

# ISS STOXX<sup>®</sup> Biodiversity Indices: How to Incorporate Biodiversity Considerations in Index Construction

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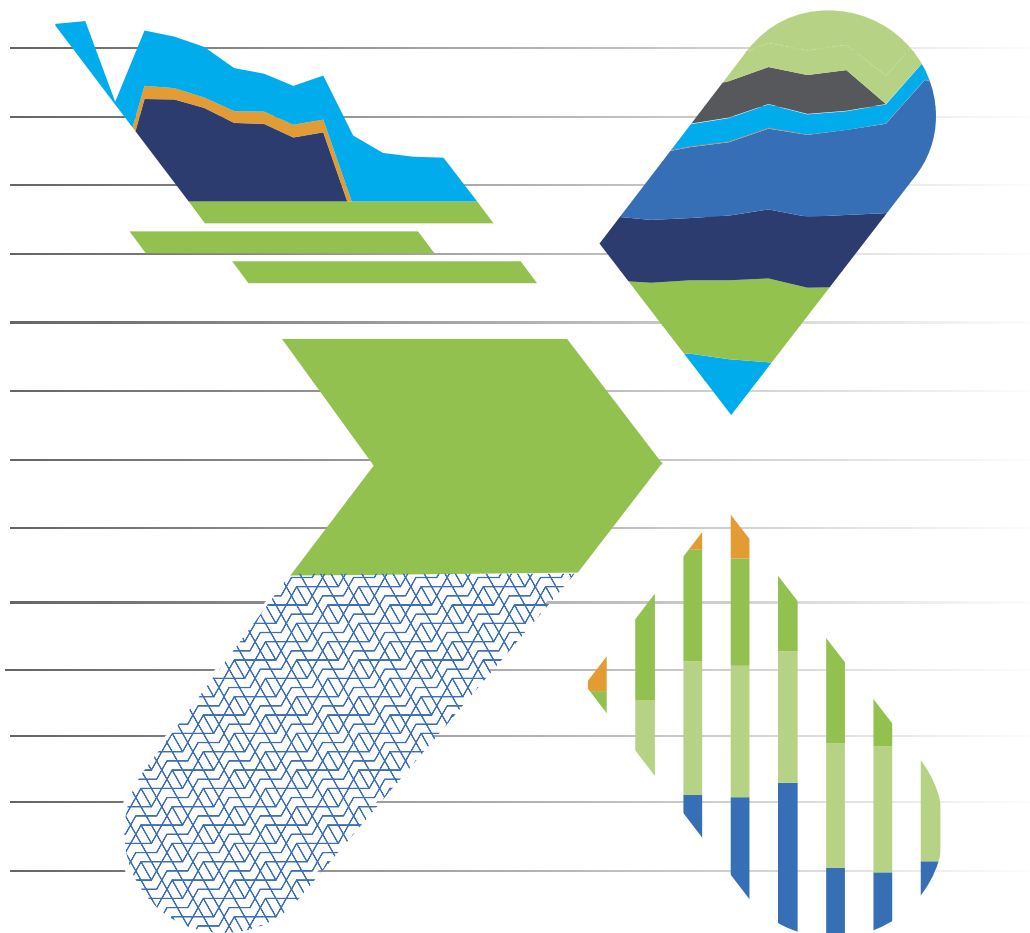
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**Table of Contents**

- 1. Introduction \_\_\_\_\_ 3
- 2. Biodiversity loss – Why investors should be concerned \_\_\_\_\_ 3
  - 2.1 The link to climate change \_\_\_\_\_ 4
  - 2.2 Consequences for investors and governments \_\_\_\_\_ 4
- 3. Biodiversity frameworks and regulation \_\_\_\_\_ 5
  - 3.1 Biodiversity risks and opportunities for investors \_\_\_\_\_ 6
- 4. Measuring companies’ impact on biodiversity \_\_\_\_\_ 7
- 5. How to include biodiversity in index construction \_\_\_\_\_ 8
  - 5.1 “Avoid” \_\_\_\_\_ 9
  - 5.2 “Minimize” \_\_\_\_\_ 11
  - 5.3 “Enable” \_\_\_\_\_ 15
  - 5.4 Carbon intensity reduction (“Decarbonize”) \_\_\_\_\_ 18
- 6. Assessing portfolio risks and opportunities \_\_\_\_\_ 19
- 7. Conclusion \_\_\_\_\_ 21
- 8. Appendix \_\_\_\_\_ 22
- 9. Contacts and further information \_\_\_\_\_ 27

## 1. Introduction

Biodiversity is the variety of life on Earth. Current and projected biodiversity loss poses an existential risk for industrial supply chains and hence potentially also for investors. A transition towards a more biodiversity-friendly and environmentally sustainable global market is therefore needed. At the same time, such a transition also offers opportunities for global investors.

According to the World Economic Forum (WEF), companies that develop nature-positive<sup>1</sup> solutions to protect biodiversity could potentially create USD 10 trillion in business opportunities and 395 million new jobs by 2030.<sup>2</sup> Access to new markets, shifts in consumer preferences, new products and services, and first-mover advantages when it comes to developing nature-based solutions are just some of the future opportunities that can be leveraged from addressing biodiversity loss.

Through the lens of the recently launched ISS STOXX Biodiversity Indices, this paper explores the rationale, methodology, and a portfolio level view of integrating biodiversity considerations in an investment process. The aim of the Biodiversity indices is to enable capital allocation to companies that minimize their biodiversity footprint and help our world's natural capital.

In this paper, we first show how companies' biodiversity impact can be measured and which metrics are available for incorporation in investable products. We then discuss how a wide range of "traditional" ESG screens, biodiversity-focused metrics and scores, and the United Nations Sustainable Development Goals (SDGs) can be taken into consideration and incorporated during index construction. The paper provides a comprehensive, multidimensional analysis of the effect of these considerations on the index in terms of industry allocation, decarbonization, risk and return performance.

The rationale and limitations behind each step are explained using the ISS STOXX Biodiversity index suite framework, and the results of the indices are shown at the end.

## 2. Biodiversity loss – Why investors should be concerned

Biodiversity plays a vital role in supporting life on Earth, including human societies and economic activity. In 2020, the World Economic Forum ranked biodiversity loss and ecosystem collapse as one of the top five threats facing humanity over the next decade. Businesses are more dependent on nature than previously thought, with approximately USD 44 trillion of economic value generation moderately or highly dependent on nature.<sup>1</sup>

To give just a few examples, pollination, water purification and soil fertility are all services provided by the ecosystem. Around 75% of global food crops rely on pollination. One-quarter of all the drugs used in modern medicine come from nature, including 70% of cancer medicines.<sup>2</sup> Forests help fight climate change because they are the largest terrestrial carbon sinks, absorbing a net 7.6 billion tonnes of CO<sub>2</sub> per year – 1.5 times more carbon than the USA emits annually.<sup>3</sup> Lower rates of biodiversity have also been linked to an increase in the proliferation of new diseases. Urbanization and deforestation are reducing the number of ecosystems, requiring animals to live in proximity to humans and increasing the risk of outbreaks.

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<sup>1</sup> World Economic Forum (2020), "[Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy.](#)"

<sup>2</sup> World Economic Forum (2020), "[Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy.](#)"

<sup>3</sup> World Economic Forum (2021), "[Climate change: Are forests carbon sinks or carbon sources?](#)"

## 2.1 The link to climate change

The assessment reports from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES),<sup>4</sup> and the Intergovernmental Panel on Climate Change (IPCC)<sup>5</sup> unambiguously document the link between climate change and the degradation of biodiversity.

According to these reports, the human population has doubled over the last 50 years, reaching eight billion people in November 2022. The world economy has grown nearly fourfold and global trade has grown tenfold. All this has dramatically increased demand for energy and materials. Economic incentives have generally favoured expanding activity, something that is often with environmental harm rather than conservation or restoration.

In addition to a sharp increase in greenhouse gas emissions, mean global temperatures and the frequency of extreme weather events, this population increase has led to habitat conversion, environmental degradation resulting from land use change, pollution and the introduction of invasive species. All these developments have expanded the number of species threatened with extinction.

Land use change is currently the biggest threat to nature. However, if we are unable to limit warming to 1.5°C below pre-industrial levels, climate change is likely to become the dominant cause of biodiversity loss in the coming decades.

Climate change is also affecting marine life. Higher levels of CO<sub>2</sub> in the atmosphere are dissolving into the ocean, lowering its pH and leading to acidification. Moreover, just as climate change can alter ecosystems and habitats, biodiversity loss can contribute to climate change and intensify its effects. For example, the destruction of marine species reduces the capacity of the ocean to sequester carbon dioxide from the atmosphere, speeding up global warming<sup>6</sup>.

## 2.2 Consequences for investors and governments

Biodiversity loss has significant economic consequences for investors and governments. This is increasingly being reflected in both national accounting systems and corporate financial reporting, as many businesses are at risk. The largest industries that are highly dependent on nature are construction, agriculture and fisheries, and food and beverages. Taken together, these sectors generate USD 8 trillion of gross value added – twice the size of the entire German economy.<sup>7</sup>

As highlighted by the European Insurance and Occupational Pensions Authority (EIOPA) in their recent publication, the buildup of economic effects at the micro level, such as within individual businesses, has the potential to influence the meso level, which pertains to local government and communal spheres. Moreover, when these effects manifest on a larger spectrum, encompassing countrywide, regional, or global dimensions, they give rise to macroeconomic consequences. These encompass disruptions across economy-wide value chains, fluctuations in raw material prices, adaptations or shifts in business operations, as well as heightened rates of capital depreciation.<sup>8</sup>

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<sup>4</sup> IPBES (2019). [Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services \(Version 1\)](#)

<sup>5</sup> IPCC (2021), "[Climate Change 2021: The Physical Science Basis](#)," [Summary for Policymakers](#) (p. 32). IPCC (2022), "[Climate Change 2022: Impacts, Adaptation and Vulnerability](#)," [Summary for Policymakers](#). IPCC (2022), "[Climate Change 2022: Mitigation of Climate Change](#)," [Summary for Policymakers](#).

<sup>6</sup> IPBES – IPCC Co-Sponsored Workshop (2021), "[Biodiversity and Climate Change. Scientific Outcome](#)".

<sup>7</sup> World Economic Forum (2020), "[Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy](#)"

<sup>8</sup> [EIOPA Staff paper on naturerelated risks and impacts for insurance, 2023](#)

Interest in biodiversity is growing among both investors and consumers. Recent developments in biodiversity policies and legislation plus better data are making biodiversity one of the fastest-developing topics around. At the same time, investors are starting to recognize the value of, and opportunities offered by, biodiversity.

For companies that are lagging in transitioning to sustainable solutions, greater policy-level and legislative intervention is expected to translate to an increased cost of doing business. These organizations will also face direct threats from physical and reputational risk. At the same time, biodiversity risk is increasingly becoming a more prominent feature of the investment process – in part aided by the recent developments in corporate biodiversity impact datasets that are usable by investors.

Conversely, companies trying to solve the biodiversity crisis can expect significant opportunities from sustainable growth. The Food and Land Use Coalition (FOLU), a self-governed community of organizations and individuals which is committed to support the transformation of food and land use for nature, climate and people, has identified a remarkable opportunity to transform food and land use systems that has the potential to create new business opportunities worth up to USD 4.5 trillion a year by 2030.<sup>9</sup> The multiple causes of biodiversity loss mean that there is potential for a number of different solutions. Examples are vertical farming, organic farming, reduced packaging and less harmful chemical formulations. This suite of solutions is expected to become attractive to an increasingly broad range of investors, accelerating growth in the markets concerned.

Biodiversity has been identified as an emerging megatrend. Innovation will drive new solutions and new business opportunities over the next decades that will generate long-term alpha. In addition to this and to protecting biodiversity, allocating capital to biodiversity solutions could help investors hedge against risks arising from the transition to a more sustainable global economy.

### 3. Biodiversity frameworks and regulation

Numerous biodiversity policies and pieces of legislation are already in place, and significant international and regional frameworks are being developed. These include the Post-2020 Global Biodiversity Framework, which is being developed under the United Nations (UN) Convention on Biological Diversity, and the EU's Biodiversity Strategy for 2030. Additionally, Biodiversity conservation is one of the EU Taxonomy Regulation's six environmental objectives. However, biodiversity-specific regulations focusing on corporate disclosure and risk management are not as prevalent as they are for the climate agenda.

The formation of the Taskforce on Nature-related Financial Disclosures (TNFD) represents an important step forward in closing this gap and recognizing the links between nature and finance. The TNFD – an informal working group consisting of 74 organizations including financial institutions, corporates, governments, regulatory bodies, think tanks and consortia – is building on the success of the Task Force on Climate-related Financial Disclosures (TCFD). It aims to help financial institutions and corporates worldwide incorporate nature-related risks and opportunities into their strategic planning, risk management and asset allocation decisions. By pooling existing tools, materials and information, the TNFD aims to promote consistency in reporting on nature-related factors. The initiative recognizes the significance of nature and biodiversity in the global economy, emphasizing the need for organizations to understand and address the impacts of their operations on ecosystems. The TNFD delivered a framework for organizations to report and act on evolving nature-related risks and opportunities in September 2023. The ultimate goal is to direct global financial flows toward nature-positive outcomes.

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<sup>9</sup> The Food and Land Use Coalition (FOLU) (2019), [“Growing Better: Ten Critical Transitions to Transform Food and Land Use”](#)

As of May 2021, Article 29 of the French Energy-Climate Law mandates that certain financial institutions<sup>10</sup> in the country disclose risks associated with biodiversity and the climate, and that they apply the principle of double materiality. Entities are required to present a strategy that aligns with long-term biodiversity objectives. This strategy should detail the chosen value chain scope and include targets for 2030, with updates every five years. The strategy must encompass:

- a) an evaluation of adherence to the Convention on Biological Diversity goals;
- b) an examination of efforts to mitigate primary strains and effects on biodiversity as outlined by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services; and
- c) reference to the utilization of a biodiversity footprint indicator, and detailing its application in gauging alignment with global biodiversity goals, if relevant.

Most recently, at the 15th conference of the UN Convention on Biological Diversity (COP 15) that was held in Montreal in December 2022, 196 states reached a landmark agreement to protect and restore 30% of the world's land and water by 2030. Many observers feel that this Kunming-Montreal Global Biodiversity Framework (GBF) agreement could do for biodiversity what the Paris Agreement did for the climate: It put biodiversity on mainstream investors' agenda and provided a strategic direction for investment flows. These developments clearly show that biodiversity is beginning to be taken into consideration more and more from a legislative standpoint.

### 3.1 Biodiversity risks and opportunities for investors

The recent progress made with regulation, improved understanding of biodiversity risks and increased data availability means we can now explore how investors can effectively incorporate biodiversity considerations into their investment strategies. Market solutions are emerging from a number of different perspectives including risk management, generating new sources of revenue and addressing real-world impacts. It is essential when starting out to determine the specific objective of these investments. Investors should reflect on whether they are looking for companies that:

- Effectively manage any significant biodiversity risks they may face
- Minimize their adverse impact on biodiversity
- Offer products and services that contribute to biodiversity solutions

By clarifying their investment goals in relation to biodiversity, investors can better navigate the options available to them and make informed decisions that are aligned with their desired outcomes.

In line with the above considerations, STOXX partnered with ISS to use their biodiversity impact measurement methodology in creating a series of biodiversity focused indices. These indices screen out companies whose products, services and operations cause significant harm to biodiversity, and select companies on the basis of how they are enabling the achievement of biodiversity linked SDGs. Additional considerations were made to include metrics related to climate performance, since the two issues are intricately linked.

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<sup>10</sup> List of institutions included here: <https://www.tresor.economie.gouv.fr/Articles/2021/06/08/publication-of-the-implementing-decree-of-article-29-of-the-energy-climate-law-on-non-financial-reporting-by-market-players>

## 4. Measuring companies' impact on biodiversity

ISS ESG has developed its Biodiversity Impact Assessment Tool to assist investors in meeting their reporting requirements and aligning with biodiversity targets. The Biodiversity Impact Assessment Tool assesses the impacts of corporates on biodiversity by considering a set of environmental pressures on species and habitats across the entire value chain and different geographical locations. The tool leverages 600+ individual factors derived from millions of individual data points (see Appendix Figure A 1: The ISS ESG Biodiversity Impact Assessment Tool model – The five key steps). As of June 2023, more than 17,000 issuers around the world were covered by the dataset, enabling investors to better understand and assess biodiversity risk in their portfolios in alignment with two (Table 1) of the most widely accepted biodiversity assessment metrics.

**Table 1:** Potentially disappeared fraction of species and mean species abundance.

	Potentially disappeared fraction of species (PDF)	Mean species abundance (MSA)
<b>Definition</b>	Quantifies the potential decline in species richness in an area over a defined period due to unfavorable conditions associated with environmental pressures. Species richness refers to the number of unique species in an area. All species are weighted equally.	Quantifies the mean abundance of original species relative to their abundance in undisturbed ecosystems. Species abundance refers to the total number of organisms in a given species. All species are valued equally.
<b>Components</b>	Change in species richness, area size, time.	Change in species abundance, area size, time.
<b>Measurement</b>	PDF measures the Potentially Disappeared Fraction of species in a dedicated area over a certain period of time. PDF value of 1 (or 100%) means full destruction of biodiversity in a given area; 0% means total preservation from human activities. The higher the PDF, the greater the damage to biodiversity.  The ISS ESG Biodiversity Impact Assessment Tool PDF biodiversity metric is defined in the unit PDF.km <sup>2</sup> .yr.	MSA describes the abundance of species remaining compared to the pristine state. A 100% MSA means that the ecosystem is intact and equal to the undisturbed, original state; 0% means that an area has completely lost its original biodiversity.  In the case of the ISS ESG Biodiversity Impact Assessment Tool MSA biodiversity metric, a negative impact on biodiversity (MSA loss) is defined in the unit MSA.km <sup>2</sup> .

Source: ISS ESG

Both PDF and MSA are two comparable and widely used metrics as relative biodiversity loss indicators. Both look at the biodiversity angle through differing lens (species richness vs abundance), and the relationship between impacts on species richness (PDF) and species abundances (MSA) varies across ecosystems and pressure types and intensities. Due to the complex nature of biodiversity, there is no single metric that can capture all its aspects. Although investors have a wide range of biodiversity impact metrics at their disposal, no industry-wide framework specifying how to use these metrics for risk management, reporting and decision-making has yet been defined.

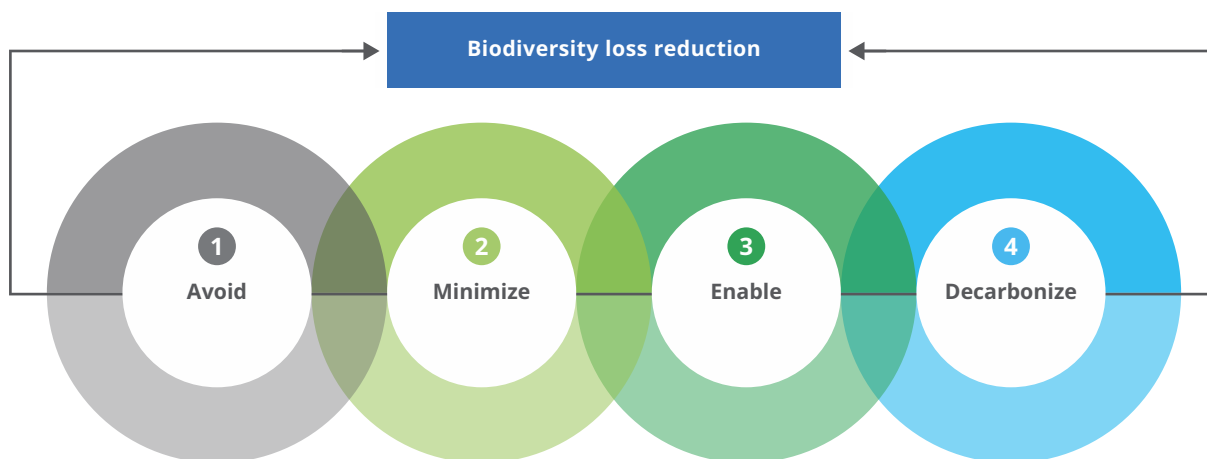
## 5. How to include biodiversity in index construction

STOXX partnered with ISS, to develop the ISS STOXX Biodiversity index suite, a family of indices that addresses biodiversity using a robust framework comprising three main goals (“Avoid”, “Minimize” and “Enable”) plus an additional carbon intensity reduction step (“Decarbonize”).

The main goal of the index suite is to enable investors to allocate capital to companies with more sustainable practices and a lower biodiversity impact compared to their peers using two distinct categories of indices: the broad “Biodiversity” and the thematic “Biodiversity Leaders” indices.

The index framework (Figure 1) is also flexible enough to address specific investor needs and to be used as the underlying for ETFs, funds, institutional mandates, structured products and listed derivatives. The ISS STOXX Biodiversity index suite is composed of seven broad indices and one thematic index (see Appendix, Table A2) and is based on the STOXX World and other STOXX flagship benchmarks. It also uses several ISS ESG datasets including the new ISS ESG Biodiversity Impact Assessment Tool), which assesses and quantifies companies’ potential impacts on biodiversity.

**Figure 1:** The ISS STOXX Biodiversity indices framework.



Source: STOXX

Not only do the indices exclude companies that are involved in controversial activities and that have a more pronounced negative impact on biodiversity compared to their peers, they also provide exposure to companies that are considered to be contributing positively to selected UN SDGs. This is done either by looking at the entire value chain or by focusing on companies that generate significant revenues from products and services that contribute to biodiversity/climate conservation (see Appendix, Table A3 for the detailed methodology).



The ISS STOXX Biodiversity framework considers specific filters for potential eligibility under Article 8 or Article 9 of the Sustainable Finance Disclosure Regulation (SFDR)<sup>11</sup> according to STOXX's Sustainable Investment methodology.<sup>12</sup> Indices in the broad Biodiversity category comply with current Article 8 requirements (see Table A4 in the Appendix), while those in the Leaders cluster are aligned with the SFDR's more ambitious Article 9 in its current form. They are identified by applying all Article 8 filters and selecting only those companies that derive at least 20% of their revenues from products and services that make a positive net contribution to all SDGs.

The following sections explore in detail how each step of the framework was put together and why certain measures were taken during construction of the ISS STOXX Biodiversity index suite. To aid discussion, all figures refer to STOXX World AC<sup>13</sup>-derived versions for both the thematic and the broad biodiversity indices. Both types of indices have a minimum average daily traded volume (ADTV) screen of EUR 3 million. The STOXX World AC Biodiversity (broad) components are capped at UCITS<sup>14</sup> bounds (4.5/8/35) while the STOXX World AC Biodiversity Leaders (thematic) components are capped at a maximum weight of 4%, to guarantee minimum liquidity and diversification characteristics.<sup>15</sup>

## 5.1 "Avoid"

The "Avoid" step in the ISS STOXX Biodiversity indices methodology aims to exclude companies classified by ISS as violating the OECD Guidelines for Multinational Enterprises/the UN Global Compact or being involved in harmful activities. These screens are aligned with both the STOXX ESG framework and Article 8 of the SFDR ("light green") using good governance and "do no significant harm" (DNSH) screens – UNGC, controversies, controversial weapons, tobacco and thermal coal – as a basis (see Table A4 in the Appendix). Additional biodiversity-targeted screens were included to ensure that economic activities are not detrimental to the ecosystem and the status of the habitat and species. These include unsustainable palm oil, pesticides, animal welfare and tighter unconventional oil and gas screens (see Table A3 in the Appendix for a full list of screens and thresholds).

**Palm oil** – Companies with unsustainable palm oil-derived revenues are excluded. Palm oil-derived revenues are considered unsustainable if they are not at least 75% RSPO Certified. Roundtable on Sustainable Palm Oil (RSPO) Certification provides assurance that the company concerned has committed to, and complied with, sustainability requirements, that it can correctly claim to be certified, and that it communicates this throughout the supply chain.<sup>16</sup>

**Genetically modified organisms (GMOs)** – Companies that are involved in the production of genetically modified plants and/or animals for agricultural use are excluded, due to the possible impact of GMOs and related agricultural practices on genetic diversity and the lack of ways to minimize their influence on biodiversity. In recent times, genetic engineering has offered a way to accelerate the production

<sup>11</sup> The Sustainable Finance Disclosure Regulation (SFDR) is a European regulation introduced to improve transparency in the market for sustainable investment products. <https://www.eurosif.org/policies/sfdr/>

<sup>12</sup> <https://qontigo.com/wp-content/uploads/2023/04/Qontigos-SFDR-Article-217-Sustainable-Investment-Methodology.pdf>

<sup>13</sup> The STOXX World AC index is a broad, market cap-weighted index designed to represent the performance of the large and mid-cap companies from developed and emerging markets that account for approximately 85% of total investable market capitalization. <https://qontigo.com/index/swp/>

<sup>14</sup> <https://www.efama.org/policy/eu-fund-regulation/ucits>

<sup>15</sup> For more details, please see the Index Methodology guide: [https://www.stoxx.com/documents/stoxxnet/Documents/Indices/Common/Indexguide/stoxx\\_index\\_guide.pdf](https://www.stoxx.com/documents/stoxxnet/Documents/Indices/Common/Indexguide/stoxx_index_guide.pdf)

<sup>16</sup> Roundtable on Sustainable Palm Oil (RSPO) Certification, <https://rspo.org/as-an-organisation/certification/>

of desired agricultural products, such as crops that grow faster, resist pests and provide more nutritious food sources.<sup>17</sup> Although there is no consensus on global regulation regarding the usage of GMOs, scientists and ecologists are aware of the potential impact that genetic modifications can produce.<sup>18</sup>

While GMOs seem to offer many benefits, their production has raised concern regarding potential human health and ecological impacts.<sup>19</sup> From a consumer point of view, uncertainties around the adverse effects of GM foods on humans are mainly due to the lack of a concise explanation from the scientific community regarding the biological techniques involved in the production of such foods, but also to health risks such as toxicity, genetic hazards or allergic reactions due to the underlying modifications of some foods. In the scientific community, key concerns relate to antibiotics resistance and dominant modified species,<sup>20</sup> which can overrun existing ones. If GMOs are improperly disseminated – either by escaping or by being released into the natural environment – they can drive the reduction in genetic diversity among plants and animals, and also pose challenges during environmental changes.<sup>21</sup>

**Hazardous pesticides** – Companies that are involved in the production of pesticides with technical grade active ingredients (TGAIs) that have been classified by the World Health Organization (WHO)<sup>22</sup> as “extremely hazardous” or “highly hazardous” are excluded from selection.

**Animal welfare** – Companies that are involved in factory farming, the live export of animals, fur production and animal testing for non-pharmaceutical purposes are excluded. This covers activities such as intensive agricultural operations for food production, the live export of animals for food consumption, the production of fur and exotic leather, and live animal testing that is not related to pharmaceutical drugs.

Figure 2 provides a clear comparison of the impact from biodiversity-related screens using the remaining ESG screens – international standards and controversial weapons (ISCW) and product involvement (PI) screens – across the benchmark’s industry weights.

<sup>17</sup> Oliver, Melvin J., PhD. Why We Need GMO Crops in Agriculture. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6173531/>

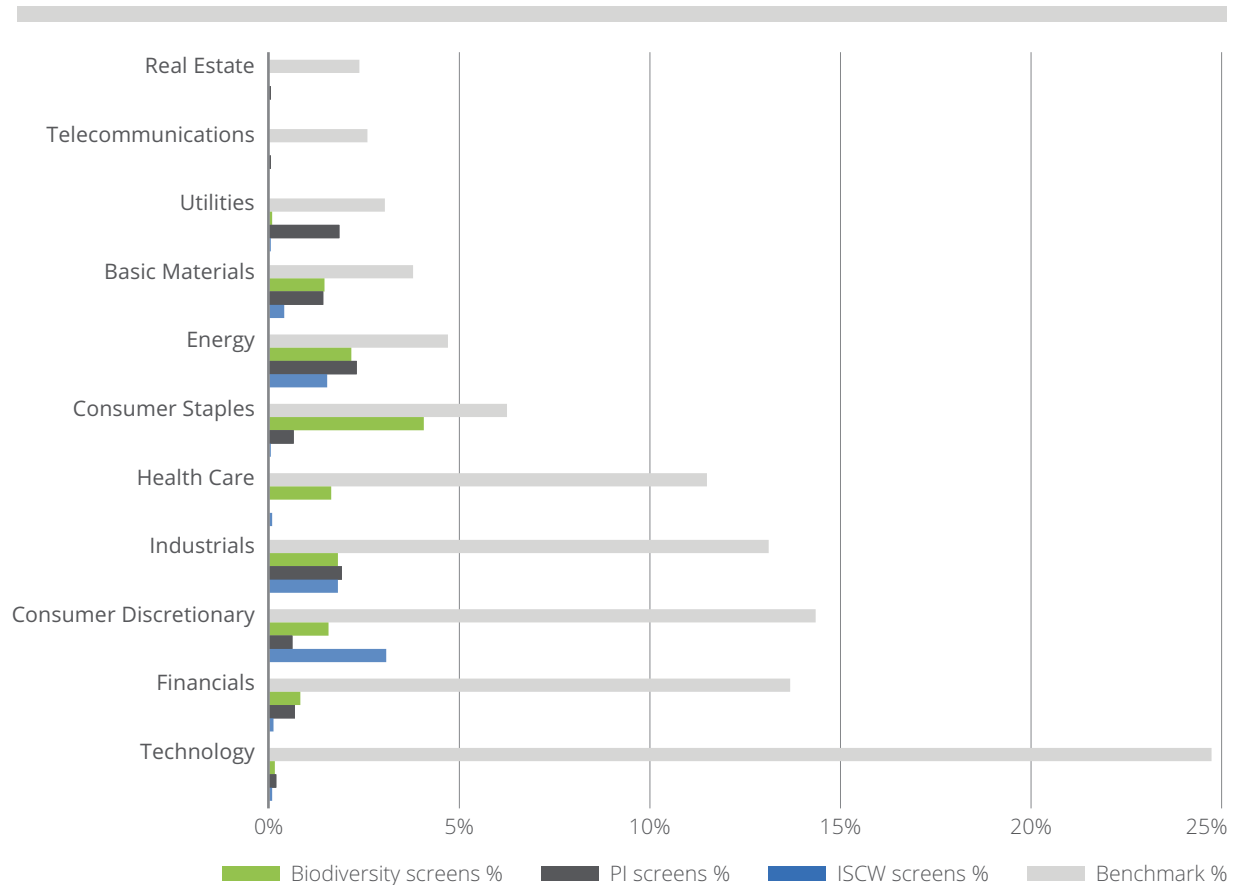
<sup>18</sup> Heather, L. Challenging Evolution: How GMOs Can Influence Genetic Diversity. <https://sitn.hms.harvard.edu/flash/2015/challenging-evolution-how-gmos-can-influence-genetic-diversity/>

<sup>19</sup> Zhang, Chen; Wohlhueter, Robert, Zhang, Han. Genetically modified foods: A critical review of their promise and problems. <https://www.sciencedirect.com/science/article/pii/S2213453016300295>

<sup>20</sup> Robert H. Devlin and others, “Assessing Ecological and Evolutionary Consequences of Growth-Accelerated Genetically Engineered Fishes”, *BioScience*, Volume 65, Issue 7, 01 July 2015, Pages 685–700, <https://doi.org/10.1093/biosci/biv068>

<sup>21</sup> Haas, B., Kamoun, S., Zody, M. et al. “Genome sequence and analysis of the Irish potato famine pathogen *Phytophthora infestans*.” *Nature* 461, 393–398 (2009). <https://doi.org/10.1038/nature08358>

<sup>22</sup> “The WHO Recommended Classification of Pesticides by Hazard and Guidelines to Classification 2019.” <https://apps.who.int/iris/bitstream/handle/10665/332193/9789240005662-eng.pdf>

**Figure 2:** “Avoid” screens – STOXX World AC industry impact in weight percent.

Source: ICB, ISS ESG and STOXX as of June 2023 review

There is a substantial overlap between the ISCW and PI screens and the added biodiversity screens within industries such as Basic Materials, Energy and Financials. However, traditional ESG screens tend to exclude more companies within Utilities, Industrials and Consumer Discretionary, whereas biodiversity screens target a higher weight percentage of companies within Consumer Staples and Health Care. This can also be seen in region-specific indices such as those for the USA, Europe and emerging markets.

## 5.2 “Minimize”

Although screening is a crucial step in avoiding companies involved in controversial products and/or activities that are detrimental to biodiversity, it does not guarantee that those companies that impact biodiversity the least when doing business are selected. The “Minimize” component of the ISS STOXX Biodiversity indices methodology allows investors to allocate their capital to companies with better biodiversity assessments by selecting candidates from the starting universe that have a lower negative impact on biodiversity than their sector peers. This is done using ISS ESG’s Biodiversity Impact Assessment Tool Potential Disappearing Fraction (PDF) metric to measure the biodiversity impact.

Companies with larger activities and operations (country coverage, supply chains, greater input/output, etc.) tend to have a greater impact on biodiversity. This makes it imperative to take the characteristics of each company into consideration and to normalize their biodiversity impact according to their size.

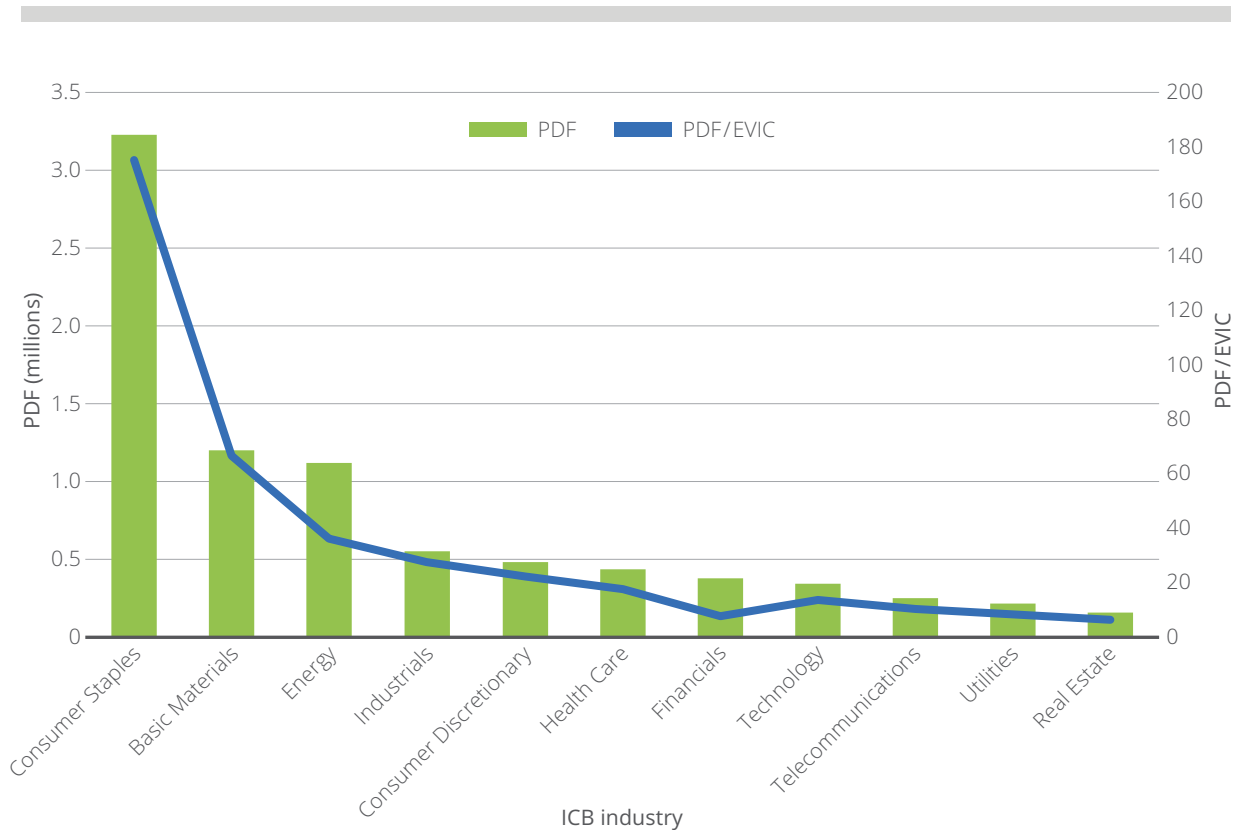
The most common metrics used to account for the size of a company are revenue and enterprise value. As industry frameworks continue to evolve, investors are increasingly moving from revenue-based metrics towards metrics that are based on the enterprise value including cash (EVIC).

EVIC is one of the commonly used financial metrics that assess a company's total value on the basis of corporate data (including the market value of equity – the most common approach used in the financial sector to determine company ownership – and the total book value of debt). This data is generally available to the market and is expected to improve further going forward thanks to the EU Benchmark Regulation, which will encourage data providers to collect EVIC data. EVIC also avoids issues associated with negative enterprise values by including cash (rather than deducting it as in the regular definition of enterprise values) and with some companies' lack of revenues.

Since larger companies generally tend to have higher PDF scores, the main reason to use EVIC in the denominator is to normalize the PDF and scale the metric in line with the company's economic activities. PDF/EVIC avoids biases towards smaller companies with smaller PDF scores. The size effect can be seen by looking at Energy and Basic Materials, for example. The PDFs for these sectors are approximately the same, but the Energy sector has a much lower PDF/EVIC ratio. The larger size of energy companies means that the average PDF/EVIC decreases substantially compared to other industries.

Companies with a high impact on biodiversity exist in many industries that are crucial to society. While energy companies' impact on biodiversity is in the spotlight due to the nature of their business (coal mining or oil extraction, for example), data shows that companies in other valuable industries can also significantly impact biodiversity. These industries include agriculture, transportation, building materials and natural resources extraction – all of which are also heavily reliant on natural capital resources.

A look at Figure 3 reveals that Consumer Staples is the ICB industry with the highest average PDF/EVIC and PDF in our sample. It is followed by industries such as Basic Materials, Energy and Industrials. A negative screening approach to PDF/EVIC that did not consider the context of the business in which individual companies are involved would have resulted in significant and undesirable industry weight shifts away from high biodiversity impact industries, such as Consumer Staples, Basic Materials and Energy, into low-impact sectors such as Real Estate, Financials and Technology. This would essentially greenwash the portfolio.

**Figure 3:** Average PDF vs. PDF/EVIC – An industry comparison.

Source: ICB, ISS ESG and STOXX as of June 2023 review

A positive best-in-class screening based on PDF/EVIC, on the other hand, captures those companies that produce the lowest possible impact on biodiversity when performing a particular activity compared to their peers.

Our research show that divergences within the same industry are mainly due to the nature of the companies' business at a lower level (ICB sector level). Therefore, the ISS STOXX Biodiversity indices conduct peer comparisons based on PDF/EVIC screens at the ICB sector level (see Table 2). The example of Consumer Staples demonstrates why this is desirable.

**Table 2:** PDF/EVIC – ICB industries versus ICB sectors.

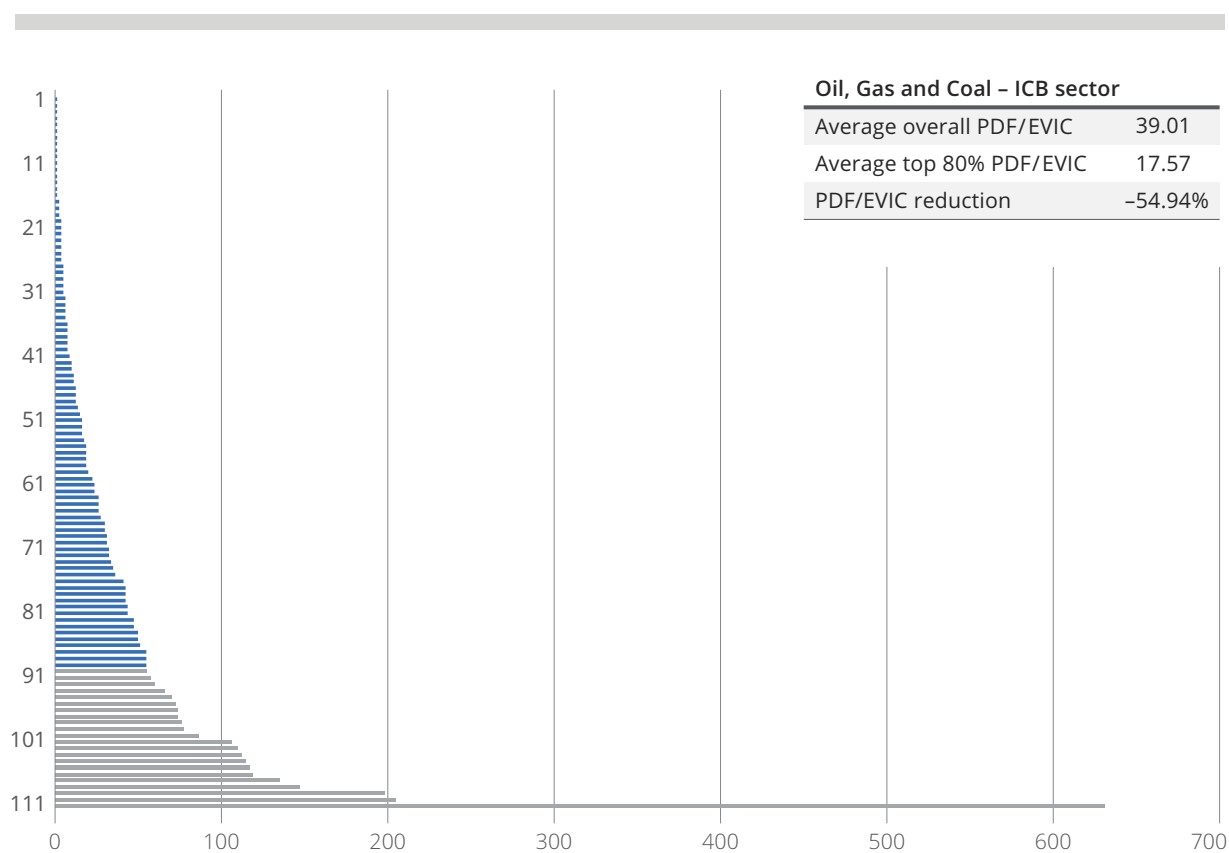
Industry	Sector	PDF	PDF/EVIC
Consumer Staples	Food Producers	5,705,682.4	345.0
Consumer Staples	Beverages	3,163,585.1	131.2
Consumer Staples	Tobacco	1,075,384.5	41.7
Consumer Staples	Personal Care, Drug and Grocery Stores	760,679.2	32.0

Source: ICB, ISS ESG and STOXX as of June 2023 review

As of June 2023, if the ICB industry level had been chosen as the basis for the best-in-class comparison, companies in the Tobacco sector would have been preferred over food and beverage producers. This would have created an undesired bias towards a completely different business activity and would not have captured the companies in the individual businesses that have the largest impact on biodiversity. Food Producers and Beverages (producers) have higher PDF scores due to their heavier reliance on natural capital to generate their products. By comparison, the Tobacco and Personal Care, Drug and Grocery Stores sectors are less reliant on nature exploitation, and hence have a less negative impact on biodiversity. A more granular ICB sector level and the use of EVIC as a biodiversity impact scaling metric was preferred, due to both the PDF/EVIC scores' dispersion within the ICB industries and the different size factors explained previously.

The use of a fixed number of companies ("top x") or a relative threshold ("top x%") are common best-in-class selection approaches. The latter was adopted in the "Minimize" component of the ISS STOXX Biodiversity indices, since some sectors consist of more companies than others. For example, Aerospace and Defense has 38 companies but Banks has 249. Ranking the companies' PDF/EVIC within their respective ICB sectors (from the lowest PDF/EVIC score to the highest) and choosing the top 80% resulted on average in a 50% reduction in the PDF/EVIC within each ICB sector. This substantial decrease is mainly driven by the fact that the companies with the largest biodiversity impact are concentrated at the bottom of each ICB sector (see Figure 4). This can be observed by taking a closer look at the Oil, Gas and Coal ICB sector and the respective PDF/EVIC ranking distribution.

**Figure 4:** Oil, Gas and Coal – PDF/EVIC rankings.



Source: ICB, ISS ESG and STOXX as of June 2023 review

### 5.3 “Enable”

Both the “Avoid” and the “Minimize” steps ensure that companies in the portfolio are not involved in controversial products and/or activities that are detrimental to biodiversity, while also ensuring that the companies in each sector are those with the lowest impact on biodiversity compared to their peers. The “Enable” step of the ISS STOXX Biodiversity indices methodology further improves on this by selecting companies that have been classified by ISS as having a high positive impact on biodiversity in the form of selected United Nations Sustainable Development Goals. These SDGs are a set of 17 interlinked objectives grouped in three major dimensions (environmental, social and economic) that were introduced by the United Nations in 2015 as a “blueprint to achieve a better and more sustainable future for all”.<sup>23</sup> The goals are part of the UN’s 2030 Agenda for Sustainable Development, which addresses poverty, inequality, climate change, environmental degradation, peace, justice and other important global challenges. According to the UN COP 15, the Kunming-Montreal Global Biodiversity Framework (GBF)<sup>24</sup> represents a major contribution towards achieving the UN’s 2030 Agenda for Sustainable Development.<sup>25</sup> By focusing on biodiversity, its conservation and the sustainable use of its components, the GBF is directly related to at least eight of the 17 UN SDGs.

Two ISS SDG datasets are used to assess companies’ contributions to the goals: SDG Solutions Assessment (SDGA) and SDG Impact Rating (SDGIR). The SDGA provides a revenue-based approach that encompasses 15 distinct sustainability objectives, using the SDGs as a reference framework, and assesses the extent to which companies are making use of existing and emerging opportunities to contribute to the achievement of global sustainability objectives by offering (innovative) products and services with a positive real-life impact. The SDGIR leverages the SDGA dataset assessing the company’s products and services impact, but also measures the extent to which companies are managing negative externalities in their operations across their entire value chain so as to minimize negative impacts and also making use of existing and emerging opportunities in their products and services to contribute to the achievement of the SDGs.

The ISS STOXX Biodiversity indices take SDGs into consideration in two distinct ways:

1. In the ISS STOXX Biodiversity indices, companies are assessed on the basis of their contribution to the biodiversity- and climate-linked UN SDGs using the ISS ESG SDG Impact Rating dataset. The selected SDG Goal Ratings are:

- 6: Clean water and sanitation,
- 7: Affordable and clean energy,
- 11: Sustainable cities and communities,
- 12: Responsible consumption and production,
- 13: Climate action,
- 14: Life below water, and
- 15: Life on land.

An aggregation model was built by ISS in order to identify the impact of each company on biodiversity at an aggregated level in line with the general spirit of the UN SDGs, which do not express a normative preference for one goal over the others. When it comes to businesses’ contribution to the SDGs, it is argued that companies can and should focus their efforts on the goals on which they can have the highest impact, based on their business models.

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<sup>23</sup> “Take Action for the Sustainable Development Goals.” <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

<sup>24</sup> Kunming-Montreal Global Biodiversity Framework. <https://www.cbd.int/gbf/>

<sup>25</sup> “Transforming our world: the 2030 Agenda for Sustainable Development.” <https://sdgs.un.org/2030agenda>

At the aggregate level, the SDG Impact Rating is determined by the Goal Rating, which ranges on a scale from –10 (significant negative impact) to +10 (significant positive impact):

- For companies without any negative ratings, the aggregate score is determined by the highest positive rating.
- For companies without any positive ratings, it is determined by the lowest negative rating.
- For companies with both contributing and obstructing impacts on sustainability goals, the aggregate score is the sum of the highest positive and the lowest negative ratings.

The companies selected are those with the highest SDG Impact Rating aggregated score in the top 80% of each ICB sector of the relevant universe. The rationale is similar to that used in PDF/EVIC selection – i.e., that scores are concentrated in the lowest deciles of each sector. As a result, choosing the top 80% results in an improvement in the score versus the benchmark (more than 50%) in most sectors.

2. In the ISS STOXX Biodiversity Leaders indices, companies are assessed in accordance with their revenues' exposure to activities that are aligned with SDGs using the ISS ESG SDG Solutions Assessment dataset. This measures the positive and negative sustainable contributions of the companies' products and services, which are assessed on the basis of the SDGs. Biodiversity and climate are interlinked, with one influencing the other. Biodiversity loss contributes to increased carbon emissions, primarily through deforestation and degradation of carbon-rich ecosystems. Conversely, climate change poses a threat to biodiversity, altering habitats and impacting species' survival. Addressing climate change and biodiversity loss simultaneously is vital to achieving a sustainable and resilient future. Different thresholds are used for the group of SDG-related activities contributing towards biodiversity and those activities contributing towards the climate, in order to maintain the focus of the selection on biodiversity. Companies must have positive revenue of at least 25% from one of the sustainable activities that contribute more directly to biodiversity preservation (SDGs 6, 12, 14 or 15) or positive revenue of at least 50% from one of the sustainable activities that contribute to reducing climate change impact (SDGs 7 or 13).

After the companies with the highest revenue exposures are selected, companies that are identified by ISS as having an overall sustainability score of less than 2 based on the ISS ESG SDG Solutions Assessment are excluded. Scores range from –10 to +10, and a company that has 100% of its product and service revenues significantly contributing to any SDG objective would receive a score of 10. This step ensures that a company is not only contributing positively towards biodiversity- or climate related SDGs but also that its activities do not obstruct the achievement of other SDGs and that, when combined with some of the previous filters, the indices are potentially eligible for Article 9 of the SFDR (see Table A 4 in the Appendix).

Table 3 shows an example of two companies in different ICB sectors and their respective scores, revenue percentages and products/services contributing towards selected SDGs.

**Table 3:** ISS ESG SDG assessment – An example.

	Water company	Renewable energy company
Activity	Biodiversity-related	Climate-related
SDG impact rating	7.84	5.82
SDG solutions overall score	10	9.45
Revenue share contributing towards biodiversity-/climate-related SDGs	100%	95%
Products/services contributing towards biodiversity-/climate-related SDGs	Water and/or wastewater services for disadvantaged/underserved residential customers.	Production of innovative solar power solutions.

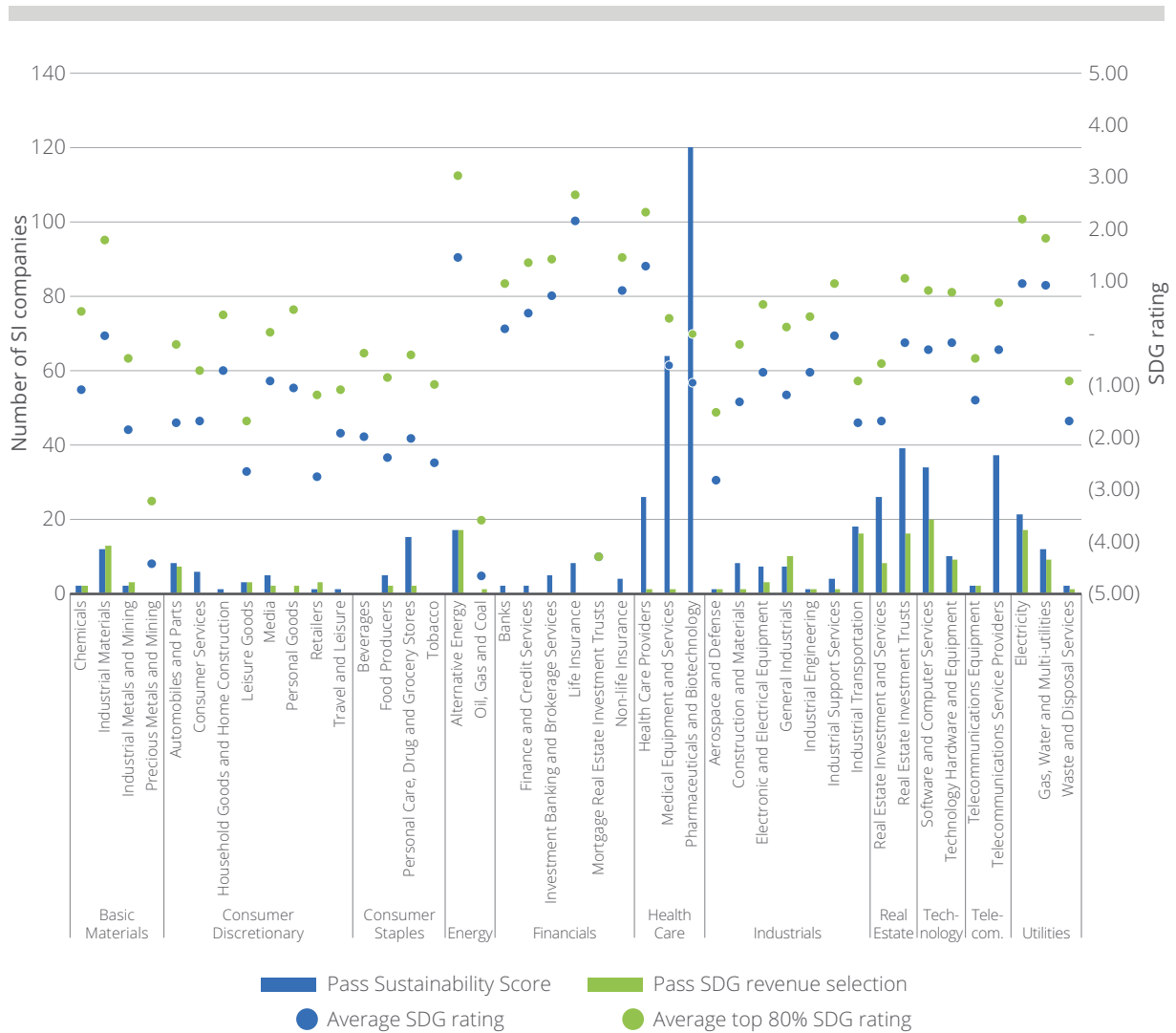
Source: ISS ESG



As regards the ISS STOXX Biodiversity indices (broad versions), which use the biodiversity-related SDG aggregated rating, Figure 5 (right-hand y-axis, “SDG rating”) shows that although most sectors have a negative average rating, 13 out of 34 sectors improve from an average negative score to a positive score when top 80% SDG rating selection is applied and 9 sectors show an average positive rating (mostly within Financials, Health Care and Utilities).

On the other hand, when we look at the revenue contribution and the companies’ sustainability assessment score (Figure 5, left-hand y-axis, “Number of SI companies”) used in the ISS STOXX Biodiversity Leaders, the sectors with the most companies passing the sustainability score are not always the ones that deliver the best products/services contributing to biodiversity-related goals. For example, although Health Care scores well in the sustainability score (SDG Solutions Score ≥ 2), only two companies were selected on the basis of their revenue contribution. A similar picture can be seen in other sectors such as Financials and Consumer Staples.

**Figure 5: “Enable” – Biodiversity-related SDG assessment (ICB sector).**



Source: ICB, ISS ESG and STOXX as of June 2023 review

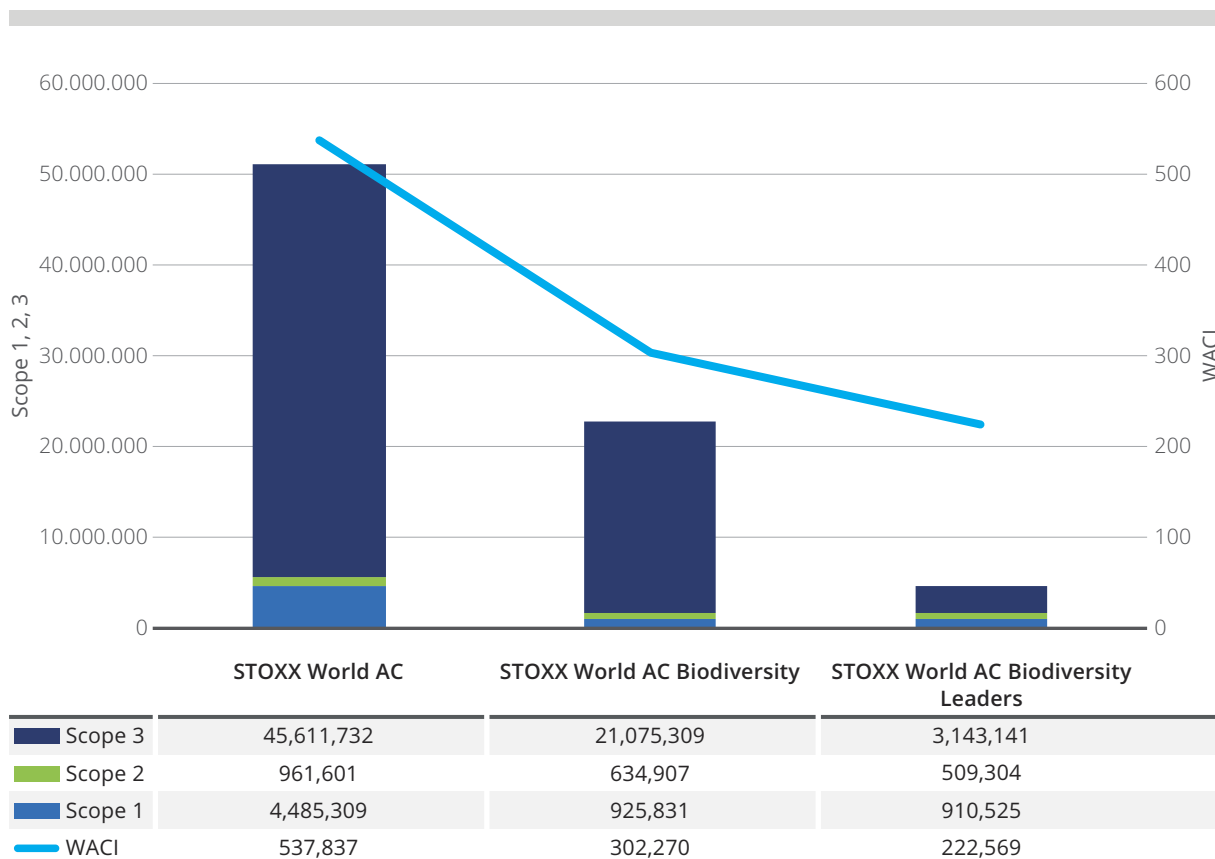
#### 5.4 Carbon intensity reduction (“Decarbonize”)

As demand grew for portfolios that integrate climate risks into their construction and align them with the climate goals of the Paris Agreement (or “Paris-aligned” benchmarks), the Technical Expert Group (TEG) specified the minimum requirements for an equity benchmark to be classified as an EU Paris-Aligned Benchmark (PAB) or Climate Transition Benchmark (CTB). One of the main PAB and CTB characteristics is that it must achieve a minimum 50% or 30% reduction in carbon emissions respectively relative to a reference benchmark. Since the PAB has stricter requirements than the CTB, EU CTBs are usually considered suitable for institutional investors such as pension funds and (re)insurance companies whose objective is to protect assets against investment risks related to climate change and the transition to a low-carbon economy. By contrast, EU PABs are designed for institutional investors that want to be at the forefront of the immediate transition towards a 1.5°C scenario.

The carbon intensity reduction target used in the ISS STOXX Biodiversity indices aims to ensure that the indices achieve a minimum 30% weighted average carbon intensity (WACI) reduction versus the parent universe. In line with the definitions set out in the EU Climate Benchmark Regulation, carbon intensity is identified as the sum of Scope 1, Scope 2 and Scope 3 emissions (emissions data in tonnes of CO<sub>2</sub> equivalent (tCO<sub>2</sub>e) provided by ISS ESG) over EVIC. If the WACI of the final selection does not achieve a reduction of at least 30% compared to the parent index, companies are removed in descending order of carbon intensity until the 30% reduction is reached.

For June 2023, the selection criteria applied prior to the “Decarbonize” step (i.e., in the “Avoid”, “Minimize” and “Enable” steps) automatically achieved a WACI reduction of 44% for the broad version and 59% for the thematic version (Figure 6). As a result, the “Decarbonize” step was not triggered.

**Figure 6:** Breakdown of emissions exposure by Scope 1, 2 and 3, and by WACI.



Source: ISS ESG and STOXX as of June 2023 review

## 6. Assessing portfolio risks and opportunities

The ISS STOXX Biodiversity index series offers a comprehensive, multidimensional framework with several levels of targeted impact, plus options to customize and optimize strategies. Its key benefit is that it allows investors to align their capital with long-term goals, risk management and investment opportunities in the area of biodiversity. This section explores the opportunities offered by this suite of indices, including the risks and dependencies that may occur in such portfolios.

Table A5 in the Appendix summarizes, for the June 2023 review period, the metrics and scores for the two selections (ISS STOXX World AC Biodiversity and ISS STOXX World) in comparison to their benchmark (STOXX World AC). The selections produce substantial improvements overall. The total impact on biodiversity of the portfolios' constituents, measured primarily by the weighted average PDF/EVIC, decreased by 44% in the broad version and around 24% in the thematic version compared to the benchmark.

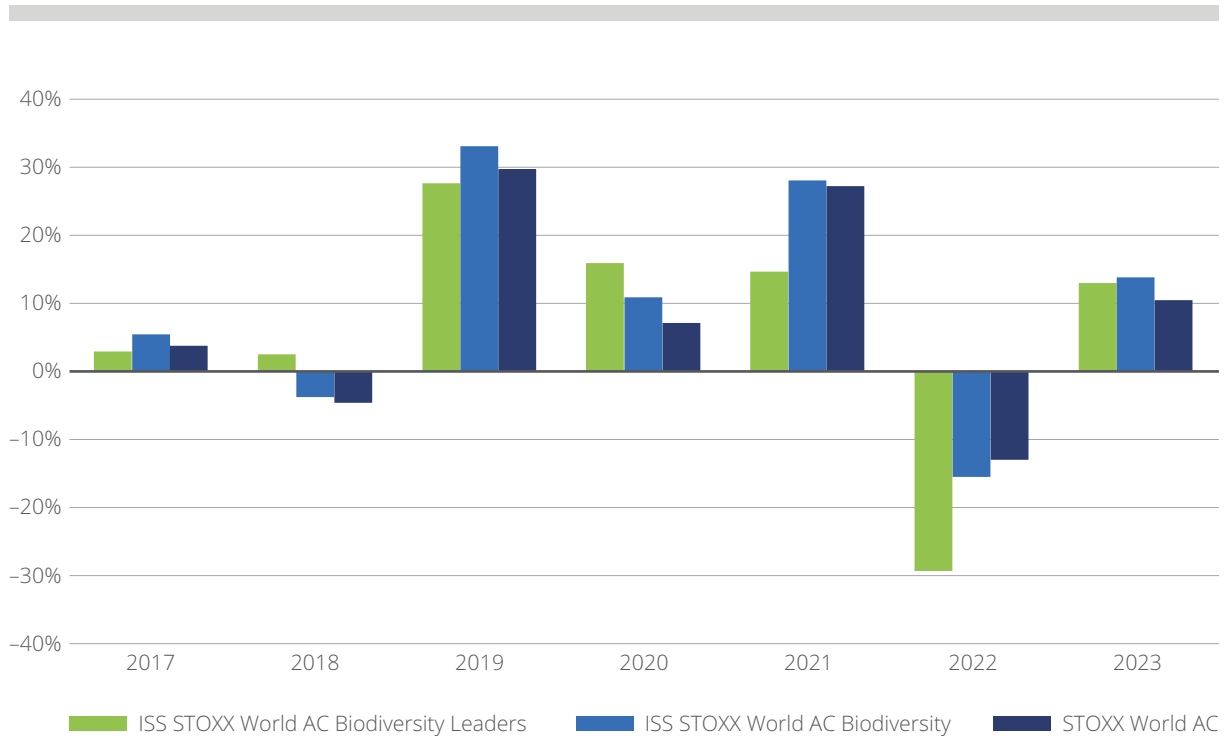
Although the biodiversity-related SDG Rating is only considered in the broad selection, both indices contain companies that are considered better contributors towards the selected SDGs and that have higher ratings as a result. As regards the overall alignment of revenue exposure with the biodiversity SDGs, the thematic version displays a large improvement, with 80% of the weighted average revenue of the constituents being considered by ISS as contributing towards the selected SDGs. Although this metric was not used in the broad selection, the latter was also able to achieve a better overall revenue contribution. The same also applies to the overall SDG Solution Score, with both indices outperforming their benchmark. Overall carbon emissions for both indices also improved, achieving weighted average total emissions and WACI reductions versus the benchmark of more than 43% for the broad index and more than 58% for the thematic version. Although both portfolios have noticeably fewer companies than their starting universe (1,522 for the broad version and 119 for the thematic one, compared to an initial 3,623 for the STOXX World AC), and better biodiversity- and climate-related metrics, the tracking error is reasonably low overall (1.9% for the broad version and 8.6% for the thematic one).

In the period from March 2017 to June 2023,<sup>26</sup> the ISS STOXX World AC Biodiversity produced a total gross return of 85.2%, while the ISS STOXX World AC Biodiversity Leaders returned 44.4% compared to the STOXX World AC return of 70.6% (see Figure 7).

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<sup>26</sup> Due to data availability, some ISS data was backcast in order to increase the backtest time horizon. The ISS Biodiversity Impact Assessment Tool PDF score was backcast from the first period available (i.e., September 2022) and the remaining ISS ESG data was backcast from December 2021.



**Figure 8:** ISS STOXX Biodiversity – Gross annual return in EUR.

Source: STOXX as of June 2023 review

However, both indices show more volatile characteristics than the benchmark, with relatively low overall tracking errors of 8.6% for the thematic version and 1.9% for the broad version (see Figure A 7 in the Appendix).

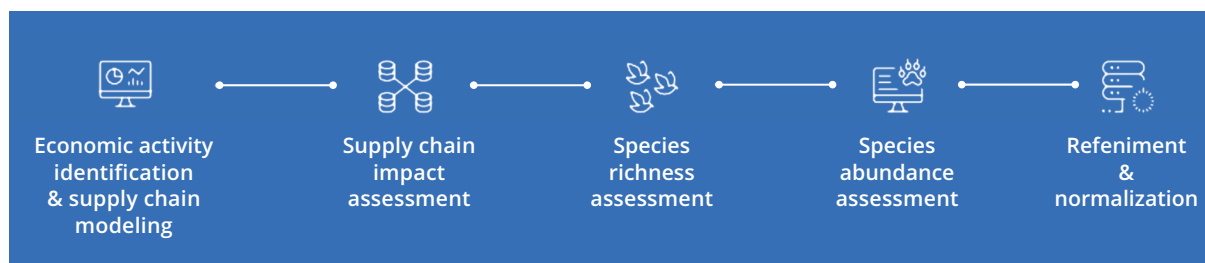
In line with the STOXX World AC, the indices are predominantly invested in US-listed companies, with the Leaders version having less than 50% exposure to the USA in June 2023 and an overexposure to companies in Canada and Asia (see Figure A 7). At an industry level, both indices are overweight Technology, while the Leaders index has no Financial or Consumer Staples companies (this is mainly due to the lack of companies making positive contributions to selected SDGs in the “Enable” step of the selection process). Conversely, it is overweight Industrials and Real Estate companies in particular.

## 7. Conclusion

This paper shows how current biodiversity research has provided investors with the tools to take this topic into account during portfolio construction. The framework created is not meant to be a final destination but rather a starting point for exploring new directions in collaboration with investors. It should also serve as a tool to engage with companies and encourage them to enhance their data disclosure and positioning on biodiversity.

## 8. Appendix

**Figure A 1:** The ISS ESG Biodiversity Impact Assessment Tool model – The five key steps.



Source: ISS ESG Biodiversity Impact Assessment Tool Methodology, <https://www.issgovernance.com/esg/biodiversity-impact-assessment-tool/>

**Table A 2:** The ISS STOXX Biodiversity index suite and related STOXX universes.

	STOXX universes	Broad indices	Thematic indices
STOXX World	STOXX World AC	ISS STOXX World AC Biodiversity	ISS STOXX World AC Biodiversity Leaders
	STOXX Developed World	ISS STOXX Developed World Biodiversity	-
	STOXX Emerging Markets	ISS STOXX Emerging Markets Biodiversity	-
	STOXX Asia Pacific AC	ISS STOXX Asia Pacific AC Biodiversity	-
	STOXX US	ISS STOXX US Biodiversity	-
	STOXX Developed Europe	ISS STOXX Developed Europe Biodiversity	-
	STOXX Europe 600	ISS STOXX Europe 600 Biodiversity	-

Source: STOXX

**Table A3:** The methodology for the ISS STOXX Biodiversity indices.

Goal	Category	Description	ISS STOXX Biodiversity indices	ISS STOXX Biodiversity Leaders indices
Avoid	International standards and controversial weapons screens	NBS international standards  Controversial weapons – AP mines, biological weapons, chemical weapons, cluster munitions, nuclear weapons, nuclear weapons (non NPT), depleted uranium and white phosphorus		
	Involvement screens	Tobacco production > 0% revenues Tobacco-related products, services and distribution > 5% revenues Thermal coal > 0% revenues – extraction and power generation capacity Unconventional oil and gas > 0% revenues – oil sands extraction, arctic oil and gas exploration and shale energy Military equipment > 10% revenues Civilian firearms production and services > 0% revenues Civilian firearms distribution > 5% revenues	Screening of companies classified by ISS as violating the OECD Guidelines/ UN Global Compact or involved in harmful activities (e.g., thermal coal, hazardous pesticides, etc.)	
	Biodiversity screens	Palm oil (unless RSPO Certified) > 0% revenues GMO agriculture > 0% revenues Hazardous pesticides Animal welfare – factory farming, live export, fur production and non-pharma testing		
Minimize	Biodiversity impact	Potential disappearing fraction (PDF)/EVIC	Selection of companies with a less severe negative impact on biodiversity than their sector peers using ISS ESG's BIAT	
Enable	UN SDGs	Biodiversity SDG aggregate score or revenues	Increase in exposure to companies whose solutions give them high scores for biodiversity- and climate-related SDGs <sup>27</sup>	Increase in exposure to companies with a high percentage of revenues derived from activities aligned with biodiversity- and climate-related SDGs <sup>28</sup>
Decarbonize	Carbon intensity	Carbon emissions (scope 1 + 2 + 3)/EVIC	Reduce carbon intensity by at least 30% relative to the parent index	
SFDR suitability	SFDR	Overall revenue contribution towards SDGs	Article 8	Article 9

Source: STOXX

<sup>27</sup> "Objective Scores" are calculated for each of the sustainability objectives. These company-specific scores assess the overall impact of a company's product portfolio on the achievement of a given objective. They are calculated by multiplying the net share of sales generated with the relevant products/services by the numeric scores assigned to them. Objective Scores range between -10.0 (i.e., 100% of net sales are generated with products/services classified as having a significant obstructing impact) to +10.0 (i.e., 100% of net sales are generated with products/services classified as having a significant contributing impact).

<sup>28</sup> This is based on the share of revenues that a company derives from products and services identified as contributing to the achievement of a given objective, and ranges from 0% to 100%.

**Table A4:** Screens applied for potential SFDR Article 8 eligibility.

Violation of UN Global Compact (UNGC) principles or OECD Guidelines for Multinational Enterprises (OECD GME), in line with Principal Adverse Impact (PAI) 10	Do no significant harm (DNSH)
Involvement in the manufacturing or selling of controversial weapons, in line with PAI 14	
Tobacco (social harm)	
Thermal coal (environmental harm)	
Violations of UN Global Compact (UNGC) principles or the OECD Guidelines for Multinational Enterprises (OECD GME), in line with PAI 10	Good governance
ESG controversies	

Source: STOXX, <https://qontigo.com/wp-content/uploads/2023/04/Qontigos-SFDR-Article-217-Sustainable-Investment-Methodology.pdf>

**Table A5:** ISS STOXX World AC Biodiversity and Biodiversity Leaders metrics versus the benchmark.

	STOXX World AC	STOXX World AC Biodiversity	STOXX World AC Biodiversity Leaders
<b>Components</b>	<b>3,623</b>	<b>1,522</b>	<b>119</b>
Components screened	-	2,101	3,504
<b>PDF score</b>	<b>1,817,541</b>	<b>1,363,474</b>	<b>214,830</b>
PDF score reduction	-	-24.98%	88.18%
<b>PDF/EVIC</b>	<b>13.86</b>	<b>7.74</b>	<b>10.59</b>
PDF/EVIC reduction	-	-44.13%	-23.59%
<b>Biodiversity SDG Rating</b>	<b>0.68</b>	<b>1.86</b>	<b>2.57</b>
Biodiversity SDG Rating improvement	-	1.19	1.89
<b>Revenue exposure to biodiversity SDGs</b>	<b>9.69%</b>	<b>10.03%</b>	<b>80.81%</b>
Revenue exposure improvement	-	0.35%	71.12%
<b>SDG Solutions Score</b>	<b>0.73</b>	<b>1.53</b>	<b>4.95</b>
SDG Solutions Score improvement	-	0.80	4.22
<b>Scope 1 + 2 + 3 CO<sub>2</sub> emissions</b>	<b>51,058,641</b>	<b>22,636,047</b>	<b>4,562,970</b>
Scope 1 + 2 + 3 CO <sub>2</sub> emissions reduction	-	-55.67%	-91.06%
<b>WACI</b>	<b>537.84</b>	<b>302.27</b>	<b>222.57</b>
WACI reduction	-	-43.80%	-58.62%
<b>Overall tracking error<sup>29</sup></b>	<b>-</b>	<b>1.94%</b>	<b>8.58%</b>

Source: ISS ESG and STOXX as of June 2023 review

<sup>29</sup> The overall tracking error figures were computed against the STOXX World AC from March 17, 2017, to June 30, 2023, using daily data.



**Table A6:** ISS STOXX Biodiversity – Gross risk and return metrics in EUR.

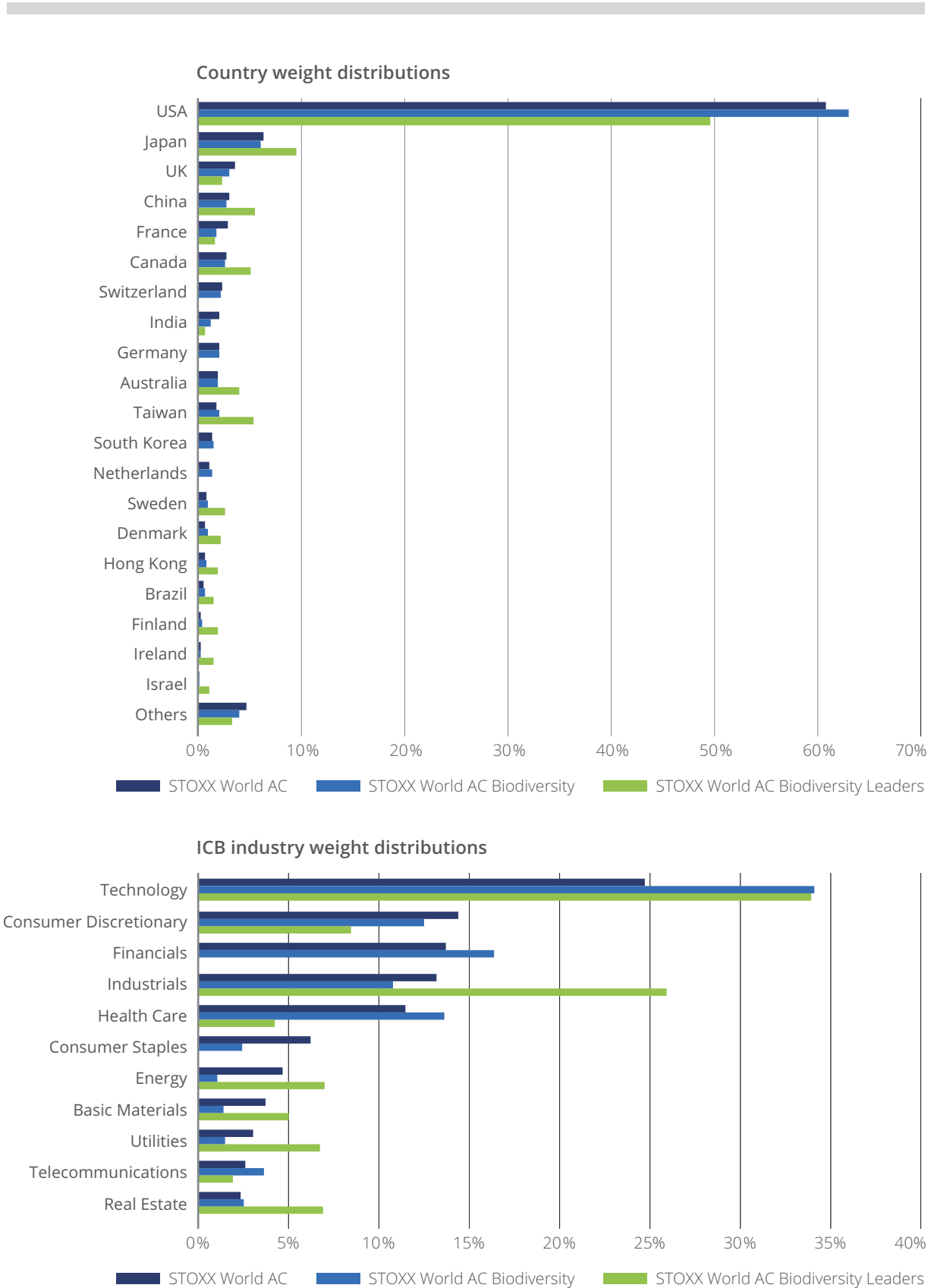
	YTD return (actual)	Overall return (actual)	1Y return (annualized)	3Y return (annualized)	5Y return (annualized)	Overall return (annualized)
ISS STOXX World AC Biodiversity	14.7%	85.21%	14.5%	12.1%	10.3%	10.3%
ISS STOXX World AC Biodiversity Leaders	14.0%	44.44%	5.2%	3.0%	6.0%	6.0%
STOXX World AC	11.6%	70.55%	11.9%	12.1%	8.9%	8.9%

	Overall volatility (annualized)	Overall tracking error (annualized)	Overall maximum drawdown	Overall dividend yield (annualized)	Overall sharpe ratio	Overall beta
ISS STOXX World AC Biodiversity	16.50%	1.94%	32.25%	2.24%	0.68	1.04
ISS STOXX World AC Biodiversity Leaders	18.35%	8.58%	36.36%	1.85%	0.41	1.03
STOXX World AC	15.71%	-	33.30%	2.38%	0.62	-

Source: STOXX as of June 2023 review

**Figure A 7:** Country and ICB industry weight distributions.



Source: STOXX as of June 2023 review

## 9. Contacts and further information

Learn more about how STOXX can help you better manage risk and enhance your investment process.

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