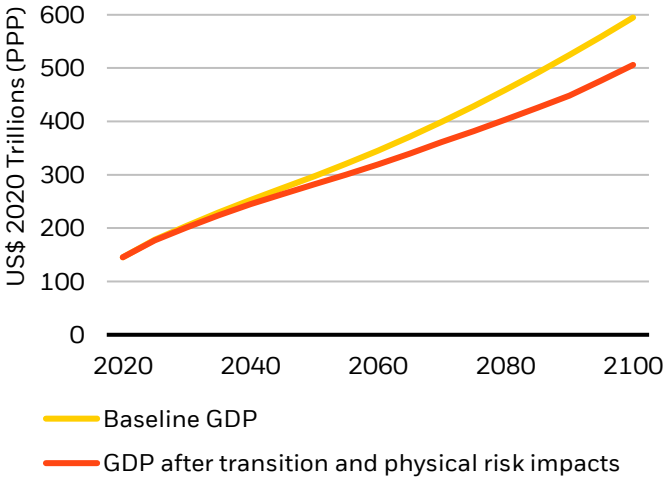
Inflation, output and policy estimated impact, 2020-2030



Forward-looking estimates may not come to pass. Source: BlackRock Investment Institute (BII), with data from Haver Analytics, July 2023. The chart shows BII's estimates of the impact of the low-carbon transition on inflation and output in DM and EM between 2020-2030 under two illustrative BII scenarios: with and without a monetary policy response (rising interest rates) to higher inflation.

Climate damages set to shrink GDP

GDP before and after climate damages, 2020-2100



Forward-looking estimates may not come to pass. Source: BlackRock Investment Institute, Aladdin Sustainability Analytics, July 2023. Notes: The chart shows evolution of global GDP with the climate damages the BIITS expects (orange), compared with a counterfactual of no damages (yellow). The gap between the red and yellow lines represents the climate damages we expect. GDP is calculated on a purchasing power parity basis in 2020 U.S. dollars. The baseline GDP value is based on World Bank data, the growth rate on OECD estimates.

Portfolio implications: What's in the price

The BIITS considers long-term, sector-level trends and is not designed to capture dynamics for individual companies or assets. It also does not assess the extent to which markets have priced in the associated risks and opportunities. The BIITS view of the low-carbon transition's path is one piece of the puzzle. The investment implications depend on: 1) how sector and technology trends change where and how revenues and profits are generated across sectors and companies; and 2) whether market prices already reflect these changes.

The BIITS results and estimates, however, can be useful inputs into investment processes. The BIITS aims to identify and size new green segments, thematic opportunities, and risks. It can also provide sector-level benchmarks as inputs to financial modeling. As a result, we plan to incorporate the BIITS results into the BII's capital market assumptions (CMAs), the estimates of long-run return and risk that underpin BII's strategic asset allocation views.

From electricity to the automobile to the internet, the emergence of new technology or policy-induced shifts in product or production practices can disrupt entire industries. Our framework for identifying tipping points across segments of the transition helps us identify where and when such transformation may happen. We can anticipate them and respond to them within portfolios as a result.

Changes in technology, policy and consumer/investor preferences can move technologies or sectors from being on a slow, linear path of decarbonization to one that accelerates exponentially when a tipping point is reached. See page 4. Markets could anticipate future earnings growth and price it in before the tipping point is reached, changing the potential investment opportunity.

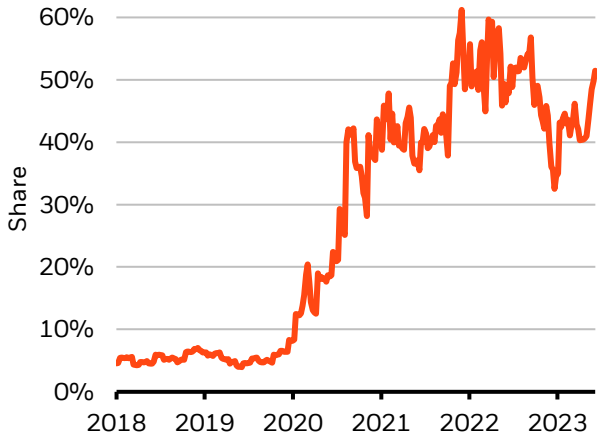
In some cases, valuations can get ahead of themselves, even as transitions continue apace. Case in point: Valuations of electric vehicle companies surged before pulling back in the past year – even as their market share keeps growing. See the charts below. We believe that finding transition-related opportunities that are not priced in yet requires granular analysis as a result.

Transition-related opportunities may also be uncovered in regions and sectors that are not in fast lanes. Examples are diversified, low-cost producers with robust transitions plans. Traditional energy players also may outperform at times, notably when there are mismatches between supply and demand, as seen in 2022. Such mismatches are set to become a persistent feature of the low-carbon transition amid underinvestment in higher-carbon energy infrastructure, in our view.

Separately, we see a risk of unintended implications of a multispeed transition for investors with certain types of portfolio decarbonization objectives. If the transition proceeds unevenly between sectors and regions, portfolio decarbonization targets could incentivize a shift in portfolio toward fast-lane sectors and away from others. This could shift exposures in potentially undesired ways for such investors, if not managed through sector or regional constraints or the use of forward-looking metrics.

EV valuations rise and fall ...

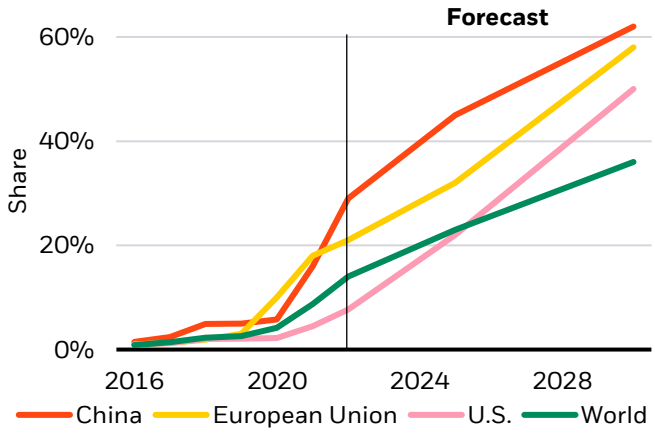
EV company market cap share, 2018-2023



This information is not intended as a recommendation to invest in any particular asset class or strategy. Source: BlackRock Investment Institute, with data from Refinitiv Datastream and MSCI, July 2023. Notes: The chart shows the combined market-cap weight of pure-play EV companies – or companies that only produce EVs - within the MSCI All-Country World Automobiles Index.

... even as EV growth is accelerating

EV sales as share of total car sales, 2018-2030



This information is not intended as a recommendation to invest in any particular asset class or strategy. Source: BlackRock Investment Institute and International Energy Agency, data as of December 2022. Notes: The chart shows the share of EV sales of total automobile sales in selected countries and regions.

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Appendix

Uncertainty and sensitivity tests

Policy and geopolitical developments in the past year underscore how quickly the transition outlook can change and the high degree of uncertainty inherent in its evolution. Historical energy transitions have been non linear, meaning they can have sudden leaps or unexpected slowdowns. This irregular process makes it difficult to forecast outcomes.

The BIITS aims to capture the impact of the transition on the real economy based on our views of the main drivers. We acknowledge the uncertainty in many areas crucial to the transition. Our methodology and assessment are inherently incomplete and highly uncertain. We recognize views on the low-carbon transition vary because of this uncertainty.

We outlined the big assumptions underpinning the BIITS around policy, tech and consumer/investor preferences on page 6. Upward or downward revisions to those calls could change the central view on the speed of the transition. Here are some of the key uncertainties that could affect those calls over time:

- Major innovation could help mitigate emissions from hard-to-decarbonize sectors. These sectors currently have requirements that make electrification and decarbonization difficult with expected innovation.
- The size and scope of climate policies could increase more than we expect. Conversely, climate policies could be restrained due to goals that potentially conflict with decarbonization, like energy security and affordability.
- We expect the cost of technology to decline, but that may not happen as rapidly as we think.
- The cost of capital could come down if incentives area created for private transition finance in emerging markets, but it could also rise if investment fuels inflation and leads to interest rate hikes.
- Geopolitical fragmentation and conflicts could restrict mineral flows or technology that are critical to the transition.

We tested how sensitive the BIITS's assumptions were to various changes related to these key uncertainties. See the table below. Some areas of uncertainty are outside the current suite of models used. Examples are geopolitical changes, physical climate damages on household wealth or migration, climate litigation, and innovations such as nuclear fusion. "Negative emissions," or carbon dioxide removal, represent another key uncertainty.

We recognize that we won't get everything right – and we can't include all potential factors that would inform our overall view. Our aim is to be roughly right rather than precisely wrong on the parts of the transition that are currently in scope.

Testing key model sensitivities

Sensitivity tests and results

Level of climate policy ambition	Varying carbon prices and taxes in the economy and specific sectors.	Higher carbon prices would spur low-carbon technology investment, faster decarbonization, and a decline in oil and gas supply. Lower carbon prices would largely bring the opposite, especially less investment in low-carbon technology.
Pace of technological innovation	Slower near-term cost reductions in mature low-carbon technologies driven by barriers to global trade and protectionism. Faster cost reductions in technologies with a longer time to market driven by technology breakthroughs.	Slowing cost reductions for mature low-carbon technologies would bring a significant increase in emissions and oil and gas supply, and a big reduction in the rate of deployment of EVs. Technological breakthroughs in emerging climate technology would bring modest acceleration to emissions reductions and a modest bump to total cumulative investments.
Cost of capital	Reduction in the cost of capital spread between EMs and DMs post 2030. Interest rate hikes in response to investment boom and other inflationary feedbacks.	Both increases and decreases in weighted average costs of capital had minimal effects on the key metrics in tests.

Source: BlackRock Investment Institute, July 2023. Note: The table lists three inputs crucial to the transition, examples of sensitivity tests around them and the results of these tests. It represents an assessment of the market environment at the time of publication.

Appendix

Methodology

The BlackRock Investment Institute Transition Scenario is a forecast view of the low-carbon transition, informed by in-house experts and developed using Aladdin Climate's suite of proprietary transition models in partnership with the BlackRock Investment Institute. There are two key steps involved: how we quantitatively implement our *view* of the transition, and the *scenario engine* that underpins it. Both are essential components of the methodology for developing the BIITS and should be considered in tandem. Some of the findings, such as the estimates of expected capital investment in the transition and inflation, are additional analyses using the results from these engines.

Limitations

The BIITS does not exhaustively represent the global energy system, and cannot capture all the drivers of the low-carbon transition and all the ways physical climate events affect the economy. Our methodology and assessment of its effects are inherently incomplete and highly uncertain, especially further out in the future. The BIITS is not designed to capture dynamics for companies or assets, nor does it assess whether markets have priced in opportunities and risks. It is not intended as a recommendation to invest in any particular asset class or strategy or as a prediction of future performance.

The view

The BIITS is driven by the views of BlackRock portfolio managers on what they see as the fundamental drivers of the low-carbon transition. The BlackRock Investment Institute engaged with 80 transition-focused BlackRock portfolio managers and leaders on topics including emissions reductions, regional climate policy ambitions, technology adoption and deployment, cost of capital trends and future technology costs – both for mature (solar, wind, electric vehicles) and emerging (clean hydrogen, carbon capture, sustainable aviation fuel). We incorporate the effects of the transition on growth and inflation, and how central banks could respond. We've supplemented these views with secondary research and consultation. We then benchmark a set of key parameters that drive the BIITS. These fall into the categories of policy, regulation, technology costs, cost of capital and other factors affecting emissions.

Summary of key parameters driving the BIITS

Key choice	Qualitative view
Major market policy incentives	• Green industrial policy subsidies in major economies (US, EU and China) drive demand for climate technology and bring forward commercial viability timelines for emerging technologies
Announced and expected regulations	• Technology use and uptake, and resulting changes in consumer/investor preferences, are shaped by policy constraints such as bans and sunsetting in higher-carbon sectors and regions
Other economy-wide climate policy	• Policy ambition increases slowly to around 2030 at separate speeds in DMs and Ems. Beyond 2030, climate events and innovation set the stage for more policy, but EM-DM divergence remains
Technology cost curves & emerging tech	• Mature technology costs will continue to decline towards very low levels • Emerging tech enables further mitigation, particularly where supported by policy today
Cost of capital	• Difference in cost of capital widens between lower- and higher-carbon sectors. Cost of capital differences for EMs and DMs will persist

Source: BlackRock Investment Institute, July 2023. Note: This material represents an assessment of the market environment at a specific time and is not intended to be a forecast of future events or a guarantee of future results.

Benchmarking

Our modeling environment benchmarks initial results against those from other comparable scenarios from other credible providers. These include the Network for Greening the Financial System Phase II and III, the UN Principles for Responsible Investment Inevitable Policy Response, private sector scenarios such as from Shell and BP where available and the Intergovernmental Panel on Climate Change. This isolates and reveals key differences between the BIITS and others, like the right chart on page 6 shows. It also provides a distribution of possible transition pathways and uncertainty on key parameters. Our database compares BIITS outputs with hundreds of metrics including primary and final energy demand, investment in electricity generation, carbon prices and potential distributions, emissions and more by fuel, sector and year.

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Appendix

Scenarios: engine and expertise

Our transition scenario modeling framework, powered by Aladdin® technology, provides an integrated approach to understanding how the low-carbon transition may evolve. It is designed to plot the interactions of the transition on the economy through the impact of changing energy prices and damage caused by physical risks under different emission and temperature outcomes. Two core components make up the modeling framework: the global transition model and macro translation layer.

Aladdin Climate's **global transition model (GTM)** provides a view of how the energy system, its costs and broader emissions can evolve over time, reflecting key technology and resource choices. It provides the majority of BIITS scenario outputs, such as future energy flows, emission levels, technology capacity, energy system costs and energy prices.

- The GTM projects how the global energy system and the consequent emissions may evolve over time. The model seeks to optimize the lowest-cost energy system[1] (supply and demand) under limits such as the pace of new technology deployment, and climate policy constraints. Key variables include the level of resource use, technology build and operation, and the transmission of energy products between regions such as the shipping of crude oil. This occurs from resource extraction through to final end-use.
- The GTM uses a wide range of data on energy and emissions technology costs and performance, such as the cost of new wind turbines or electric vehicles. We take into account changing cost profiles and other constraints to reflect on key technology and policy developments, such as limits on the pace of new technology deployment due to supply chain constraints or fiscal incentives provided by climate policies in material countries and regions.

The GTM is linked to the **macro translation layer (MTL).** This allows for a feedback loop between the key climate-related transition developments and the impact on long-term economic growth via three sub-modules:

- **BII macro model:** This is a macro-econometric model that relates GDP to total-factor productivity, labor and capital stock such as factories. Productivity is affected by real energy prices, the relative price of investment, and factors such as the level of education in the workforce. It takes the GTM's view of evolving energy prices – a key driver of transition risk – and estimates the impact on GDP across economies. Higher prices lead to lower growth relative to a baseline view of future GDP – and vice versa.
- **Aladdin Climate's physical risk function:** Similar to the BII macro model, this uses forecasts of emissions from the GTM to understand the potential impact of physical risk damage on economic activity. It compares the GTM's implied path of global temperatures with the results of a pre-existing physical risk scenario that correlates physical climate change to economic activity.
- **Energy demand module:** This links the GTM, which takes exogenous energy demand as one of its key inputs, with the impact of the low-carbon transition on long-term economic growth from the BII macro model and Aladdin Climate's physical risk function. It relates future energy demands to different combinations and growth trajectories for GDP per capita, population and rates of urbanization. Projections for the latter two variables are fixed as part of the scenario inputs, while GDP projections evolve from a starting baseline given the changing physical and low-carbon transition risks. The changed GDP trajectory in turn affects future energy demand and the GMT's transition pathway.

Limitations

Even these advanced models cannot account for point-of-no-return changes in the environment or their knock-on effects, nor can they distinguish between a productive recovery from a hazard and a non-productive recovery from a hazard. Additional knock-on effects to economic activity, such as through changes to capital stock, wealth levels and wellbeing, are not captured. Recognizing these limitations, we use our damage models to assess the top-line effect on growth to build a feedback loop between our energy demand growth pathways, resulting emissions and their effects. Recognizing these limitations, we use our damage models to assess the top-line effect on growth to build a feedback loop between our energy demand growth pathways, resulting emissions and their effects.

The interaction between the global transition model and macro transition layer is updated until an equilibrium is reached – the point when there is no further impact on GDP for a given transition pathway and its knock-on effects.

We use about 150 data sources to arrive at the final transition scenario. See the list on page 16. The key datasets underlying the GTM and the MTL include GDP forecasts from the OECD, energy balances from the International Energy Agency, and granular data for energy producing sectors from GlobalData.

1 The GTM is a least cost, multi-period, multi-region, linear optimization model.

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Appendix

Impact on inflation and capital investment

The global transition model and macro transition layer also produce estimates on inflation and capital investment:

Inflation assumptions

- We assume changes in energy prices resulting from the low-carbon transition are causing inflation pressures directly via their impact on the energy component of inflation and indirectly via the pass through to other, non-energy prices.
- We then assume central banks observe past inflation pressures and respond using a standard rule that's commonly used in the literature (Taylor rule). That it means central banks respond to above-target inflation by raising interest rates. Higher policy rates in turn dampen inflation and lower growth - and vice-versa for lower rates.
- In addition, capital spending affects inflation through the increased demand for investment. Central banks can respond to this by raising interest rates. If they don't do this, higher capital spending feeds into higher inflation.
- We then calibrate key parameters such as the sensitivities of inflation and growth to policy, inflation pass-through to non-energy prices and the effect of capital spending based on standard literature on inflation (Baba & Lee 2022, Rachel & Summers 2019).

Capital investment assumptions

- The BIITS derives its estimates of transition capital spending from our future technology cost expectations and the physical deployment of energy capacity and supporting infrastructure over time, taken from the GTM.
- We segment the capital investment volumes into supply- and demand side, and into high-and low carbon sectors.
- We then assess the marginal increase in energy infrastructure investment in light of the supply of money in the economy to determine whether this amount of elevated investment would increase the cost of capital.

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Appendix

Data sources

The following sources of data were used as inputs into the models described on pages 13-15.

- Airbus
- Alstom
- Argonne National Laboratory
- ATA/Ellondee
- Aviation Services
- Bane NOR
- Boeing
- BP
- Bureau of International Recycling
- Chalmers U
- Columbia - SIPA Center on Global Energy Policy
- Compass International
- CRAVEzero
- Duke University
- ECMWF
- EconnectEnergy
- Efficiency Maine
- EnergieHeld
- EntsoG
- Equinor
- ETH Zurich
- Getting to Zero Coalition (Global Maritime Forum)
- GFEI
- GHG Protocol - WRI / WBCSD
- GIIGNL
- Global Efficiency Intelligence
- Hydrogen Council
- ICAO
- ICCT
- IEA
- IEAGHG
- IFEU
- IIASA
- IMO
- Intergovernmental Panel on Climate Change
- IRENA
- KU Leuven
- Lazard batteries & PNNL PumpHydro/efficiency PNNL
- Madhusudhanan et al.
- Marine Insight
- Mayer_et_all_Macroeconomic Implications
- MDPI - EAF steelmaking profitability
- Mitsubishi
- National Bureau of Statistics of China
- NeocarbonEnergy
- NREL
- OECD
- OICA
- Oliver Wyman
- Oxford University Research Archive
- PNNL
- Power Engineering
- Power Mag
- ScienceDirect
- SeaRoutes
- SINTEF
- Society of Naval Archietects and Engineering
- Solar load profiles
- Tecolote
- Tsinghua Univerisity, Building Energy Research Centre
- UIC
- UK Government
- UNCTAD
- University of Piraeus
- Wartsila
- WEF
- World Resources Institute
- World Shipping Council
- World Steel Association

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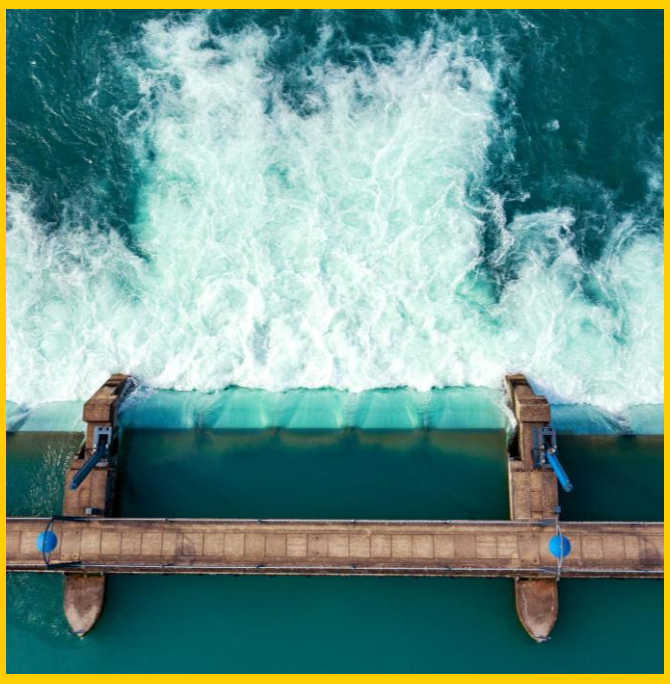
**Mega forces –
Low-carbon transition**

BlackRock.

Climate resilience: an emerging investment theme

Moving beyond risk assessments to climate resilience as an investment theme.



BlackRock
Investment
Institute

December 2023

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Summary

- The impact of climate change is being increasingly felt worldwide: in recent years, we've seen more frequent extreme weather events, rising global temperatures and ballooning spending on disaster recovery. **We're seeing a growing response across businesses, governments and society to address climate change on two fronts.** First, by building resilience to it – the focus of this paper. Second, by limiting it by transitioning to a low-carbon economy – one of five mega forces we see shaping markets and economies.
- Climate change is expected to continue over coming decades, no matter how the low-carbon transition unfolds from here. The result? **Climate-related damages are set to keep mounting in coming years.** It's difficult to put a number on the impact on human health and wellbeing – but the quantifiable economic damage is already growing fast. Our research suggests climate-related economic damages could detract about 5% from global GDP by 2050, varying widely by region.
- We think that means extensive investment will be needed in products and solutions that build climate resilience. Climate resilience refers to **the ability to prepare for, adapt to and withstand climate hazards and to rebuild better after climate-related damages.** Think early monitoring systems to predict floods, air conditioning to better cope with heatwaves, or retrofitting buildings so they better withstand extreme weather. It is distinct from decarbonization, or limiting future warming by reducing emissions.
- We expect demand to grow for products and services that increase resilience and help society assess and manage risks. Some market growth is already evident – and we think policy, regulation and markets will spur more. We also expect greater spending on rebuilding after climate disasters. **As this market grows, we see climate resilience emerging as a new investment theme.**
- Defining this emerging investment theme is complex, as it spans different types of responses such as early warning systems, climate technology and building materials to help protect against disparate types of climate hazards across sectors. **We divide climate resilience into three sub-themes: 1) assessing and quantifying risks, 2) managing risk and 3) rebuilding physical infrastructure.**
- Investing in climate resilience is both distinct from and complementary to investing in the low-carbon transition for several reasons, in our view. One reason is sector exposure: **we see investment opportunities in resilience solutions spanning sectors, including some subsectors underrepresented in typical transition exposures – such as healthcare, water utilities and professional services.**
- We believe there are opportunities to invest in climate resilience solutions across public and private equity and debt. **We think financial markets may be underappreciating the prospects for companies that enable climate resilience.**
- In public equities, we use our proprietary resilience metric to identify companies enabling climate resilience and define a broad investment universe. Combined with further analysis, this allows us to generate a concentrated thematic basket – our preferred approach given the many uncertainties around this new theme. Regardless of the portfolio approach taken, we find that, **in public equities, even a narrow definition can generate exposure to a broad spectrum of industries and sectors.**

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Climate risk: here and now

The effects of climate change are materializing now: multiple records have been broken in recent years, with average sea and surface temperatures hitting repeated new highs and Antarctic sea ice coverage shrinking to its smallest on record earlier this year, according to NASA.

These are not one-offs that simply revert: climate change is manifesting as constant and gradual shifts over decades, the IPCC reports. We're witnessing persistent increases in average annual temperatures, precipitation and sea levels. Climate change is also triggering acute weather events like extreme heat, widespread floods, wildfires and severe drought – and we've seen an increase in their frequency and intensity over recent years. Recent advances in "climate attribution science" are increasingly making it possible to quantify the extent to which such events are the result of climate change.

Climate-related events primarily affect human health and well-being – the economic cost of which is difficult to quantify. The economic damage that can be quantified is already material – and growing. The number of events with inflation-adjusted damages above US$1 billion has steadily increased over the past roughly four decades. See the chart top right. The U.S. hit a record number of such events just nine months into 2023. Climate damages can disrupt economic activity and result in productivity losses. Take, for example, low water levels in the Panama Canal and Europe's River Rhine, due to droughts, that have at times slowed shipping activity. We also saw a pullback in nuclear power production in France last summer due to high water temperatures resulting from extreme heat.

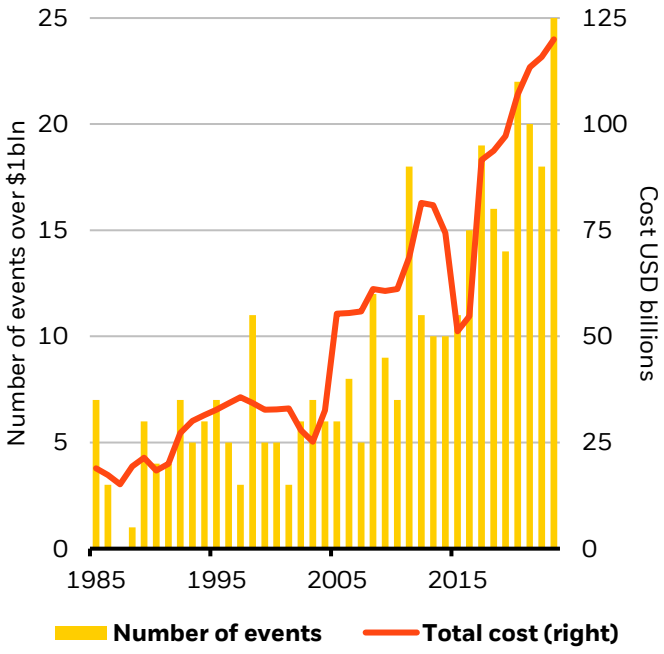
Yet impacts – economic and beyond – are set to keep increasing as most scientific institutions expect climate change to continue in the near term, regardless of the speed of the transition to a low-carbon world. The amount by which global temperatures rise over the next 10 years is nearly identical across the range of scenarios assessed by organizations such as the Intergovernmental Panel on Climate Change. See the chart below right. Longer term, a faster transition could limit climate risk and damages.

Our BlackRock Investment Institute Transition Scenario (BIITS) informs an assessment, on behalf of clients, of how the low-carbon transition is most likely to play out based on what we know and expect today – and the potential portfolio impact. The BIITS suggests that climate-related physical damages could detract more than 5% from GDP by 2050.

It also shows that emerging markets are likely to bear the major share of those losses. Why? Many are in tropical latitudes that are vulnerable to climate-related events and have fewer resources to invest in resilience solutions like upgraded infrastructure and early warning systems. They typically have less access to protective infrastructure, healthcare and insurance – and tend to be highly reliant on climate-sensitive sectors like agriculture.

Real physical damages mount

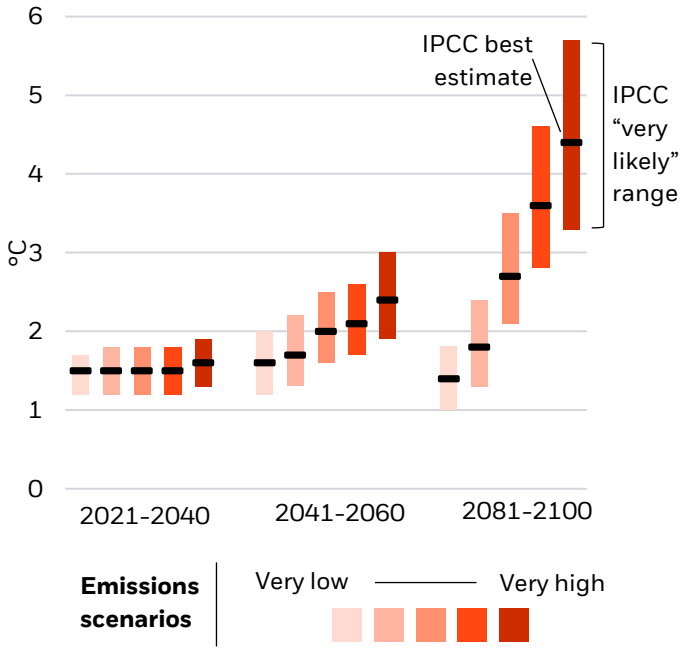
U.S. events with inflation-adjusted losses over $1 billion



Sources: NOAA National Centers for Environmental Information (NCEI) U.S. Billion-Dollar Weather and Climate Disasters (2023)., data as of November2023. Notes: The yellow bars show the number of climate events with losses greater than US$1 billion. The data include droughts, flooding, severe storms, hurricanes, wildfires, winter storms and freezes. The orange line shows the total cost as a ten-year moving average. The data are adjusted for inflation using 2022 dollars. All currency figures are in USD.

Rising temperatures

Global temperatures under different emissions scenarios



BlackRock Investment Institute and Aladdin Sustainability Analytics, with data from the IPCC Sixth Assessment Report Working Group 1 Summary for Policymakers, December 2023. Notes: The chart shows estimated increases in average global surface temperatures vs the 1850-1900 reference period over three different time horizons for five climate scenarios laid out by the IPCC. Black lines represent the IPCC's "best estimate." Colored error bars represents an uncertainty range estimated by the IPCC as "very likely" (a probability of 90-100%). These scenarios cover a range of possible outcomes but there is no assessment of the likelihood of individual scenarios

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Resilience: a growing market

We are already seeing early signs of increased demand for resilience solutions – products and services that help companies, households and economies anticipate, prepare for and cope with climate-related events. For example, consumers are increasingly seeking out solutions that help them cope with warmer temperatures and poorer air quality. A case in point: Demand for home air-filtration appliances in the northeastern U.S. spiked during the Canadian wildfires in early 2023. As the chart shows, air conditioner sales are also increasing. As temperatures climb, more and more U.S. households and firms are likely to install air conditioning, including in areas where a cooler climate has typically made it less prevalent, like northwestern and far northeastern U.S. Growth is expected to be even greater in other countries where heatwaves are becoming more frequent and air conditioning is less common. For example, only 19% of European households have air conditioning, up from 10% in 2000 and compared with 78% in North America, International Energy Agency data from 2022 show.

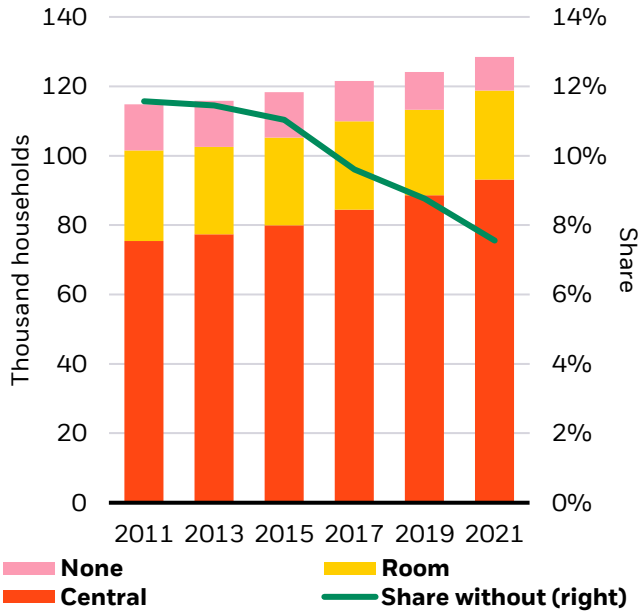
Disaster aid in the U.S. has reached record levels in recent years, driven both by increasing numbers of extreme weather events and by huge Covid-related spending. The five-year running average in the U.S. has now reached over $25 billion a year, including pandemic spending, or $15 billion a year excluding it – five times, or three times respectively, the amount it was spending a decade ago, according to Federal Emergency Management Agency 2022 estimates. Should the recent trend persist, the cost of disaster rebuilding in coming years could reach levels akin to the $39 billion of energy investments linked to the more widely discussed U.S. Inflation Reduction Act.

What's clear: it's likely to take extensive investment in coming years to build society's resilience to growing climate impacts – and we see potentially attractive investment opportunities from doing so. Sizing the opportunity requires answering two key questions, in our view: What's the growth potential in the likely market for resilience-related products and services? How much growth have markets already priced in? We see both growth and pricing creating investment opportunities.

We also see policy, regulation and economic forces driving market growth for resilience products. U.S. public spending on climate resilience includes US$50 billion from the Infrastructure Investment and Jobs Act and over US$20 billion from the Inflation Reduction Act. Other policy support comes from building code updates in the U.S. and the EU that explicitly focus on improving climate resilience or, in Asia, the AIIB's bond issue specifically targeting resilient infrastructure. Regulatory disclosure requirements may also catalyze resilience investments – for instance, jurisdictions around the world are mandating climate risk disclosure for firms, and adapting to climate change is one of the six environmental objectives of the EU Taxonomy introduced in 2021.

Keeping cool

U.S. household air-conditioning, 2011-2021



Sources: BlackRock Investment Institute and U.S. Census, with data from the American Housing Survey, December 2023. Notes: The chart shows the number of U.S. households that have air conditioning installed either centrally and covering the whole home (red bars) or in an individual room (yellow bars), as well as the number (pink bars) and share (green line) of households that do not have any type of air conditioning.

Markets are starting to price in physical risks, as a recent review by the Bank of International Settlements found. As market participants become more attuned to the impacts of extreme weather, they are seeking to reduce their exposure to related losses.

For example, energy companies, insurers and financial investors are increasingly utilizing weather derivatives, investment contracts whose payoff is determined by weather variables like temperature, precipitation, snowfall or wind. Data compiled by Reuters shows that open interest in weather derivatives is rising and reached new monthly highs of 200,000 contracts in 2023, a fourfold increase in just a year. Another example is insurance markets. In Florida, annual property insurance payments rose to an average of $4,200 in 2022 – triple the U.S. average – as several insurance providers pulled out of the market. Yet our assessment of U.S. municipal bond and publicly listed utilities found that those risks are still largely underpriced, presenting possible investment implications, in our view.

As markets better price in risks, we expect they will also start pricing in growth in demand for resilience solutions (see next page). In our view, this will be driven both by projected revenue growth and by investor sentiment, as investors with sustainability objectives increasingly recognize resilience as a theme driving sustainability outcomes.

Defining the opportunities

Much of our past climate modelling and analytics has been focused on understanding and quantifying physical risk. We recognized that investors increasingly needed tools that could allow them to quantify and incorporate climate risks in their portfolios. We now have a much better understanding of those risks – and how to assess them. We continue that research, but we also now expand it. We have developed a new framework that helps define resilience solutions, which enables us to better identify investment opportunities, as we explore on the next page.

Up to now, climate resilience has largely been considered a financial risk issue and an area requiring public finance – and less an area ripe for private investment. Yet public financing is still well below investment needs, particularly in infrastructure and in emerging markets. We believe capital markets can play a role in plugging part of this investment gap, notably when it comes to financing products and services that provide climate resilience. Yet what might be considered an investment in climate resilience is not straightforward: different types of climate risk warrant different responses, and they can vary further still across sectors. As a result, myriad taxonomies have been developed by different organizations and firms as an effort to categorize resilience as an investment theme.

We distinguish between activities that *prepare* for climate damage and those that *repair* it. Resilience infrastructure (bright yellow sections in the table below) is largely the purview of public finance, so we focus on investment opportunities in resilience solutions (light yellow sections), grouping them under three key subthemes:

- **Prepare: Assess and quantify risks**: Here we include products and services that help monitor conditions like air or water quality, predict imminent disasters and enable immediate action.
- **Prepare: Manage risks:** This category refers to solutions that: 1) help prepare for climate impacts; 2) ensure resilient and reliable supply of essentials like water, food and energy; and 3) improve quality of life. It also includes solutions in the fields of disaster preparedness and recovery.
- **Repair: Built environment**: In this category, we include activities to upgrade physical structures – like buildings, energy grids, water supply – so they are more resilient to climate-related events. Not all rebuilding adds resilience; it some cases they may actually reduce it. So, it's key to differentiate here.

The table below provides some examples of products and services for each subtheme. We believe they are likely to benefit – to varying degrees – from the growing demand for climate resilience. We think markets likely underappreciate the extent of that growth in demand, creating potential investment opportunities.

Investing in climate resilience is complementary to investing in the low-carbon transition for several reasons, in our view. One reason is sector exposure: we see investment opportunities in resilience solutions spanning sectors, including some subsectors underrepresented in typical transition exposures – such as healthcare, water utilities and professional services. We recognize some aspects of investing in climate resilience may be at odds with investing in the low-carbon transition. For example, the manufacture or operation of some resilience solutions may generate emissions, like production of cement for sea walls. Investors with transition-related goals can seek out synergies across the two themes – for instance, power grid stability and batteries, or energy-efficient heating, ventilation and air conditioning that could benefit as the grid decarbonizes.

Example resilience activities by category

	PREPARE: Assess and manage risk		REPAIR: (Re)Build smarter	
Type	**Resilience solutions**			**Resilience infrastructure**
	Assess & quantify risks	Manage risks	Built environment	
Asset classes	Public equity, private equity, corporate credit			Municipal/sovereign bonds, real assets, project finance
Examples	**Monitoring:** air quality sensors, weather stations, satellites **Analytics:** weather forecasting, early-warning systems, climate risk analytics **Business intelligence:** supply chain analytics, industrial production and operations	**Food/ag.:** precision agriculture technology, drought-resistant crops, aseptic packaging **Health:** cold/cool item transportation, disease surveillance, remote healthcare (telehealth) **Risk transfer:** parametric insurance*, weather derivatives	**Construction:** heating, ventilation and air conditioning; weather-resistant materials and paints **Water supply:** on-site harvesting/recycling, smart water meters **Energy supply:** on-site generation and storage	**Flood protection:** seawalls, levees, stormwater management **Water supply:** treatment, storage desalination **Energy supply:** distributed grids, microgrids, storage, weatherized infra

Source: BlackRock Investment Institute, Aladdin Sustainability Analytics, December 2023. Notes: The table is for illustrative purposes and is subject to change without notice.
*Parametric insurance is insurance that pays out a prespecified amount if a given event occurs, as opposed to an amount based on the actual losses incurred.

Moving to implementation

Implementing this emerging investment theme in portfolios requires a solid understanding of climate risks and how they might evolve. That helps investors form a view on which resilience solutions and companies are most likely to see growth.

We think investors need tools that allow them to carry out such an assessment. As an example, BlackRock's Aladdin Climate models how climate-related hazards – tropical cyclones, wildfires, extreme temperatures – and their related damages may impact asset values, business continuity and labor productivity. We then use asset valuation models to calculate the financial impacts at the security and portfolio levels under different climate scenarios. Investors use these insights to evaluate the impact on valuations of publicly traded securities, including municipal bonds and mortgage-backed securities, as well as for ongoing risk monitoring.

Climate analytics can help us establish what corporate investment needs and priorities might be in terms of insulating business operations from specific climate impacts. For example, extreme heat and drought strain agricultural yields – so companies or regions that are particularly exposed to that risk may invest heavily in crop protection solutions. Through this analysis, we can build a picture of where we see market opportunities for resilience solutions.

We believe there are opportunities to invest in climate resilience across public and private equity and debt. In public equity, we find them by first identifying companies enabling climate resilience. This is not always obvious as those companies don't typically market their products specifically as "climate resilient", and existing datasets don't yet explicitly capture exposure to climate resilience. We have developed our proprietary resilience metric, taking a data-driven approach and using both revenue-based metrics and natural language processing – into which we input our definitional framework.

This metric provides a systematic way for us to identify companies involved in the activities identified in our framework as resilience solutions (excluding infrastructure, since that's typically the purview of public finance). This helps to define a broad investment universe for climate resilience. We then apply research and fundamental expertise to inform our view and look at company fundamentals to validate our findings.

We can use our proprietary resilience metric in portfolios to gain broad-based exposure to climate resilience, tilting into companies that score well on our metric, and we can adjust thresholds and weights based on conviction and client choice.

We can also use the investment universe as the starting point for further analysis of company fundamentals and the application of investment criteria to generate a concentrated thematic basket. We like the fundamental thematic approach for resilience, since resilience is still an emerging theme with many uncertainties. That's why it takes deep industry knowledge and research to pick suitable stocks – making this theme fertile ground for potential opportunities for portfolio managers with access to thematic and sector expertise.

Regardless of the approach taken, we find that, in public equities, even a narrow definition of resilience would speak in favor of getting exposure to a broad spectrum of industries and sectors. Materials and industrial sectors are likely to feature more heavily given the physical requirements of adapting buildings and infrastructure. The utilities and energy sectors have a dual role to play: they are adapting both to decarbonize and to be more resilient to climate events.

Technology is another sector with an outsized role: connectivity and communication are crucial to predicting and responding to weather events and to monitoring environmental conditions.

Climate resilience solutions in practice

Category	Climate risk	Resilience opportunity	Example company solution
Prepare: Assess and quantify risks	**Water shortages and reliable supply:** In many advanced economies, water utility and supply infrastructure is decades old and not equipped to be regularly stressed by heatwaves, flooding and unseasonal precipitation.	**Innovative technology:** U.S. water meter producers are monitoring source water quality so they can respond to water chemistry changes (due to storms, algae blooms, industrial discharge).	A U.S. company is driving adoption of "advanced metering infrastructure" that allows for real-time water measurement. Alarms and triangulation enable a fast response to burst pipes and leaks, reducing water loss and system downtime.
Repair: Buildings and infrastructure	**Extreme weather:** Most homes are not built for extreme weather. External parts of a house are especially likely to be exposed to increased variability in humidity and temperature.	**Expansion of addressable market for niche products:** High-performance building materials exist, but their use may be limited. Examples include high-performance glass, insulation and heat-resistant paint.	A large U.S. decking company has a proprietary process to convert waste into durable, weather-resilient and visually appealing composite decking.

Source: BlackRock Investment Institute, December 2023. Notes: The table offers hypothetical examples of climate resilience solutions and is for illustrative purposes only. Views are subject to change.

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Global perspectives on investing in the low-carbon transition

Survey of 200 institutional investors

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Executive summary

The transition to a low-carbon economy is among a handful of major structural shifts that we see rewiring economies, sectors, and businesses.

Clients are increasingly asking BlackRock how to mitigate investment risks and capture opportunities associated with climate and the low-carbon transition.

To help inform the choices BlackRock offers our clients, in June 2023 we commissioned iResearch Services, an independent third-party research consultancy, to conduct a market survey on our behalf. The survey seeks to better understand institutions' needs and preferences related to investing in the low-carbon transition.

iResearch Services polled 200 institutional investors globally, representing $8.7 trillion[1] in assets under management, with the goal of providing a representative sample across regions and organization types. All survey respondents are involved in the investment process at their respective organizations. Survey responses have not been edited and solely represent the opinions of the respondents at the time of the survey.

The results offered a lens into how institutional investors globally are thinking about investing in the low-carbon transition. **Four key themes emerged:**

200
Institutional investors

15+
Countries

$8.7T
AUM represented

01.
Low-carbon transition as an investment priority

56% of investors who took this survey indicated that they plan to increase transition allocations in the next 1-3 years, and 46% said navigating the transition is their most important investment priority in the next 1-3 years.

02.
A mix of approaches

Globally, the majority - 56% - of respondents indicated a **preference for a whole portfolio approach to transition investing**, while 41% expressed a preference for an asset-class-by-asset-class approach.

03.
Spotlight on whole portfolio, fixed income, KPIs[2], and performance

Respondents expressed that there are some product offerings gaps (e.g., **whole portfolio approach, emerging markets, fixed income**), as well as other challenges with transition allocations (e.g., tracking KPIs).

04.
Managers' research and deal access are key

When it comes to selecting a transition partner, institutional investors are looking for an asset manager with **strong research capabilities, access to proprietary deals, and performance track record.**

As a fiduciary, BlackRock invests on our clients' behalf to help them meet their investment objectives. Our role in the transition is to help clients navigate investment risks and opportunities, not to engineer a specific decarbonization outcome in the real economy. Our investment approach is informed by three principles: we provide choice, we seek the best risk-adjusted returns within the mandates clients give us, and we underpin our work with research, data, and analytics.

1 Currency is shown in USD
2 Key Performance Indicators

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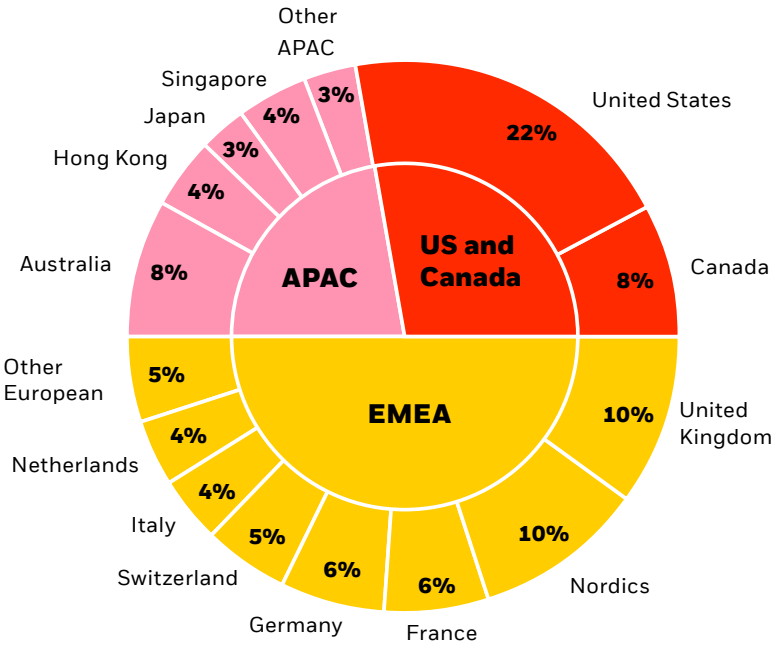
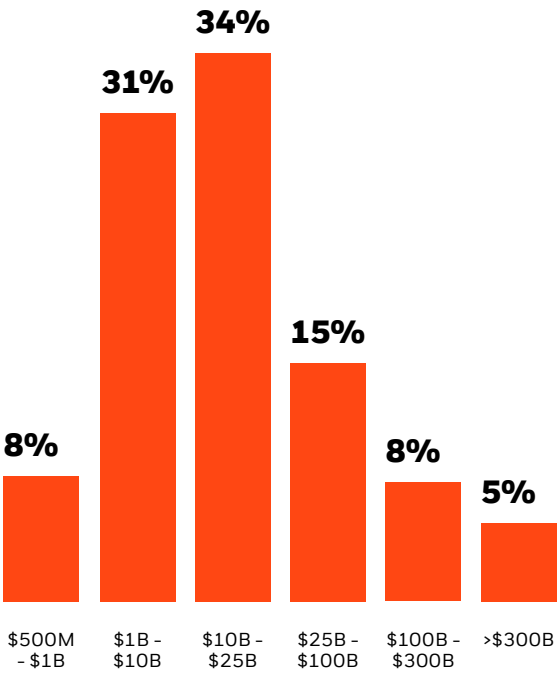
About the survey

Understanding a diverse set of client perspectives

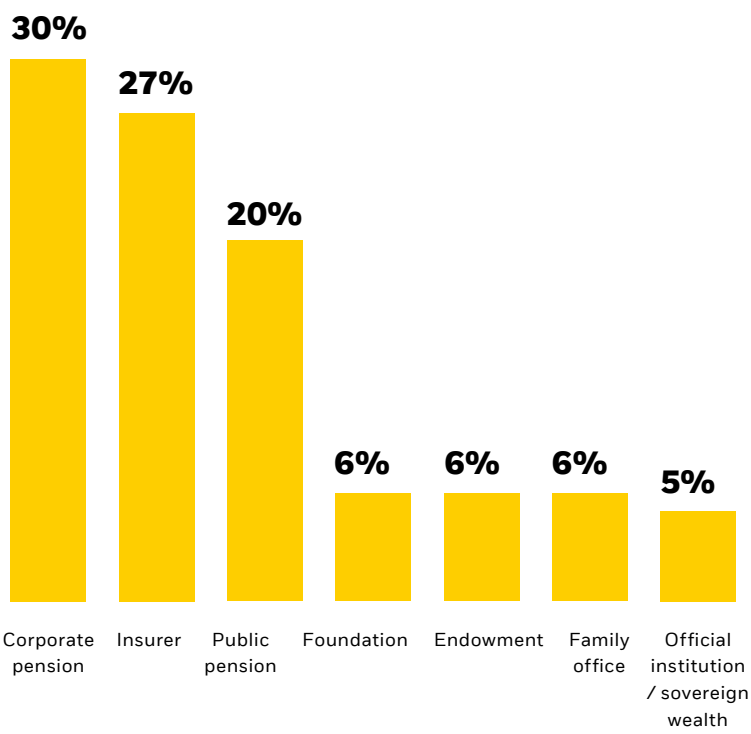
The survey polled 200 institutions around the globe. Their sizes and geographies varied widely.[1]



Institution size (USD)



Organization breakdown



1 Percentages shown on subsequent pages may not always add to 100% due to rounding.

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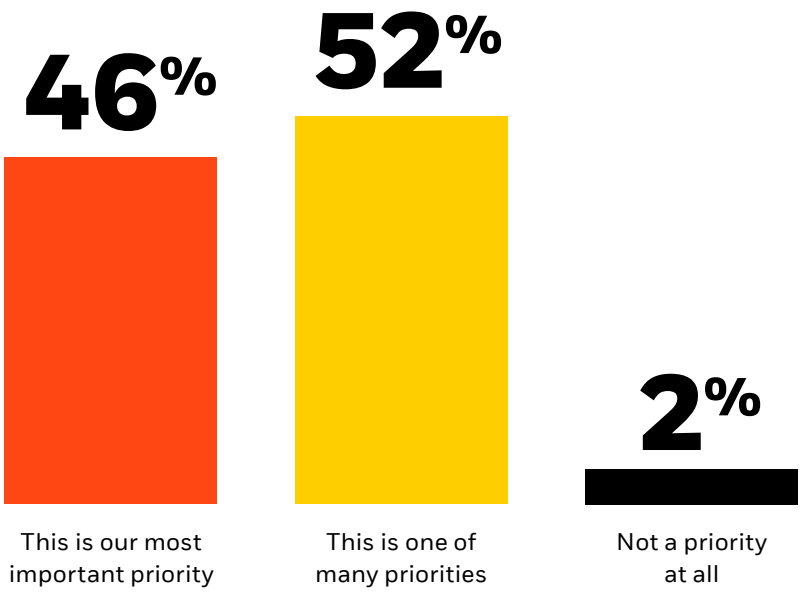
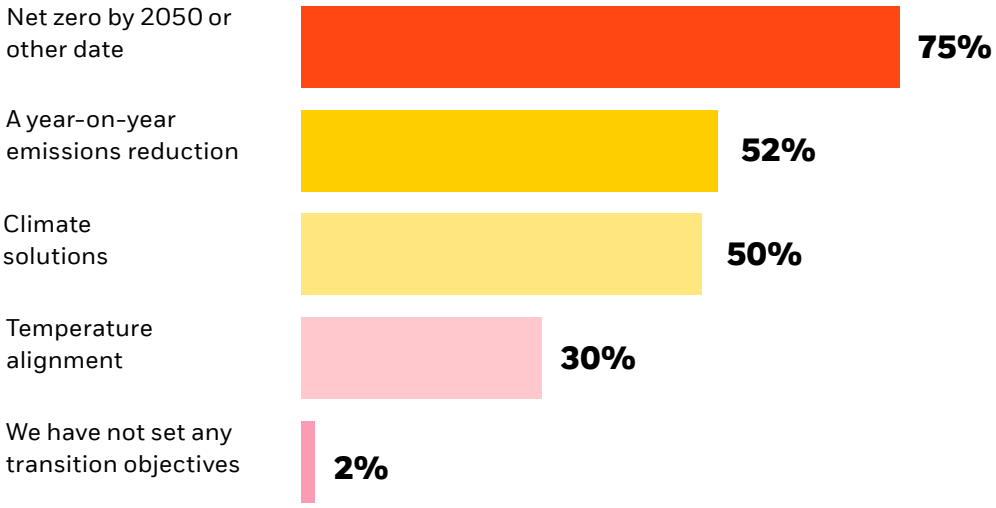
1. Low-carbon transition as an investment priority

Q | Where does navigating the transition to a low-carbon economy rank in your investment priorities in the next 1-3 years?



Q | Have you set any transition investment objectives across your portfolio?

98% of investors that took this survey have set some kind of **transition investment objective** for their portfolios.



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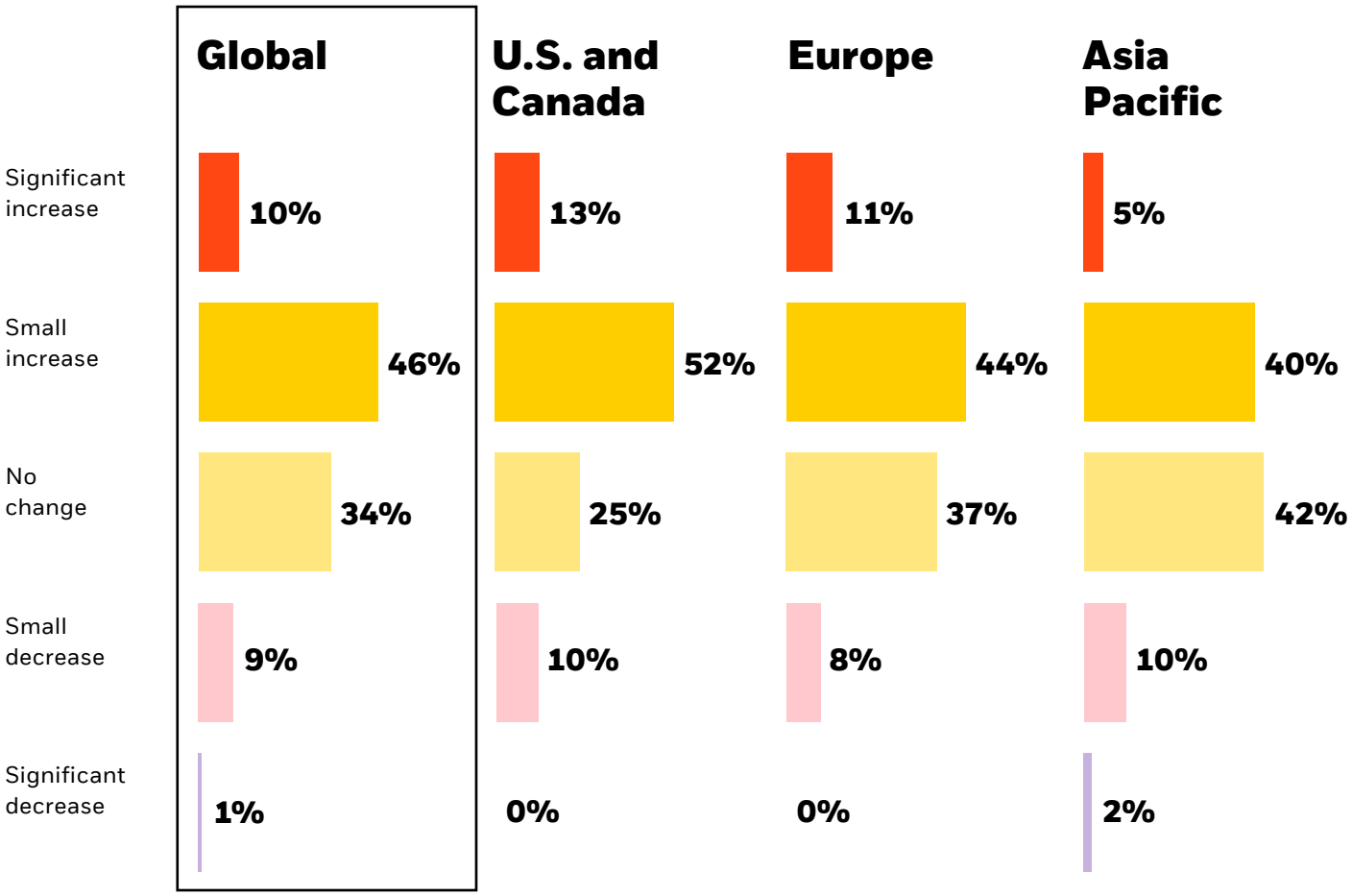
Low-carbon transition as an investment priority

Q | How do you expect to change your allocations to transition strategies over the next 1-3 years?



56% of survey respondents are looking to **increase their allocations to transition strategies,** with investors in U.S. and Canada expressing the strongest intention to increase allocations.

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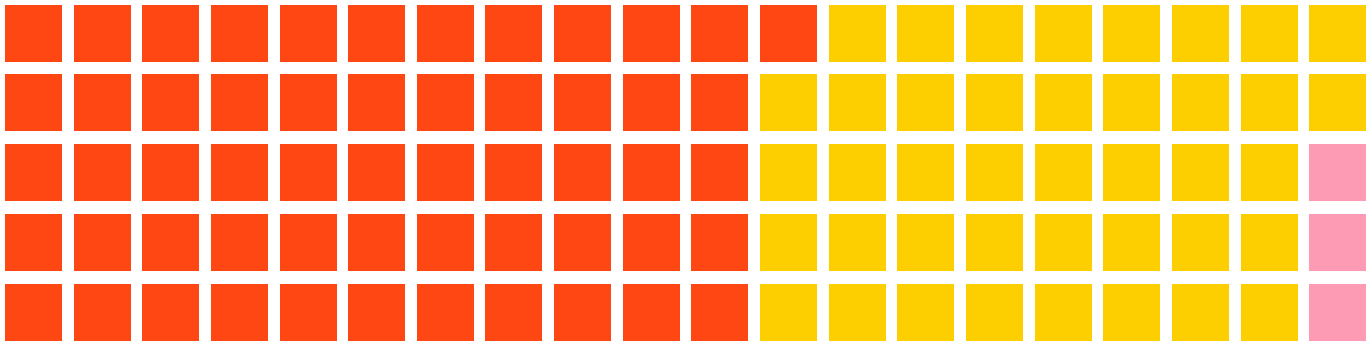
2. A mix of approaches

Q | If you're planning to increase your allocation to transition strategies, is the increase at an asset class level or on a whole portfolio basis?[1]



56%
Whole portfolio approach

41%
Asset-class-by-asset-class

3%
Hybrid approach

A majority of respondents indicated a preference for a **whole portfolio approach** to investing in the low-carbon transition, while 41% of respondents expressed a conviction for an asset-class-by-asset-class approach.

1 For respondents who indicated that they planned to increase asset allocations to transition investing over the next 1-3 years.

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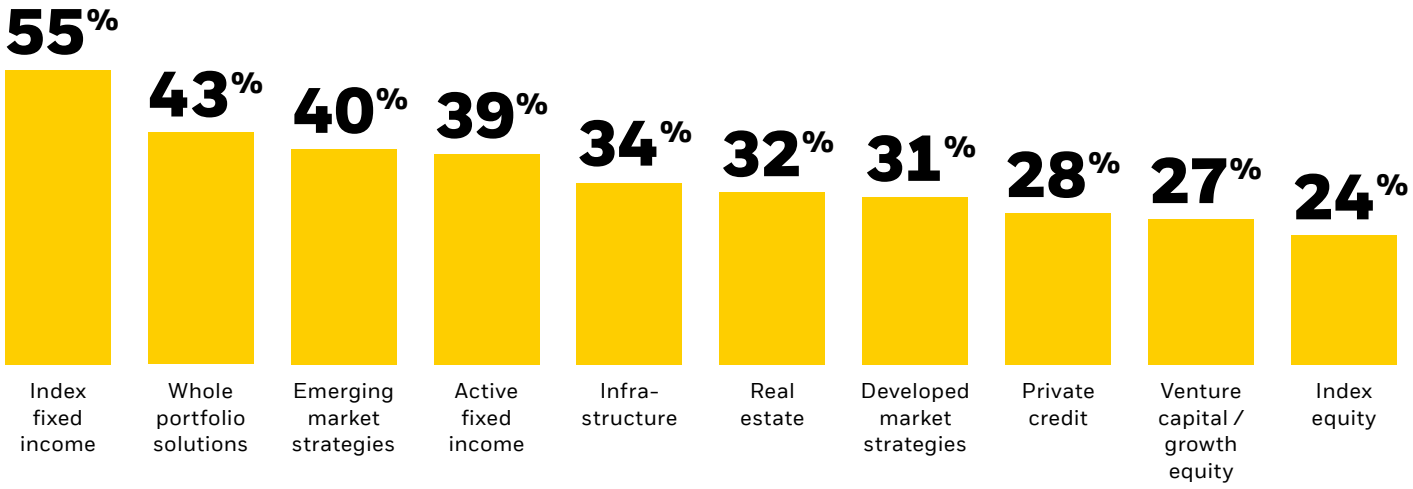
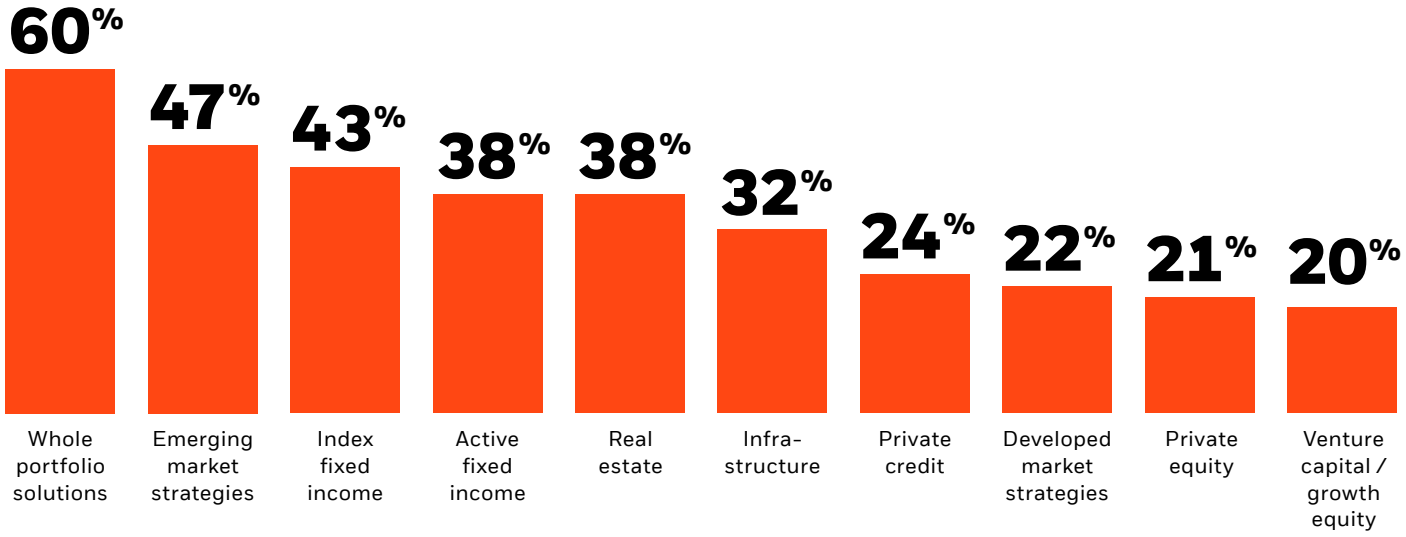
3. Spotlight on whole portfolio, fixed income, KPIs, and performance

Q | In which asset classes do you intend to increase allocation to transition strategies? Please select all that apply.[1]



Q | Where do you wish to see more transition and sustainable investing products available? Please select all that apply.



The top asset classes where institutional investors intend to increase allocations are **index fixed income, whole portfolio solutions**, and **emerging markets**. They would like to see **more products available in the same asset classes** in which they intend to increase allocations, particularly whole portfolio solutions.

1 For respondents who indicated that they planned to increase asset allocations to transition investing over the next 1-3 years.

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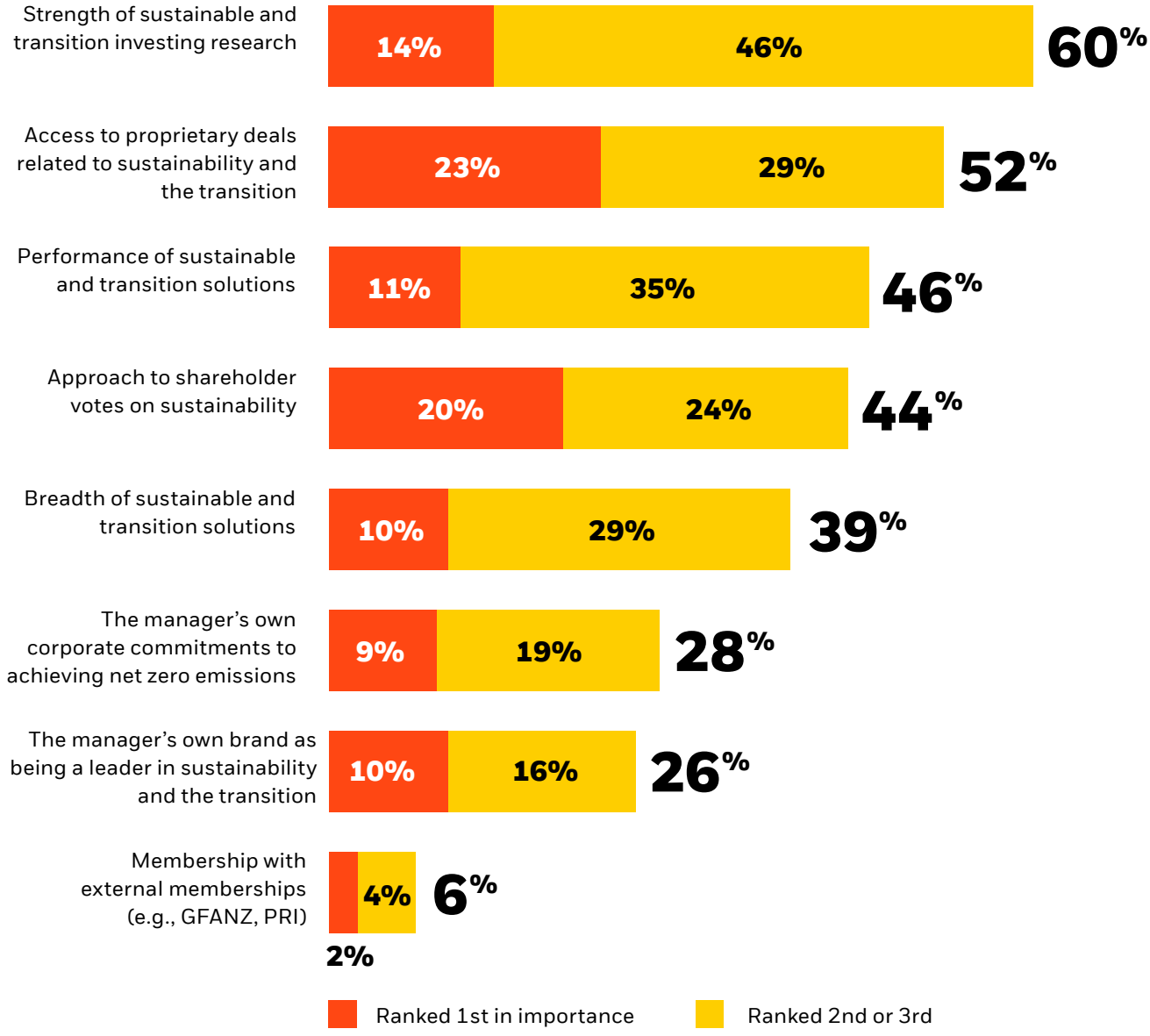
Spotlight on whole portfolio, fixed income, KPIs, and performance

Q | What are the biggest challenges when allocating to transition strategies? Please select all that apply.

4. Managers' research and deal access are key

Q | What are the most important considerations when selecting your transition investing manager? Please rank up to 3 responses.



Institutional investors rank sustainable and transition investing **research, proprietary deal access,** and **performance of sustainable and transition solutions** as the most important factors in selecting a manager for transition allocation. **23%** of investors ranked access to proprietary deals as their **top consideration**.

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Survey methodology

The Global Transition Investing survey was conducted in June 2023. All respondents in this survey were institutional investors sourced by an independent third-party research consultancy. Respondents were asked to answer questions about the transition to a low-carbon economy, including their approach to portfolio allocations for the transition, portfolio transition objectives, and which qualities are important when selecting a transition asset manager. Respondents were also asked to respond to their level of responsibility for making investment decisions across the organization's portfolio. Further questions related to organization type, size, and location were included in order to gather insight about respondent demographics.

Any opinions expressed reflect our survey results as of June 2023. They are not intended to be a forecast of future events or a guarantee of future results. There is no guarantee that any forecasts made will come to pass.

Numbers or percentages may not add up to 100 due to rounding.

Sample size is 200 global respondents throughout unless indicated otherwise. This includes 100 respondents in Europe, 40 respondents in Asia Pacific, and 60 in North America (Canada and the United States).

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