A Scientific Beta Publication

Scientific Beta
An SGX and EDHEC Venture

Scientific Beta welcomes the NZAOA's Principles for Net-Zero-Aligned Benchmarks

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The authors can be contacted at contact@scientificbeta.com.

About the Author

Erik Christiansen is an ESG and Low Carbon Investment Specialist with Scientific Beta. He was previously Head of Investment Strategy with the Etablissement de Retraite Additionnelle de la Fonction Publique (ERAFP), the mandatory pension scheme for French civil servants, where he was responsible for implementing the equity and ESG strategies. He has also previously worked as a Methodology Coordinator and Analyst at V.E, the ESG rating agency that is now part of Moody's ESG. Erik holds a Master's degree in Management from the ESCP Business School and is a CFA charterholder.

Introduction

Introduction

The UN-convened Net-Zero Asset Owner Alliance (NZAOA) recently launched a call to action for asset owners and index providers for the development and uptake of Net-Zero-Aligned Benchmarks. NZAOA spells out 10 principles such indices should follow to underpin the alliance's goal of transitioning investment portfolios to net-zero greenhouse gas (GHG) emissions by 2050, consistent with a maximum temperature rise of 1.5°C above pre-industrial levels.

• In the first part of this document, we show how Scientific Beta's Climate Impact Consistent (CIC) indices integrate these 10 principles. Indeed, the CIC indices are designed to maximise the climate-impact potential of an investment strategy and, in line with the commitment that NZAOA members make, they "emphasise GHG emissions reduction outcomes in the real economy".

• The NZAOA also points to some of the shortcomings of the European Union's climate benchmarks. Scientific Beta has previously voiced concerns about this regulation and concurs with the NZAOA's arguments. In the second part of this document, we show how many indices that comply with the regulated Paris Aligned Benchmark (PAB) constraints fail to reflect some of the NZAOA's core benchmark principles.

How CIC Indices Align with the NZAOA's 10 Principles for Net-Zero-Aligned Benchmarks

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1. Ensure Transparency in Methodology and Design

Transparency on index construction philosophy and rules have always been at the centre of Scientific Beta's indices. Our homepage provides documentation that describes in minute detail the index construction methodology, from the universe and calculation rules to the stock selection and weighting mechanisms.

We also, as recommended, assess our indices annually "to ensure they remain credible, relevant and appropriate". Scientific Beta's indices are the result of a rigorous R&D process. By nature, research is dynamic and we ensure that our clients benefit from ongoing developments by updating the index rules and data sources each year, in conjunction with the client, through a transparent and interactive process.

2. The Starting Point of Decarbonisation Should be set to "Today"

We offer two versions of the CIC indies, one that complies with PAB constraints and a standard version that better reflects Scientific Beta's house views. While the PAB version complies with the legal requirement that its carbon intensity should be 50% lower than its standard parent index from the outset, for standard CIC indices the annual 7% decarbonisation pathway does start at inception. At the outset we just verify that the CIC index is not more carbon intensive than its parent.

3. No Mechanical Exclusion of High Emitting Sectors (Except Thermal Coal) or Countries

We spelled out our position on fossil fuels divestment in a recent paper titled Financing the Energy Transition: What is the Role of Fossil Fuels Divestment? Except for thermal coal and tar sands, our position is that fossil fuel divestment policies should be discerning and escalating – not indiscriminate and immediate. The dual movement out of fossils and into renewables needs to be implemented in a coordinated, orderly manner. It's a transition, not a disruption.

Applying the PAB regulation's fossil fuels exclusion criteria will not help tackle climate change and could even be counterproductive: indeed, we show in that paper that PAB requirements exclude companies that represent almost 40% of global renewables-based electricity generation from large and mid-cap listed equity universes.

4. Net-Zero-Aligned Indices Should Correspond to Real-Economy Decarbonisation

The white paper presenting the CIC index philosophy and methodology shows how we have thought through the choice of metrics and portfolio construction methodology. Our aim is to encourage decarbonisation of the real economy. Issuer-level climate performance and decarbonisation, relative to the relevant sector, unambiguously determine a constituent's weight and its variation over time. Capital allocation thus not only influences the terms on which issuers may enjoy access to capital but also sends them clear signals about the importance of decarbonising.

How CIC Indices Align with the NZAOA's 10 Principles for Net-Zero-Aligned Benchmarks

This means that the CIC Indices are a tool in the hands of Net-Zero aligned investors wishing to maximise the impact of their engagement efforts: from the outset of the engagement, capital is allocated to each company in a manner consistent with the stated Net-Zero alignment commitment of the investor. An effective reward mechanism for companies is implemented whereby improved corporate climate alignment translates into higher index weights, i.e. into increased capital allocation. It is our view that synergies between portfolio construction and engagement must be at the core of any investment policy that seeks climate change impact.

5. Account for Difference in Speed of Decarbonisation Across sectors and Geographies

For the CIC indices, a company's weight, i.e. the capital allocation it receives, does indeed depend on its past and planned decarbonisation efforts compared to its peers in the same sector. This ensures that the 7% annual decarbonisation pathway is implemented at the portfolio-level, while at the stock-level the differences in decarbonisation speeds between industries are accounted for. Moreover, we ensure that the capital allocation to sectors and regional blocks is in line with their market weights, thus avoiding macroeconomic biases and greenwashing that simply consists in underfunding carbon-intensive sectors or countries.

6. Ensure that Forward-Looking Indicators are a Key Input in the Decarbonisation Process

The assessment of a company's climate performance and efforts should indeed reflect both current and forward-looking aspects. In a transparent adjustment to each company's current performance, the CIC weighting scheme increases the weight of companies that have decarbonisation plans approved by the Science Based Targets initiative. The adjustment is higher for companies with more ambitious targets.

7. Every Index Universe Needs to Report on Climate Key Performance Indicators

Scientific Beta provides an in-depth climate and ESG reporting for all its indices, not only for its climate and ESG indices. In addition to exhaustive climate impact and climate risk key performance indicators, the reporting includes greenwashing metrics that we believe are key to analysing different climate investing strategies, as we will outline in more details in the second section of this paper.

In line with the recommendation that "asset owners should then be able to easily customise standard indices as needed" we offer extensive customisation capabilities to our clients. In effect, the vast majority of Scientific Beta's climate and ESG indices are customised to respect the specific requirements of our clients, which are mostly pension funds.

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8. Lack of Data Must be Correctly Addressed

We fully agree that stock weightings should differ between assessments based on company self-reported data and those for which they need to be estimated, lest "issuers can improve their standing by not providing the data". The CIC weighting rules do therefore include – as recommended – a "penalising mechanism for those issuers that fail to provide their data". This mechanism is severe, as companies in the most carbon intensive sectors may be excluded for failing to report their Scope 1 and 2 emissions, while in other sectors they are downweighted.

9. Key Metrics Should be Comparable to the Parent Index and Tracking Should be Practical

As highlighted above, the CIC indices weight stocks by comparing their climate performance with that of their peers in the same sector and they avoid macroeconomic biases in their capital allocations to different sectors and regional blocks. The sector-relative stock weighting scheme, which is entirely based on climate metrics and not diluted by other considerations, maximises the incentive of companies to do better than their peers on the climate front. At the same time, the macro-consistent allocation across sectors and regions results in moderate levels of tracking error, of about 2%.

Ensuring low transaction costs through high levels of investability has been a key feature of all Scientific Beta indices. It is a critical consideration since the indices we produce are not plain vanilla cap-weighted indices. We have developed a transparent methodology for estimating these costs, as outlined in the following paper. Based on these calculations we estimate, for example, the annual average transaction costs for replicating the SciBeta Developed Climate Impact Consistent index to be a mere 2 basis points.

When it comes to the recommendation that "To ensure a broad implementation, key metrics such as turnover (…) should be comparable to the parent index", this is neither necessary for low transaction costs, nor possible for a credible Net-Zero-Aligned Benchmark, if this parent index is taken to be a "broad traditional-market index". Indeed, broad cap-weighted indices have an incompressible level of turnover, simply resulting from corporate actions, IPOs/bankruptcies and minimum liquidity requirements. There is no turnover arising from deliberate investor choices, which is why tracking them is often called passive investing.

Unless the investor's current portfolio is already a Net-Zero-Aligned portfolio and unless the relative climate performances of issuers never change, shifting to a Net-Zero-Aligned Benchmark will incur turnover. This is not a design flaw, but how they reach their objective. Net-Zero-Aligned strategies are an active investment policy that must "emphasise GHG emissions reduction outcomes in the real economy". They cannot be a passive strategy that statically accepts the world as it is.

How CIC Indices Align with the NZAOA's 10 Principles for Net-Zero-Aligned Benchmarks

10. The benchmark Universes Should Incorporate Metrics for a Just Transition, Acknowledging that Appropriate Metrics are Still to be Refined

The Scientific Beta Core ESG Filter is applied to all CIC indices. It reflects the most consensus-based screening criteria applied by investors. It implements norms-based and negative screens which are grounded in global norms, including in the social dimension. Exclusions promoted by the Core ESG Filter send clear signals to companies and other stakeholders. Unlike best-in-class screening which are used in ESG integration strategies that mix ESG considerations, such as ESG scores, with traditional financial inputs in the portfolio construction process, the Core ESG Filter strictly guarantees the exclusion of companies that are known to violate ethical principles or minimum standards, irrespective of their overall ESG ratings or financial attractiveness.

The NZAOA acknowledges that appropriate metrics pertaining to a just climate transition still need to be refined. In that regard it will be important to avoid repeating some of the failures of traditional ESG scores, whose use can have perverse effects as we outlined in the following white paper.

How Paris Aligned Benchmarks Fail to Integrate the NZAOA Principles

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Contradiction with Principle 3

We already mentioned above how the PAB fossil fuel screens are in contradiction with Principle 3 that there should be "No mechanical exclusion of high emitting sectors (except thermal coal)". The regulation may at first glance seem to make a relevant distinction between the three main types of fossil fuels, coal, oil and gas[1], as the exclusion thresholds of 1%, 10% and 50% of revenues respectively indicate a consistent hierarchy. However, in practice, all companies in the fossil fuels sector in the Scientific Beta Global Universe of mid and large cap companies end up being excluded from PAB compliant indices.

The PAB requirements include another fossil-related exclusion, namely of companies "*that derive 50 % or more of their revenues from electricity generation with a GHG intensity of more than 100 g CO2 e/kWh*". As a result, electric utilities relying on fossil fuels for most of their activity are to be shunned.

All in all, as shown in Exhibit 1 below, the PAB fossil screens lead to the withdrawal of funding for companies representing about 35.8% of the renewable electricity generated in the global listed equity universe. This tightening of funding increases the cost of capital for these companies and hampers their ability to pursue further investments in renewable energies.

Exhibit 1: Share of total renewable electricity revenues generated by PAB-excluded companies

Share of renewable electricity revenue generated by companies excluded by the different PAB fossil fuels exclusion criteria	Developed Markets	Emerging Markets	Global Markets
No more than 1% of revenues from coal, 10% from oil, 50% from gas	7.4%	38.6%	14.1%
No more than 50% of revenues from electricity generation with a GHG intensity of more than 100 g CO2 e/kWh	29.3%	29.3%	29.3%
All four of the above PAB fossil fuels screening criteria (screening criteria may overlap for the same company)	32.8%	46.6%	35.8%

Scientific Beta universes as of the end of June 2022. Renewable electricity revenues sourced from ISS ESG. The shares are computed as the sum of revenues from renewable electricity generated by excluded companies, divided by the same revenues for all companies in the respective Scientific Beta universes. Revenues are trailing 12 months for the period ending 31 March 2022.

Contradiction with Principle 4

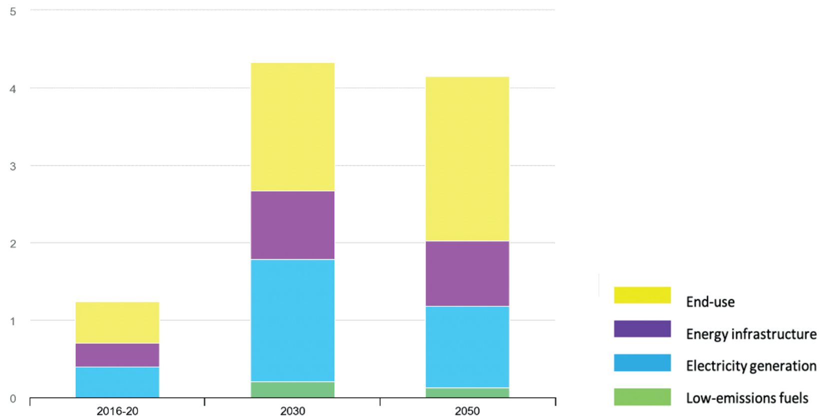
While such counterproductive effects are a direct consequence of the fossil-screening requirements of the PAB regulation, these requirements also allow for further greenwashing. In particular, many PAB compliant indices fail to reflect the NZAOA's Principle 4 that "Net-zero-aligned indices should correspond to real-economy decarbonisation".

The shift to an economy compatible with no more than 1.5°C warming will require massive investments, in particular in low-carbon electricity generation and storage and transmission infrastructure, as shown in the International Energy Agency's net zero projections in Exhibit 2 (see IEA (2021). Net Zero by 2050 A Roadmap for the Global Energy Sector, May)..

1 -Cf. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32020R1818. "Administrators of EU Paris-aligned Benchmarks shall exclude all of the following companies from those benchmarks: Article 12 (d) companies that derive 1 % or more of their revenues from exploration, mining, extraction, distribution or refining of hard coal and lignite; (e) companies that derive 10 % or more of their revenues from the exploration, extraction, distribution or refining of oil fuels; (f) companies that derive 50 % or more of their revenues from the exploration, extraction, manufacturing or distribution of gaseous fuels"

How Paris Aligned Benchmarks Fail to Integrate the NZAOA Principles

Exhibit 2: Clean energy investment in the net zero pathway, USD trillion



Source: IEA (2021). Net Zero by 2050 A Roadmap for the Global Energy Sector, May.

However, the real-economy outcome of many PAB-compliant indices is the exact opposite: less financing of electric utilities, not more. In a paper on detecting greenwashing in climate investing strategies, we show that typical methodologies used to construct climate indices lead to a drastic reduction in the capital allocation to the electric utilities sector. As demonstrated in Exhibit 3, whether the portfolios are built by tilting (over and underweighting stocks, relative to a standard cap-weighted benchmark, based on their carbon intensity measures) or by optimisation (using a portfolio optimiser to achieve an average carbon intensity reduction while minimising tracking error with respect to a standard cap-weighted benchmark), the outcome is a severe reduction in the weighting of electric utilities. Moreover, imposing the greenwashing constraint of the PAB, which prohibits the underweighting of high climate impact sectors in aggregate – as opposed to sector by sector – has almost no effect on this problem.

Exhibit 3: Representation of the electricity sector by strategy type

	Tilting strategies	Optimisation strategies
Unconstrained strategies		
Electricity sector absolute active weight	-2.2%	-2.5%
Electricity sector relative active weight	-81.0%	-90.5%
Strategies with aggregate constraint on high climate impact sectors		
Electricity sector absolute active weight	-2.2%	-2.4%
Electricity sector relative active weight	-79.0%	-89.4%

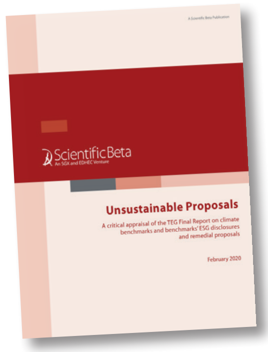
We report results for each strategy type, averaging across the 8 different climate scores we maintain. Our results thus provide a complete picture across the eight climate metrics. We note that results align very closely across the eight metrics so that averaging does not hide relevant information. We assess impact consistency measures once a year in June from 2011 to 2020 and report the average value. We thus provide a view on impact consistency observed on average over one decade. Electricity sector is from the Scientific Beta climate impact sector classification. Note: Index products may deviate from stylised strategies in important ways. Results derived for stylised strategies may not be applicable to index products, in particular in the case where index products employ additional constraints or rules which are not accounted for in the stylised strategies.

Further Reading

Further Reading

A Critical Appraisal of Recent EU Regulatory Developments Pertaining to Climate Indices and Sustainability Disclosures for Passive Investment Date

This paper examines the EU BMR regulation which introduces expensive ESG disclosures that do more to advance the interests of ESG data and services providers than sustainability.



Unsustainable Proposals

A critical appraisal of the TEG Final Report on climate benchmarks and benchmarks' ESG disclosures and remedial proposals.

Financing the Energy Transition: What is the Role of Fossil Fuels Divestment?

This paper illustrates the pitfalls of fossil fuels divestment policies by looking at the European Union's regulated Paris Aligned Benchmarks.

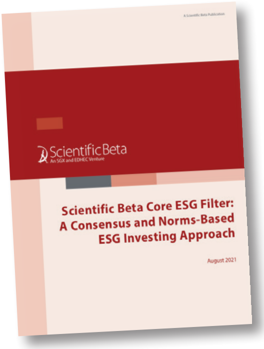
Climate Impact Consistent Indices: Making Portfolio Decisions and Climate Engagement Consistent

This paper presents the Scientific Beta Climate Impact Consistent (CIC) indices, whose bottom-up construction methodology ensures consistency between stock-level decisions and overall climate impact goals.

Scientific Beta Enhanced ESG Reporting – Supporting Incorporation of ESG Norms and Climate Change Issues in Investment Management

Paper focusing on Scientific Beta's Enhanced ESG Reporting framework, which covers ESG Norms, Climate Transition Risks, Climate Change and Greenwashing.

Further Reading



Scientific Beta Core ESG Filter: A Consensus and Norms-Based ESG Investing Approach

This paper describes, justifies and analyses Scientific Beta's Core ESG Filter that reflects the most consensus screening criteria applied by investors and is grounded in global norms.

Towards Cost Transparency: Estimating Transaction Costs for Smart Beta Strategies

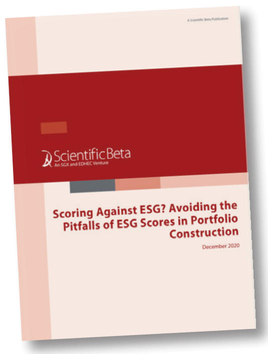
This paper computes transaction cost levels and net performance of investable smart beta indices and also analyses the main determinants of transaction costs.

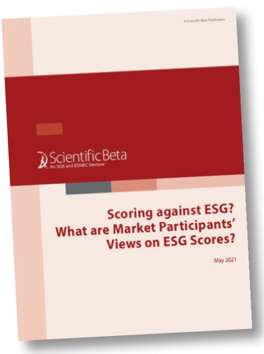
Doing Good or Feeling Good? Detecting Greenwashing in Climate Investing

This study identifies greenwashing risks in the construction of portfolios that represent popular climate strategies, especially those that correspond to net-zero alignment strategies.

Scoring against ESG? Avoiding the Pitfalls of ESG Scores in Portfolio Construction

Traditional ESG scores try to translate assessments across a host of criteria into one convenient number. This paper looks at the limitations of individual ESG scores and the problems with using portfolio-average ESG scores





Scoring against ESG? What are Market Participants' Views on ESG Scores?

The results of the survey analysing the extent of agreement and disagreement with the arguments put forward in the "Scoring against ESG? Avoiding the Pitfalls of ESG Scores in Portfolio Construction" white paper.

About Scientific Beta

About Scientific Beta

Scientific Beta's aim is to encourage the entire investment industry to adopt the latest advances in smart factor and ESG/climate index design and implementation. Our institution was established in December 2012 by EDHEC-Risk Institute, one of the top academic institutions in the field of fundamental and applied research for the investment industry, as part of its mission to transfer academic know-how to the financial industry. Scientific Beta brings the same concern for scientific rigour and veracity to all the services that it provides to investors and asset managers. We offer the smart factor and ESG/Climate solutions that are most proven scientifically, with full transparency of both methods and associated risks.

On 31 January 2020, Singapore Exchange (SGX) acquired a majority stake in Scientific Beta. SGX continues to support our strong collaboration with EDHEC Business School, and the principles of independent, empirical-based academic research that have benefited our development to date.

Scientific Beta has developed two types of expertise over the years, responding to two of the major challenges that investors face:
- Smart Beta and, more particularly, factor investing.
- ESG, in particular climate investing.

To date, Scientific Beta has made offerings with two major types of climate objective available to investors:

Since 2015, we have offered products with financial objectives that respect ESG and carbon constraints. These correspond to the application of exclusion filters, the design of which allows the financial characteristics of the index to be conserved. This involves reconciling financial objectives and compliance with ESG norms and climate obligations. As such, our Core ESG, Extended ESG and Low Carbon filters can be integrated into smart beta or cap-weighted offerings in line with the financial objectives targeted by the investor.

Since 2021, Scientific Beta has also offered indices with pure climate objectives (Climate Impact Consistent Indices) that enable climate exclusions and weightings to be combined in order to translate companies' climate alignment engagement into portfolio decisions.

Since it was acquired by SGX in January 2020, Scientific Beta has accelerated its investments in the area of Climate Investing as part of the SGX Sustainable Exchange strategy, which is mobilising an investment of SGD20 million. In addition, EDHEC and Scientific Beta have set up a EUR1 million/year ESG Research Chair at EDHEC Business School.

With the aim of providing worldwide client servicing, Scientific Beta has a presence in Boston, London, Nice, Singapore and Tokyo. As of 31 July 2022, our indices had USD52.47bn in assets under replication. Scientific Beta has a dedicated team of 55 people who cover not only client support from Nice, Singapore and Boston, but also the development, production and promotion of our index offering. Scientific Beta signed the United Nations-supported Principles for Responsible Investment on 27 September 2016. We became an associate member of the Institutional Investor Group on Climate Change on 9 April 2021.

About Scientific Beta

Today, Scientific Beta devotes more than 40% of its R&D investment to climate investing and more than 45% of its assets under replication refer to indices with an ESG or climate focus. As a complement to its own research, Scientific Beta supports an important research initiative developed by EDHEC on ESG and climate investing and cooperates with Moody's ESG and ISS ESG for the construction of its ESG and climate indices.

On 27 November 2018, Scientific Beta was presented with the Risk Award for Indexing Firm of the Year 2019 by the prestigious professional publication Risk Magazine. On 31 October 2019, Scientific Beta received the Professional Pensions Investment Award for "Equity Factor Index Provider of the Year 2019." On 2 February 2022, Scientific Beta was named "Best Specialist ESG Index Provider" at the ESG Investing Awards 2022.

Scientific Beta Publications

Scientific Beta Publications

2022 Publications

- Christiansen, E. Scientific Beta welcomes the NZAOA's Principles for Net-Zero-Aligned Benchmarks (December).
- Christiansen, E. Financing the Energy Transition: What is the Role of Fossil Fuels Divestment? (November).
- Mauguin, R. Scientific Beta Global Universe. (July).
- Christiansen, E., D. Aguet and N. Amenc. Climate Impact Consistent Indices. (March).
- Esakia, M and F. Goltz. Targeting Macroeconomic Exposures in Equity Portfolios: A Firm-Level Measurement Approach for Out-of-Sample Robustness. (February).

2021 Publications

- Amenc, N., G. Bruno and F. Goltz. Should ESG alpha Really be Positive? Assessing the Five Forces that Drive ESG Investment Returns. (December).
- Mahtani, R. Scientific Beta Enhanced ESG Reporting – Supporting Incorporation of ESG Norms and Climate Change Issues in Investment Management. (August).
- Bruno, G., M. Esakia and F. Goltz. "Honey, I Shrunk the ESG Alpha": Reactions of Investment Professionals (November).
- Amenc, N., F. Goltz, and V. Liu. Doing Good or Feeling Good? Detecting Greenwashing in Climate Investing (August).
- Aguet, D. Protecting your Equity Portfolio Against Inflation. (July).
- Christiansen, E., D. Aguet and N. Amenc. Scientific Beta Core ESG Filter: A Consensus and Norms-Based ESG Investing Approach. (August).
- Christiansen, E. Scoring against ESG? What are Market Participants' Views on ESG Scores? (May).
- Amenc, N., M. Esaki and F. Goltz. When Greenness is Mistaken for Alpha: Pitfalls in Constructing Low Carbon Equity Portfolios. (May).
- Bruno, G., M. Esakia and F. Goltz. "Honey, I Shrunk the ESG Alpha": Risk-Adjusting ESG Portfolio Returns. (April).
- Aguet, D., N. Amenc and F. Goltz. Reconciling Financial and Non-Financial Performance. (February).

2020 Publications

- Christiansen, E. and F. Ducoulombier. Scoring Against ESG? Avoiding the Pitfalls of ESG Scores in Portfolio Construction (December).
- Aguet, D. and E. Orecchini. Examining the Financial Performance and Risks of Smart Beta Strategies (December).
- Ducoulombier, F. A Critical Appraisal of Recent EU Regulatory Developments Pertaining to Climate Indices and Sustainability Disclosures for Passive Investment. (December).
- Amenc, N., Christiansen, E. and F. Ducoulombier. ESG and Climate Change Integration Philosophy and Capabilities. (November).
- Amenc, N., Christiansen, E. and F. Ducoulombier. Scientific Beta ESG Index Customisation Capabilities.

Scientific Beta Publications

(November).

• Ducoulombier, F. and V. Liu. Carbon intensity bumps on the way to net zero. (October).

• Ducoulombier, F. Understanding the Importance of Scope 3 Emissions and the Implications of Data Limitations. (October).

• Ducoulombier, F. A Critical Appraisal of Recent EU Regulatory Developments Pertaining to Climate Indices and Sustainability Disclosures for Passive Investment. (October).

• Aguet, D., N. Amenc and K. Schneider. Why Should Investors Stick with their Factor Strategies? (September).

• Korovilas, D. Single-Factor indices. (August).

• Aguet, D. and E. Christiansen. Scientific Beta Core ESG Filter: A Consensus and Norms-Based ESG Investing Approach. (July).

• Aguet, D., N. Amenc and E. Shirbini. Scientific Beta Factor Analytics Services (SB FAS) - A New Tool to Analyse and Improve your Portfolio. (June).

• Amenc, N., E. Christiansen, F. Ducoulombier, F.Goltz, and V. Liu. ESG Engagement and Divestment: Mutually Exclusive or Mutually Reinforcing? (May)

• Amenc, N. and D. Korovilas. Robustness of Smart Beta Strategies: a Competitor Overview. (May).

• Aguet, D., N. Amenc and E. Shirbini. Q1 2020 Performance Analysis. (April).

• Amenc, N., G. Bruno and F. Goltz. Crowding Risk in Smart Beta Strategies. (April).

• Amenc, N., G. Bruno and F. Goltz. Ten Misconceptions about Smart Beta. (March).

• Amenc, N., G. Bruno and F. Goltz. Investability of Scientific Beta Indices. (March).

• Amenc, N., and F. Ducoulombier. Unsustainable Proposals (February).

• Amenc, N., F. Goltz, and B. Luyten. Intangible Capital and the Value Factor: Has Your Value Definition Just Expired? (February).

• Amenc, N., F. Goltz, B. Luyten and D. Korovilas. Assessing the Robustness of Smart Beta Strategies. (February).

• Aguet, D., N. Amenc. Improving Portfolio Diversification with Single Factor Indices. (January).

• Aguet, D., N. Amenc and F. Goltz. Managing Sector Risk in Factor Investing. (January).

• Aguet, D., N. Amenc and F. Goltz. What Really Explains the Poor Performance of Factor Strategies Over the Last Four years? (January).

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For more information, please contact:
Séverine Cibelly on: +33 493 187 863 or by e-mail to: severine.cibelly@scientificbeta.com

Scientific Beta HQ & Asia-Pacific
2 Shenton Way
#02-02
SGX Centre I
Singapore 068804
Tel: +65 6713 7578

Scientific Beta R&D
393 promenade des Anglais
BP 3116 - 06202 Nice Cedex 3
France
Tel: +33 493 187 863

Scientific Beta—Europe
10 Fleet Place, Ludgate
London EC4M 7RB
United Kingdom
Tel: +44 207 332 5600

Scientific Beta Germany
ONE, Brüsseler Straße 1-3
Frankfurt, 60327
Germany

Scientific Beta—North America
One Boston Place, 201 Washington Street
Office 2606, Boston, MA 02108
United States
Tel: +1 857 239 8891

Scientific Beta—Japan
East Tower 4th Floor, Otemachi First Square
1-5-1 Otemachi, Chiyoda-ku,
Tokyo 100-0004
Japan
Tel: +81 352 191 418

Scientific Beta Abu Dhabi
Level 36, Etihad Towers
Tower 3, Corniche Road
Abu Dhabi
United Arab Emirates
Tel: +971 2 409 3015

Scientific Beta—Chicago
155 North Wacker Drive, Suite 4250
Chicago, IL 60606
United States
Tel: +1 312 803 4993

Scientific Beta—Melbourne
Level 27, 101 Collins Street
Melbourne Victoria 3000
Australia
Tel: +61 3 9653 6411

Scientific Beta—Sydney
Level 35, 100 Barangaroo Avenue
Sydney NSW 2000
Australia
Tel: +61 2 8114 4588

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