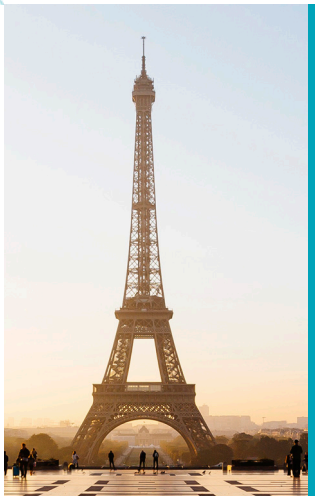
ROBECO
The Investment Engineers

The why, the how and the what:

Showing the way to Paris-aligned investing

Sustainable Investing Expertise by ROBECOSAM



White paper

For professional investors
June 2021

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‘It’s no longer a question of *if*, but *how* institutional investors can contribute to the Paris Agreement’

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Summary

The race to zero is on. Almost on a weekly basis, a new commitment to reach net zero by 2050 is announced by a government, company or investor. But what does this mean in practice? This white paper explains the key components of Paris-aligned investing and shares Robeco's views and insights realized from developing our own net zero roadmap.

Commitments are being made across business and society to help achieve the goals of the Paris Agreement. Experts estimate that countries with net zero targets represent as much as 61% of global emissions and 68% of global GDP.[1] In the shorter term, however, there is a critical ambition gap. While science tells us that we need to halve global emissions by 2030, the policies envisaged by national governments will result in a mere 0.5% reduction, according to the United Nations.[2] This means there is a hundredfold gap between ambition and reality.

A forceful policy response, sooner or later, is inevitable. Leading investors are anticipating a low-carbon future by aligning their portfolios with the goals of the Paris Agreement. According to Robeco's 2021 Global Climate Survey,[3] climate change will be central to the investment strategy of almost 90% of global investors in the next two years, while over 50% of investors will commit to aligning their investments with the ambition to realize a net zero economy by 2050.

In the past six months, a number of frameworks have become available to facilitate investors in this process. This paper summarizes the key components for Paris-aligned investing, based on guidance from the Net Zero Investment Framework of the Paris Aligned Investment Initiative, the Target-Setting Protocol of the Net Zero Asset Owner Initiative, the financial sector guidance of the Science-Based Targets initiative, and the EU Benchmarks Regulation.

Subsequently, the paper shares Robeco's views and experiences. Based on the four above-mentioned investor frameworks, Robeco is developing a net zero roadmap with interim targets for 2025 and 2030. While our roadmap won't be published until just before November's COP26 Climate Change Summit in Glasgow, in this paper we give you a sneak preview of our views and insights.

Finally, the paper provides a number of case studies with concrete solutions for Paris-aligned investing. These solutions include the climate strategies we have developed in line with the EU Benchmarks Regulation, our research on carbon beta as a forward-looking investment metric, and our engagement on climate with carbon-intensive companies in the utilities, automotives, and oil and gas sectors.

1 Source: https://ca1-eci.edcdn.com/reports/ECIU-Oxford_Taking_Stock.pdf?mtime=20210323005817&focal=none
2 Source: https://unfccc.int/sites/default/files/resource/cma2021_02E.pdf
3 Downloadable at: https://www.robeco.com/en/sustainability/climate-investing/

The race to zero

The United Nations recently reported that the combined climate policies of national governments will reduce global greenhouse gas emissions by a mere 0.5% by 2030.[4] If unchanged, this trajectory will push global warming far beyond 2°C, with dramatic consequences for countries around the world, as well as for the global financial system. So, it's no longer a question of if, but how institutional investors should build Paris-aligned portfolios – even if the world isn't yet on track for a net zero future.

This year marks a critical point for global climate action. UN Secretary General António Guterres has called 2021 the "make or break year" for the Paris Agreement. To reach the objectives of this landmark shift in the fight against climate change, global greenhouse gas (GHG) emissions need to halve by 2030 (relative to 2010) and drop to net zero by 2050. At November's UN Climate Change Summit (the COP26) in Glasgow, national governments will come together to review their progress in implementing the Paris Agreement and to set new targets for their climate policies. This is known as the 'ratchet mechanism' and means that every five years, starting this year, countries must report on their progress in delivering on their climate policies, as well as crank up their ambitions based on the latest scientific insights.

Optimism, despite falling short

There is a dire need for countries to step up their ambitions towards tackling climate change. In February, the secretariat of UNFCCC (United Nations Framework Convention on Climate Change, an intergovernmental treaty better known as the Paris Agreement) reported that the latest climate policies of governments will reduce global greenhouse gas (GHG) emissions by only 0.5% by 2030 (relative to 2010). As such, governments are falling far short of what is needed to avoid catastrophic climate change. The UN's Intergovernmental Panel on Climate Change (IPCC) indicated in their 2018 report that global emissions need to fall 50% by 2030 for the world to meet the 1.5°C target, or alternatively 25% by 2030 to meet the 2°C target.[5] This means governments need to gear up their policy ambitions a hundredfold to limit global warming to 1.5°C or fiftyfold for it to remain below 2°C.

While this is a sobering observation, there are still reasons for optimism. In the same report, the UNFCCC concludes that governments' longer-term targets imply a 90% reduction of global GHG emissions by 2050. This is in fact in line with the IPCC's below-2°C scenarios. More and more regions and countries are legislating for net zero emissions by 2050, including the EU, the UK, New Zealand, Canada, South Korea and Chile. Late 2020, China announced a commitment to reach net zero carbon by 2060, alongside Japan and Korea, which pledged to do the same by 2050. On his first day in office, US President Joe Biden rejoined the Paris Agreement and recently announced a series of ambitious targets to tackle climate change.[6]

Experts estimate that these new commitments mean 61% of global emissions and 68% of global GDP are lined up for the 2050 net zero ambition.[7] If delivered on, this would put the world on track for the below-2°C trajectory. This level of climate commitment has not been seen before – not even in 2015, when the Paris Agreement was signed at COP21. So, the real task for this year's UN Climate Summit in Glasgow is to translate the long-term government pledges into more immediate policies and actions to significantly curb global emissions by as early as 2030.

4 Source: https://unfccc.int/sites/default/files/resource/cma2021_02E.pdf
5 Source: https://www.ipcc.ch/sr15/
6 For more information on climate action by national governments: https://climateactiontracker.org/
7 Source: https://ca1-eci.edcdn.com/reports/ECIU-Oxford_Taking_Stock.pdf?mtime=20210323005817&focal=none

Traction in the market

The strong wave of climate commitments in the market is a source of encouragement for governments to ratchet up their policy ambitions. Corporates and investors are accelerating their efforts to align their businesses with the transition to a net zero economy, with nearly 1,400 companies taking part in the Science-Based Targets initiative (SBTi) to implement GHG reduction targets in line with the objectives of the Paris Agreement.[8] Over one-third of these companies are following the latest 1.5°C scenarios for their sectors and, therefore, are seeking to align with net zero. That the 338 companies who got together to set science-based targets back in 2015 have since reduced their combined emissions by 25% is testament to the impact of the SBTi. Contrast this with the 3.4% increase in global emissions from energy and industrial processes over the same period.[9]

An additional group of companies, organized in The Climate Pledge, are committing to net zero by 2040. This initiative, composed predominantly of large international companies, has gained significant support since its inception in 2019 and currently has over 100 signatories.[10]

Investors have also set up several initiatives to align their portfolios with a net zero economy:

- The UN Net Zero Asset Owner Alliance, convened in 2019 by the UN Environmental Program (UNEP) and the Principles of Responsible Investment (PRI), is a group of 37 institutional investors with USD 5.7 trillion in AuM. Committed to achieving net zero investments by 2050, several members of the group have announced concrete decarbonization targets for 2025, while others are in the process of doing so.[11]
- The Paris Alignment Investment Initiative[12] was initiated in 2019 by the Institutional Investors Group on Climate Change (IIGCC) and soon became a global initiative, thanks to other regional investor groups from North America, Asia and Australasia signing up. It has also had two spin-offs: a group of 21 asset owners with USD 1.2 trillion in assets[13] and the Net Zero Asset Managers Initiative, comprising 87 investors with USD 37 trillion in AuM.[14] Robeco is a founding member of the Net Zero Asset Managers initiative.
- Finally, 58 financial institutions including investors, banks and insurers have committed to implementing targets that are aligned with the financial sector guidance of the Science-Based Targets initiative.[15]

Box 1. Defining 'Paris alignment' and 'net zero'

In this paper, references to 'Paris alignment' refer to investment strategies that aim to contribute to the goals of the Paris Agreement to keep the global temperature rise well below 2°C, and preferably to 1.5°C, compared with pre-industrial levels. A Paris-aligned investment strategy aims to comply in particular with Article 2.1 (c) of the agreement, which sets out the goal of "making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development".

While the Paris Agreement sets limits in terms of degrees Celsius, in 2018 the UN IPCC climate science panel translated these limits into clear thresholds for GHG emissions and defined two basic emission pathways based on the goals of the Paris Agreement:

- The 2°C objective requires a 25% reduction in carbon emissions by 2030 (relative to 2010), net zero carbon emissions by 2070 and net zero emissions of other greenhouse gases by the end of the century.
- The 1.5°C objective requires a 50% reduction in carbon emissions by 2030 (relative to 2010), net zero carbon emissions by 2050, and net zero emissions of other greenhouse gases by 2070.

The IPCC defines net zero emissions as the point at which man-made greenhouse gas emissions into the atmosphere (from fossil fuels and land use) are balanced by anthropogenic removals over a specified period. Removal can occur through engineered solutions such as carbon capture usage and storage (CCUS) or through nature-based solutions such as tree planting.

In this paper, 'net zero' refers to the latter IPCC scenario and, therefore, to the alignment of investment portfolios with a 1.5°C emission reduction pathway, which implies a halving of carbon emissions by 2030 and net zero carbon emissions by 2050.

8 The Science-Based Targets initiative was jointly established by the Worldwide Fund for Nature (WWF), the World Resources Institute (WRI), the Carbon Disclosure Project (CDP) and UN Global Compact: https://sciencebasedtargets.org/
9 Source: https://sciencebasedtargets.org/news/330-target-setting-firms-reduce-emissions-by-a-quarter-in-five-years-since-paris-agreement
10 Source: https://www.theclimatepledge.com/us/en.html
11 Source: https://www.unepfi.org/net-zero-alliance/
12 Source: https://www.parisalignedinvestment.org/
13 Source: https://www.parisalignedinvestment.org/media/2021/03/PAII-Net-Zero-Asset-Owner-Commitment-Statement.pdf
14 Source: https://www.netzeroassetmanagers.org/
15 Source: https://sciencebasedtargets.org/sectors/financial-institutions

From ambition to action

So, there does indeed appear to be a race to zero, given this remarkable wave of net zero commitments by both corporates and investors. This was precisely the aim of the UN's Race To Zero campaign, set up in preparation for November's Climate Summit in Glasgow to rally leadership from businesses, cities, regions and investors for an accelerated decarbonization of the economy. Collectively, these actors now account for nearly 25% of global CO2 emissions and over 50% of GDP.[16] The commitments have been concentrated in developed economies, as was anticipated in the Paris Agreement. Yet stakeholders in emerging markets are also increasingly committing to net zero. As we get closer to the Climate Summit, we can expect a significant increase in the number of companies and investors aligning with this global ambition.

But the key question is how we get from ambition to action. The commitments from companies, investors and national governments to achieve net zero emissions by 2050 are vital; they create the basis for changing business-as-usual and demonstrate the direction of travel to numerous supply chain partners, investment project developers, local decision-makers and consumers around the world. But ambition without immediate action quickly becomes greenwashing, and climate mitigation cannot wait. Every year of inaction increases the impact of climate change and the costs to society.

A number of net zero investment frameworks have recently become available, enabling investors to set concrete targets and take immediate action. The next chapter describes these different frameworks and summarizes their guidance towards building Paris-aligned portfolios.

16 Source: https://unfccc.int/climate-action/race-to-zero-campaign

Aligning investments with Paris

What does it mean to align investment portfolios to the Paris Agreement? Investors and legislators have addressed this question through several initiatives, with the resulting guidance and frameworks recently becoming available. This chapter describes the different frameworks and provides an overview of the key components of Paris-aligned investing.

Companies have since 2015 had access to science-based market standards with which to align their business strategies with the goals of the Paris Agreement. Until recently, there have been no such market standards for investors. The absence of an industry-wide methodology has not discouraged the investment community from taking action, though, and investors have increasingly been focused on mitigating climate change through various approaches. These include driving the reduction of carbon footprints, excluding fossil fuels, engaging with companies in high-emitting sectors, implementing climate risk metrics and models, and investing in green bonds and other climate solutions. With the introduction of four frameworks for Paris-aligned investing, published by various initiatives, these tools and measures can now be integrated in a consistent fashion and deployed to create a fully Paris-aligned approach.

They include:

1. Amendments to the climate benchmarks in the EU Benchmarks Regulation (December 2020)
2. The Net Zero Investment Framework of the IIGCC and other regional investor networks (March 2021)
3. The Target Setting Protocol of the UN Net Zero Asset Owner Alliance (February 2021)
4. The Financial Sector Science-Based Targets Guidance of the SBTi (pilot version, October 2020)

In this chapter, we look at each of the above frameworks in turn.

1. EU climate benchmarks

As part of the 2018 EU Action Plan on Sustainable Finance, the European Commission set the ambition to create clear standards for low-carbon benchmarks in the European Union.

A Technical Expert Group on sustainable finance (TEG) was set up in 2018 to assist the Commission in this task. The TEG published its final reports at the end of 2019[17] and the Commission completed the legislative process in December 2020.[18]

The Commission created two low-carbon benchmarks: the EU climate transition benchmarks (EU CTB) and the EU Paris aligned benchmarks (EU PAB). Both benchmarks focus on decarbonization, but only the latter is labeled by the regulator as being 'Paris-aligned'. The main characteristics of the EU Paris-aligned benchmark are described in Box 2.

The alignment thresholds embedded in the EU climate benchmarks have been developed as follows:

- The 7% year-on-year decarbonization rate has been calculated using the IPCC 1.5°C scenario, and is considered the required the required pathway to halve emissions by 2030.

17 EU TEG Benchmark Final Report: https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/190930-sustainable-finance-teg-final-report-climate-benchmarks-and-disclosures_en.pdf
EU TEG Benchmark Handbook: https://ec.europa.eu/info/sites/default/files/business_economy_euro/banking_and_finance/documents/192020-sustainable-finance-teg-benchmarks-handbook_en_0.pdf

18 Amendments to the benchmark regulation: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019R2089&from=EN
Delegated Acts with the technical requirements: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32020R1818

- The -30% departure point for the EU CTB was set around the level of GHG footprints achieved by thus far by low-carbon indices. This was determined to be the right ambition level for this tool.
- To ensure the EU PAB would be more ambitious, it had to depart from a more rigorous point, for which -50% was deemed appropriate.[19]

Since their publication, the EU climate benchmarks have seen significant interest and uptake in the market. At Robeco, we have developed fixed income and quant equity strategies in accordance with the EU Paris-aligned benchmark definition, as described in the case study in the last chapter of this paper.

Box 2. What is an 'EU Paris-aligned benchmark'?

- Starts with 50% footprint reduction relative to the universe
- Requires 7% annual reduction thereafter
- Sector exposure should be in line with the investable universe
- Green/brown share should be four times higher than the investable universe
- Fossil fuel exclusions: coal >1% of revenues; oil >10% of revenues; natural gas > 50% of revenues; power producers with carbon intensity >100gCO2/kWh. This effectively means excluding almost the entire utilities and oil and gas sectors.

2. Net Zero Investment Framework

Launched in March 2021, the Net Zero Investment Framework (NZIF) provides guidance to investors on decarbonizing investment portfolios and increasing investment in climate solutions in a way that is consistent with a 1.5°C net zero emissions future. The NZIF is designed for use by asset managers and asset owners, large and small, to enable an industry-wide approach. It was developed by the European investor network IIGCC[20] and has been embraced by investor networks in North America (Ceres), Asia (AIGCC) and Australasia (IGCC).

The Net Zero Investment Framework supports investors in building a comprehensive net zero investment strategy that starts with governance and covers all aspects of the investment process. Investors are required to implement a number of measures and targets, based on the criterion of 'comply or explain'. The NZIF requirements can be clustered into three areas:

A. Governance and overall strategy

- Establish an organizational commitment to achieve net zero portfolio emissions by 2050 or sooner.
- Deploy climate-aware economic scenarios to adjust strategic asset allocation.
- Disclose in line with the TCFD framework[21] and report transparently on alignment with net zero goals.
- Engage actively in policy advocacy, and engage with market participants and stakeholders, all with the aim of promoting climate action.
- Set a target to reduce operational emissions (Scope 1 and 2) in line with net zero by 2050.

B. Portfolio targets

- Set portfolio-level targets for decarbonization, in line with science-based pathways. These targets should be <10 year but ideally <5 year, including Scope 1 and 2, while phasing in Scope 3 over time.[22]
- Set portfolio-level targets for increasing investment in climate solutions, which should be defined using the climate change mitigation objective of the EU Taxonomy.[23]

19 Source: pp. 8-11 from the EU TEG Handbook on climate benchmarks: https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/192020-sustainable-finance-teg-benchmarks-handbook_en_0.pdf
20 https://www.parisalignedinvestment.org/
21 https://assets.bbhub.io/company/sites/60/2020/10/FINAL-2017-TCFD-Report-11052018.pdf
22 For an explanation of scope 1, 2 and 3, see: https://www.robeco.com/en/key-strengths/sustainable-investing/glossary/scope-1-2-and-3-emissions.html
23 https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities_en#documents

C. Asset classes

- Assess the forward-looking alignment of carbon-intensive companies and assets in the portfolios,[24] and set targets to drive the transition of these companies and assets. These targets include the percentage of assets to be aligned to a net zero pathway, and the percentage of emissions in carbon-intensive sectors that are subject to active engagement.
- The engagement approach should include timebound escalation steps.

The central notion of the Net Zero Investment Framework is that investors can have the most real-world impact by driving the transition, rather than by divesting from carbon-intensive industries. Assessing how companies align with net zero pathways is therefore critical. Box 3 describes how NZIF defines company alignment with net zero. Table 1 provides an overview of the recommended methodologies and data sources.

The Net Zero Investment Framework has been put to test in the real-word portfolios of five investor funds.[25] According to the researchers, the analysis shows that net zero alignment is a 'no regrets choice'. However, they caution that this type of analysis has significant methodological limitations. In the business-as-usual scenario, where there is no further climate action beyond current policies, the impact on risk-adjusted returns was found to be modest.[26] In scenarios with ambitious climate action, the performance of aligned portfolios was significantly better.

Box 3. NZIF definition of company alignment with net zero

The NZIF provides six criteria to assess the alignment of companies:

1. A long-term 2050 goal consistent with achieving global net zero
2. Short and medium-term emissions-reduction targets (Scope 1, 2 and material Scope 3)
3. Current emissions-intensity performance relative to targets
4. Disclosure of Scope 1, 2 and material Scope 3 emissions
5. A quantified plan to deliver GHG targets and the proportion of revenues that are green
6. Demonstration that the capital expenditures of the company are consistent with net zero emissions by 2050

Investors should look at all six criteria for companies that are in scope of Climate Action 100+ and/or the Transition Pathway Initiative, since all the required data is available for these companies. For other companies in material sectors, investors should look only at criteria 2, 3 and 4.

Based on the criteria, investors can distinguish four categories of alignment:

1. Aligned to or already achieving net zero: companies that meet all the criteria or whose carbon emission performance is already close to net zero
2. Aligning towards net zero: companies that meet criteria 1, 2, 4 and 5
3. Committed to aligning: companies that meet criteria 1
4. Not aligned: all other companies

As data availability improves, investors should consider other criteria such as revenues aligned with the EU Taxonomy, lobbying activities, board oversight, Just Transition and TCFD disclosures.

24 Carbon-intensive sectors that are defined as material are those in NACE code categories A-H and J-L
25 https://www.parisalignedinvestment.org/media/2021/03/Portfolio-Testing-Report-IIGCC-Net-Zero-Investment-Framework-1.pdf
26 See pp. 27-28 of the testing report

Table 1 | Net Zero Investment Framework: overview of required targets, approaches and methods

Target	Approach & methods
Portfolio decarbonization	5 or 10-year horizon
	Reduction of absolute emissions (tCO2e) or carbon footprint (tCO2e per million invested, as per PCAF definition).
	Scope 1 and 2, and where possible phase-in of Scope 3. Further guidance on Scope 3 to follow
Investment in climate solutions	5 or 10-year horizon
	% of revenue or capex from AUM
	Based on EU Taxonomy mitigation criteria
Alignment	5-year horizon
	% of assets in material sectors that are aligned to net zero
	By 2040, 100% of assets should be aligned to net zero
	Sovereigns: alignment assessment based on emission performance (per GDP or capita), key sector performance and climate policy positions. Recommended method: Germanwatch Climate Change Performance Index
	Listed equity and corporate bonds: alignment assessment based on six criteria: company climate ambition, emission targets, emission performance, disclosure, quality of plan to deliver targets, and capital allocation. Recommended methods: Climate Action 100+ benchmark, Transition Pathway Initiative, Science-Based Targets initiative
	Real estate: alignment assessment based on carbon emissions and energy intensity in line with net zero pathways. Recommended method: CRREM
Engagement	5-year horizon
	% of emissions in material sectors subject to direct or collective engagement
	A minimum of 70% now, growing to 90% by 2030
	Escalation steps in engagement, voting and selective divestment
Investor's own emissions from business operations	Operational Scope 1 and 2 emissions
	5 or 10-year horizon

Source: https://www.parisalignedinvestment.org/media/2021/03/PAII-Net-Zero-Investment-Framework_Implementation-Guide.pdf

Referenced methods:

- EU Taxonomy: https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy-annexes_en.pdf
- PCAF, Partnership for Carbon Accounting: https://carbonaccountingfinancials.com/files/downloads/PCAF-Global-GHG-Standard.pdf
- Germanwatch Climate Change Performance Index: https://ccpi.org/download/the-climate-change-performance-index-2021/
- Climate Action 100+ benchmark: https://www.climateaction100.org/progress/net-zero-company-benchmark/
- Transition Pathway Initiative: https://transitionpathwayinitiative.org/sectors
- Science-Based Targets initiative: https://sciencebasedtargets.org/sectors
- CRREM: https://www.crrem.eu/wp-content/uploads/2020/09/CRREM-Risk-Assessment-Reference-Guide-2020-09-21.pdf

3. Target-setting protocol of the UN Net Zero Asset Owners Alliance

The UN Net-Zero Asset Owner Alliance is a group of 34 institutional investors committed to transitioning their investment portfolios to net zero GHG emissions by 2050. The group is convened by the United Nations Environmental Program (UNEP-FI) and the Principles for Responsible Investment (PRI).

In February 2021, the NZAOA published their Target Setting Protocol, which is structured in four pillars:

A. Portfolio decarbonization

- Set decarbonization targets every five years. Targets can be set on an absolute basis (tCO2e) or relative per million invested. Scope 1 and 2 must be included, while Scope 3 must be reported
- For 2025, set a target in the range of -16% to -29% relative to 2019. The portfolio scope is listed equity, publicly traded corporate debt and real estate

B. Sectoral decarbonization

- For priority sectors, set sector-specific carbon intensity targets in line with net zero pathways[27]
- Priority sectors are oil and gas, utilities, steel and transport (civil aviation, shipping and road transport)

C. Engagement

- For 2025, identify either the 20 highest-emitting companies, or those responsible for 65% of portfolio emissions, which have yet to make Paris-aligned transition commitments
- Set KPIs for engagement with the identified group of high-emitting companies (directly or collectively)

D. Financing the transition

- Without setting quantitative targets, investors are encouraged to grow the supply side of net zero solutions, such as green bonds, green buildings, renewable energy in emerging markets, sustainable forestry and agriculture, and green hydrogen
- The focus is on enlarging the scale, pace and geographic reach of net zero solutions, through activities such as roundtables and collaboration with development finance institutions.

The NZAOA works with academics and research initiatives to provide supporting research and methodologies.[28] In conjunction with the University of Technology Sydney, the NZAOA has developed scientific 1.5°C sector decarbonization pathways for oil and gas, transport, utilities, steel and cement.[29]

4. Science-Based Targets guidance for the financial sector

In 2018, after a few years of successfully working with corporates, the Science-Based Targets initiative (SBTi) launched a program to develop guidance for financial institutions. In October 2020, the pilot version became available. Around 70 financial institutions have since committed to implementing the SBTi guidance in their target-setting. About one-third of these are investors.

The SBTi is a partnership between non-profit expert organizations: the World Wide Fund (WWF), World Resources Institute (WRI), Carbon Disclosure Project (CDP) and UN Global Compact. The initiative sets detailed requirements for decarbonization targets. Investors can submit their targets for validation and, if these are approved, these can be communicated as SBTi-approved targets. The SBTi provides supporting tools, including an open-source portfolio temperature scoring tool and a series of eligible sector decarbonization pathways.[30]

The SBTi requires financial institutions to set targets for their operations (Scope 1 and 2 emissions) and for the investment and lending activities of financial institutions (Scope 3). It proposes an asset class-specific approach: real estate, mortgages, project finance, as well as corporate equity, bonds and loans. For the first three asset classes, the SBTi requires financial institutions to set targets to reduce physical emission intensities, such as GHG emissions per square meter of real estate.

27 Example metrics are tCO2e/kWh for utilities, or tCO2/unit of steel. Where possible, Scope 3 is to be included
28 Recommended methods include PCAF, CRREM, TPI and SBTI, referenced before in this paper
29 For example: https://www.unepfi.org/wordpress/wp-content/uploads/2020/12/OECM-Sector-Pathways-Report-FINAL-20201208.pdf
30 Available at: https://sciencebasedtargets.org/sectors/financial-institutions

For corporate equity, bonds and loans, the SBTi provides three optional approaches:

1. Sectoral decarbonization: financial institutions set physical intensity targets for carbon-intensive sectors, including power generation, cement, pulp and paper, transport, iron and steel, and buildings.
2. Portfolio coverage: financial institutions set engagement targets to drive investee companies to set SBTi-approved science-based targets.
3. Temperature rating: financial institutions determine the current temperature rating of their portfolios and take actions to align their portfolios to the 1.5°C ambition in the long term.

Additional requirements are that financial institutions should stop financing coal by 2030 globally, while immediately ceasing the provision of financial support for coal-fired power plant expansions and retrofits. Financial institutions should also disclose their annual investments in fossil fuels.

Robeco's view

Now that standards for Paris-aligned investing are available, investors are working to implement these in the context of real-life portfolios. In this chapter, we share Robeco's views and insights from developing our own net zero roadmap. Our approach takes the key components of the net zero investment frameworks into a twofold strategy: top-down decarbonization targets for portfolios, combined with bottom-up assessment of the 'transition readiness' of companies and countries.

In December 2020, Robeco announced its commitment to aligning its investments with the 2050 net zero ambition. We made this announcement in our capacity as a founding signatory of the Net Zero Asset Managers initiative (see Box 4). Our net zero ambition is a core component of our broader Sustainable Investment Strategy, alongside the Sustainable Development Goals (SDGs) and our rigorous approach to ESG integration. Safeguarding environmental and social assets is a prerequisite for a healthy economy and the generation of attractive returns in the future. The investment industry's focus must therefore be on creating both wealth and well-being. This dual focus also holds for Paris-aligned investing: it supports better-informed, forward-looking portfolio management, and it contributes to reducing real-world GHG emissions.

Forward-looking portfolio management

We believe that integrating climate change and other sustainability factors into the investment process leads to better-informed investment decisions and healthier long-term, risk-adjusted returns. While the future is low carbon, the costs and risks of the transition towards that goal are not yet sufficiently understood and priced into the market. That is why we believe that being at the forefront of the low-carbon transition is sound from a portfolio and risk management perspective.

Currently only a fifth of global GHG emissions are being priced in the economy, at an average price of around USD 2 per ton CO2e.[31] This price is far from being an effective incentive for companies to decarbonize. It is also far below estimates of the true cost of carbon emissions, calculated as the net present value of future damage from emitting one ton of CO2e. Although this cost is difficult to estimate, many companies use as proxy an internal carbon price of around USD 40 per ton of CO2e. The value that the Biden administration uses to assess the climate impact of policies is set at USD 51 per ton of CO2e.

31 World Bank, State and Trends of Carbon Pricing 2020, https://openknowledge.worldbank.org/bitstream/handle/10986/33809/9781464815867.pdf?sequence=4&isAllowed=y

Box 4. Net Zero Asset Managers initiative

The Net Zero Asset Managers initiative is an international group of asset managers committed to supporting the goal of net zero greenhouse gas emissions by 2050, or sooner, and investing in a way that is aligned with this goal.

There currently are 87 signatories, with a total of USD 37 trillion in assets under management. The Net Zero Asset Managers commitment sets out a range of actions to take asset managers forward: engaging with clients, setting targets for assets managed in line with net zero pathways, corporate engagement and stewardship, and policy advocacy. Several asset managers are already taking such actions. But the Net Zero Asset Managers initiative is a step change; it requires the actions to be in line with the net zero goal and anticipates increasing the scope of assets until 100% is reached. Asset managers will also have to report on their actions and update their targets regularly, to ensure transparency and accountability in the process.

Before November 's COP26 UN Climate Change Summit in Glasgow, the 30 signatories who joined the initiative at its launch – including Robeco – will announce the proportion of assets to be managed in line with net zero goals, as well as setting 2030 targets for these assets. New signatories must do this within the first year of joining. Once every five years the signatories will review and revise their five-year targets.

Further information: https://www.netzeroassetmanagers.org/

Academic research generally indicates that carbon prices should be between USD 40 and 80 now, rising to between USD 100 and 150 by 2030. Arguably the most authoritative experts on this topic, economists Nicolas Stern and Joseph Stiglitz, indicate a price of USD 100 by 2030.[32] This price is not trivial for companies, particularly in carbon-intensive industries such as steel and cement. For some companies, such a price for their current emission levels would be equivalent to multiple times their earnings (EBITDA).

Even though we don't know when markets will sufficiently price in the costs and risks of the low-carbon transition, we do know that such a pricing correction is inevitable. Investing in a way that is aligned with the Paris agreement, and which is thus at the forefront of the low-carbon transition, places investors in the advantageous position of being able to anticipate the pricing in of climate change.

Contributing to real-world impact

However, Paris-aligned investing is not only about securing long-term risk-adjusted returns; it is equally about achieving real-world impact. To help avoid the worst effects of global warming, the investment industry has a responsibility to contribute to the goals of the Paris Agreement. Its prime contribution is to allocate capital to achieving the low-carbon, green economy. It is through investing in the opportunities of the climate transition that we achieve real-world emission reductions.

This means that investors need to look beyond portfolio decarbonization. Focusing only on reducing a portfolio's carbon footprint would lead to the unsatisfactory outcome of investors selling those carbon-intensive companies that need long-term capital and shareholder engagement to accomplish decarbonization. Carbon-intensive securities that are sold simply end up in another portfolio, which doesn't create clear progress in reducing emissions globally.

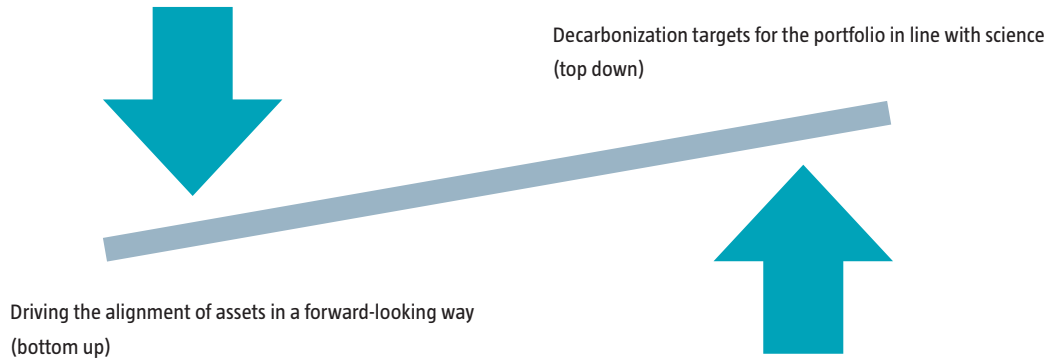
Decarbonizing the real economy requires a more sophisticated and forward-looking approach. It is through investing in the low-carbon transition, and by advocating and lobbying for it, that investors can contribute to reducing real-world emissions. Their portfolios will decarbonize as a result of these actions. In other words, portfolio decarbonization should be an outcome, rather than a goal in itself.

32 Source: https://www.nber.org/system/files/working_papers/w28472/w28472.pdf

To achieve such balance, a Paris-aligned investment strategy works through combining top-down and bottom-up targets:

- Top-down targets are about portfolio decarbonization: monitoring a portfolio's carbon footprint against a GHG emission trajectory that is consistent with science-based 1.5°C scenarios.
- Bottom-up targets are about aligning securities: tuning investment decisions and active ownership activities to a forward-looking assessment of the transition-readiness of companies and countries.

Figure 1 | A two-fold strategy for net-zero investing



The two components are explained in detail in the following sections.

Portfolio decarbonization (top down)

Portfolio decarbonization targets are about reducing the carbon emissions embedded in an investment portfolio. Top-down targets are used to monitor a portfolio's carbon footprint against a historic baseline and a forward-looking GHG emission pathway that is consistent with science-based 1.5°C scenarios. This is not a straightforward exercise, as one compares an investment universe, with carbon footprints that are largely estimated, to a scientific long-term projection of real-world GHG emissions. It is therefore critical to make credible and transparent assumptions.

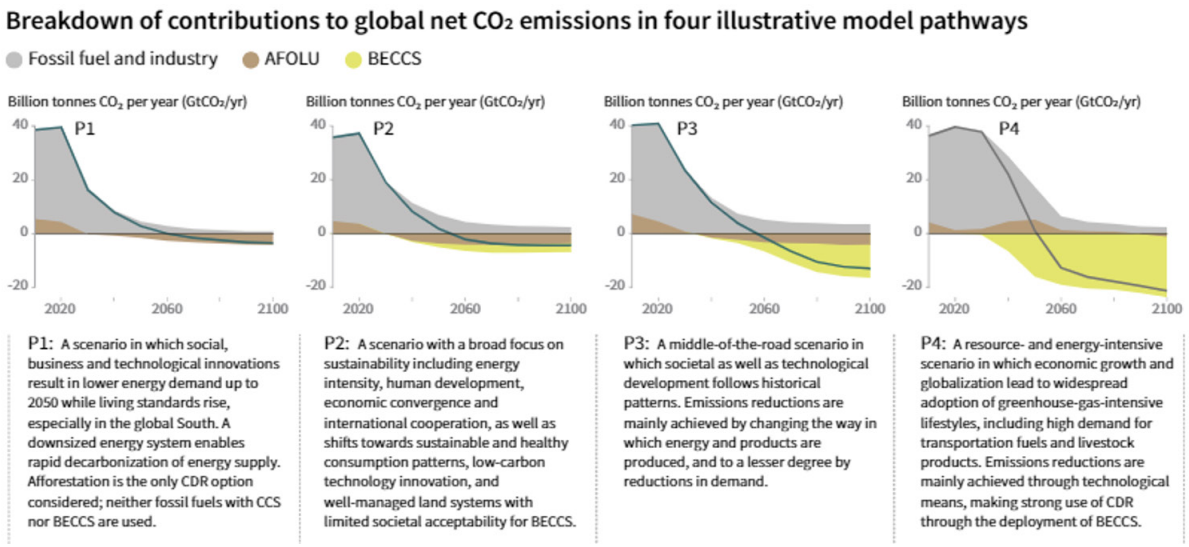
That is precisely what the EU Technical Expert Group did when designing the EU climate benchmarks. They calculated a 7% year-on-year decarbonization rate as the required pathway to halve emissions by 2030, as per the requirement of the most ambitious IPCC 1.5°C scenario. For the baseline, they established a -30% departure point for the EU CTB (against the broad market), since that is the level of GHG footprints achieved by low-carbon indices today. To ensure that the EU PAB would be more ambitious, it had to depart from a more rigorously decarbonized point, for which they found -50% a reasonable choice.[33]

These thresholds position the EU climate benchmarks as tools for frontrunner investors. There are also other legitimate and science-based options available, for broader applications. We illustrate this with an example below.

The first step is to choose a credible, science-based emission reduction pathway. In their 2018 report, the IPCC identified 90 scenarios that lead to 1.5°C global warming, each with specific assumptions and different degrees of probability. Based on this, the IPCC designed four illustrative model pathways that range from an immediate and drastic emission reduction to a delayed response that strongly relies on carbon removal at the end of the century (see Figure 2).

33 Source: pp. 8-11 from the EU TEG Handbook on climate benchmarks: https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/192020-sustainable-finance-teg-benchmarks-handbook_en_0.pdf

Figure 2 | Four illustrative pathways to limit global warming to 1.5°C



Source: IPCC, 2018, SR15, page 14

For the purposes of target setting, the second model pathway (P2) appears the most relevant. It is an ambitious scenario that disrupts business as usual, but is also well aligned with the broader societal development goals. The latter is an essential prerequisite for reducing emissions: climate action needs to generate co-benefits, so that society supports climate action. The P2 model pathway is composed of the following emissions milestones:

- -49% reduction of GHG emissions in 2030
- -89% reduction of GHG emissions in 2050
- Both reduction milestones are relative to 2010.[34]

The second step is to set a baseline. The baseline year for the IPCC 1.5°C scenarios is 2010, but investors usually do not have the data to go back this far in time. A different baseline year can be used, but should be recalibrated relative to 2010 to ensure alignment with 1.5°C. This can be done in the following way:

- We assume that a global market benchmark, such as the MSCI ACWI Index, is a fair reflection of GHG emissions in the global economy. This enables investors to use the carbon footprint of the global index as a baseline for decarbonization. Regional indices can be used for regional economies.
- Financial portfolios usually deploy carbon data with a time lag of two years, i.e., the carbon footprint of a portfolio in FY2020 is calculated using company emissions data from 2018. Hence, for a 2020 baseline, one needs to use 2018 emissions data.
- We derive global emissions data from IPCC reports or from the Emission Gap Reports of the UN Environmental Agency. They estimate that global GHG emissions in 2018 were 55Gt CO2e, up from 49Gt in 2010.[35]
- A 2020 baseline may therefore start at -10% against the benchmark, to compensate for the growth of real-world GHG emissions between 2010 (49Gt) and 2018 (55Gt).

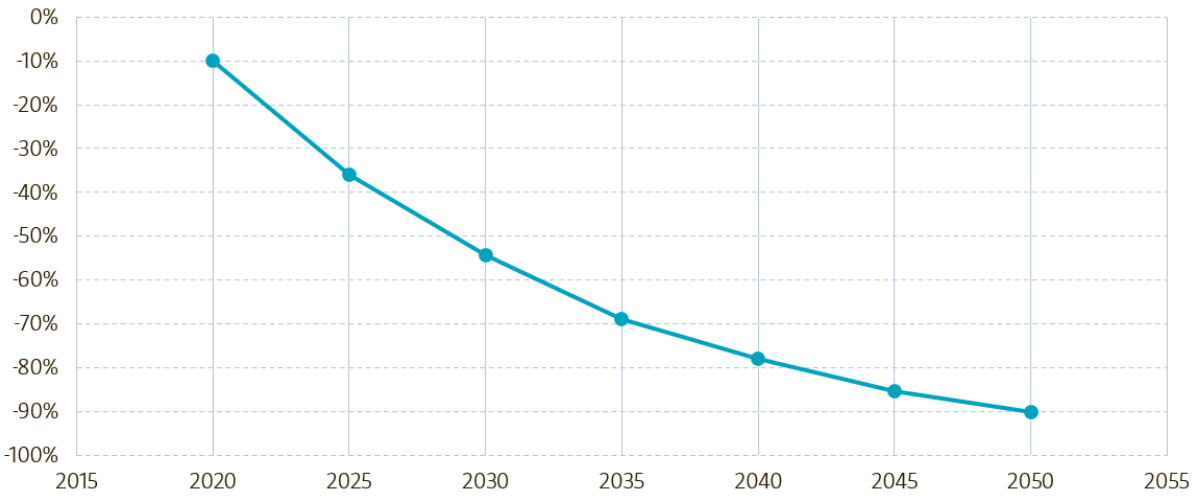
The third step is to set the forward-looking portfolio decarbonization pathway. Based on the figures above, the example pathway is composed as follows:

- The portfolio should nearly halve its footprint by 2030 against the 2020 baseline (-49%).
- The portfolio should reduce its footprint by 89% by 2050 against the 2020 baseline.
- This means ~7% year-on-year decarbonization between 2020-2050.

34 Page 14 in: https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_High_Res.pdf
35 UNEP 2020 Emission Gap Report: https://wedocs.unep.org/bitstream/handle/20.500.11822/34438/EGR20ESE.pdf?sequence=25

The resulting portfolio decarbonization pathway is shown in Figure 3.

Figure 3 | Change in GHG emissions relative to 2020 benchmark



Source: Robeco

The example shows that there are multiple assumptions and choices involved. In addition, different carbon metrics are being used (see Box 5). By consequence, there is a significant range in the decarbonization targets set by investors, which renders a direct comparison impossible. Given the range in targets and underlying assumptions, it is therefore advisable to be transparent about one's approach. Figure 4 provides an overview of decarbonization targets recently announced by investors.

Box 5. Choice of steering metric for portfolio decarbonization

Different carbon metrics are available for calculating financed emissions in investment portfolios. The Sustainable Finance Disclosure Regulation (SFDR) in Europe requires investors to disclose three carbon metrics:

Total emissions	The absolute greenhouse gas emissions associated with a portfolio (expressed in tons of CO2e). Emissions are allocated to an investor based on their share of a company's total capital.
Carbon footprint	Total emissions for a portfolio, normalized by the market value of the portfolio (expressed in tons CO2e/EUR invested). Emissions are allocated to an investor based on their share of a company's total capital (EVIC: enterprise value including cash).
Carbon intensity	The portfolio's exposure to carbon-intensive companies (expressed in tons CO2e/EUR revenue). Emissions are allocated to an investor based on companies' portfolio weights.

In 2017, the Taskforce for Climate-related Financial Disclosure recommended carbon intensity as the leading metric for investors. This was in line with TCFD's focus on climate risks. However, in 2021 the focus has shifted to investors' responsibility and their contribution to the Paris Agreement. In line with that shift, recent legislation and market standards converge in recommending carbon footprint as the leading metric.

Robeco views carbon footprint as the preferred metric. We believe that the best way to communicate to our clients and stakeholders on decarbonization is by demonstrating a gradual decrease in the total carbon emissions per invested euro. The carbon footprint metric allows for this. It reflects the amount of greenhouse gas emissions an investor owns, normalized by the size of the portfolio. By reducing their carbon ownership, investors contribute to the Paris Agreement.

As a final note, it is important to mention that target setting is dynamic. Decarbonization targets will need to be reviewed at certain intervals. Robeco follows the five-year cycle proposed by the Net Zero Asset Manager Initiative, which is synchronized with the five-year ratcheting mechanism of the Paris Agreement itself. The review is both forward and backward-looking: it evaluates the progress thus far in reaching the portfolio targets, the extent to which this stems from decarbonization of the benchmark or from portfolio construction, and how it compares to real-world emission reduction. It also takes into account any updates in climate scenarios based on new scientific insights as well as improved measurements and estimation models. Also, scenarios are updated in line with the progress, or lack thereof, that society makes in curbing global emissions and the climate policy ambitions of national governments.

Figure 4 | Overview of decarbonization targets by investors

Carbon footprint metric	
ABP	-40% by 2025 relative to 2015
PME	-50% by 2025 relative to 2015
CDPQ	-25% by 2025 relative to 2017
Allianz	-25% by 2025 relative to 2019
Scottish Widows	-50% by 2030
CNP	-25% by 2025 relative to 2019
AXA	-20% by 2025 relative to 2019
SCOR	-27% by 2025 relative to 2019
Wespath	-35% by 2025 relative to 2018
PensionDanmark	-20% by 2025 relative to 2019
Folksam	-29% by 2025 relative to 2019

Carbon intensity metric	
PGGM	-30% by 2025 relative to 2020
Storebrand	-32% by 2025 relative to 2018
Aviva	-25% by 2025 and -60% by 2030 relative to 2020

Source: Robeco

Driving asset alignment (bottom up)

In the previous section, we showed how to frame targets for portfolio decarbonization in a science-based way. In this section, we focus on how to achieve these targets while avoiding a simple sell-off of carbon-intensive assets. While divestment will successfully decarbonize an investor's portfolio, such a change of ownership is unlikely to contribute to real-world emission reduction. In fact, systemic climate risks might increase if carbon-intensive assets are transferred to less-responsible investors or into private markets.

To avoid this, portfolio decarbonization needs to be managed in a forward-looking manner. This can be done by assessing the transition-readiness of assets, and subsequently integrating this assessment into investment strategies and active ownership activities. Assets with a high capacity to decarbonize will become more attractive for investment, while assets with a low capacity to decarbonize will become the focus of engagement, voting and, when no positive outlook remains, divestment.

The key challenges are the coverage and the quality of the assessment. Data vendors have invested in forward-looking data and ratings, including temperature scoring approaches, but there is a high degree of methodological immaturity and model uncertainty. Models used by data vendors are complex and opaque, with multiple layers of assumptions.[36] As a result, it's not always possible to compare the outcomes from different vendors' models. Yet, with so much focus in the market on net zero investing, including the push from regulation, one can expect strong innovation and increased harmonization in the coming years.

36 For a more detailed discussion, see for example:
https://www.cisl.cam.ac.uk/resources/sustainable-finance-publications/climate-performance-of-investment-funds
https://www.tcfdhub.org/wp-content/uploads/2020/10/PAT-Report-20201109-Final.pdf
https://www.louisbachelier.org/wp-content/uploads/2020/07/rapport-0607.pdf

What helps is that one can focus on a limited number of sectors and companies and still cover the bulk of GHG emissions embedded in investment portfolios. The 167 companies that are in scope of the Climate Action 100+ investor engagement program jointly represent over 80% of global industrial emissions.[37] Experiences from investors indicate that by assessing 150 to 200 companies in carbon-intensive sectors, over 80% of GHG emissions embedded in investment portfolios are covered. These sectors include utilities, oil and gas, agriculture, pulp and paper, steel, aluminum, cement, autos, aviation, shipping, chemicals, heavy industry and mining.

The assessment of companies' transition-readiness is done within the context of their industry sector. Several public sources provide sector-specific decarbonization scenarios that are in line with the goals of the Paris Agreement. These so-called 'sector pathways' indicate how carbon-intensive industries should decarbonize over time. This is usually expressed in carbon intensity per unit of product. The scenarios also indicate what technologies are expected to contribute to sectoral decarbonization, and what policies and market dynamics come into play.

Two prominent sources of sector decarbonization pathways are the Science-Based Targets initiative and the Transition Pathway Initiative.[38] Robeco is a research funding partner of the latter. Their sector pathway assessments are derived from the models of the International Energy Agency (IEA). On 18 May 2021, the IEA published a new global roadmap for achieving net zero emissions globally by 2050. The report provides a detailed sector-by-sector analysis of the changes that are needed over the next 30 years, including specific technology and policy milestones, and the wider implications for economies and society.[39]

The sector pathways provide a benchmark against which the transition-readiness of companies can be assessed. This is essentially a scorecard approach with quantitative and qualitative elements. Data points include company emission targets going forward and emission performance in past years; business strategy to deliver on targets, most notably capital allocation; and company climate policy (e.g., carbon tax or ETS), governance and disclosure.

For countries, a similar analysis can be conducted by looking at GHG emission performance, the performance of key economic sectors, and climate policies and targets. A leading data source is the Climate Change Performance Index developed by Germanwatch.[40]

Robeco's research analysts are working to include transition-readiness analysis into the company and country ESG profiles that are prepared for our investment teams. The investment teams take these profiles into account for their investment cases. For example, company valuations may be adjusted to include carbon pricing, cost abatement curves of low-carbon technologies, or declining market demand for carbon-intensive products. As a result, companies with a high capacity for decarbonization may become more attractive for investments.

The second use case for the transition-readiness analysis is in engagement and voting. Based on the net zero investment framework, investors can distinguish four categories of alignment:

1	Companies that are aligned to or already achieving net zero
2	Companies that are aligning towards net zero
3	Companies that are committed to aligning
4	Companies that are not aligned

37 https://www.climateaction100.org/
38 https://www.transitionpathwayinitiative.org/
39 https://sciencebasedtargets.org/
https://www.iea.org/events/net-zero-in-2050-a-roadmap-for-the-global-energy-system
39 https://ccpi.org/

By integrating transition-readiness into investment strategies, portfolios should become increasingly 'green' over time. Assets in the amber and red categories should be subject to engagement. Time-bound escalation steps can be defined in this process to signal disapprovals through votes against directors and accounts, as applicable. Ultimately, if red-category companies do not show any prospect of improvement, divestment may be the consequence.

To sum up, investors can use a forward-looking, bottom-up approach to drive the alignment of assets through both investment and engagement. This will result in portfolio decarbonization, as framed by the top-down targets. The combination of top down and bottom up ensures that this decarbonization results in real-world GHG emission reduction.

Box 6. The role of carbon offsets

A frequent question from investors relates to the role of carbon offsets. In most 1.5°C scenarios, carbon removal plays an important role, through both nature-based and engineered solutions. Nearly all corporate climate strategies rely heavily on carbon offsets, particularly in hard-to-abate sectors. This has prompted a fierce debate on the performance of the carbon credit market and the legitimacy of carbon offsets in decarbonization strategies.

Performance of the carbon credit market
These concerns relate to the voluntary market (as opposed to regulated markets such as the EU ETS) and center around the integrity of the market, the effectiveness of verification systems, and the existence of a large stock of legacy credits that can be bought at low prices but which do not reduce any emissions.[41] While these concerns are legitimate, the growing demand for carbon offsetting implies that the current market will scale at least 15 times by 2030.

This prompted the establishment of a Taskforce on Voluntary Carbon Markets, which developed a blueprint with key policy measures for creating a large-scale, transparent carbon credit trading market.[42] The taskforce is expected to drive the implementation of these measures in a similar way to how the TCFD drove the introduction of climate-related disclosures. In the meantime, it is obvious that operating on the voluntary carbon credit market requires a cautious approach with robust due diligence.

Role of offsetting in decarbonization strategies
Net zero frameworks for corporates[43] and investors[44] clearly indicate that the basis for a net zero strategy should be a robust decarbonization strategy. Carbon offsets are complementary to this and can only be deployed to compensate residual emissions.

In the case of investors, this implies that an investment portfolio should follow a science-based decarbonization trajectory of around 7% year on year. Investors should not purchase offsets at the portfolio level to achieve these emissions-reduction targets, nor should they offset emissions by accounting for avoided emissions in another part of their portfolio. Their approach in relation to the use of carbon offsets by the underlying assets should be precautionary, only allowing this where no other technologically or financially viable solution is available.

However, complementary to the 7% year-on-year self-decarbonization, investors may purchase carbon credits to enhance the low-carbon performance of an investment strategy. These can only be carbon removal credits that invest in long-term sequestration, such as through reforestation. Emission avoidance credits from, for example, renewable energy projects are not eligible. When purchasing these credits, investors should be aware of the integrity concerns described above.

41 https://trove-research.com/wp-content/uploads/2021/01/Global-Carbon-Offset-Supply_11-Jan-1.pdf
42 https://www.iif.com/Portals/1/Files/TSVCM_Report.pdf
43 https://www.smithschool.ox.ac.uk/publications/reports/Oxford-Offsetting-Principles-2020.pdf
44 https://www.parisalignedinvestment.org/media/2021/03/PAII-Net-Zero-Investment-Framework_Implementation-Guide.pdf

Practical solutions

Now is the time to act on climate change. Every year of delayed response amplifies the risks and increases the costs of mitigation and adaptation. So, how can investors act? What solutions are available? In this chapter, we share three case studies that involve concrete solutions.

This chapter provides four concrete approaches to Paris-aligned investing:

1. Robeco's climate strategies developed in line with the EU climate benchmarks
2. Our research on carbon beta as a forward-looking investment metric
3. Engagement on climate action with carbon-intensive companies (utilities, automotives, oil & gas).

Case 1: Paris-aligned climate funds

Earlier in this paper we described the EU Benchmarks Regulation and its technical standards for Paris-aligned benchmarks. In accordance with this regulation, Robeco has developed investment solutions focused on fixed income and quantitative equities, which enable investors "to be at the forefront of the transition, favoring today the players of tomorrow's economy".[45]

Climate fixed income solutions at the forefront of the transition to a low-carbon economy

The Robeco Climate Global Bonds and Climate Global Credits strategies invest in global fixed income assets in a way that strives to keep the temperature rise well below 2°C above pre-industrial levels, and aims to limit it even further to 1.5°C. It provides for a 7% year-on-year decline in the portfolio's overall emission footprint. This is measured per capita for sovereigns and per unit of total capital for corporates. The Climate Global Credit strategy goes further by starting with a 50% lower emission footprint than the investment universe at inception and excludes fossil fuel production. The two strategies are managed against new indices that are constructed on the basis of the EU Benchmarks Regulation, as discussed earlier in this paper. With this, the Robeco Climate Global Bonds strategy is one of the world's first global fixed income strategies to be fully aligned with Paris.

Box 7. The new Paris-aligned Benchmark sets the bar

Robeco has innovated by partnering with Solactive to create a Paris-aligned benchmark for fixed income investing. While the EU Benchmarks Regulation defines the Paris-aligned benchmark, no such benchmark existed for global aggregate fixed income. Moreover, the Regulation only covers corporates, and does not incorporate guidelines and requirements for sovereigns.

Robeco innovated in this area, by working with Solactive to create Paris-aligned benchmarks for fixed income investing – for corporate credits and aggregate bonds. These are the indices against which the performance of the Robeco Climate Global Fixed Income strategies is measured.

Our findings are that the index characteristics mimic those of the general market over time. Specifically, back-testing of the Solactive Paris-aligned benchmark indices for credits and bonds against the Solactive global indices for credits and bonds gives favorable results: the behavior and yield characteristics of the Paris-aligned indices are very similar to those of their equivalent generic indices, with the important difference being that the Paris-aligned indices have a much lower carbon footprint.

45 The regulatory requirements for Paris-aligned Benchmarks exceed the requirements of the Paris Agreement. Therefore, the EU Technical Expert Group on Sustainable Finance used these words to qualify the nature of the EU Paris-aligned Benchmarks. EU Technical Expert Group on Sustainable Finance, "Report on Benchmarks", September 2019

An active, contrarian approach to climate change considerations

Robeco Climate Global Bonds and Robeco Climate Global Credits are active investment strategies that build on our established global fixed income capability. They combine our top-down perspective on the macroeconomic and credit cycles with bottom-up issuer selection, to navigate market cycles, exploit market inefficiencies, and contribute positively to sustainable activity.

Climate change considerations are fully integrated in the investment process and portfolio construction, across multiple components. The Robeco Sustainable Investing Center of Expertise shares its input with the investment teams and our team of data scientists provides insight into greenhouse gas emissions and their varying metrics.

Bottom-up issuer selection that is in line with the Paris Agreement

The top-down view is combined with bottom-up issuer selection that is grounded in rigorous fundamental research and contributes positively to sustainable economic activity. Robeco's team of seasoned fixed income professionals filters down the available investment universe to a select list of issuers. This incorporates sector, country and ESG considerations.

We select issuers by factoring in the CO2 emission footprint of sovereigns, sectors and issuers. This ensures that the strategy follows a decarbonization trajectory that reduces the portfolio's overall emission footprint by 7% on a year-on-year basis. Furthermore, our forward-looking approach is to invest in countries and companies that allocate capital to activities that are in line with the EU Taxonomy, and that are efficient in reducing their carbon emissions.

Importantly, this may include issuers whose emissions are currently high, as our criterion for allocating capital is that sovereigns and companies must be serious about making the transition to sustainable energy, and that they play an important role in facilitating such a shift.

Climate Conservative Equities strategy

The Climate Conservative Equities strategy offers investors a climate-focused solution that integrates sustainability in all steps of its investment process, with the aim of delivering long-term market-like returns with lower downside risk. While the solution focuses on the climate, it integrates various dimensions of sustainability, as shown in Figure 5.

Figure 5 | Five dimensions of sustainability integration in Climate Conservative Equities

Addressing the environmental footprint	50% lower carbon footprint and 7% self-decarbonization per annum 20% lower footprint on waste and water
Exclude controversial stocks from universe	Paris-aligned exclusions: coal, oil & gas, electric utilities Values-based exclusions: alcohol, adult entertainment, artic drilling, controversial weapons, firearms, gambling, military contracting, nuclear power-based productions, palm oil, tobacco and UN Global Compact breaches
SDG Screening	Exclude stocks with negative contributions to the UN Sustainable Development Goals
ESG integrated in the portfolio construction	Portfolio score at least 10% higher than benchmark
Active engagement is reflected in portfolio	Integrated in portfolio management

Source: Robeco

The starting point for the Climate Conservative Equities strategy is a carbon footprint that is at least 50% better than the broader market index. To measure this, we use the carbon footprint metric, where Scope 1, 2 and 3 greenhouse gas emissions are included, based on MSCI carbon data, and scaled by a company's enterprise value including cash (EVIC). In addition to this, the strategy will follow a 7% year-on-year carbon-reduction path. The portfolio carbon footprint is monitored against a secondary reference benchmark, namely the MSCI World Climate Paris Aligned Index. Restrictions in terms of other environmental indicators are also taken into account, including a 20% lower footprint than the market on waste generation and water usage.

In shaping the Paris-aligned investment universe, firms with revenues from coal mining are ruled out, along with most oil and gas companies – based on 10% and 50% revenue thresholds, respectively. Carbon-intensive electricity producers whose emissions exceed 100g CO2/kWh are also not eligible. Given our belief that sustainability is multi-dimensional by nature, we exclude controversial stocks from the investable universe. These are companies whose business practices or products we view as harmful to society, to the extent that it makes them incompatible with a sustainable investment strategy. These include firms linked with alcohol, adult entertainment, arctic drilling, controversial weapons, firearms, gambling, military contracting, nuclear power-based productions, palm oil, tobacco, cannabis and UN Global Compact breaches.

We exclude stocks that contribute negatively to the United Nations' Sustainable Development Goals (SDGs) as we believe they may entail unrewarded sustainability risks. To this end, the Robeco proprietary SDG rating methodology maps companies on the different SDGs. This is based on the goods they produce or services they provide, how they produce these goods or provide these services, and whether they have been involved in any controversies.

We also incorporate ESG criteria in the strategy by ensuring that the portfolio's total ESG score is at least 10% higher than the index. Here, we use the proprietary Robeco Smart ESG scores, which are designed to identify what we perceive to be the most financially relevant ESG indicators for different industries, providing a sharper focus on their financial materiality. Our ESG integration ensures the portfolio has a preference for ESG leaders over ESG laggards.

In addition, we believe engagement and voting are critical elements of a successful sustainable investment strategy. In our view, we can encourage companies to reduce their climate risks and improve their sustainability through these mechanisms, which should contribute to the creation of long-term shareholder value.

Selecting defensive stocks within a climate-focused investable universe

The Climate Conservative Equities strategy follows a low volatility approach in terms of selecting attractive low-risk stocks within its climate-focused investable universe. This investment style aims to capture one of the oldest anomalies in equity research: low risk. Our robust, proprietary stock-ranking model combines the beta and volatility effects in one low risk theme that allows us to potentially exploit the risk-seeking behavior of market participants. We simultaneously take into account distress risk, as this captures the negative effect of excessive debt on a company's balance sheet. Moreover, we consider strong momentum and positive earnings revisions as well as high dividend yields and attractive valuations to improve upside potential.

Given its stock-selection process, the Climate Conservative Equities strategy typically invests in often profitable, stable and mature businesses that pay relatively high dividends. These traits usually result in stable equity returns, that tend to come with high income over the long term.

All in all, we believe this purpose-built solution is suitable for investors seeking a low-carbon, highly sustainable equity strategy, with the aim of delivering long-term market-like returns with lower downside risk.

Case 2: Carbon beta as a forward-looking investment metric

The Paris Agreement provides a clear objective: to keep global warming well below 2°C. The means to achieve it, however, are less clear. The investment industry seems to converge on specific, quantifiable metrics, such as 50% lower carbon footprint than the market and 7% year-on-year decarbonization. For Paris-aligned investing, we rely

on carbon emissions data because ultimately, global warming is driven by the remaining carbon budget to keep the temperature rise below 2°C and preferably below 1.5°C. However, next to all the advantages of emissions data, investors should also be aware that relying purely on data can have several pitfalls.

First of all, the complexity of carbon data estimation gives rise to a number of biases. On one hand, most of the existing carbon data is backward looking, reported with a lag, and does not capture carbon risk that is due to financial structures – even when Scope 3 is considered. On the other hand, investors need a forward-looking approach to identify the carbon winners of tomorrow. This trade-off creates the measurement dilemma. Active fundamental strategies solve this dilemma by analyzing the transition-readiness of companies, and by looking at their carbon targets, business strategy and technologies. Indices require a more systematic approach to solving the measurement dilemma.

Our research has identified a complementary market-based measure of carbon risk.[46] In our view, it captures market expectations on a firm's exposure to carbon risk which contains a forward-looking component. If carbon risk represents a systematic risk factor that partially drives returns, it must be possible to construct a mimicking portfolio that isolates movements in a carbon risk factor. To measure a firm's exposure to the carbon risk factor, we estimate its carbon beta: its sensitivity to the carbon risk factor.

We believe that this measure effectively solves a number of challenges related to traditional carbon data. First, the data availability is significantly higher than for carbon emissions data. We only require emissions data for the construction of a carbon risk factor. We can then estimate each stock's sensitivity to this factor using at least two years of historical returns. As a result, we can extend the coverage of carbon data beyond common benchmarks. This is especially important in emerging markets and the small-cap segment of the market. Furthermore, carbon beta provides estimates of carbon risk up to the most recent month, while carbon emissions are reported with a lag and might lead to financial decisions being based on outdated information.

Second, in contrast to most other measures of carbon risk that are backward looking in nature, carbon betas have the potential to capture future expectations. Corporate GHG emissions, for example, serve more as an indication of historical operational performance than of future business risks. Moreover, they are often only reported one to two years after the fact. Our carbon risk factor is market-based and thus has the potential to capture market participants' expectations of a firm's exposure to carbon risk. This includes its current emissions levels as well other factors potentially affecting the firm's ability to transition to a low-carbon economy, such as expectations on the availability of green technologies, quality of management, future innovation, competition and financial health. For example, a software company that specializes exclusively in oil-related technologies has very little direct emissions but will still face significant business risk in transitioning to a low-carbon economy. Such links are effectively identified by our carbon beta measure.

Finally, carbon beta effectively identifies emitting companies beyond self-reported emissions. Even Scope 3 does not capture pollution due to investments or royalties, such as real estate investment trusts or royalties for gold. The table below shows that these risks are identified by carbon beta. Companies which rank as highly non-polluting based on Scope 1, 2 and 3 seem to have very high exposure to the carbon risk factor. Closer investigation reveals that the underlying reason is hidden polluting activities. One example is a company that invests in royalties for gold, oil and mining. This is a specific financial structure which has no direct emissions but is highly exposed to carbon risk. This is effectively identified by its high carbon beta of 4.32, which ranks in the worst 1%. Other examples are real estate structures such as REITs and banks that specialize in real estate loans.

46 See Huij, Laurs, Stork, Zwinkels: "Carbon Beta: A Market-Based Measure of Carbon Risk", working paper 2021

Figure 6 | Carbon beta identifies carbon risk beyond Scope 1, 2 and 3

Description	Direct emissions (ttCO2e)	(rank)	Indirect emissions (ttCO2e)	(rank)	Carbon beta	(rank)	Source of Scope 1, 2, 3 emissions data
Invests in royalties for gold, oil and gas mining and exploration	0	0.01	42	0.01	4.32	0.99	Estimate based on CDP
Real estate investment trust that directly invests in real estate property used for logistics	2	0.07	89	0.03	1.57	0.90	Derived from previous year
Real estate investment trust for health care, offices, housing, etc.	7	0.15	411	0.20	1.52	0.89	Exact value from CDP
Manufactures and wholesales pharmaceuticals (deodorants) and medical equipment	4	0.10	403	0.20	1.51	0.89	Exact value from CDP
Big real estate developer. Also owns car parks, properties and dry-cleaning businesses.	3	0.09	358	0.17	1.31	0.85	Value derived from CSR

*Data as of Dec 2018. Only showing companies that are part of MSCI World. Direct and indirect emissions are shown in thousand tons of CO2 equivalent (abbreviated as ttCO2e). Source: Robeco

In summary, carbon emissions data make it possible to incorporate Paris-aligned objectives into investment strategies. However, investors should be aware of potential pitfalls, such as their backward-looking nature. In addition to using traditional fundamental analysis, our research shows the benefits of incorporating information about carbon betas, which correct for the biases inherent in traditional carbon data. This ensures that we not only consider companies' self-reported emissions, but also add an additional way of judging whether a company will be impacted by a shift to a low-carbon economy.

Case 3: Engagement

Reducing a portfolio's carbon footprint is a quick way of limiting exposure to future risks, but it transfers the exposure to someone else: another investor will buy the polluting companies. The most effective way for investors to truly play a role in solving the climate crisis is through engagement: persuading polluting companies to adopt less carbon-intensive business models. It is also an excellent way of reducing the climate risk of an existing portfolio.

We have played an active role in encouraging companies in several sectors to reduce their carbon footprints. What's more, in line with our belief in the importance of reducing global carbon emissions, decarbonization has been one of our engagement priorities since 2018. Our approach comprises a combination of collaborative and individual engagement with our investee companies. Robeco partners with other institutional investors under the Climate Action 100+ initiative, a global coalition of 545 institutional investors engaging collectively with the world's top 167 corporate greenhouse gas emitters, to ensure they take necessary action on climate change. As an active member of this initiative, Robeco has been co-leading the engagement with three focus companies.

Working towards net zero emissions

Our engagement aims to contribute to the goals of the Paris Agreement. In order to achieve this, the world effectively needs to become carbon neutral by 2050, which is a major challenge given its reliance on fossil fuel energy.

Through our dialogue with companies, we call on business leaders to develop corporate strategies to decarbonize their businesses and the products they sell. This entails implementing a strong governance framework, making science-based commitments to climate change action, aligning their capital expenditures with a low-carbon scenario, promoting a just transition, and improving their disclosure of climate-related topics – including cost-benefit analyses of the transition to net zero. Our engagement objectives are aligned with those of the Climate Action 100+ initiative.

The collaborative engagement by investors has already resulted in companies taking the lead in the energy transition. These companies are differentiating themselves from peers by adopting stronger commitments to decarbonize their business operations. We have witnessed some breakthrough commitments particularly from companies in the automotive, utilities and oil and gas sectors, with some of those companies being part of our engagement theme.

Zero emissions transport: A treacherous road to a clear goal

The passenger vehicle segment must be overhauled if the world is to achieve the goals of the Paris Agreement. The transition poses significant risks to auto manufacturers if untimely strategic decisions are implemented. But it also brings opportunities, with the potential for financial outperformance for those that shift their fleet to electric mobility.

When we launched our engagement with the auto industry in 2017, the idea of achieving zero-emissions transport was not being seriously considered by any incumbent car manufacturer. Yet, three years later, broad industry acknowledgement of this ambition started to emerge. Policies setting ambitious fleet emissions targets, particularly in the EU and China, have been a critical driving force for change in the industry. More recently, the rise of successful battery electric vehicles by new industry entrants is challenging the status quo while gaps in technological innovation among incumbents are starting to become visible.

As investors, we have been calling on car manufacturers to show leadership in the transition to zero emissions vehicles. This entails taking action to align their business strategy with the ambition to achieve net zero by 2050 or earlier. Robeco has engaged with car manufacturers on this topic, both individually and collectively under the Climate Action 100+ initiative. We have also played a proactive role in developing the sector engagement priorities as sector coordinator in the Institutional Investor Group on Climate Change (IIGCC).

Throughout our dialogue, we have seen some car manufacturers begin to respond with significant long-term commitments that aim to achieve net zero emissions by 2050. All companies under engagement have set targets around reducing emissions or electrifying their fleets. Examples to be mentioned are two companies in the peer group that have set ambitious commitments, one of which has been certified as being aligned with a 1.5°C scenario by the Science-Based Targets initiative (SBTi). A third company has also set a mid-term (2030) emissions-reduction target that has been certified by SBTi, and the company was considering setting a long-term target.

We are encouraged by the industry's acknowledgment of the need to decarbonize its products. However, we also see that the transition will take decades to complete. We are now witnessing what is only the beginning of a long and uncertain road to zero emissions mobility.

Emissions from end user consumption matter

Oil and gas firms have a crucial role to play in the transition to cleaner sources of energy, and we have been engaging with companies in the sector since 2016. Although emissions from the production phase are relatively low, the end use of oil and gas products accounts for over half of global GHG emissions associated with energy consumption. As such, oil and gas producers have been a priority for us, with our engagement calling for the industry to provide more transparency on the financial impact of climate change and to take greater responsibility for all its emissions.

In 2018, our engagement saw a turning point after one of the European oil majors committed to a net zero carbon footprint that covered direct and indirect emissions from the use of their products. This breakthrough commitment has since been followed by other European oil companies. Our engagement welcomes these commitments and is now focusing on demanding a clear plan that outlines how oil companies will evolve their business and prepare for a low-carbon scenario.

Renewables are the future

Research by Carbon Tracker suggests that European coal plants will become loss-making by 2030. While all of the utility companies in scope for our engagement have committed to not developing new coal-fired plants, they have been unable to commit to a phase-out date for their existing coal assets. Phasing out coal plants requires regulatory approval. Policymakers fear supply uncertainty if the intermittent energy from renewables is not backed up by reliable

coal-fired power plants. In some cases, this is resulting in investments to upgrade existing coal-plants in order to reduce their emissions and extend their life.

The utilities sector is the farthest advanced in the energy transition. Most companies in our engagement peer group have set emissions-reduction targets and aim to become carbon neutral by 2050. It remains unclear what the energy mix of these utilities will be under a net zero emissions scenario. Yet, it is evident that more investment in renewables and other low-emissions energies is needed. Moreover, we have found differences in the decarbonization strategies of utilities, the starkest being between European and US companies. While the former envision achieving a net zero scenario primarily through renewables and storage, the latter see a more prominent role for both nuclear power and natural gas-powered plants that are retrofitted with carbon capture and storage (CCS) technology. It remains unclear whether CCS and battery storage will be sufficiently developed from a technical perspective or financially viable by 2050, when these technologies are needed the most.

Reconciling short-term accountability with long-term ambitions

Climate change is a global challenge of unprecedented proportions. Planning for the energy transition requires companies to sketch scenarios on how their businesses may evolve over the next three or four decades, a timeframe that goes well beyond most industries' planning horizons. Yet, we increasingly see business leaders committing to a low-carbon future and setting net zero targets by mid-century. In our engagement, we aim to develop frameworks that can be used to hold top management accountable for the realization of a low-carbon scenario. Besides setting intermediate targets, we encourage companies to integrate these strategic targets into executive remuneration plans. As more companies commit to decarbonizing their business in line with a 2°C scenario, management accountability will increasingly become a priority in our engagement.

The start of a multi-decade transformation

Our engagement results reflect the fact that we're still in the very early stages of the energy transition. While we believe it's positive that more companies are willing to set ambitious net zero emissions targets for 2050, the biggest challenge is translating these targets into clear and feasible transition plans. Although several companies have come a long way in acknowledging the sense of urgency to take action, most of them simply need more time to define their pathways. According to research by the Transition Pathway Initiative, which assesses global publicly listed companies on their carbon performance, only a few major companies have so far aligned their emissions pathway with the goal of limiting climate change to 2°C or lower.

It is clear that more action is needed. As investors in high-emitting companies, we consider engagement to be a robust and critical tool to ensure that companies, key industries and the global economy are on a transition pathway that is aligned with the need to limiting global warming to 1.5°C.

Suggested reading

The literature on net zero strategies is booming. This paper includes many relevant references in the footnotes. As a suggested reading list, below are the four key frameworks relevant to Paris-aligned investing.

1. Paris-Aligned Investment Initiative (2021), Net Zero Investment Framework Implementation Guide. Published by IIGCC, Ceres, AIGCC and IGCC.

   https://www.parisalignedinvestment.org/media/2021/03/PAII-Net-Zero-Investment-Framework_Implementation-Guide.pdf

2. UN-convened Net Zero Asset Owner Alliance (2021), Inaugural 2025 Target Setting Protocol. Published by PRI and UNEP-FI.

   https://www.unepfi.org/wordpress/wp-content/uploads/2021/01/Alliance-Target-Setting-Protocol-2021.pdf

3. Science-Based Targets initiative (2021), Financial Sector Science-Based Targets Guidance. Published by WRI, WWF and CDP.

   https://sciencebasedtargets.org/resources/files/Financial-Sector-Science-Based-Targets-Guidance-Pilot-Version.pdf

4. EU Technical Expert Group on Sustainable Finance (2019), Handbook of climate transition benchmarks, Paris-aligned benchmarks and benchmarks' ESG disclosures.

   https://ec.europa.eu/info/sites/default/files/business_economy_euro/banking_and_finance/documents/192020-sustainable-finance-teg-benchmarks-handbook_en_0.pdf

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