

Emerging Markets Enhanced Indexing

Mastertext

July 2024

1. Executive summary

Passive investing offers exposure to the equity premium, predictable portfolio characteristics and low fees. We can do better. Robeco's Enhanced Indexing strategies offer all these advantages as well as a superior return compared to passive vehicles by incorporating 50 years of academic insights. This return is achieved by overweighting those index constituents that score highly on factors proven to deliver superior returns, and underweighting those that score poorly.

Robeco's Emerging Markets Enhanced Indexing strategy is managed by a successful team of investment professionals within an organization that is fully committed to quantitative investing. The quant group consists of more than 50 quantitative researchers and portfolio managers.

The team benefits from the proximity of Robeco's 12-member fundamental Emerging Markets Equities team as both portfolio managers and researchers tap into its extensive local market knowledge.

Robeco's quantitative stock-ranking models are designed to identify and exploit market inefficiencies systematically. The strategy is managed according to a unique investment approach. It combines the output from our stock ranking model with a disciplined proprietary portfolio construction algorithm.

Robeco has been a pioneer in the field of quantitative stock selection, which resulted in the first models being developed in the early '90s. In 1994 the first stock ranking models were used in the Robeco equity strategies. Following the success of the models in practice, in 2002 Robeco launched a 100% quantitative equity product line. As of end of June 2024 we manage EUR 76.3 billion in quantitative strategies in equities, fixed income and multi asset for a wide range of clients worldwide.

The competitive strengths of the Robeco Enhanced Indexing Equities include:

- Proven track record for developed markets (2004) and emerging markets (2007).
- Proprietary stock-ranking model that identifies stocks with specific proven characteristics: Value, Quality, Price momentum, Analyst revisions and Short-term signals.
- Innovative, novel signals that use alternative data and advanced modelling techniques (ML/NLP)
- Sustainability integration throughout the entire investment process and across multiple dimensions: exclusions, ESG, SDGs, environmental footprints and active ownership.
- Integrated risk management approach that considers:
 - Unrewarded risks: mitigate through the use of enhanced factor definitions in the stock-ranking phase
 - Static risks: tightly manage stock, sector, and country deviations from the benchmark
 - Dynamics risks: minimize risk from dynamic elements that influence the prevalent market environment, such as interest rates, commodity prices and tail events
- Robust portfolio construction algorithm that enables fully explainable portfolio positions.
- Focus on reducing trading costs at every step of the investment process.
- Experienced investment team of more than 50 professionals dedicated to quantitative strategies.
- Adaptable strategy regarding the investable universe, tracking error and sustainability preferences.

Contents

1. Executive summary	2
2. Investment team.....	4
Investment professionals.....	4
Team interactions and portfolio management support.....	8
3. Investment philosophy	9
A better alternative to passive	9
4. Investment process	11
Performance drivers.....	11
Description of investment process.....	11
Portfolio construction.....	17
Buy and sell discipline	22
Decision making process	23
5. Risk management	24
Internal guidelines	24
Risk management systems	26
6. Track record and performance	27
Track record.....	27
Performance target.....	27
7. Appendix	28

2. Investment team

The strategy is managed by an experienced team of investment professionals within an organization that is fully committed to quantitative investing.

Head of the Core Quant Equities capability is Wilma de Groot. She is also Head of Factor Investing Equities, Deputy Head of Quant Equity and member of the Quant Equity Portfolio Management team. The team works together to implement the model's ranking in the portfolio and to monitor positions and risk exposures.

The Quant Equity Portfolio Management team is embedded in Robeco's quant group. This group includes all quantitative portfolio management and research activities for equities, bonds and multi-asset strategies. The quant group consists of more than 50 quantitative researchers and portfolio managers. The group is headed by Weili Zhou.

The portfolio managers benefit from the expertise of our quantitative researchers in managing the strategy. These researchers are responsible for developing and enhancing quantitative models and applications, which form the heart of our quantitative equities product line. The client portfolio management team, consisting of client portfolio managers and investment specialists, is accountable for the quant group's commercial activities.

Robeco's quantitative investment professionals maintain strong relationships with universities, keeping our team abreast of the latest developments in the academic world. For instance, Harald Lohre is an honorary researcher with Lancaster University, responsible for the joint PhD program. Furthermore, Weili Zhou, Wilma de Groot, Pim van Vliet, David Blitz, Mike Chen and Harald Lohre are guest lecturers.

Our quantitative researchers regularly publish articles in well-known academic journals, including the Journal of Econometrics, Journal of Financial Economics, Journal of Financial and Quantitative Analysis, Journal of Banking and Finance, Journal of Portfolio Management, Financial Analyst Journal, Emerging Market Review, Pacific Basin finance journal, and Journal of Sustainable Finance & Investment.

Investment professionals

The following table provides an overview of the Head of Quant Investing & Research, portfolio managers and researchers.

Table 1 | Head of Quant Investing & Research, portfolio managers and researchers

Name	Job title	Industry	Firm	
<i>Head of Quant Investing & Research</i>				
Weili Zhou	Head of Quant Investing & Research	2002	2006	
<i>Portfolio managers</i>				<i>PM Quant Equity since</i>
Wilma de Groot	Head of Core Quant Equities, Head of Factor Investing and Deputy Head of Quant Equity	2001	2001	2014
Pim van Vliet	Head of Conservative Equities, Chief Quant Strategist	2000	2005	2010
Arlette van Ditshuizen	Portfolio Manager	1997	1997	2007
Han van der Boon	Portfolio Manager	1997	1997	2018
Maarten Polfliet	Portfolio Manager	1999	2005	2014
Machiel Zwanenburg	Portfolio Manager	1999	1999	2014
Tim Dröge	Portfolio Manager	1999	2000	2007
Arnoud Klep	Portfolio Manager	2001	2001	2016
Daniel Haesen	Portfolio Manager	2003	2003	2018
Jan Sytze Mosselaar	Portfolio Manager	2004	2004	2014
Dean Walsh	Portfolio Manager	2013	2023	2023
Wouter Tilgenkamp	Portfolio Manager	2014	2016	2021
Vania Sulman	Portfolio Manager	2013	2023	2023
Koen Rijnen	Portfolio Manager	2018	2022	2022
Yaowei Xu	Head of Quant China	2014	2004	2018
<i>Researchers</i>				
David Blitz	Chief Researcher	1995	1995	
Mike Chen	Head of Next Gen Research	2005	2022	
Harald Lohre	Head of Quant Equity Research	2006	2022	
Bart van der Grient	Researcher	2007	2007	
Matthias Hanauer	Researcher	2009	2014	
Iman Honarvar	Researcher	2012	2017	
Kristina Ūsaite	Researcher	2011	2017	
Clint Howard	Researcher	2016	2022	
Thom Marchesini	Researcher	2017	2017	
Rob Huisman	Researcher	2018	2018	

Sebastian Schneider	Researcher	2019	2019	
Maarten Jansen	Researcher	2020	2020	
Tobias Hoogteijling	Researcher	2020	2020	
Nick Mutsaers	Researcher	2021	2021	

The portfolio managers and researchers cooperate with six client portfolio managers who conduct meetings with prospects and clients and articulate and position quant strategies. This enables the portfolio managers and researchers to focus on their investment responsibilities.

Table 2 | Quantitative equities client portfolio managers

Name	Job title	Primary focus	Industry	Firm
Jan de Koning	Head of Client Portfolio Management	Global	2005	2015
Lejda Bargjo	Client Portfolio Manager	Europe	2008	2020
Jeroen Hagens	Client Portfolio Manager	Europe	2013	2016
Jan Rohof	Client Portfolio Manager	Asia-Pacific	2014	2014
Rupeng Chen	Client Portfolio Manager	Asia-Pacific	2006	2020
Dijana Kostic	Client Portfolio Manager	The Americas	2019	2019

Our quantitative equities portfolio managers and researchers closely cooperate with the professionals of our Sustainability Investing Center of Expertise in a number of ways:

- The portfolio managers use the engagement results of our Active Ownership professionals in defining our investment universe and constructing the portfolio. These results are coded into the ranking models and portfolio algorithms.
- Portfolio managers are also part of sustainability-related working groups, such as the Climate Change Committee and the Biodiversity Working Group.
- The quant equity researchers rely on an extensive historical database containing ESG ratings for their research projects.
- The quant equity researchers also conduct ESG projects together with sustainability researchers for the enhancement of variables and factors.
- The Head of Sustainability Integration controls the quality of sustainability integration into Robeco's portfolios. The quant equity portfolio managers and researchers implement recommendations into the investment processes.

The key professionals of the Sustainable Investing Center of Expertise are listed below.

Table 3 | Key professionals Sustainability Investing Center of Expertise

Name	Function	Location	Industry	Firm
Carola van Lamoen	Head of Sustainable Investing	Rotterdam	2001	2007
Lucian Peppelenbos	Climate & Biodiversity Strategist	Rotterdam	2005	2020
Jan Anton van Zanten	SDG Strategist	Rotterdam	2014	2020
Rachel Whittaker	Head of Sustainable Investing Research	Zurich	2000	2015 - 2017, 2021
Masja Zandbergen	Head of Sustainability Integration	Rotterdam	1997	1997- 2008, 2015

The portfolio managers' role differs from that of traditional portfolio managers, given that the investment decisions are based on the ranking generated by Robeco's stock-ranking model. To ensure a consistent translation of the model's ranking into client portfolios, their main role is related to:

- Analysis and portfolio management
- Strategy and process enhancements
- Client servicing

Analysis and portfolio management The entire investment process is continuously monitored by the portfolio managers and researchers. All investment professionals have a well-defined role, including checks on data quality, screening the universe, instrument selection, anticipating index reviews, position monitoring, plausibility of large position changes and the feasibility of proposed trades. In addition, the investment team addresses the potential impact of corporate actions and special situations, such as mergers and acquisitions. The portfolio managers can take appropriate action if necessary by influencing buy and sell decisions. These decisions are aimed at avoiding additional risks that go beyond the scope of the ranking model and to lower trading costs by avoiding unnecessary transactions. The portfolio managers are supported by our Portfolio Engineering & Trading team, providing operational support, order execution and trading research to all Robeco investment teams. The team includes operational portfolio managers, traders, researchers and data scientists.

Strategy and process enhancements The portfolio management team is involved in the research projects undertaken by the quantitative equity researchers, who continuously look for enhancements to the investment strategy and portfolio implementation process. For example, in 2019, we added news sentiment to the momentum factor of all our quantitative equity stock-ranking models. Moreover, during the period between 2020 and 2022, we supplemented the basket of short-term variables with a machine-learning distress risk signal and increased portfolio liquidity to further improve trading efficiency. A committee consisting of portfolio managers and researchers formally approves enhancements to the models and sets the research agenda for the upcoming quarters.

Client servicing Each portfolio manager is responsible for a number of discretionary managed institutional portfolios and/or investment funds. The portfolio managers conduct portfolio and market analyses on a continuous basis and have periodic review meetings or calls to discuss developments of the portfolio with their clients. In addition they are involved with client consultations on the tailoring of segregated accounts to specific client needs, such as values-based exclusions and sustainability targets.

Team interactions and portfolio management support

In addition to the quantitative researchers, the quantitative portfolio managers benefit from the close proximity of Robeco's experienced fundamental Emerging Markets Equities team, responsible for managing over EUR 5 billion in emerging markets portfolios as of end of June 2024. This team provides the quantitative portfolio managers with valuable local market knowledge on company-specific issues, political risks, corporate actions, new stock listings and brokers.

3. Investment philosophy

Our investment philosophy is based on the conviction that financial markets are not fully efficient and that we have the expertise and resources to identify and exploit the resulting anomalies for the benefit of our clients. We believe that using active management to take advantage of selected factor premiums and applying a disciplined investment process leads to long-term risk-adjusted outperformance.

Robeco's quantitative investment strategies are based on the following beliefs:

- **Economic rationale.** Understanding economic fundamentals is at the heart of our investment process. Through this awareness we can enhance generic factors. For instance, by identifying avoidable risks that are not adequately rewarded. In general, single-factor strategies contain diversifiable risks that can be mitigated by combining and integrating multiple factors. As such, we consider ourselves economists applying our ideas systematically rather than statisticians looking for any patterns in the data. We also recognize that the environment we operate in is not static but may evolve over time, in particular markets and human behavior. Hence, our models need to adapt to these changing dynamics.
- **Evidence-based practice.** We adhere to an evidence-based research approach to identify factors rewarded with superior risk-adjusted performance. This includes extensive empirical testing over long periods and in different markets to ensure robustness. We use broad and deep data sets to examine ideas inspired by academic literature, alternative data providers, internal discussions or client meetings. In our experience, falsification is more common than confirmation, as we reject many promising ideas that lack sufficient consistency. Our cautious pioneering approach focuses on enhancing established factors and developing innovative new signals.
- **Prudent investing.** We respect the 'prudent person' principle. This means we act responsibly for our clients as if managing our own money. Our stewardship is not exclusively focused on wealth but also recognizes well-being, in particular, the impact of our investments on society. We do so through active ownership, i.e. voting and engagement, and by integrating sustainability considerations into our investment process. Prudence is also reflected in our aim to keep the investment process transparent and easily explainable. We also recognize that avoiding unnecessary trading costs is crucial to avoid a silent erosion of returns in the long run. For this reason we prefer a proprietary portfolio construction algorithm that allows us to be in full control compared to off-the-shelf optimization tools, which tend to resemble a 'black box'.

A better alternative to passive

Passive investors simply buy and hold the market portfolio at minimal costs. This approach has solid theoretical and empirical foundations. Research shows it is an effective way to capture the equity premium. The main claim against active management is that, on aggregate, it is a zero-sum game before costs and a negative-sum game after costs. This would imply that low-cost passive investing should ensure a better performance than the average actively managed fund.

Pioneers in the field of passive investing have provided proof of concept for passive investing in practice. Their success has not gone unnoticed, as the market share of passive managers has risen steadily over time, and many large institutional investors nowadays invest large portions of their assets passively. However, despite its indisputable merits of being low-cost and transparent, passive investing comes with its own set of challenges as it:

- Inevitably lags the market index due to management fees and transaction costs.
- Is prone to arbitrage due to its transparent approach that can be exploited by active investors.
- Ignores decades of academic insights on asset pricing and can have negative exposure to proven factors.
- Faces sustainability integration limits and does not have the tool of divestment as recourse.

An alternative to passive that takes these into account is enhanced indexing investing. This approach enhances the risk, return and sustainability profile of an index by implementing small overweight and underweight positions with respect to the index, while maintaining the tracking error at a low level. Sustainability is integrated in every step of the investment process: from defining the investable universe to reflecting our stewardship activities in the positioning of our portfolios.

Indices can be enhanced by focusing on stocks that exhibit certain proven characteristics that are found to be strong return predictors in equity markets, are well documented, and have been identified over long time periods and across regions. As such, we target positive exposures to well-established factors, which we have further enhanced with our proprietary research:

- **Value:** The tendency for inexpensive stocks to provide above-market returns.
- **Quality:** Stocks with supportive or sound fundamentals tend to outperform those with weak fundamentals and the market as a whole.
- **Momentum:** The tendency for recent winner stocks to continue to outperform, while recent loser stocks will continue to perform poorly.
- **Analyst revisions:** Stocks with recent upward revisions tend to outperform stocks that received downward revisions.
- **Short-term signals:** Stocks with favorable short-term dynamics (e.g., reversal, flow, sentiment, etc.) tend to deliver returns ahead of the market.

Ultimately, our strategy provides the same benefits to those offered by passive investing with diversified and transparent portfolios as well as high liquidity and low fees.

4. Investment process

Performance drivers

The Robeco Enhanced Indexing strategies are managed on the basis of a purely quantitative bottom-up driven investment strategy. Stock selection is the sole performance driver used, as determined by our proprietary quantitative ranking model which ranks stocks on their relative attractiveness based on valuation, quality, momentum, analyst revisions and short-term signals. The model has been developed in a joint effort by Robeco quantitative equity researchers and portfolio managers.

Our approach selects stocks with the highest integrated factor scores to overweight in the portfolio. Some other advantages of this approach are transaction cost netting and a relatively low turnover.

The identified factors and variables are the result of 25 years of extensive empirical research and more than 15 years of portfolio management experience in practice with the quantitative ranking model.

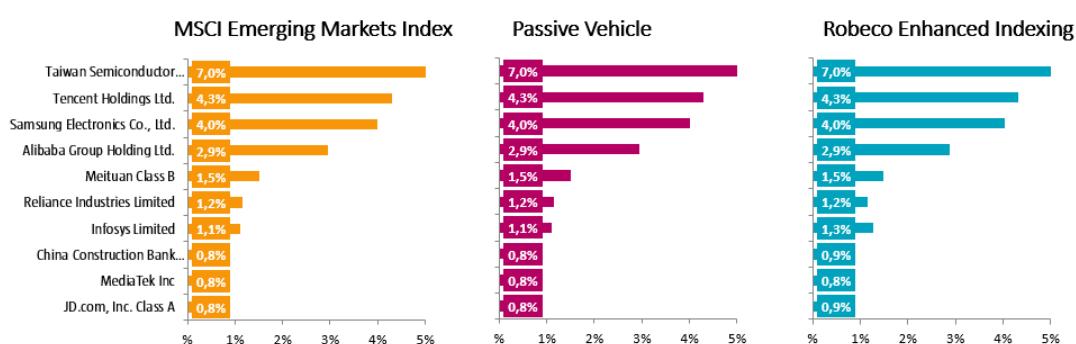
Description of investment process

Enhanced indexing: a smarter way to get index exposure

Enhanced Indexing: enhances an index by getting exposure to factor characteristics. The index weights are the starting points. Weights are then adjusted according to their relative attractiveness. This relative attractiveness is determined by Robeco's proprietary quantitative ranking model which scores and ranks stocks based on their exposure to academically proven factors. Attractive constituents get a higher weight, while unattractive constituents get a lower weight. These deviations from the index weights are relatively small, on average around 20-30 basis points for the Emerging Markets Enhanced Indexing strategy.

The figure below demonstrates how this works for the top 10 MSCI Emerging Markets Index constituents.

Figure 1 | Weightings of top ten index constituents



Top ten holdings of the MSCI Emerging Markets Index as of December 2021 are shown with the respective weight of a full-replication ETF and an example weight of Robeco Emerging Enhanced Indexing.

A passive solution, as shown in the figure above, replicates an index by obtaining exposure to all index constituents with weights that exactly resemble those of the parent index. In contrast, our Enhanced Indexing strategies enhance the parent index by adjusting constituent weights depending on their attractiveness.

The investment universe

The investment universe consists of approximately 1600 stocks: 1400 constituents of the MSCI Emerging Markets Index and 200 off-benchmark stocks. These off-benchmark stocks are liquid emerging small caps from MSCI, S&P or FTSE indices. These stocks increase the breadth of investable universe. The off-benchmark limit is set at 5% of the portfolio to limit the tracking error level.

The investment universe excludes dual listings and stocks with data issues and we apply a liquidity screening based on a minimum average trading volume and minimum market cap.

Quantitative ranking model

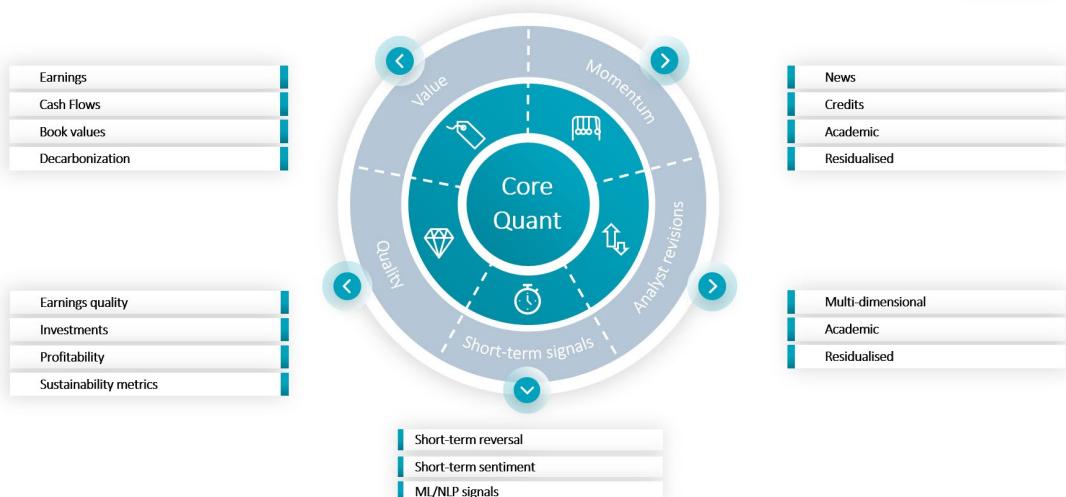
Our research¹ shows that an index can be enhanced by focusing on stocks that exhibit certain proven characteristics. As such, we determine the relative attractiveness of stocks based on value, quality, momentum, analyst revisions and short-term signals:

- **Value.** Stocks with attractive valuation tend to outperform less attractively valued stocks. The model scores stocks on a number of diversified valuation factors such as price to fundamentals.
- **Quality.** Stocks with supportive or sound fundamentals tend to outperform those with weak fundamentals and the market as a whole. We adopt a multi-dimensional view of quality that incorporates profitability, earnings quality (accruals) and investments (net stock issues) related factors.
- **Price momentum.** Stocks with positive price momentum, which we define as stocks with high recent stock returns, tend to outperform stocks with negative price momentum. Next to academic definitions of price momentum we utilize advanced residualization techniques which use stock-specific returns adjusted for other characteristics. This results in reduced time-varying risk in portfolios, which is important especially in sharply reverting markets.
- **Analyst revisions.** Stocks with recent upward analyst revisions tend to outperform stocks that received downward revisions. Also, to capture this factor in the best possible way we focus on multiple analyst revisions and apply advanced residualization techniques to address the tendency of analysts to be overly optimistic over future earnings growth prospects of growth stocks.
- **Short-term signals.** Stocks with favorable short-term dynamics tend to outperform those with negative short-term dynamics. We incorporate signals that aim to exploit short-term stock price reversals, short-term sentiment (e.g. short-term stock, industry and factor momentum), short-term flow data (e.g. short-term volume dynamics and short-selling metrics) and short-term return patterns (using ML techniques).

The figure below shows how an index can be enhanced by focusing on stocks that exhibit certain proven characteristics.

¹ Passive Indexing? Enhanced Indexing! Blitz, David, Robeco Research Paper, March 2015

Figure 2 | Enhanced Indexing: Exposure to proven characteristics



The exhibit shows the set-up of the Robeco proprietary stock selection model that is used as the sole performance driver. Please note that the figure is only an illustrative representation for explanatory purposes.

Each factor consists of multiple underlying variables that are defined, selected and refined by Robeco's Quant Equity Research team. More specifically, we apply sophisticated risk controls in the variable definitions by applying our integrated risk management techniques. By enhancing factor definitions, we aim to avoid unrewarded risks.

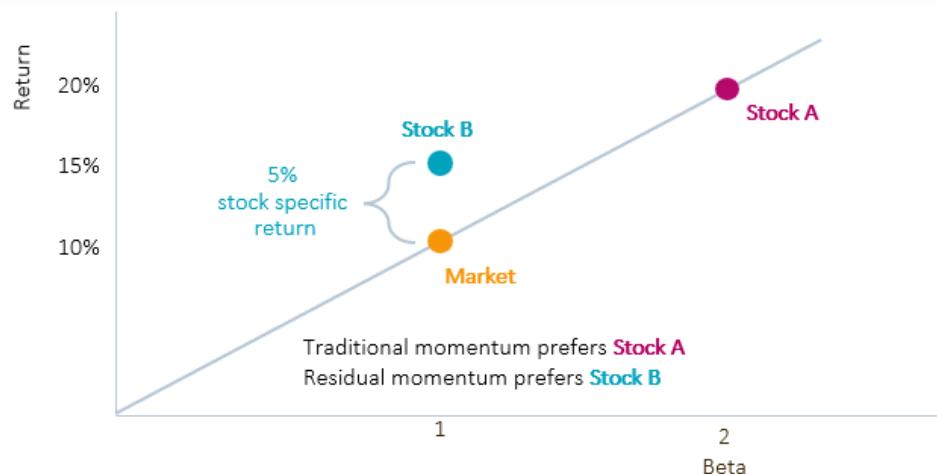
An example of an enhanced factor definition is 'decarbonized value'. Our Research shows that generic value strategies exhibit high environmental footprints as measured by greenhouse gas (GHG) emissions, water use and waste generation. This is partially due to its structural tilt towards asset-heavy companies and sectors such as energy, utilities and materials. We developed an innovative way to improve the environmental footprint of value signals without lowering its return premium.

Key benefits of integrated risk management approach

We use integrated risk management when ranking stocks. This approach is more effective and efficient than postponing risk management to the portfolio construction phase.

- **Enhance proven factors to increase risk adjusted returns.** Proven factor premiums can involve significant risks that are often not properly rewarded. Therefore, we apply integrated risk management techniques already at the very start of the process: in the definition of our factors. First, we identify and eliminate those risks that are unrewarded to enhance proven factors. Second, we optimize each characteristic individually in the first stage of the process instead of optimizing the aggregate portfolio characteristics at the final stage. Optimizing at the aggregated level omits important information regarding individual factors. We find that our approach results in superior risk-adjusted returns.
- **Residual momentum captures the momentum premium at lower risk.** Our research shows that a simple momentum strategy exhibits large dynamic exposures to various risk factors. The dynamic beta exposures of a generic momentum factor contribute a lot to the risk of the strategy, but hardly anything to its return. During bull markets a generic momentum factor typically gets biased towards high-beta stocks, as such stocks tend to have the highest return when markets go up. Similarly, the generic momentum strategy gets biased towards low-beta stocks during bear markets. This inspired us to develop a so-called 'residual momentum' technique, which isolates the momentum that is stock-specific by eliminating the part of the momentum that is simply driven by the beta characteristics of a stock. Of the two stocks in the graph below, stock A has the highest return. However, the return of A is in line with its expected return given its market sensitivity (beta) of 2, while stock B earns a 5% excess return after correcting for its beta. This 5% is the so-called stock-specific or residual return, because it remains after correcting for the market-expected return. Since residual momentum ranks stocks by the highest stock specific returns, that are by definition unrelated to the stocks' betas, unrewarded beta tilts in the resulting portfolio are eliminated. Without this unrewarded risk, the returns of the portfolio are much less sensitive to market- and other trend reversals. The result is a similar return pattern as that of a generic momentum strategy at much lower risk.

Example: Residual momentum uses stock specific returns



- **More robust and transparent portfolio construction algorithm.** Instead of relying on an optimizer at a later stage, unintended market risk exposure is already neutralized in the stock ranking phase. This reduces the need for more complex optimizers and risk models in the portfolio construction stage of the investment process. Furthermore, our approach results in easily explainable portfolios and transactions. Applying our more robust and transparent portfolio construction algorithm makes it much easier to remain in full control.
- **Efficiently maintain proper factor diversification.** By eliminating unintended factor risks, we aim to stabilize the risk contribution of factors over time. First, the time-varying risk of a conventional momentum strategy is largely driven by its time-varying beta exposures, which we eliminate with our approach. Second, by stabilizing the risk contribution of factors there is no need to dynamically adjust model weightings to keep proper factor diversification. Our approach prevents unnecessary turnover and reduces transaction costs.

The stock-ranking model produces a total score for each stock in the investable universe by combining value, quality, price momentum, analyst revisions and short-term signals. The impact of outliers is limited by capping the individual factor scores. Then all stocks are ranked from high to low. The rankings are done relative to the stocks within the same country. This means that bottom-up country allocation effects will not influence portfolio construction.

Advanced sustainability integration

Within our Enhanced Indexing strategies we incorporate sustainability in the investment and decision-making process in multiple ways:

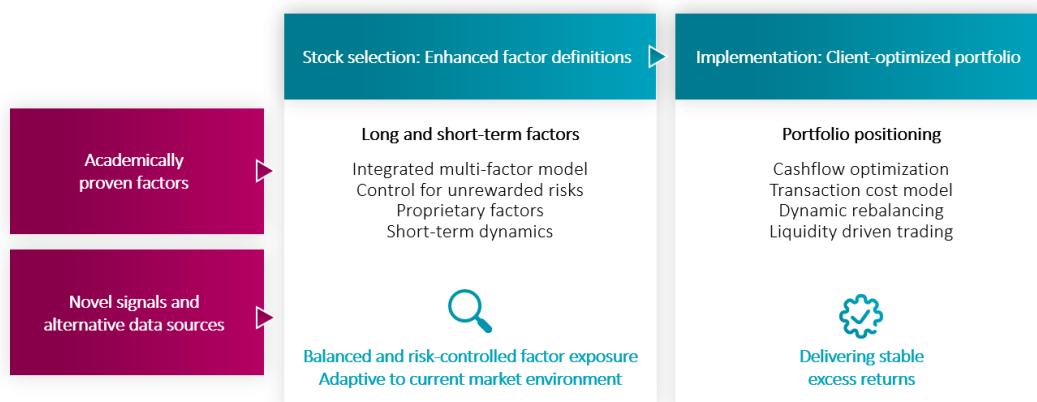
- First, the strategy adheres to the Robeco exclusion policy, level 1. The policy can be found at [docu-exclusion-policy.pdf \(robeco.com\)](https://www.robeco.com/docu-exclusion-policy.pdf) Robeco wants to avoid making any investments which we or our clients deem unsuitable. In addition to this, we can work with client- specific exclusion lists for segregated accounts.
- Second, we integrate proprietary signals in our stock ranking model that target sustainability as well as outperformance. We take these signals into account in the quality factor. Research shows that, companies that score better on ESG, often possess strong quality characteristics. By integrating these signals in the quality factor, the portfolio tilts towards more sustainable stocks. Additionally, our stock ranking model uses decarbonized value signals to reduce the portfolio's environmental footprint.
- Third, we ensure that the ESG Risk Rating of the portfolio is lower than the benchmark. The ranking model proposes a high-ranking stock for an overweight when constructing the portfolio. It will propose another well-rated stock if the portfolio would score higher than average on ESG Risk Ratings. The Risk Rating is a score developed by the external ESG data provider Sustainalytics. Companies with a lower ESG Risk Rating have a greater chance of an overweight in the portfolio as a result of this positive screening.
- Fourth, we integrate the carbon footprint in the portfolio-construction process by ensuring that the greenhouse gasses environmental footprint of the portfolio is lower than the benchmark. The ranking model proposes a high-ranking stock for inclusion when constructing the portfolio. It will propose another high-ranking stock if the portfolio would not score lower on the carbon footprint than the benchmark. Companies with a higher score have a greater chance of an overweight in the portfolio as a result of this positive screening. Besides carbon, the water and waste footprints of the portfolio are also lower than the benchmark.
- Fifth, the portfolio has a higher weight in stocks with positive SDG scores than the benchmark. We make sure to include a higher portfolio weight with an SDG score of 1,2 or 3 than in the benchmark at the moment of rebalancing. Robeco has developed a proprietary SDG Rating methodology between -3 (worst) and 3 (best) in order to assess the Sustainable Development Goals (SDGs) of a company.
- Sixth, all stocks in the portfolio can take part in voting. The responsibility for deciding how to vote on ballot items lies with the Active Ownership team, using our voting policy. The policy provides guidance on common proposals for shareholder meetings. We also use proprietary analysis from our Sustainability Investing Research team and external analysis from RepRisk, Glass Lewis and Sustainalytics to make well-informed voting decisions.

- Seventh, all stocks in the portfolio can take part in engagement. We target a relevant subset of companies globally in our portfolios for a constructive dialogue on environmental, social and governance factors. There is a direct link between the enhanced engagement program and portfolio holdings. For companies with egregious governance issues, according to the information stemming from the Active Ownership's voting operation no overweight positions are taken. For companies that are placed under enhanced engagement, no overweight positions are taken as well for the duration of the enhanced engagement process. Once an enhanced engagement case is closed successfully, the stock constraints will be removed. When the case is closed unsuccessfully, the company will likely be excluded from the investable universe and any remaining positions in the portfolio may be sold.
- Eighth, all investments are subject to Robeco's Good Governance policy, that stipulates Robeco's expectations with regards to good governance practices. For investee companies, this policy incorporates requirements amongst other with regards to sound management structures, employee relations, remuneration of staff and tax compliance.
- Ninth, we are able to reflect investors' preferences in a variety of different dimensions such as: exclusions, integration, footprint reduction such as reduction of CO2 emissions, UN Social Development goals and voting.

Portfolio construction

The portfolio construction process is disciplined and transparent with continuous monitoring and control by the portfolio managers. It is based on the ranking generated by the quantitative ranking model. The aim is to optimize returns while constraining risk. An overview of the process is shown in the figure below.

Figure 3 | Overview portfolio construction process



Phase 1. Stock selection: Enhanced factor definitions

We consider academically proven long-term factors, novel signals and short-term dynamics to rank stocks. In terms of long-term factors, we rely on our proprietary enhanced factor definitions as they control for unrewarded risks. These factors are based on academically proven factors. The portfolio managers check for plausibility, particularly when stocks exhibit a significant change in their ranking.

Regarding novel signals, we use alternative data to steer on resource efficiency and employee engagement to supplement our quality signal, for example. Carbon emissions, waste generation and water usage are related to a firm's economic activities, can measure its operational efficiency and are linked to its financial performance. Therefore, resource efficiency is not only good for a firm's bottom line but also for its environmental footprint. Meanwhile, employee ratings and reviews shed light on productivity levels. Engaged employees are expected to be more motivated and, therefore, more productive. Moreover, a satisfied workforce is desirable for corporate social responsibility. All in all, by integrating these sustainability considerations, we believe our quality signal tilts towards stocks that exhibit higher quality characteristics and better sustainability profiles.

We also take into account short-term dynamics to create a final stock ranking of the most attractive stocks. Our short-term signals have a forecasting horizon of one to three months and are, therefore, a very useful tool to time transactions. Moreover, they offer diversification as they tend to be uncorrelated. The short-term variables are not covered by the long-term factor signals, which have a medium-term investment horizon of nine to twelve months.

Instead, they exploit short-term dynamics and reflect short-term reversal, flow, momentum and return patterns in stock markets. These themes allow us to benefit from short-term liquidity imbalances between supply and demand, changes in short-term volume dynamics and short-selling metrics and shifts in near-term sentiment.

Figure 1 | Short-term signals based on themes



Innovative short-term signals that exploit market inefficiencies:

- **Short-term reversals:** Academic literature illustrates that stocks with high recent returns tend to underperform stocks with low recent returns. This theme exploits the temporary liquidity imbalances between supply and demand. Specifically, if demand temporarily exceeds supply, then stock prices go up to absorb this demand, only to revert towards fair value subsequently and vice versa. As a result, including the model's short-term reversal effect leads to additional diversification benefits. Moreover, we apply our residualization technique to eliminate unrewarded risks.
- **Short-term sentiment:** Empirical research shows that factor returns exhibit a strong short-term momentum effect. This means that individual stocks that score well on factors that outperformed over the previous month are more likely to be bought than stocks that score well on factors that underperformed. This theme also includes short-term analyst revisions, industry momentum, factor momentum and job momentum. The latter alternative data signal monitors the number of job vacancies at firms, viewing an increase as an expectation for future growth. We have observed that this indicator drives short-term performance.
- **Stock flows:** This signal prefers stocks that have had more attention in the past one to four weeks. Academic articles have documented that abnormal trading volumes are usually caused by investors with material, non-public information. This is usually positive for stock prices. Because of this variable's short-term nature, it is not broadly applied in standard quantitative models.
- **ML/NLP signals:** This theme exploits a combination of ML-based signals that aim to capture the component of stock returns that is not explained by traditional long-term factors over a short-term horizon. This also helps to diversify the model as these signals have uncorrelated return predictions compared to academically proven long-term factors. Moreover, these ML algorithms exploit nonlinear relationships and interaction effects between variables.

After stocks have been sorted by the ranking model, we move on to the next step, which entails the construction of the portfolio. Our proprietary portfolio construction algorithm achieves this by building an optimal portfolio according to risk, return and sustainability considerations. For example, our algorithm aims to ensure that the portfolio has overweight positions in index constituents that score highly on proven factors and underweighting positions in those that score poorly while simultaneously considering sustainability aspects and adhering to specific constraints on country, sector, stock and liquidity limits.

The risk profile of the portfolio is managed both directly and indirectly. More specifically, risk is directly managed when constructing and rebalancing the portfolio. When building the portfolio, the objective of the portfolio construction algorithm is to maximize the portfolio's exposure to the stock ranking while adhering to the pre-defined risk budget and position limits. This allows to optimize the portfolio for the highest possible information ratio. The portfolio construction algorithm targets a long-term average beta of 1 versus the benchmark at the moment of rebalancing.

We apply various constraints to manage portfolio risks. For instance, the maximum allowable size for active positions versus the reference index is 0.3% for underweight positions and 0.2% for overweight holdings. Moreover, the maximum deviation allowed from the reference index in terms of countries and sectors is 0.5% for both underweight and overweight exposures.

The portfolio construction algorithm also considers dynamic risks alongside constraints on static risks, such as country and sector tilt limits. Our proprietary risk model analyzes the current market environment for prominent dynamic risks during portfolio rebalancing. For example, excess returns based on risks linked to interest rates or commodity exposures vary over time and are dynamic. Thus, these risks should be handled differently over time. When dynamic risks significantly influence recent market movements, they are considered return drivers in the short to medium term. As such, these dynamic risks are neutralized when constructing the portfolio.

Liquidity risk is considered when estimating trading costs during portfolio rebalancing. Thus, the algorithm favors – all else equal – stocks with higher liquidity over those with lower liquidity. We also decrease the positions of the least liquid and most expensive stocks based on our proprietary trading cost model (including both implicit and explicit costs) to ensure a sufficiently liquid portfolio.

Defining features of Robeco's proprietary portfolio construction algorithm

The defining features of Robeco's proprietary portfolio construction algorithm include:

- **Improving downside risk assessment with our Distress Risk Model.** When constructing the portfolio, we make sure that we do not take overweight positions in distressed companies at the moment of rebalancing. The Robeco Distress-Risk Model takes into account how balance sheet leverage might translate into future distress and also incorporates other forward-looking financial information about a firm's corporate structure.
- **Portfolio fully in line with model factor input.** One of the main advantages of using a proprietary portfolio construction algorithm is that it is fully tailored to our investment objectives. The algorithm was developed to capture the proven capacity of our quantitative ranking model to identify both winning and losing stocks in equity markets and to optimally translate that forecasting power to portfolio performance. The resulting portfolio characteristics are exactly as intended. In contrast, standard portfolio optimizers might distort portfolio characteristics in unpredictable ways as risk factors may interfere with return factors.
- **Transaction cost management.** Our portfolio construction algorithm incorporates stock-specific transaction costs to determine the optimal active weights. Stocks with higher expected trading costs get lower active weights when constructing the portfolio. We use the Robeco Trading Cost Model to calculate the estimated transaction costs. These costs comprise not only estimated market impact, but also estimated broker commissions, currency conversion costs and taxes. We have built our own Trading Cost Model because we were not satisfied with the existing third-party models. These models typically assume standard trades in terms of size, timing and location that substantially differ from Robeco quantitative equity trades. Our model is calibrated periodically based on all Robeco trades in recent years both in developed and emerging markets.
- **Easily explainable portfolio positions and transactions.** We can easily explain all portfolio positions and transactions. What was the stock's position on the quantitative ranking? Why did it have that position on the quantitative ranking? Which restriction within our rules-based algorithm resulted in adjusting the weight of that specific stock? In contrast, due to their black box nature, portfolio managers using standard optimizers have difficulty in explaining individual positions and/or trades.
- **Unique portfolio positions.** The use of a proprietary portfolio construction algorithm results in unique portfolio positions, avoiding crowded positions. In contrast, standard optimizers will push portfolios towards the same stocks.

The portfolio construction algorithm aims to maximize the exposure of the portfolio to the highest ranked stocks, while ensuring neutrality on all relevant risk factors and portfolio turnover is controlled. We aim to be neutral towards sectors, industry groups, regions and countries compared to the benchmark and aim for a beta of 1. This means that on these characteristics, the portfolio will exhibit exposures very close to the benchmark. We allow small deviations from the benchmark weights to limit turnover.

Check of proposed transactions

Portfolio managers carefully check all proposed transactions and the new portfolio. According to the four-eyes principle, transactions have to be verified by two team members. The final responsibility for buy-sell decisions lies with the portfolio managers.

Phase 2: Implementation: Client-optimized portfolio

A proprietary portfolio construction algorithm translates the quantitative rankings into a client- optimized portfolio. The algorithm uses validated rankings from the quantitative ranking model. Advantages of the integrated ranking approach are transaction cost netting and a relatively low turnover. An advantage of executing portfolio construction at the overall portfolio level is that any investment restriction can be managed and monitored at the overall level.

Robeco's dedicated global equity trading desk executes the trades after a pre-trade compliance check on client guidelines and restrictions in the trading system. The portfolio consists of approximately 500 positions.

Portfolio managers closely monitor positions and the risk exposure of the portfolio between rebalancing dates. If it is necessary to take action earlier, for example, due to significant cash inflow or outflow, or to reduce unintended risks, an extra portfolio adjustment takes place. The portfolio managers also continuously monitor for corporate actions, position settings, foreign-currency exposure and performance.

Advantages of client optimized portfolios over a single model portfolio:

We use client-optimized portfolios instead of applying one single model portfolio. In case of a cash inflow, we buy top-ranked stocks rather than investing proportionally over all existing positions in the portfolio. In the event of a cash outflow, we sell the bottom-ranked stocks. In general, client-optimized portfolios offer three main advantages:

- Cash flows are used efficiently to obtain better model exposure, which leads to higher expected risk adjusted returns, lower turnover and lower transaction costs.
- By rebalancing different portfolios at different times, the resulting trades have less market impact.
- Client exclusion lists and other client-specific restrictions can be implemented more effectively.

Buy and sell discipline

The portfolio construction process is based on a relative trade-off basis between implied alpha and costs associated with trading. With our approach we ensure an optimal trade-off between transaction costs, turnover and optimal positioning for the portfolio.

The portfolio is evaluated whether it has an optimal exposure to the model ranking at each cycle of the portfolio rebalancing. A trade is made if we can improve the overall exposure while taking into account expected transaction costs.

In general, high-ranked stocks are overweighted whereas low-ranked stocks are underweighted or have no weighting at all.

Stock overweights are limited at rebalancing to create optimal diversification of the enhanced weights and to improve portfolio liquidity. The size of the active positions is determined by taking the liquidity and the estimated trading costs into account. In addition, the team has set thresholds to limit stock-specific exposure. If, for example, overweights increase too much due to market movements, the algorithm scales the positions back to the initial weight.

Furthermore, the portfolio manager could sell between rebalancing dates, for instance as a result of a corporate action such as a merger or acquisition. All trading occurs within concentration and position limits. Low turnover is an important focus of our buy and sell discipline.

Decision making process

We aim to rebalance the portfolio on a monthly basis. Portfolio managers and researchers closely monitor the entire investment process, resulting in full control and human overview of the portfolio.

Table 4 | Human control and overview

Control	Overview
Data quality of factor scores	Quant equity researchers
Data quality of environmental footprints	Climate strategist, sustainable investing data scientists
Data quality of SDG scores	SDG strategist, sustainable investing researchers
Voting and engagement inputs	Active ownership analysts
Universe screening	Portfolio managers, operational portfolio managers
Instrument selection	Portfolio managers, operational portfolio managers
Anticipate index changes	Portfolio managers, operational portfolio managers
Sustainability risk not captured by the model	Portfolio managers
Feasibility proposed trades	Portfolio managers, operational portfolio managers, equity traders
Monitoring of positions and risk exposure	Portfolio managers, risk managers

Before proposed trades are implemented in the portfolio, the portfolio managers perform extensive checks on their feasibility. These checks include the analysis of corporate actions and of special situations that go beyond the scope of the model, including sustainability related events, such as such as a recent occurrence of a carbon emissions scandal or an oil spill that has yet to be accounted for in the investment process. According to the four-eyes principle, all proposed transactions are verified by a second team member.

5. Risk management

Internal guidelines

Risk management is fully integrated into all stages of the investment process. Robeco's strict risk control framework ensures that portfolios are always in line with guidelines and investment constraints. It consists of the following elements:

- Integrated risk management
- Risk framework
- Portfolio limits
- Exception reports
- Human overview
- Monitoring by Risk Management

Integrated risk management The common practice of postponing risk management entirely to the portfolio construction phase is suboptimal. We prefer to incorporate risk management already at the very start of the process: in the definition of the factors in our stock-ranking model. This approach has proven to reduce sensitivity to market reversals, it reduces the most important time-varying style tilts and by doing so it helps to stabilize the risk contribution of the factors in the stock-ranking model over time.

Risk framework The portfolio managers use an active share framework to manage the risk objective of the portfolio. The portfolio construction algorithm calculates transactions that have to match a pre-set active share range, resulting in a portfolio within the ex-ante tracking error limit. In this way, investment decisions and risk management are fully integrated.

Portfolio limits The strategy targets on average a 20 basis points over- and 30 basis points underweight against the benchmark for high and low ranked stocks respectively. The portfolio is diversified over a large number of names, which decreases the stock specific risk of the portfolio and increases the predictive power of the model. Stocks with low liquidity, and high estimated transaction costs based on input from our transaction cost model, will be appointed a lower initial overweight position. The algorithm scales back the positions to the initial weights when the deviations widen due to market movements.

Table 5 | Internal portfolio limits and characteristics

Characteristic	Emerging Markets Enhanced Indexing
# portfolio holdings	Around 500
Active share	35%
Individual initial target*	On average 20-30 bps vs benchmark
Individual sector exposure*	Sector neutral, max 100 bps vs benchmark
Individual country exposure*	Country neutral, max 30 bps vs benchmark
Currency exposure*	Currency neutrality vs benchmark resulting from country neutrality
Beta exposure*	Beta neutral
Cash position	Target is zero
Off-benchmark stocks	5%. Additional constituents from MSCI, S&P and FTSE EM index included.
Target average ex post tracking error	1.2%

* On rebalancing dates

These settings are based on extensive empirical analyses and historical portfolio simulations.

Exception reports These reports are generated from the team's portfolio database to identify events that are outside of what is considered a normal range, for instance, because of market movements. Examples include active share and pending mergers and acquisitions. The portfolio managers discuss these reports within the team and act when necessary.

Human overview Risk management is integrated in the investment process. The portfolio managers check all positions and transactions. The objective of this human overview is to reduce risk that is not systematically captured by the stock ranking model.

Monitoring by Risk Management Apart from ongoing risk monitoring by the portfolio managers, the risk limits are monitored by Risk Management, which operates independently from the investment team. Every week the responsible risk manager evaluates all actual tracking errors against their limits. If any limits are breached, a standard procedure is followed to ensure that the risk is brought back within limits as soon as possible. Risk Management reports on the liquidity of the client portfolios too.

Risk management systems

Robeco has implemented the following risk-management systems in order to provide the most rapid and detailed information on the risk levels of a portfolio:

- **RiskMetrics** is used both by the portfolio managers and our Risk Management department to monitor the tracking error and the liquidity profile of the portfolio. RiskMetrics provides timely and detailed information concerning the risks of a portfolio.
- **Charles River** is Robeco's order management system. It enables pre-trade compliance checks with respect to client restrictions and internal guidelines. When a portfolio manager enters a proposed trade into the trading system, pre-trade compliance checks are automatically performed. Trades that are not permitted are instantly rejected by the system. The Investment Restrictions team maintains information on client restrictions and guidelines.
- **MSCI Barra** is an external risk management system used by the team to confirm the estimates from RiskMetrics.

6. Track record and performance

Track record

The following table provides a detailed overview of the track record of Emerging Markets Enhanced Indexing.

Table 6 | Performance Robeco Composite Emerging Markets Enhanced Indexing

Annualized performance	31-03-2024				
	1 Year	3 Year	5 Year	10 Year	Inception
Composite Emerging Enhanced*	15,18%	1,64%	5,74%	7,29%	5,57%
MSCI Emerging Markets Index**	8,80%	-2,34%	3,02%	5,49%	3,66%
Relative performance	6,38%	3,98%	2,72%	1,81%	1,91%
Tracking error	1,82%	1,64%	1,66%	1,37%	1,45%
Information ratio	3,51	2,43	1,64	1,32	1,32

Calendar year performance	2023	2022	2021	2020	2019
Composite Emerging Enhanced*	10,84%	-13,10%	10,07%	7,25%	20,55%
MSCI Emerging Markets Index**	6,11%	-14,85%	4,86%	8,54%	20,61%
Relative performance	4,73%	1,76%	5,22%	-1,29%	-0,07%

The currency in which the past performance is displayed may differ from the currency of your country of residence. Due to exchange rate fluctuations the performance shown may increase or decrease if converted into your local currency.

Periods shorter than one year are not annualized. The value of your investments may fluctuate. Past performance is no guarantee of future results.

Returns gross of fees, based on gross asset value. In reality costs (such as management fees and other costs) are charged. These have a negative effect on the returns shown.

Source: Robeco, MSCI. Portfolio: Robeco Composite Emerging Enhanced. Index: MSCI Emerging Markets Index (net dividends reinvested). All figures in EUR. Data end of 31 December 2023. * As of 1 January 2008, the benchmark changed from S&P/IFC EM Regional Investable Composite (Net dividends reinvested) to the MSCI Emerging Markets index (Net dividends reinvested).*

Performance target

The aim is to outperform the MSCI Emerging Markets Index with an information ratio of 1. Given an expected tracking error of 1.2%, the target annual outperformance is 1.2%.

7. Appendix

Engagement and voting

We believe that our engagement with investee companies on financially material sustainability issues will have a positive impact on our investment results and on society. Robeco actively uses its ownership rights to engage with companies on behalf of our clients in a constructive manner. Improvements in sustainable corporate behavior can result in an improved risk return profile of our investments. Robeco engages with companies worldwide, in both our equity and credit portfolios.

The outcomes of our engagement efforts are communicated to analysts, portfolio managers, and clients, enabling them to incorporate this information into their investment decisions as part of Robeco's integrated Sustainable Investing framework.

In 2023, we engaged with 292 companies on 319 cases. Engagement is standard for Robeco funds. The service can be provided for segregated mandates as well.

Robeco carries out three different types of corporate engagement with companies in which we invest:

- *Value engagement* is a proactive approach focusing on long-term issues that are financially material and/or causing adverse sustainability impacts. The primary objective is to create value for investors and mitigate adverse impacts by improving the sustainability conduct and corporate governance of companies.
- *Enhanced engagement* focuses on companies that severely and structurally breach minimum behavioral norms in areas such as human rights, labor, the environment, biodiversity and corruption. The primary objective of enhanced engagement is to address reported shortfalls against internationally accepted codes of conduct for corporate governance, social responsibility, the environment and transparency.
- *Portfolio engagement* is associated with the objectives of specific Robeco investment strategies, often with clear impact objectives, including the promotion of positive societal contributions such as the SDGs and mitigation of negative externalities related to the value creation process.

In addition, Robeco conducts proactive and collaborative sovereign engagements, aiming to create value by improving sustainable business environments within the respective countries. Sovereign engagements are set up and executed in close consultation with our sustainability country experts and Global Macro investment team.

For all types of engagement, we establish specific, measurable objectives. Our engagements typically run over a three-year period, during which we have regular contact with company representatives. We track progress against the engagement objectives.

Our engagement approach is built on three building blocks:

- 1 Extensive engagement track record of Active Ownership team.
- 2 Dedicated sustainability expertise
- 3 Robeco's asset management capabilities

This integrated approach, focused on knowledge sharing and leveraging financial expertise as well as our sustainable investing expertise, places us in a unique position within the asset management field. Effective engagement requires a range of skills, many of which are not traditionally found within asset managers.

Robeco Active Ownership team

Robeco's Active Ownership team is responsible for all engagement and voting activities undertaken by Robeco on behalf of its clients. As the team operates across markets on a global basis, the team is multi-national and multi-lingual. This diversity provides an understanding of the financial, legal and cultural environment in which the companies we engage with operate.

The Active Ownership team applies a balanced engagement approach and focuses on constructive dialogues. This sets us apart from other parties that might employ a more activist and confrontational approach. This method has allowed us to build positive relationships with the companies under engagement and leads to open and fruitful discussions.

The Active Ownership team works closely together with investment teams and the other members of Robeco's Sustainable Investing Center of Expertise, who provide input for the analysis of engagement cases, adding to the quality and depth of the engagement process.

In addition, we leverage Robeco's global presence. We collaborate with investment professionals in Robeco's local offices (such as Shanghai, Hong Kong and Singapore) on several engagement cases, leveraging local language capabilities. The local investment professionals work as liaison and door opener. This local market insight and presence improves our engagement success in local and emerging markets.

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Biographies

Head of Quant Investing & Research

Weili Zhou, Head of Quant Investing & Research

Weili Zhou is Head of the Quant Investing & Research team. Her areas of expertise include stock selection, portfolio construction and trading costs research. She has published in various academic and industry journals, including the *Journal of Banking and Finance*, *Financial Analysts Journal*, *Journal of Portfolio Management* and *Pacific-Basin Finance Journal*. In addition, she is a guest lecturer at several universities. She joined Robeco in 2006 after working as a financial news reporter at China Central Television for two years. Weili holds a Master's in Quantitative Finance from Erasmus University Rotterdam and a Bachelor's in Statistics from Fudan University. She is a CFA® Charterholder.

Portfolio managers

Wilma de Groot, Head of Core Quant Equities, Head of Factor Investing and Deputy Head of Quant Equity

Wilma de Groot is Head of Core Quant Equities, Head of Factor Investing and Deputy Head of Quant Equity. She is responsible for quant equity strategies and specializes in asset pricing anomalies, portfolio construction and sustainability integration. She has published in various academic publications including the *Journal of Impact and ESG Investing*, *Journal of Banking and Finance*, *Journal of International Money and Finance*, *Journal of Empirical Finance* and the *Financial Analysts Journal*. She is a guest lecturer at several universities. Wilma joined Robeco as a Quant Researcher in 2001. Wilma has a PhD in Finance from Erasmus University Rotterdam and holds a Master's in Econometrics from Tilburg University. She is a CFA® Charterholder.

Pim van Vliet, Head of Conservative Equities and Chief Quant Strategist

Pim van Vliet is Head of Conservative Equities and Chief Quant Strategist. As Head of Conservative Equities, he is responsible for a wide range of global, regional, and sustainable low-volatility strategies. He specializes in low-volatility investing, asset pricing, and quantitative finance. He is the author of numerous academic research papers including publications in the *Journal of Banking and Finance*, *Management Science*, and the *Journal of Portfolio Management*. Pim is a guest lecturer at several universities, author of an investment book and speaker at international seminars. He became Portfolio Manager in 2010. Pim joined Robeco in 2005 as a Researcher with responsibility for asset allocation research. Pim holds a PhD and a Master's cum laude in Financial and Business Economics from Erasmus University Rotterdam.

Arlette van Ditshuizen, Portfolio Manager

Arlette van Ditshuizen is Portfolio Manager Quantitative Equities. She has been portfolio manager since 2007. Arlette's areas of expertise are portfolio construction and risk management. She chairs Robeco's Equity Risk Management and Quant Portfolio Management Committees. Previously, she was Risk Manager within Robeco for two years and held a position as Portfolio Manager and Head of Derivatives Structures with Robeco for six years. Arlette started her career as a researcher at Robeco in 1997. She holds a Master's in Econometrics from Erasmus University Rotterdam.

Han van der Boon, Portfolio Manager

Han van der Boon is Portfolio Manager Quantitative Equities. He specializes in quantitative stock selection and portfolio construction. He was a Technical Portfolio Manager and Operational Portfolio Manager with a focus on equities in the period 2009-2018. He joined Robeco in 1997 as a Business Controller. He holds a Master's in Business Administration from Erasmus University Rotterdam.

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Maarten Polfliet is Portfolio Manager Quantitative Equities. Maarten specializes in portfolio construction and investment style analysis. Until 2014, Maarten was a Quant Client Portfolio Manager at Robeco. From 2002, he was Equity Portfolio Manager at Bank Insinger de Beaufort, until he joined Robeco in 2005. He started his career as a Portfolio Manager for private and institutional clients at SNS Bank Nederland in 1999. He has a Master's in Financial Economics from Tilburg University and a Master's in Financial Analysis from the University of Amsterdam.

Machiel Zwanenburg, Portfolio Manager

Machiel Zwanenburg is Portfolio Manager Quantitative Equities. He specializes in quantitative stock selection and portfolio construction. One of his areas of expertise is sustainability integration within quantitative equities. Previously, he held positions as Risk Manager and Head of Client Portfolio Risk at Robeco. He joined Robeco in 1999 as a member of the Quant Research team. He holds a Master's in Econometrics from Erasmus University Rotterdam and a Master's in Economics from the London School of Economics.

Tim Dröge, Portfolio Manager

Tim Dröge is Portfolio Manager Quantitative Equities. Tim specializes in quantitative stock selection, portfolio construction and Emerging Markets. Previously, he held positions as Portfolio Manager Balanced Investments and Account Manager institutional clients. Tim has been working as a Portfolio Manager since 2001. He started his career at Robeco in 1999. He holds a Master's in Business Economics from Erasmus University Rotterdam.

Arnoud Klep, Portfolio Manager

Arnoud Klep is Portfolio Manager Quantitative Equities. Arnoud specializes in portfolio construction and sustainability integration within quantitative equities. Previously, Arnoud was Head of Structured Investments with Robeco, managing various quantitative investment strategies. He started his career in the Robeco Quantitative Research department in 2001. Arnoud holds a Master's in Econometrics from Tilburg University.

Daniel Haesen, Portfolio Manager

Daniel Haesen is Portfolio Manager Quantitative Equities. He specializes in factor research and portfolio management. Daniel joined Robeco in 2003 as a quantitative researcher, with a specific focus on quant selection research, working on both equity and corporate bond multi-factor selection models. He was also responsible for quantitative sustainability and quantitative allocation research. He has published in several academic journals, including the Journal of Banking and Finance. He holds a Master's degree in Econometrics and Quantitative Finance from Tilburg University in the Netherlands and is a CFA® Charterholder.

Jan Sytze Mosselaar, Portfolio Manager

Jan Sytze Mosselaar is Portfolio Manager Quantitative Equities. He is responsible for quant equity strategies and specializes in quantitative stock selection as well as portfolio and market analysis. Jan Sytze is the author of 'A Concise Financial History of Europe', published by Robeco. He started his career in 2004 at Robeco and worked for ten years as a multi-asset portfolio manager, responsible for multi-asset funds, quant allocation funds and fiduciary pension mandates. He holds a Master's in Business Economics with a specialization in Finance & Investments from the University of Groningen. He is a CFA® Charterholder.

Dean Walsh, Portfolio Manager

Dean Walsh is Portfolio Manager Quantitative Equities. Dean specializes in quantitative stock selection, portfolio construction and sustainable integration. Prior to joining Robeco in 2023, he worked at Mercer Global Investments as a currency portfolio manager and as a principal in their Portfolio Intelligence unit. In this role, he led on quantitative research, including work on factor portfolios, sustainable & Paris-aligned investing, and risk management. He joined the industry in 2013 at JP Morgan. Dean holds a Master's in Quantitative Finance from University College Dublin. He is a CFA® and CAIA® Charterholder.

Wouter Tilgenkamp, Portfolio Manager

Wouter Tilgenkamp is Portfolio Manager Quantitative Equities. Wouter joined Robeco in 2016 as a Data Scientist, with a specific focus on Equity Trading Research, automatization of portfolio processes, portfolio construction, and optimal execution of strategies. He started his financial career in 2014 as Derivative Trader at Optiver. He holds a Bachelor of Science in Applied Mathematics from Technical University of Delft and a Master's in Quantitative Finance.

Vania Sulman, Portfolio Manager

Vania Sulman is Portfolio Manager Quantitative Equities. She specializes in the stock selection and sustainability integration in customized portfolios. She rejoined Robeco in 2022. Previously, she worked as a data scientist for three years and prior to that as a Quant Researcher at Robeco with a focus on quantitative stock selection. She joined the industry and Robeco in 2016. She holds a Master's (cum laude) in Quantitative Finance from Erasmus University Rotterdam.

Koen Rijnen, Portfolio Manager

Koen Rijnen is Portfolio Manager Quantitative Equities. Koen specializes in portfolio construction and sustainability integration within quantitative equities. He joined Robeco in 2022. Previously, he was Hedging Specialist and Balance Sheet Manager at Aegon. He started his career in consultancy in 2015 and joined the industry in 2018. Koen holds a Master's (cum laude) in Hydraulic Engineering from Delft University of Technology.

Yaowei Xu, Head of Quant China

Yaowei Xu is Head of Quant China. Previously, she was Portfolio Manager Quantitative Equities and part of the Robeco fundamental Emerging Markets team. Prior to joining Robeco in 2014, Yaowei was Senior Portfolio Manager at Pelargos Capital where she co-managed the long/short hedge fund focusing on Asia Pacific ex Japan equities. She started her investment career in 2004 at ABN AMRO Asset Management as Portfolio Risk Manager. Yaowei holds a Master's in Financial Management.

Quantitative Researchers

David Blitz, Chief Researcher

David Blitz is Chief Researcher at Robeco's Quant Equity Research team. His areas of expertise include general research, portfolio construction and stock selection research. He has been instrumental in the design and development of Robeco's quantitative investment strategies. He chairs the two committees that govern new strategies and model enhancements. David has published dozens of papers in peer-reviewed academic journals, such as *Journal of Empirical Finance*, *Journal of Portfolio Management* and *European Financial Management*. He started his career in the investment industry at Robeco in 1995. He holds a PhD in Finance and a Master's in Econometrics (cum laude) from Erasmus University Rotterdam.

Mike Chen, Head of Next Gen Research

Mike Chen is Head of the Next Gen Research team. He joined Robeco in 2022. In the period 2016-2022, he worked at PanAgora where he was Head of Sustainable Investments. He was also responsible for model research and development in the Equity Division while managing quantitative portfolios. Prior to joining PanAgora, Mike was a Quant Portfolio Manager at BlackRock's Systematic Active Equity (SAE) team, where his responsibilities included portfolio management and research into alpha insights for use across the entire SAE platform. Before BlackRock, Mike was a Senior Capital Market Analyst at Google. Mike started his career in the industry in 2005 as an Interest Rates Derivatives Trader at Morgan Stanley. Mike has published in various finance and engineering journals, including the *Journal of Portfolio Management*, *Financial Data Science*, and *IEEE Transactions on Automatic Control*, among others. Mike has a PhD in Electrical and Computer Engineering, a Master's in Mathematics, and a Master's in Electrical and Computer Engineering, all three from the University of Illinois.

Harald Lohre, Head of Quant Equity Research

Harald Lohre is Head of the Quant Equity Research team. Prior to joining Robeco in 2022, Harald served on the management team of Invesco Quantitative Strategies and was Head of Quantitative Research and Portfolio Manager at Deka Investment. He is an Honorary Researcher at Lancaster University Management School and a Research Fellow at the Hamburg Financial Research Center. He has published in the *Journal of Empirical Finance*, the *Financial Analysts Journal*, and the *Journal of Portfolio Management* among others. Harald serves on the Research Committee of Inquire Europe and as an Associate Editor of the *Journal of Systematic Investing*. He joined the industry in 2006. Harald holds a PhD in Finance summa cum laude from the University of Zurich and a Diploma in Mathematical Finance from the University of Konstanz. He is a past Fellow of the Centre for Endowment Asset Management at Cambridge Judge Business School.

Bart van der Grient, Researcher

Bart van der Grient is Researcher at Robeco's Quant Equity Research team. His areas of expertise include portfolio construction and stock selection research. He has published in various journals including the *Financial Analysts Journal*. Bart started his career in the investment industry at Robeco in 2007. He graduated summa cum laude in Quantitative Finance at Erasmus University Rotterdam.

Matthias Hanauer, Researcher

Matthias Hanauer is Researcher at Robeco's Quant Equity Research team. His areas of expertise include international factor premia and stock selection research. Matthias also holds a position as a postdoctoral researcher at the Technical University of Munich (TUM). He has published his work in various peer-reviewed finance journals, including the *Journal of Banking and Finance*, *Finance Research Letters*, and the *Journal of Portfolio Management*. Matthias joined Robeco in February 2014 after submitting his doctoral dissertation. He holds a PhD in Finance (summa cum laude) and a Master's in Business Administration from Technische Universität München and is a CFA® Charterholder.

Iman Honarvar, Researcher

Iman Honarvar is Researcher at Robeco's Quant Equity Research team. His areas of expertise include bottom-up stock selection research and empirical asset pricing. Iman joined Robeco in 2017 after submitting his doctoral dissertation at Maastricht University. He has published in the *Journal of Empirical Finance* and *International Review of Financial Analysis*. Iman holds a PhD in Empirical Finance from Maastricht University and a Master's in Financial Engineering from École Polytechnique Fédérale de Lausanne.

Kristina Ūsaitė, Researcher

Kristina Ūsaitė is Researcher at Robeco's Quant Equity Research team. Her areas of expertise include bottom-up stock selection research and empirical asset pricing. Kristina joined Robeco in 2017. She studied at Tilburg University in the period 2015-2016. She worked for three years as an Investment Analyst and Treasury Analyst at APG where she started her career in the industry in 2011. Kristina holds a Master's (cum laude) in Econometrics and Mathematical Economics from Tilburg University and a Bachelor's (cum laude) in Economics from Vilnius University. She is a CFA® Charterholder.

Clint Howard, Researcher

Clint Howard is Researcher at Robeco's Quant Equity Research team. His areas of expertise include stock selection research and portfolio construction research. He joined Robeco in 2022. Prior to this, he worked as a Researcher at Macquarie Investment Management. He joined the industry in 2016. Clint has a Bachelor of Engineering (Chemical), and a Bachelor of Science (Mathematics) with First Class Honours and the University Medal, both from the University of Sydney. He has a PhD in Quantitative Finance at the University of Technology Sydney.

Thom Marchesini, Researcher

Thom Marchesini is Researcher at Robeco's Quant Equity Research team. His areas of expertise include bottom-up stock selection research and empirical asset pricing. Thom joined Robeco in 2017 after finishing his Master thesis during Robeco's Super Quant internship. He has published in the *Journal of Portfolio Management*. Thom holds a Master's in Quantitative Finance from Erasmus University Rotterdam and is a CFA® Charterholder.

Rob Huisman, Researcher

Rob Huisman is Researcher at Robeco's Quant Equity Research team. His areas of expertise include portfolio construction and bottom-up stock selection research. He joined Robeco in 2018. Rob holds a Master's in Quantitative Finance (cum laude) and a Bachelor's in Econometrics (cum laude), Economics (cum laude) and Business Administration, all from Erasmus University Rotterdam. He is also a CFA® Charterholder.

Sebastian Schneider, Researcher

Sebastian Schneider is Researcher at Robeco's Quant Equity Research team. His areas of expertise include stock selection research and sustainable investing research, with a focus on alternative data. Sebastian holds a Master of Science in Finance from Vrije Universiteit Amsterdam, a Bachelor of Arts in Economics from University of Graz and is a CFA® Charterholder.

Maarten Jansen, Researcher

Maarten Jansen is Researcher at Robeco's Quant Equity Research team. He joined Robeco in 2020. His areas of expertise include portfolio construction and stock selection research. Maarten has published in the Pacific-Basin Finance Journal. He holds a Master's in Quantitative Finance from Erasmus University Rotterdam (cum laude) and Bachelor's in Econometrics (cum laude) and in Economics (cum laude) from Erasmus University Rotterdam.

Tobias Hoogteijling, Researcher

Tobias Hoogteijling is Researcher at Robeco's Quant Equity Research team. He joined Robeco in 2020. His areas of expertise include stock selection research and machine learning, and he is a coordinator of the Robeco Super Quant Internship program. Tobias has publications in The Review of Financial Studies and The Journal of Portfolio Management. He graduated summa cum laude from Erasmus University Rotterdam, with a Bachelor's in Econometrics and Economics and a Master's in Quantitative Finance.

Nick Mutsaers, Researcher

Nick Mutsaers is Researcher at Robeco's Quant Equity Research team. His focus is on Natural Language Processing (NLP) and portfolio construction. Additionally, Nick is part of the internal Quant Apps team and is one of the coordinators of the Summer Internship. He joined the industry and Robeco in 2021. Nick holds a Master's in Quantitative Finance from Erasmus University Rotterdam. He obtained his Bachelor's in Econometrics (cum laude), Economics (cum laude) at Erasmus University Rotterdam as well.

*Client Portfolio Managers***Jan de Koning**, Head of Client Portfolio Management

Jan de Koning is Head of Quant Client Portfolio Management. In his previous roles at Robeco he was portfolio manager Quantitative Equities and Client Portfolio Manager Quantitative Equities. Jan is the author of a book on quantitative investing and has published in The Journal of Impact and ESG Investing. Before joining Robeco in 2015, he worked as a fiduciary manager at NN Investment Partners. He started his investment career in 2005 with Centuria Capital and was a Portfolio Manager at Somerset Capital Partners. Jan holds a Master's in Organizational Studies from Tilburg University and is a CFA®, CAIA®, CIPM® and CMT® Charterholder. He is also a PhD Researcher at the University of Amsterdam focusing on index capitalism in the age of sustainable investing.

Lejda Bargjo, Client Portfolio Manager

Lejda Bargjo is Client Portfolio Manager in Quant Investing based in Frankfurt. She is responsible for the German, Swiss, Austrian and Italian markets. She conducts client and consultant meetings, speaks at conferences and gives seminars about Robeco's Quant Investing capabilities. Before joining Robeco in 2020, she worked at Bankhaus Lampe as a Quantitative Portfolio Manager. She has also worked at FactSet and Citigroup. Lejda started her career in the industry in 2008 as a Risk Manager. She holds a Master's in Money and Finance from Goethe University in Frankfurt and a Bachelor's in Mathematical Engineering from Polytechnic University of Tirana.

Jeroen Hagens, Client Portfolio Manager

Jeroen Hagens is Client Portfolio Manager in Quant Investing based in Rotterdam. In this capacity he represents Robeco's Quant Investing team in Europe. He conducts client and consultant meetings, speaks at conferences and gives seminars about Robeco's Quant Investing capabilities. He has been a Client Portfolio Manager since 2022 and joined Robeco in 2016. Previously, he supported Robeco's Quant Equities capabilities as an Investment Specialist in Rotterdam. He started his financial career in 2013 as Derivative Trader at 323 Trading. Jeroen holds a Master's in Finance & Investments from Erasmus University Rotterdam and is a CFA® and CAIA® Charterholder.

Jan Rohof, Client Portfolio Manager

Jan Rohof is Client Portfolio Manager in Quant Investing based in Sydney. In this capacity he supports Robeco's sales force in the Asia-Pacific region and conducts client and consultant meetings, speaks at conferences and gives seminars about Robeco's Quant Investing capabilities. He has been a Client Portfolio Manager since November 2019 and joined Robeco in 2014. Previously, he supported Robeco's Quant and Fundamental Equities capabilities as an Investment Specialist in Rotterdam. Jan holds a Master's in Strategic Management from Erasmus University Rotterdam, and he is a CAIA® Charterholder.

Rupeng Chen, Client Portfolio Manager

Rupeng Chen is Client Portfolio Manager in Quant Investing based in Hong Kong. In this capacity she supports Robeco's sales force in the Asia-Pacific region, conducts client and consultant meetings, speaks at conferences and gives seminars about Robeco's Quant Investing capabilities. Prior to joining Robeco in July 2020, she was an Investment Director in the Quantitative Equities Product investment team at Schroders, representing the team's capabilities across the Asia Pacific region. Rupeng started her career in this industry in early 2006, with actuarial consulting roles at Mercer and Alea Actuarial Consulting. Rupeng holds double degrees: a Bachelor's of Commerce (Actuarial Studies) and a Bachelor's of Laws from Macquarie University Australia. She is a CFA® Charterholder and an Actuary.

Dijana Kostic, Client Portfolio Manager

Dijana Kostic is Client Portfolio Manager in Quant Investing based in Rotterdam. In this capacity she represents Robeco's Quant Investing team in North America. She conducts client and consultant meetings, speaks at conferences and gives seminars about Robeco's Quant Investing capabilities. She has been a Client Portfolio Manager since 2022 and joined Robeco in 2020. Previously, she was a Junior Analyst at AF Advisors. Dijana holds a Master's in Finance and Investments and a Bachelor's in Business administration from Erasmus University Rotterdam and is a CFA® Program participant.

*Key professionals Sustainability Investing Center of Expertise***Carola van Lamoen**, Head of Sustainable Investing

Carola van Lamoen is Head of Sustainable Investing at Robeco. In this role she leads the Sustainable Investing Center of Expertise, responsible for active ownership and sustainability research, ESG thought leadership and client portfolio management. In addition, Carola is Chair of the Dutch governance platform Eumedion. Before joining Robeco in 2007, she was Corporate Governance Policy Advisor at the Dutch Ministry of Finance. Carola has been active in the field of corporate governance since 2001. She holds a Master's in Business Administration from Erasmus University Rotterdam.

Lucian Peppelenbos, Climate & Biodiversity Strategist

Lucian Peppelenbos is Climate & Biodiversity Strategist at Robeco. In this role, he oversees Robeco's work on decarbonizing the investment portfolios and integrating climate and biodiversity-related risks and opportunities in the investment processes. Thought leadership and publications are also part of his role, in collaboration with peer investors, academics and policy institutions. Prior to joining Robeco in 2020, he was Responsible Investment Specialist at APG Asset Management. Lucian started his career in 1999. He holds a PhD in Social Sciences from Wageningen University.

Jan Anton van Zanten, SDG Strategist

Jan Anton van Zanten is Robeco's SDG Strategist. He is positioned in Robeco's Sustainable Investing Center of Expertise and is responsible for integrating the SDGs into investment strategies. Jan Anton chairs Robeco's SDG Committee, conducts research, and engages with clients. Prior to joining Robeco, he worked as a Consultant at Steward Redqueen, and he was a Consultant at the United Nations Environment Programme, where he started his career in 2014. Jan Anton holds a Master's in Global Business & Stakeholder Management from Erasmus University Rotterdam and a Master's in Development Studies from the University of Cambridge. He also holds a cum laude PhD from Erasmus University Rotterdam. His dissertation studied the role of companies in achieving the SDGs and his research has been published in various academic journals.

Rachel Whittaker, Head of Sustainable Investing Research

Rachel Whittaker is Head of Robeco's Sustainable Investing Research. She leads an international team of 18 Sustainability Analysts focused on evaluating the impact of ESG topics on industries and investments. Prior to rejoining Robeco in 2021, she was a Sustainable Investing Strategist at UBS Global Wealth Management in Zurich. Previously, Rachel held specialist sustainability roles at UN PRI, Vontobel Asset Management and Mercer Investment Consulting. She started her career in the industry in 2000 as a sell-side Equity Research Analyst, working at Morgan Stanley and Merrill Lynch in London. Rachel earned her undergraduate degree at the University of Cambridge and a Master's in Corporate Environmental Management from the University of Surrey. She is also a CFA® Charterholder.

Masja Zandbergen, Head of Sustainability Integration

Masja Zandbergen is Head of Sustainability integration and coordinates the Sustainable Investing Client Portfolio Management team. Previously, she has been working as a Research Analyst covering financials, IT and Nordic stocks. Since 2003 she also specialized in Sustainability Investing. Prior to joining Robeco, Masja held had roles as Portfolio Manager and Responsible Investment Specialist at her own company and Head of Equity at Syntrus Achmea. She started her career at Robeco in 1997 and rejoined Robeco in 2015. Masja holds a Master's in Econometrics from Erasmus University Rotterdam and is a Certified European Financial Analyst.

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Generally, no offer or sale of the Shares is permitted in Malaysia unless where a Recognition Exemption or the Prospectus Exemption applies: NO ACTION HAS BEEN, OR WILL BE, TAKEN TO COMPLY WITH MALAYSIAN LAWS FOR MAKING AVAILABLE, OFFERING FOR SUBSCRIPTION OR PURCHASE, OR ISSUING ANY INVITATION TO SUBSCRIBE FOR OR PURCHASE OR SALE OF THE SHARES IN MALAYSIA OR TO PERSONS IN MALAYSIA AS THE SHARES ARE NOT INTENDED BY THE ISSUER TO BE MADE AVAILABLE, OR MADE THE SUBJECT OF ANY OFFER OR INVITATION TO SUBSCRIBE OR PURCHASE, IN MALAYSIA. NEITHER THIS DOCUMENT NOR ANY DOCUMENT OR OTHER MATERIAL IN CONNECTION WITH THE SHARES SHOULD BE DISTRIBUTED, CAUSED TO BE DISTRIBUTED OR CIRCULATED IN MALAYSIA. NO PERSON SHOULD MAKE AVAILABLE OR MAKE ANY INVITATION OR OFFER OR INVITATION TO SELL OR PURCHASE THE SHARES IN MALAYSIA UNLESS SUCH PERSON TAKES THE NECESSARY ACTION TO COMPLY WITH MALAYSIAN LAWS.

Additional information for investors with residence or seat in Mexico

The funds have not been and will not be registered with the National Registry of Securities or maintained by the Mexican National Banking and Securities Commission and, as a result, may not be offered or sold publicly in Mexico. Robeco and any underwriter or purchaser may offer and sell the funds in Mexico on a private placement basis to Institutional and Accredited Investors, pursuant to Article 8 of the Mexican Securities Market Law.

Additional information for investors with residence or seat in Peru

The Superintendencia del Mercado de Valores (SMV) does not exercise any supervision over this Fund and therefore the management of it. The information the Fund provides to its investors and the other services it provides to them are the sole responsibility of the Administrator. This Prospectus is not for public distribution.

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Additional information for investors with residence or seat in Spain

Robeco Institutional Asset Management B.V., Sucursal en España with identification number W0032687F and having its registered office in Madrid at Calle Serrano 47-14^o, is registered with the Spanish Commercial Registry in Madrid, in volume 19.957, page 190, section 8, sheet M-351927 and with the National Securities Market Commission (CNMV) in the Official Register of branches of European investment services companies, under number 24. The investment funds or SICAV mentioned in this document are regulated by the corresponding authorities of their country of origin and are registered in the Special Registry of the CNMV of Foreign Collective Investment Institutions marketed in Spain.

Additional information for investors with residence or seat in South Africa

Robeco Institutional Asset Management B.V. is registered and regulated by the Financial Sector Conduct Authority in South Africa.

Additional information for investors with residence or seat in Switzerland

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Additional information for investors with residence or seat in Taiwan

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Additional information for investors with residence or seat in Thailand

The Prospectus has not been approved by the Securities and Exchange Commission which takes no responsibility for its contents. No offer to the public to purchase the Shares will be made in Thailand and the Prospectus is intended to be read by the addressee only and must not be passed to, issued to, or shown to the public generally.

Additional information for investors with residence or seat in the United Arab Emirates

Some Funds referred to in this marketing material have been registered with the UAE Securities and Commodities Authority ("the Authority"). Details of all Registered Funds can be found on the Authority's website. The Authority assumes no liability for the accuracy of the information set out in this material/document, nor for the failure of any persons engaged in the investment Fund in performing their duties and responsibilities.

Additional information for investors with residence or seat in the United Kingdom

Robeco Institutional Asset Management B.V (FRN: 977582) is authorized and regulated by the Financial Conduct Authority.

Additional information for investors with residence or seat in Uruguay

The sale of the Fund qualifies as a private placement pursuant to section 2 of Uruguayan law 18,627. The Fund must not be offered or sold to the public in Uruguay, except under circumstances which do not constitute a public offering or distribution under Uruguayan laws and regulations. The Fund is not and will not be registered with the Financial Services Superintendency of the Central Bank of Uruguay. The Fund corresponds to investment funds that are not investment funds regulated by Uruguayan law 16,774 dated 27 September 1996, as amended.

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