



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

July 2019

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# Abstract

Introduced in July 2019, Scientific Beta’s Enhanced Environmental, Social and Governance (ESG) Reporting is intended to assist investors in meeting the challenges and seizing the opportunities of the incorporation of ESG dimensions into passive investment management.

Scientific Beta’s Enhanced ESG Reporting includes over a dozen reports covering ESG Norms and Climate Change. Offered on a complimentary basis and available not only for ESG indices but across the entire index offering, it provides unparalleled pre-selection and ongoing transparency on index exposure to ESG issues at the top of institutional investor concerns. As such, it facilitates the incorporation of ESG dimensions in investment analysis and decision-making as well as performance measurement and reporting.

Scientific Beta recognises the diversity of investor motivations justifying the incorporation of ESG dimensions into investment selection and management and its Enhanced ESG Reporting is designed to serve the needs of ethical and socially responsible investors as well as those of business-case ESG investors. In particular, Enhanced ESG Reporting analytics are relevant to investors whose ESG objectives or constraints may include one or several of the following:

- Dissociating from companies involved in controversial products and conducts;
- Incentivising the respect of global norms and/or the transition to a low-carbon economy;
- Improving investment resilience to climate change;
- Shunning investments that could create reputational and liability risks;
- Altering the expected risk/return profile of the portfolio by avoiding companies whose ESG performances may expose the portfolio to materially adverse financial impacts.

Updated after the end of each quarter, the Enhanced ESG Reporting supports statutory and voluntary reporting exercises, including in respect of responsible investment initiatives such as the Principles for Responsible Investment. In this regard, it is noteworthy that two of the seven Climate Change reports under the Enhanced ESG Reporting cover all the carbon metrics mentioned by the Taskforce on Climate-related Financial Disclosures in its guidance for asset owners and asset managers (TCFD, 2017).

The present paper describes the Enhanced ESG analytics that are available on the Scientific Beta platform and illustrates how to use these to assess index-based investments against ESG standards or, where relevant, to proxy exposure to ESG risks.

The ESG Norms analytics measure index exposure to companies that are found to fall short of global standards of responsible business conduct and corporate governance or to have involvement in activities that conflict with global norms or their objectives. Reporting in respect of controversial products covers involvement in weapons that violate fundamental humanitarian principles; involvement in tobacco; and coal involvement. Reporting in respect of controversial conducts covers companies with current or recent implication in critical ESG controversies in respect of their fundamental responsibilities or associated with a high risk of future serious violations of fundamental ethical norms, as well as companies that fail to respect basic corporate governance and shareholder rights by denying voting rights to public investors.

## Abstract

The Climate Change reporting includes carbon footprinting analytics; carbon exposure analytics; analytics for deep-dive into carbon-related assets; and physical risks analytics. Carbon footprinting analytics measure the indirect investor responsibility for Climate Change by allocating holdings' greenhouse gas emissions to the investment according to the share of the equity capital controlled. Carbon exposure analytics measure exposure to carbon-intensive companies and sectors. Carbon footprinting and exposure analytics include and complement the common carbon metrics that the TCFD recommends or considers worthy of consideration for reporting by asset owners and asset managers to their beneficiaries and clients (TCFD, 2017). While these are not risk metrics, they provide information on exposure of investments to the risks of the transition to a low-carbon economy. Deep-dive reporting into carbon-related assets includes potential emissions from fossil fuel reserves, fossil fuel analytics, and power generation analytics. This reporting allows for a finer-grain assessment of investment exposure to assets and sectors with high stranding risk potential and includes breakdowns of relevance for gauging stranding risk. Finally, the physical risks reporting estimates exposure of index constituents to acute and chronic physical risks from Climate Change.

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## About the Authors



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# Introduction

# Introduction

The incorporation of Environmental, Social and Governance (ESG) dimensions into investment analysis and decision-making processes and reporting has traditionally been optional and a low priority for most institutional investors. However, this is changing rapidly owing to both push and pull factors. On the one hand, institutional investors are increasingly required, or expected, to explain how they factor ESG dimensions into investment decisions and to report on their ESG incorporation processes and the ESG performance of their investments. On the other hand, a growing number of institutional investors consider that the ESG characteristics of investments may have a material impact on investment risks and returns or recognise that an increasing share of end-investors wish to see the environmental and social impacts of investments being considered together with (or ahead of) their financial characteristics.

Regulators worldwide have long required that public companies disclose all factors with potential financial materiality for investors and have at times clarified that ESG factors were in the scope of statutory filings or provided guidance on specific ESG disclosures (one example is the 2010 United States Securities and Exchange Commission Guidance Regarding Disclosure Related to Climate Change).

Going beyond this traditional position, a significant number of regulators have introduced sustainability reporting requirements for large public companies. Most notable is the 2014 European Union Directive imposing disclosure of non-financial and diversity information in annual reports from 2018 on listed companies, banks and insurance companies and other companies of public-interest (Directive 2014/95/EU amending the accounting directive 2013/34/EU).<sup>1</sup> Sustainability reporting requirements for issuers also increasingly arise in relation to listing - at end 2018, over fifteen stock exchanges worldwide had mandatory ESG reporting requirements and the number of exchanges providing written guidance on ESG reporting had grown four-fold over five years (SSE, 2018).

While sustainability reporting by corporates remains largely voluntary, it is common best practice amongst large companies – according to the 2017 KPMG Survey of Corporate Responsibility Reporting, 93% of the world's 250 largest companies by revenue, and 75% of the top 100 companies in the 49 countries surveyed, report on corporate responsibility (KPMG, 2017). For the pioneer and leading advocate of sustainability reporting: “the practice of disclosing sustainability information inspires accountability, helps identify and manage risks, and enables organisations to seize new opportunities” (GRI, 2019). Naturally, participation in sustainability initiatives typically comes with reporting obligations; recognition as a participant in the world's leading initiative of that kind, the UN Global Compact, requires reporting annually on ongoing efforts.

Institutional investors have welcomed if not demanded sustainability reporting by issuers but until recently, and with rare exceptions,<sup>2</sup> had not been required or expected to make comparable disclosures in respect of investments.

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1 - Disclosures are required in relation to respect for human rights; social responsibility and treatment of employees; environmental protection; anti-corruption and bribery; and diversity on company boards. The materiality perspective of the Directive covers both financial materiality and environmental and social materiality. The European Commission has published non-binding guidelines to promote consistency in reporting (C/2017/4234), which it has recently supplemented in regards to climate-related disclosures (C/2019/4490).

2 - France's Energy Transition for Green Growth Act of 17 August 2015 is celebrated as the first example of ESG reporting requirements being imposed on institutional investors (as per its Article 173-VI); although the flexibility of its comply-or-explain rules currently limits its impact, the Act has proven an inspiration for other regulators.

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However, recent and ongoing regulatory activity suggests that regulatory attention in respect of sustainability is turning towards institutional investors. This is most evident in the European Union where the 2016 update of the workplace pension scheme regulation required their managers to include consideration of ESG factors in investment processes and disclosures,<sup>3</sup> and where co-legislators agreed, in March 2019, on regulation imposing harmonised transparency requirements upon institutional investors with regard to the integration of sustainability risks and the consideration of adverse sustainability impacts in their processes and the provision of sustainability-related information on financial products.

This notwithstanding, such sustainability disclosures by investors still remain primarily voluntary and guided by responsible investing commitments, including those required for participation in responsible investing initiatives, or consideration of stakeholder preferences.

It is noteworthy that signatories of the United-Nations backed Principles for Responsible Investment (listed on Table 1 below), the world’s most successful responsible investing initiative, have to commit to incorporating ESG issues into investment analysis and decision-making processes and to reporting on activities and progress. As part of the mandatory annual reporting and from 2020, these signatories will have to report climate indicators aligned with the recommendations of the Task Force on Climate-related Financial Disclosures set up by the Financial Stability Board (PRI, 2019).<sup>4</sup>

Table 1: The Principles for Responsible Investment (PRI, 2006)

Principle 1	We will incorporate ESG issues into investment analysis and decision-making processes.
Principle 2	We will be active owners and incorporate ESG issues into our ownership policies and practices.
Principle 3	We will seek appropriate disclosure on ESG issues by the entities in which we invest.
Principle 4	We will promote acceptance and implementation of the Principles within the investment industry.
Principle 5	We will work together to enhance our effectiveness in implementing the Principles.
Principle 6	We will each report on our activities and progress towards implementing the Principles.

As for stakeholder preferences, the results of multiple market surveys suggest that consumer and investor interest in, and adoption of, sustainable products has increased significantly in recent years, with “millennials”, i.e. the cohort that reached adulthood in the 21st century, leading the movement – for illustration, a 2017 survey of U.S. individual investors by the Morgan Stanley Institute for Sustainable Investing found 23% of the population and 38% of millennials to be very interested in sustainable investing (up 4 and 10 percentage points over 2015, respectively). Analysis of fund flows suggests that investors act on these preferences – Hartzmark and Sussman (2019) find that market-wide demand for U.S. mutual funds varies as a function of their sustainability ratings in manner that is “consistent with positive affect influencing expectations of sustainable fund performance<sup>5</sup> and non-pecuniary motives influencing investment decisions.”

While responsible investing was traditionally motivated by deontological (“dissociate from harm”) or consequentialist ethical concerns (“do no harm” and “do good”), some of its promoters attempted to increase its marketability by contending that it could produce superior risk-adjusted financial

3 - Directive (EU) 2016/2341 requires institutions for occupational retirement provision to include consideration of ESG factors related to investment assets in investment decisions into their governance (Article 21) and risk management (Article 25) systems, to publicly disclose how their investment policy accounts for ESG factors (Article 30) and provide their (prospective) members with information on whether and how ESG factors are considered in the investment approach (Article 41).

4 - While investors can be recognised by the TCFD by publicly declaring their support for the recommendations, this is dissociated from any requirement to implement the TCFD recommendations.

5 - The authors do not find evidence that high sustainability funds outperform low sustainability funds, which is consistent with forty years of studies of live ESG funds and indices that indicate that ESG incorporation neither hurts nor improves risk-adjusted performance (Ducoulombier and Liu, 2019b). Note that 63% of the millennials surveyed by Morgan Stanley expected a trade-off between financial and ESG performance.

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rewards (“do well”), at least in the long-term, thus addressing the fiduciary concerns of investors showing interest in a progressive ESG agenda but lacking a clear investment mandate (“do good and do well”)<sup>6</sup> and also appealing to business-as-usual investors (“do well by doing good”).

In 2005, in an effort to remove a roadblock that was hampering the incorporation of ESG considerations into mainstream investment, the United Nations Environment Programme Finance Initiative (UNEP FI) commissioned the law firm Freshfields Bruckhaus Deringer to determine whether it was “voluntarily permitted, legally required or hampered by law and regulation.” (Freshfields Bruckhaus Deringer, 2015). The firm concluded that the practice was “clearly permissible and arguably required in all jurisdictions” where its objective was to “more reliably predict financial performance”, that it was arguably required in the presence of a consensus amongst the beneficiaries and that it was permissible as a tiebreaker when faced with options that are equally attractive from a financial standpoint (Freshfields Bruckhaus Deringer, 2015, hereafter “the Freshfields report”). While we would argue that uncertainty about the impact of ESG issues and the general fiduciary standard of prudence provide some leeway for progressive ESG investment strategies supported by a resilience justification,<sup>7</sup> the conclusions of the Freshfields report have been used to promote business-case ESG incorporation and reshape the responsible investing industry.

Today, responsible investing, as defined by PRI, no longer requires a progressive ESG agenda or even a positive ESG impact<sup>8</sup> and the amoral incorporation of ESG information into standard investment decision making (“do well with ESG data”), which is promoted negatively as a fiduciary obligation for any investor (evidently where such data concern issues with potential financial materiality, as underlined by the Freshfields report) and positively as a way to improve risk management and return generation, is sufficient to claim the responsible investing badge.

As business-case investors incorporating ESG dimensions to enhance returns and/or strengthen risk management join traditional values-based investors imposing non-financial constraints and/or objectives to align their investments with personal values or social norms, the motivations for incorporating ESG data into investment management have never been so diverse.

Scientific Beta recognises the diversity of these motivations and its ESG and Low Carbon Fiduciary Options as well as its Enhanced ESG Reporting are designed to serve the needs of ethical and socially responsible investors as well as those of business-case ESG investors.

Since inception, Scientific Beta has been offering full transparency on the financial risks and performances of its indices along with fiduciary options allowing investors to control non-diversifiable risks. The Enhanced ESG Reporting, along with the ESG and Low Carbon Fiduciary Options also introduced in July 2019, extend this tradition into the ESG space.<sup>9</sup>

Specifically, the objective of Scientific Beta’s Enhanced ESG reporting is to assist investors with the incorporation of ESG dimensions into their investment analysis and decision-making processes as well as their mandatory and voluntary disclosures.

6 - The imposition of non-financial constraints on portfolio construction should indeed be questioned if the investment mandate has not made room for such considerations, and if it appears that its sole objective is to maximise financial performance.

7 - While this is forward-looking, there is abundant empirical evidence suggesting that integration of ESG considerations into investment decision making need not have a detrimental effect on risk-adjusted investment performance, refer to Revelli and Viviani (2015) or Friede et al. (2015) for meta-studies.

8 - “Responsible investment is an approach to investing that aims to incorporate environmental, social and governance (ESG) factors into investment decisions, to better manage risk and generate sustainable, long-term returns.” (PRI, 2019)

9 - The Low Carbon and ESG Fiduciary Options are presented in Ducoulombier and Liu (2019a, 2019b).

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The Enhanced ESG Reporting includes over a dozen reports covering ESG Norms and Climate Change and is offered on a complimentary basis and available not only for ESG and Low Carbon Option indices but across the entire index offering. As such, it provides unparalleled pre-selection and ongoing transparency on index exposure to ESG issues at the top of institutional investor concerns. Enhanced ESG Reporting analytics are relevant to investors whose ESG objectives or constraints may include one or several of the following:

- Dissociating from companies involved in controversial products and conducts;
- Incentivising the respect of global norms and/or the transition to a low-carbon economy;
- Improving investment resilience to climate change;
- Shunning investments that could create reputational and liability risks;
- Altering the expected risk/return profile of the portfolio by avoiding companies whose ESG performances may expose the portfolio to material adverse financial impacts.

Updated after the end of each quarter, the Enhanced ESG Reporting supports statutory and voluntary reporting exercises, including in respect of responsible investment initiatives such as the Principles for Responsible Investment. In this regard, it is noteworthy that two of the seven Climate Change reports under the Enhanced ESG Reporting cover all the carbon metrics mentioned by the TCFD in its guidance for asset owners and asset managers.

In the rest of this White Paper, we describe in detail the ESG Norms and Climate Change analytics that make up the Enhanced ESG reporting.

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# 1. ESG Norms Reporting

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Scientific Beta’s ESG Norms analytics measure index exposure to companies with involvement in products that conflict with global Environmental, Social or Governance (ESG) norms or their objectives and to companies whose conduct violates fundamental ethical or corporate governance norms.

A norm is a standard of behaviour to which members of a group are expected to conform. Global norms that can be applied to intergovernmental organisations, states and non-state actors of various kinds have to transcend the diversity of groups. Such norms can be established by international organisations through treaties, conventions and declarations, by the collaborative work of global policy networks and more formal multi-stakeholder initiatives, and through international campaigns led by non-governmental organisations (Martinsson, 2011). Because treaty norms are codified agreements between states or international organisations, they carry particular weight as international standards.

Measuring exposure to companies that violate global norms or whose activities are fundamentally at odds with the ESG objectives pursued by global norms, and possibly excluding these companies, has relevance for ethical and socially responsible investors as well as for business-as-usual investors. Table 2 below illustrates how exclusion in respect of global norms can, in certain conditions, be simultaneously justified in deontological, (non-egoist) consequentialist and egoist perspectives.

Table 2: Possible motivations for analysing respect of global norms

Deontological	Dissociate from investments that contravene global norms
Non Egoist Consequentialist	Incentivise the respect of global norms for the common good
Egoist	At the investor level, avoid reputational and liability risk involved with investments that contravene global norms
	Avoid exposure to investments with high ESG risks and adverse potential financial materiality
	Promote the reduction of negative externalities that are financially detrimental to the portfolio of a universal owner

In the rest of this chapter, we first present the analytics concerned with global norms regulating business conduct and corporate governance and then review the analytics covering products and activities that are at odds with global norms.

## 1.1. Responsible business conduct and corporate governance norms and analytics

Traditionally, the most commonly used reference texts to assess the business conduct of companies have been:

- The conventions of the International Labour Organisation (ILO), notably the eight “fundamental conventions”<sup>10</sup> that deal with four key issues: freedom of association and the effective recognition of the right to collective bargaining; the elimination of all forms of forced or compulsory labour; the effective abolition of child labour; and the elimination of discrimination in respect of employment and occupation – these principles are also covered in the ILO Declaration on Fundamental Principles and Rights at Work (1998 updated 2010);

<sup>10</sup> - Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87); Right to Organise and Collective Bargaining Convention, 1949 (No. 98); Forced Labour Convention, 1930 (No. 29); Abolition of Forced Labour Convention, 1957 (No. 105); Minimum Age Convention, 1973 (No. 138); Worst Forms of Child Labour Convention, 1999 (No. 182); Equal Remuneration Convention, 1951 (No. 100); Discrimination (Employment and Occupation) Convention, 1958 (No. 111).

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- The Organisation for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises (1976 updated 2011) which provide principles and standards of good practice in seven areas: human rights, employment and industrial relations, environment, combating bribery, bribe solicitations and extortion, consumer interests, science and technology, competition, and taxation;
- The anti-bribery conventions issued by the OECD and the United Nations (OECD Convention on Combating Bribery of Foreign Public Officials in International Business Transactions, 1999 and the United Nations Convention against Corruption, 2005);
- The Universal Declaration of Human Rights (1948);
- The Rio Declaration on Environment and Development (1992) and the Convention on Biological Diversity (1993) adopted during the Earth Summit.

A popular reference for norms-based screening of companies in respect of conduct is the United Nations Global Compact (“UN Global Compact”). The latter is not a global norm *stricto sensu* but a voluntary corporate responsibility/sustainability initiative whose ten principles are derived from global norms in the areas of Human Rights, Labour Rights, Environment and Anti-Corruption.

Likewise, in the specific area of human rights, the United Nations developed the 2011 Guiding Principles for Business and Human Rights (“UNGPs”) which are meant to assist in the prevention of human rights violation in the course of business activities and to ensure that adequate redress be provided when such violations occur. As with the UN Global Compact, the normative contribution consists in elaborating the implications of existing standards and practices and packaging these as a list of principles. The UNGPs have been incorporated into the OECD Guidelines on Multinational Enterprises.

An emerging trend is to consider the body of global norms applying to States under the 1992 United Nations Framework Convention on Climate Change (UNFCCC), and notably the 2005 Paris Agreement, as a relevant backdrop for assessing the conduct of companies to exclude those whose behaviour is grossly incompatible with objectives set by the international community. Amongst leading institutional investors, it is noteworthy that the Norwegian Ministry of Finance introduced in 2016 a new category for the conduct-based exclusions applicable by the Central Bank to the management of the country’s oil fund that targets “acts or omissions that on an aggregate company level lead to unacceptable greenhouse gas emissions.”

The above norms leave aside corporate governance *per se*. The most notable references in the field are the OECD/G20 Principles of Corporate Governance (1999, updated 2004 and 2015) and the International Corporate Governance Network (ICGN) Global Governance Principles (1995, last updated 2017). The former is intended for policy makers, investors and corporations and provides an international benchmark for assessing and improving corporate governance. The latter is primarily intended for companies but also aims to serve as a reference for norm-setting globally (ICGN, 2017).

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# 1. ESG Norms Reporting

In the rest of this chapter, we present and justify our choice of analytics in respect of norms of responsible business conduct and corporate governance.

## 1.1.1. Responsible Business Conduct: Ethical Norms Report

The Ethical Norms Report measures the cumulated weight of index constituents associated with high risk of gross violations of fundamental ethical norms or facing critical ESG controversies in respect of their fundamental responsibilities (or otherwise ineligible to be recognised as participants in the United Nations Global Compact).

Table 3: Ethical Norms Report for sample flagship index at December 2018<sup>11</sup>

SciBeta Developed Low Carbon HFI MBMS 6F4S EW	Index	Broad CW	Change
Companies excluded from Norway's GPFGE investment universe for gross violations of fundamental ethical norms	0.00%	0.87%	-100%
Companies ineligible to join the UN Global Compact or facing critical ESG controversies	4.91%	13.62%	-64%

Analytics are calculated at the end of the latest quarter and with ESG data updated at the beginning of the penultimate month of the quarter. Data for assessment of compliance with the UN Global Compact are sourced from Vigeo-Eiris.

### Context

At a minimum, responsible business conduct entails compliance with applicable laws and internationally recognised standards of appropriate behaviour (global norms).

From a deontological ethics standpoint, dissociating from a company that grossly violates global norms in respect of fundamental ethical obligations provides a basis for investment exclusion. From a consequentialist ethics standpoint, exclusion is a proper tool that offers a superior way to influence company's conduct than other approaches – the possibility of exclusion may also bring credence to these other approaches.

Egoist justifications for excluding companies that flout global norms from the investment universe include the reduction of reputational and liability risk for the investor; the reduction of exposure to companies that are unattractive as they face a variety of potentially financially material risks as a result of their transgressions; and, under the Universal Owner Hypothesis (Monks and Minnow, 1995), the promotion of a reduction in the production of negative externalities that benefit these companies but is detrimental to the overall portfolio due to their impacts on other holdings.

### Definition of Metrics

The Ethical Norms Report tracks exposure to companies that present high risk of future gross violations of fundamental ethical norms and exposure to companies that are facing critical ESG controversies in respect of their fundamental responsibilities.

There are two international initiatives that define principles of responsible business conduct by drawing on international conventions and declarations with (quasi) universal consensus:

- Launched in 2000, the United Nations Global Compact ("Global Compact") is a voluntary corporate responsibility initiative with global reach;

<sup>11</sup> - The sample index includes a Core ESG filter that includes negative screening in respect of companies on the GPFGE list of exclusions.

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- Originally issued in 1976 and regularly updated, the OECD Guidelines for Multinational Enterprises are government recommendations to multinationals operating in or from adhering countries (48 such countries as at July 2019).

Scientific Beta relies on the UN Global Compact as the main reference because its scope and simplicity make it highly accessible to the widest range of issuers. The UN Global Compact Ten Principles (see Table 3 below) are derived from the Universal Declaration of Human Rights, the International Labour Organisation’s Declaration on Fundamental Principles and Rights at Work, (1998, review 2010), the Rio Declaration on Environment and Development (1992) and the United Nations Convention Against Corruption (2005).

Table 4: The Ten Principles of the United Nations Global Compact (UNGC, 2019)

Area	Principle
Human Rights	1: Businesses should support and respect the protection of internationally proclaimed human rights;
	2: make sure that they are not complicit in human rights abuses;
Labour	3: Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining;
	4: the elimination of all forms of forced and compulsory labour;
	5: the effective abolition of child labour;
	6: the elimination of discrimination in respect of employment and occupation.
Environment	7: Businesses should support a precautionary approach to environmental challenges;
	8: undertake initiatives to promote greater environmental responsibility;
	9: encourage the development and diffusion of environmentally friendly technologies;
Anti-Corruption	10: Businesses should work against corruption in all its forms, including extortion and bribery

## Companies presenting high risk of future gross violations of fundamental ethical norms

For exposure to companies that present high risk of future gross violations of fundamental ethical norms, Scientific Beta relies on the exclusion list resulting from the assessment made by the Central Bank of Norway (“Bank”) in the context of the management of the country’s Government Pension Fund Global. This assessment follows published government guidelines (Norwegian Ministry of Finance, 2014 last updated 2017) and is informed by quarterly recommendations from the Council on Ethics (“Council”), an independent and well-resourced body appointed by the Ministry of Finance; Council recommendations and Bank decisions are substantiated and published.

A company may be excluded if there is an unacceptable risk that it contributes to/is responsible for:

- a. Serious or systematic human rights violations, such as murder, torture, deprivation of liberty, forced labour and the worst forms of child labour;
- b. Serious violations of the rights of individuals in situations of war or conflict;
- c. Severe environmental damage;
- d. Acts or omissions that on an aggregate company level lead to unacceptable greenhouse gas emissions;
- e. Gross corruption;
- f. Other particularly serious violations of fundamental ethical norms.

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As such, the framework of the Bank reasonably maps the Ten Principles of the Global Compact (a and b cover Principles 1, 2, 4 and 5; c and d cover Principles 7, 8 and 9; e covers Principle 10 and catch-all f covers Principles 3 and 6).

When deciding upon exclusions, the Bank is required to take a consequentialist approach and consider “whether other measures, including the exercise of ownership rights, may be more suited to reduce the risk of continued norm violations, or whether such alternative measures may be more appropriate for other reasons.” It is authorised to consider such factors as “the probability of future norm violations, the severity and extent of the violations and the connection between the norm violation and the company in which the Fund is invested.” (Norwegian Ministry of Finance, 2010). The consideration of the probability of future norm violations by a company may be informed by the quality of its risk management and by how it is responding to ESG controversies and notably whether it is putting forward remediating or corrective measures (remedial response) as well as preventative measures (proactive response).

Being concerned with grossly unethical conduct, framed in a consequentialist approach, and made to integrate forward-looking and risk-management considerations, the Bank’s exclusions are necessarily limited. Their objective is not to implement a reaction to past corporate transgressions but to serve as a defence mechanism for the investor against the risk of complicity in unacceptable practices going forward.

## Companies ineligible to join the UN Global Compact or facing critical ESG controversies

By contrast, our tracking of companies facing critical ESG controversies in respect of their fundamental responsibilities is based solely on past transgressions and disregards the response of the company and the frequency of controversies (which could inform on the quality of controversy risk management).

In reference to the framework defined by the Office of the UN High Commissioner for Human Rights to detail corporate responsibilities pertaining to human rights (UNHCR, 2011), a critical controversy relates to a fundamental issue and has high adverse impact on a large scope.

Fundamental issues are in relation to the four areas covered by the Global Compact as above, i.e. human rights, labour, environment and anti-corruption.

Controversy screening and criticality assessment are performed by a commercial source. Once the source has qualified that a company is facing a critical controversy, the company will remain on the critical controversy list (on the basis of this particular controversy) for four years unless an update justifies a downward revision in the severity assessment of the case (which is exceptional).

Added to this list are companies ineligible to join the Global Compact, which are defined as those that: i) are subject to a United Nations (UN) sanction; or ii) are listed on the UN Ineligible Vendors List for ethical reasons; or iii) derive revenue from the production, sale and/or transfer of antipersonnel

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landmines or cluster bombs; or iv) derive revenue from the production and/or manufacturing of tobacco. We further discuss reporting in relation to controversial weapons and tobacco in the second section of this chapter.

## 1.1.2. Corporate Governance Norms: Non-voting Shares Report

The Non-Voting Shares Report measures the cumulated weight of index constituents issued by companies that only offer non-voting stocks to the public.

Table 5: Non-voting Shares Report for sample flagship index at December 2018<sup>12</sup>

SciBeta Developed Low Carbon HFI MBMS 6F4S EW	Index	Broad CW	Change
Companies offering only non-voting stocks to the public	0.11%	0.035%	+214%

Analytics are calculated at the end of the latest quarter and with ESG data updated at the beginning of the penultimate month of the quarter.

### Context

Corporate governance describes the set of structures and processes organising the rights and responsibilities of the various corporate stakeholders (management, board, shareholders and others), notably with respect to decision-making, implementation and oversight.

Corporate governance impacts economic efficiency at the level of the individual company but the corporate governance framework has macroeconomic implications as it affects capital formation and allocation.

Given the separation of ownership and management, a central element of corporate governance and corporate governance framework is the protection of shareholders’ rights. These notably include the right to share in the profits and net assets of the corporation, the right to participate and vote in general shareholder meetings and the right to choose board members to exercise oversight over management.

Proportionality between corporate ownership and control protects all shareholders against conflicts of interest and is expected to promote good corporate performance and market efficiency via internal and external (i.e. the market for corporate ownership and control) mechanisms. For this reason, it is amongst the eight Global Governance Principles established by the International Corporate Governance Network, the leading investor-based advocacy organisation in the fields of corporate governance and investor stewardship.

The issuance of multiple share classes and the reliance on cascading shareholdings are the main, age-old, mechanisms to leverage the power of certain shareholders to the detriment of others.

Opponents of proportionality represent that the limitation of proportionality allows founders and controlling shareholders to insulate against market short-termism and focus on long-term value creation for all (e.g. Govindarajan and Srivastava, 2017); another argument is that these limitations are positive for the size and diversity of the public equity market as they allow issuance of shares by

12 - From June 2019, the sample index includes, as part of its Core ESG filter, negative screening in respect of companies offering only non-voting stocks.

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companies in need of capital but whose founders and/or existing shareholders are unwilling to lose control (e.g. Howell, 2017).

From an ethical standpoint, one may object to violation of proportionality from the vantage point of fairness or by representing that it undermines macro-economic efficiency. Egoist justifications of opposition to this violation would include the reduction of governance risks that are potentially financially material (although the traditional association between governance and returns has faded as documented in Bebchuk et al., 2012).

There has been considerable interest in multiple-class share structures recently due to their resurgence and growing usage, notably by technology companies, starting with Google in 2004, and in the wake of excesses such as the 2017 decision by Snap Inc. to only list non-voting shares. In this context, concerned U.S. investor groups (notably the influential Council of Institutional Investors and the Investor Stewardship Group) have lobbied stock exchanges to impose restrictions on the use of multiple class structures, including sunset provisions at a minimum, and requested that index providers conduct consultations with their stakeholders on the eligibility of non-voting equities for index inclusion.

## *Definition of Metrics*

The G20/OECD Principles of Corporate Governance, which are the leading corporate governance benchmark endorsed by governments, recognise voting rights as one of the basic shareholder rights but do not require proportionality.

Against this backdrop, the Non-Voting Shares Report tracks exposure to companies that only offer non-voting stocks to the public.

## **1.2. Norms and analytics covering controversial products and activities**

Global norms in respect of prohibited and restricted activities centre on weapons that violate fundamental humanitarian principles through their normal use due to their disproportionate or indiscriminate impact.

The relevant treaties may not only target usage of these weapons, but also involvement in their development, production, transfer, stockpiling and exceptionally assistance or encouragement of prohibited activities. Where a treaty proscribes assistance, divestment from companies involved in the prohibited activities may be a legal requirement for the investor. In this regard, the 2008 Convention on Cluster Munitions contains language that has been widely interpreted as requiring signatory states to prohibit investment in the production of the weapons banned by the convention and dozens of states have either introduced such prohibitions in their local laws or clarified that interpretation – a number of countries have extended such investment prohibitions to other inhumane weapons, primarily to Anti-Personnel Mines which had become widely reviled amongst

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# 1. ESG Norms Reporting

the public thanks to a successful international campaign.<sup>13</sup> In the absence of applicable law prohibiting investment in companies involved in inhumane weapons, exclusion of such companies is voluntary. As such, it may be restricted to companies whose types of involvement in weapons explicitly covered by global treaties violate treaty provisions; extend to all companies involved in weapons explicitly covered by global treaties; or be generalised to also include involvement in inhumane weapons not (yet) explicitly regulated by a global treaty<sup>14</sup> (which nevertheless fall under the general prohibitions of the law of war and customary international law).

Activity or product-based exclusions in relation to global norms may go beyond the strict respect of the letter of a treaty and target companies whose activities or products are fundamentally at odds with the ESG objectives pursued by the treaty. In this regard, we focus on two areas of strong institutional investor interest – tobacco and climate change – for which global norms with close to universal support exist.

Legally binding in 181 countries (out of 195), the 2003 World Health Organization (WHO) Framework Convention on Tobacco Control aims “to protect present and future generations from the devastating health, social, environmental and economic consequences of tobacco consumption and exposure to tobacco smoke by providing a framework for tobacco control measures (...) in order to reduce continually and substantially the prevalence of tobacco use and exposure to tobacco smoke.”

Ratified by all the member states of the United Nations, the 1992 United Nations Framework Convention on Climate Change aims for the “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system” in a manner that ensures that food production is not threatened and enables economic development to proceed in a sustainable manner (Article 2). Ratified by 185 Parties to the Convention (out of 197), the 2015 Paris Agreement primarily aims to (a) hold the increase in the average global temperature well below two degrees Celsius above pre-industrial levels and pursuing efforts to target an increase of 1.5 degrees Celsius; (b) increase the ability to adapt to the adverse impacts of climate change and foster climate resilience; and (c) make finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development. (Article 2).

Institutional investor interest in respect of tobacco and climate change is demonstrated by fund flows: tobacco screening has recorded the fastest growth amongst exclusions in recent years and is now the most popular screen globally (GSIA, 2019; Eurosif, 2018) while fossil fuel divestment registers high interest globally and climate change is the second ESG theme in the US responsible investment industry by assets to which it is applied (US SIF, 2018).

Below, we present and justify our choice of analytics in respect of products and activities contravening global norms or their objectives with respect to inhumane weapons (also known as “controversial weapons:”), tobacco and climate change.

13 - The International Campaign to Ban Landmines led to their prohibition by the Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction and earned the organisation and its founding coordinator, Ms Jody Williams, The Nobel Peace Prize in 1997.

14 - Some of which may be covered by investment prohibitions in certain jurisdictions.

# 1. ESG Norms Reporting

## 1.2.1. Controversial Weapons Report

The Controversial Weapons Report measures the cumulated weight of index constituents whose issuers are involved in controversial weapons in general and certain classes of weapons in particular, namely cluster munitions and anti-personnel landmines on the one hand, and weapons of mass destruction on the other.

Table 6: Controversial Weapons Report for sample flagship index at December 2018<sup>15</sup>

SciBeta Developed Low Carbon HFI MBMS 6F4S EW	Index	Broad CW	Change
Companies involved in controversial weapons	1.15%	2.53%	-55%
Companies involved in cluster munitions and anti-personnel mines	0.00%	0.65%	-100%
Companies involved in nuclear, biological and chemical weapons	0.97%	2.33%	-58%

Analytics are calculated at the end of the latest quarter and with ESG data updated at the beginning of the penultimate month of the quarter. This report relies on public sources and Controversial Weapons Risk Assessment data provided by Vigeo-Eiris.

### Context

Controversial weapons are weapons that violate fundamental humanitarian principles through their normal use due to their disproportionate or indiscriminate impact.

Their use may be explicitly prohibited or regulated by international treaties or may be subject to stakeholder campaigns and discussions in international institutions regarding possible future regulation. Treaties may also prohibit involvement in the development, production, transfer and stockpiling of these weapons. As for Cluster Munitions, assistance, encouragement or inducement to engage in any prohibited activity is also prohibited.

Investment in companies with involvement in some of these weapons is prohibited in certain jurisdictions and may expose the investor and its staff to legal and liability risks, including criminal liability. Legal and liability risk considerations aside, investing in companies involved in inhumane weapons raises deontological and consequentialist ethical concerns and exposes the investor to reputational risk.

### Definition of Metrics

Scientific Beta tracks exposure to ten classes of controversial weapons as per Table 7 below.

Involvement is defined as development/production, sales, stockpiling or transport of such weapons or key components to such weapons; involvement may be either direct or through a subsidiary or joint venture with majority control.

Within these ten classes, we provide breakdown of exposure in respect of anti-personnel landmines and cluster munitions on the one hand and weapons of mass destruction on the other:

- Anti-Personnel Landmines and Cluster Munitions have been the subject of successful international campaigns, which have made them widely reviled amongst the public and have led to several countries prohibiting financial institutions from investing directly or indirectly in companies

<sup>15</sup> - The sample index includes a Core ESG filter that includes negative screening in respect of companies with involvement in anti-personnel landmines and cluster munitions.

# 1. ESG Norms Reporting

involved in these weapons and to investors voluntarily adopting these investment prohibitions. It should also be underlined that companies that derive revenue from the production, sale and/or transfer of antipersonnel landmines or cluster bombs cannot be recognised as participants in the UN Global Compact.

- Weapons of Mass Destruction, i.e. Nuclear, Bacteriological and Chemical (NBC) weapons are those most often excluded voluntarily by investors after Anti-Personnel Landmines and Cluster Munitions; while some investors limit the exclusion in respect of Nuclear weapons to those companies in breach of the Non-Proliferation Treaty, a growing numbers of investors extend the prohibition to all companies with involvement in Nuclear weapons.

Table 7: Classes of Controversial Weapons and international treaties dedicated to banning or regulating their use

Type of weapon	Treaty basis for prohibition or regulation
Anti-personnel landmines	Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction (1997)
Cluster munitions	Convention on Cluster Munitions (2008)
Nuclear weapons	Treaty on the Non-Proliferation of Nuclear Weapons (1968) Treaty on the Prohibition of Nuclear Weapons (no force, 2017)
Bacteriological weapons	Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or other Gases, and of Bacteriological Methods of Warfare (1925) Biological and Toxin Weapons Convention (1972)
Chemical weapons	Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or other Gases, and of Bacteriological Methods of Warfare (1925) Chemical Weapons Convention (1997)
Weapons using non-detectable fragments	The Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May be Deemed to be Excessively Injurious or to Have Indiscriminate Effect (1980 revised 1995)
Incendiary weapons	
Blinding laser weapons	
Depleted uranium weapons	
White phosphorous munitions	No dedicated treaty - Discussions in international for and/or prohibition campaigns

## 1.2.2. Tobacco Report

The Tobacco Report measures the cumulated weight of index constituents with involvement in tobacco production and/or distribution.

Table 8: Tobacco Report for sample flagship index at December 2018<sup>16</sup>

SciBeta Developed Low Carbon HFI MBMS 6F4S EW	Index	Broad CW	Change
Companies producing tobacco products	0.00%	1.03%	-100%
Companies with 5% or more of turnover derived from the production or distribution of tobacco	0.16%	1.28%	-87%

Analytics are calculated at the end of the latest quarter and with ESG data updated at the beginning of the penultimate month of the quarter. This report relies on public sources and Controversial Activities Screening data provided by Vigeo-Eiris.

### Context

Tobacco consumption is now universally recognised for the major health risk it is and the significant economic toll it imposes on the affected individuals, their employers and governments. Aiming to reduce the supply of and demand for tobacco products, the 2003 World Health Organization (WHO) Framework Convention on Tobacco Control is legally binding in 181 countries (out of 195).

<sup>16</sup> - The sample index includes a Core ESG filter that includes negative screening in respect of Tobacco Industry companies and manufacturers of tobacco products.

# 1. ESG Norms Reporting

Strengthening implementation of the Convention is a target of the third goal of the 2015 UN Sustainable Development Goals (SDGs).<sup>17</sup>

Divestment from tobacco companies is not required by the Convention but is aligned with its goal to reduce the supply and consumption of tobacco. Divestment from tobacco companies and companies with significant revenues from tobacco production or distribution can be justified on ethical as well as self-interested grounds. Engagement of the tobacco industry is not a viable strategy as the only acceptable objective is the termination of the industry itself.

Financial support to an industry whose product kills up to half (Peto et al., 1996) of those who use it as intended raises ethical concerns and exposes the investor to reputational risk. In this regard, the UN Global Compact considered that to maintain its status as a reference for corporate sustainability leadership, it should no longer recognise companies involved in the production and/or manufacture of tobacco as participants (UN Global Compact Integrity Policy Update of October 2017).

From the point of view of the potential financial materiality of ESG risks for investments, it can be remarked that an industry that creates externalities to society that are a multiple of its revenues may be exposed to significant regulation and litigation risk. While the tobacco industry has developed and successfully deployed a range of tactics (e.g. Saloojee and Dagli, 2000) to maintain the externalisation of its social and environmental costs, it is nevertheless facing an unprecedented global and concerted effort that has already de-normalised product use, reduced global prevalence and remains focused on the ultimate elimination of tobacco. It should also be observed, that companies that have engaged or continue to engage in disinformation campaigns and the corruption of public policy decision-making processes are facing legal and liability risks in these respects.

Institutional investor support for tobacco divestment has increased spectacularly in recent years. In 2018, close to USD3 trillion and a quarter of the Sustainable, Responsible and Impact Investing funds in the United States included tobacco-restrictions (USSIF, 2018); globally, the divestment campaign started by Dr Bronwyn King continued to gather pace and reached a new milestone with the launch of the Tobacco-Free Finance Pledge, supported by PRI and the UN Environment Programme and extremely well received in the institutional investor community (at end June 2019, it had 140 Signatories and Supporters, including investors with over USD7 trillion of assets under management).

## *Definition of Metrics*

Scientific Beta tracks exposure to Tobacco Industry companies and companies with involvement in the production of tobacco products irrespective of industry classification and regardless of the percentage of revenues represented by this activity. Scientific Beta also tracks exposure to companies that derive more than 5% of their revenues from the production or distribution of tobacco.

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<sup>17</sup> - Close to four-fifths of tobacco users live in low- and middle-income countries (WHO, 2019) and while the tobacco epidemic is still in its early stages there, developing countries already shoulder a significant share of the overall economic costs of tobacco - Goodchild et al. (2018) estimate that direct exposure to smoking only represented a cost of 1.8% of global GDP in 2012 and that almost 40% of this toll is paid by developing countries.

# 1. ESG Norms Reporting

Involvement in the production of tobacco products concerns only complete tobacco products; the production of filters, packaging, additives or chemicals such as acetate used in tobacco filters are not in scope. This corresponds to the definition of involvement adopted by the Tobacco-Free Finance Pledge (2018) and is also consistent with the definition disqualifying a company for recognition as a participant in the UN Global Compact (2017).

Involvement in production or distribution of tobacco at a level of 5% or more of turnover concerns ownership of tobacco plantations and the manufacture of tobacco products (including revenues from the sale of own products) and wholesaling and retailing of tobacco products manufactured by other companies.

## 1.2.3. Coal Report

The Coal Metrics report the index exposure to companies with significant involvement in coal as per industry classification, turnover, ownership of reserves or, in the case of Utilities, usage for power generation.

Table 9: Coal Report for sample flagship index at December 2018<sup>18</sup>

SciBeta Developed Low Carbon HFI MBMS 6F4S EW	Index	Broad CW	Change
Companies classified in the coal industry	0.00%	0.11%	-100%
Companies with 30% or more of turnover from thermal coal mining	0.00%	0.00%	N/A
Companies owning coal reserves (other than those in the Iron and Steel industry)	0.00%	2.30%	-100%
Utilities with 30% or more of coal in power generation fuel mix	0.00%	1.98%	-100%

Analytics are calculated at the end of the latest quarter and with ESG data updated at the beginning of the penultimate month of the quarter. Energy and Extractive Industry data provided by Institutional Shareholder Services are used to prepare this report.

### Context

Amongst widely used fuels, coal boasts the highest greenhouse gas emissions per heating unit produced (the combustion of lignite emits 84% more carbon dioxide than natural gas, EIA, 2019).

While the share of coal in primary energy demand and in electricity generation has started to decrease slowly, it remains the largest source of electricity and the second-largest source of primary energy. In 2018, global energy related CO<sub>2</sub> emissions reached a historic high of 33.1 Gt CO<sub>2</sub> and 44% of these emissions were related to coal use (including an all-time high of 10.1 Gt CO<sub>2</sub> for coal-fired power generation and 4.5 Gt CO<sub>2</sub> for other coal uses). Coal-fired power plants were the single largest contributor to the growth in emissions observed that year (IEA, 2019a).

The consumption of coal, even at current levels, is not compatible with achievement of the 2015 Paris Agreement target, let alone the more ambitious goal of keeping global warming below 1.5 degrees Celsius above pre-industrial levels. Reducing reliance on coal is a priority in any energy transition scenario. McGlade and Ekins (2015) estimate that 82% of coal reserves need to remain unburned before 2050 in the 2-degree scenario (along with half of the gas reserves and a third of the

18 - The sample index includes a Core ESG filter that includes negative screening in respect of coal involvement defined by any of the following criteria: classification in the Coal Industry Group; turnover of 30% or more derived from thermal coal; ownership of coal reserves (for companies outside the Iron & Steel Industry); and reliance on coal for 30% or more of the power generation capacity (for power-generating companies in the Utilities and Financials Economic Sectors).

# 1. ESG Norms Reporting

oil reserves). In the 1.5-degree scenarios of the Intergovernmental Panel on Climate Change (IPCC), the median reduction in coal use between 2020 and 2050 is 85% and as far as energy generation is concerned, the median reduction in coal usage is 96% (IPCC, 2018).

In addition, the production of coal is also associated with multiple environmental problems including aquifer depletion, water contamination and the destruction of headwater ecosystems, landscapes, forests and wildlife habitats. The burning of coal releases sulphur dioxide, nitrogen oxides, particulate matter, and heavy metals that cause smog, acid rain, and toxic air pollution.

Prolonged reliance on fossil fuels materially contributes to reducing the likelihood of averting catastrophic climate change. Extending financial support to activities that need to be phased out in the transition to a low-carbon economy and for which alternatives exist can be ethically questioned as contributing to unnecessary harm. From a deontological ethics standpoint, dissociating from an activity that causes harm is sufficient justification for divestment; from a consequentialist ethics standpoint, it should allow to avoid causing harm. Divesting from these activities may also be viewed as promoting climate action, a positive moral responsibility. Divestment sends a clear signal to stakeholders, exerts pressure on the cost of capital through changes in demand for securities and incentivises transition towards, if not environmentally beneficial, at least less harmful activities and technologies, on the part of shunned and other companies. It also frees up resources to invest in activities that facilitate the transition to a low-carbon economy. All of this is coherent with the fundamental responsibilities of signatories to the United Nations Global Compact in the areas of environment. As part of the Ten Principles of the Global Compact, businesses “should support a precautionary approach to environmental challenges” (Principle 7); “undertake initiatives to promote greater environmental responsibility” (Principle 8); and “encourage the development and diffusion of environmentally friendly technologies” (Principle 9).

The rapid phasing out of coal is key to averting the climate catastrophe and coal divestment has rightly been a priority of recent fossil fuel divestment campaigns (whose critical impact has been political but which have also registered direct successes with leading institutional investors, particularly on both sides of the Atlantic). The fossil fuel divestment movement initially focused on reserves ownership but divestment campaigns and programmes now include a diversity of criteria affecting downstream companies.

While fossil fuel divestment campaigns are motivated by ethical considerations, divestment is also increasingly promoted as a hedge against the financial consequences of climate change and notably the materialisation of carbon asset stranding risk in general and the adverse repricing of companies owning fossil fuel reserves in particular. The sectors most at risk of stranding are the Energy – Fossil Fuels and Electric and Natural Gas Utilities sectors and coal-powered plants and the entire coal supply chain are particularly at risk as the above figures suggest.

Table 10 below shows the potential benefits from thermal coal divestment identified by PRI (2018).

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# 1. ESG Norms Reporting

Table 10: Potential benefits of phasing out investments in thermal coal, PRI (2018)

Reinforce and mobilise climate-related investment goals and beliefs.
Support the attainment of a 2°C or less scenario.
Reduce the social and environmental physical impact risks.
Reinforce investor engagement efforts with governments to support climate-related policy actions consistent with 2°C or less scenario.
Align investment portfolios with 2°C or less scenario
Reinforce engagement efforts with (less coal-intensive) fossil fuel companies to reduce emissions and diversify into lower carbon assets.
Reduce portfolio emissions in absolute and relative terms.
Mitigate portfolio risk of future coal-related assets becoming stranded.
Better align with beneficiary and stakeholder values and preferences.

Sectors and companies that may be viewed as having a high responsibility in climate change are also exposed to liability risk. Note that this risk is heightened and combined with legal risks for companies that have engaged in the corruption of policymaking processes to slow down climate action.

## Definition of Metrics

Scientific Beta tracks exposure to Coal Industry companies and companies that derive 30% or more of their turnover from thermal coal mining, to companies that own coal reserves and to Utilities that rely on coal for 30% or more of their power-generation capacity. The reference to a 30% threshold corresponds to the current expectations of divestment advocacy groups (see for example, Unfriend COAL, 2018). In-scope fossil fuels and thresholds will be reviewed over time for consistency with decarbonisation pathways.

Industry classification is as per the Thomson Reuters Business Classification (TRBC) and covers coal mining or beneficiating, provision of support services for coal, mining support (e.g. testing, tunnelling, blasting, training, and other contract-based, coal-related services) and wholesaling of coal.

Involvement in thermal coal mining at a level of 30% or more of turnover is determined regardless of industry classification; the focus on thermal coal is predicated on the observation that, in the medium-term, there is no economically-relevant at-scale substitute for metallurgical coal used for iron and steel manufacturing. For this reason, companies in the Iron & Steel classification are disregarded for the coal reserves analytics.

Utilities with power-generation capacity are companies with such capacity classified in the Utilities and Financials sectors. In regard to the fuel mix and in the event that the coal ratio is not available, the thermal ratio (“brown” share) is used in its stead to ensure the assessment of exposure remains conservative.

## 2. Climate Change Reporting

## 2. Climate Change Reporting

Climate Change reporting looks into the greenhouse gas emissions associated with the operations of index constituents and provides indicators of relevance to the assessment of exposure to climate change risks.

The Earth has warmed by 0.8-1.2 degrees Celsius from pre-industrial times (IPCC, 2018) and the resulting changes in weather patterns, sea levels and frequency of extreme weather events are already affecting ecosystems, human communities and economies on a global scale.

Global warming is primarily driven by the accumulation in the atmosphere of greenhouse gases (GHG), i.e. gases that capture and radiate towards the planet's surface some of the heat radiating from Earth toward space and thus create a "greenhouse effect". The concentration of these gases in the atmosphere has significantly increased since the Industrial Revolution and the rate of increase has accelerated dramatically since the mid-twentieth century when emissions from fossil fuels became the dominant source of human emissions.

While ethical and socially responsible investors should be expected to orient their investments, engagement and outreach policies to contribute to the fight against Climate Change, all investors need to consider the possible financial impacts of Climate Change on their portfolios.

Constituent-by-constituent impact will depend on how the market value of their future cash flows is affected by the economy-wide, industry and idiosyncratic dimensions of climate change risks and their management.

From an investment standpoint, climate change risks refer to the potential impacts of climate change on the values of holdings. Impact may be from physical effects – of an acute nature (e.g. damage to assets or supply chain disruptions due to climate events) or a chronic nature (e.g. changes to resource availability or productivity, increase in temperatures or sea level); from regulatory, technology and market changes brought about by the need to mitigate the effects of climate change and transition to a low greenhouse gas economy or from climate change-related litigation (e.g. in relation to a company's failure to mitigate climate change or adapt to it, of insufficient climate change disclosure). Impacts may be through revenues, expenditures, assets and liabilities, and access to funding.

It is typical to classify Climate Change Risks into Physical Risks and Transition Risks, with the latter including Litigation Risks. The risk of early or unexpected asset impairment or conversion to liability as a result of climate change is termed "Stranding Risk" and is usually considered only in the context of the risks of the transition to a low greenhouse gas economy (often termed "low carbon economy" because carbon dioxide is the number one contributor to the greenhouse effect amongst the gases directly released by human activity and the key gas to target for long-term global warming mitigation).

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## 2. Climate Change Reporting

Scientific Beta Climate Change reporting is meant to support analysis and reporting in regards to contribution to Climate Change; overall exposure to Transition Risks and Stranding Risks; and exposure to Physical Risks.

The evaluation of greenhouse gas emissions associated with issuers is a preliminary to the assessment of the indirect contribution of a portfolio to Climate Change and central to understanding exposure to Transition Risks; Box 1 below imparts some basic information on accounting for greenhouse gases at the corporate level.

### Box 1: Corporate Accounting of Greenhouse Gas Emissions

The Greenhouse Gas (GHG) Protocol Corporate Standard, developed by World Resources Institute and the World Business Council on Sustainable Development, first published in 2001, is the international standard for corporate and organisational GHG inventory.

The Corporate Standard covers the accounting and reporting of the seven gases covered by the 1997 Kyoto Protocol and its 2013 Doha amendment: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF<sub>6</sub>) and nitrogen trifluoride (NF<sub>3</sub>).

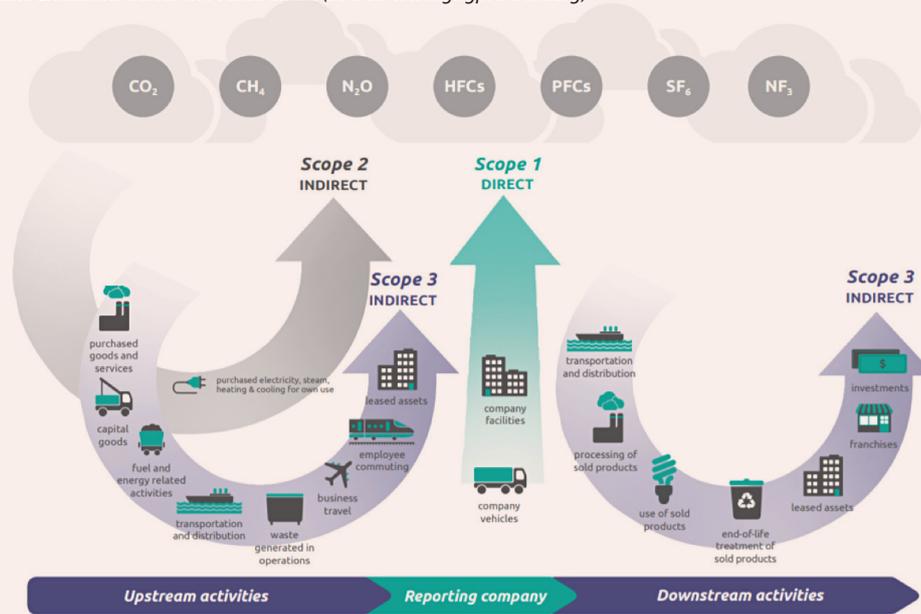
Emissions of various greenhouse gases are typically expressed in terms of CO<sub>2</sub> equivalent emissions (CO<sub>2</sub>e) based on the global warming potential of these gases over a given period, typically one hundred years, relative to that of carbon dioxide.

The Corporate Standard distinguishes three scopes of emissions: Scope 1 emissions are direct emissions from sources owned or controlled by the company; Scope 2 emissions are indirect emissions from electricity, steam, heating/cooling purchased or consumed by the company; and Scope 3 emissions are other indirect emissions in the corporate value chain (see Table 11 and Figure 1 for details and illustrations).

Table 11: Scopes of Greenhouse Gas Emissions

Scope 1 emissions	GHG emissions from sources that are owned and/or controlled by the company.
Scope 2 emissions	GHG emissions from the generation of electricity, steam, heating or cooling purchased/consumed by the company.
Scope 3 emissions	All other indirect greenhouse gas emissions that occur in the value chain of the company (i.e. emissions that result from upstream activities such as the production of purchased raw material, as well as emissions from downstream activities, such as the distribution and use of the company's products).

Figure 1: Scopes and Emissions across the Value Chain (source: www.ghgprotocol.org)



## 2. Climate Change Reporting

Scope 3 emissions occur from multiple upstream and downstream sources not owned or controlled by the reporting company and as such may be challenging to estimate; in addition, there is a higher risk of double counting arising from reporting companies taking different views on the boundaries of their activities for emissions measurement. At this stage, reporting of Scope 3 emissions is not a requirement in most jurisdictions and very few companies report Scope 3 emissions comprehensively. As a result, self-reported Scope 3 emissions data is too scarce and lacking in quality and consistency to support stock selection decision-making. Scope 3 emissions can nevertheless be modelled to provide potentially useful insights, and a number of specialised providers offer quality data. While the precision and granularity of these estimates will typically be insufficient to guide stock picking, they could provide relevant order of magnitude information at the levels of sectors or segments to assist in defining priority areas for action.

Table 12 below identifies the relevance of the various Climate Change reports provided for these analysis and reporting exercises. In the rest of this chapter, we present and justify our choice of analytics in respect of each.

Table 12: Relevance of the various Climate Change Reports

Objective	Approach	Relevant report
Measuring contribution of holdings to Climate Change	Carbon Footprinting of index	Carbon Footprinting
Assessing exposure of holdings to the Transition Risks of Climate Change	Carbon Footprinting of index	Carbon Footprinting
	Measuring exposure of index to Carbon Intensive companies and sectors	Carbon Exposure WACI Decomposition
	Measuring exposure of index to assets and sectors with high Stranding Risk potential and performing finer grain analysis	Reserved Emissions Fossil Fuels Power Generation
Assessing exposure of holdings to the Physical Risks of Climate Change	Assessing exposure of index constituents to acute and chronic Physical Risks	Physical Risks

### 2.1. Measuring Contribution to Climate Change

Carbon Footprinting entails allocating to the portfolio a share of the greenhouse gas emissions of each holding in proportion to the share of its capital that is controlled by the portfolio (which is in line with the ownership or economic interest principle of the GHG Protocol Corporate Standard). Carbon footprinting metrics thus represent the indirect responsibility of a portfolio's investor in respect of emissions.

Table 13: Carbon Footprinting Report for sample flagship index at December 2018

SciBeta Developed Low Carbon HFI MBMS 6F4S EW	Index	Broad CW	Change
Total Emissions (S1+2, Gt)	N/A	4.686	N/A
Total Emissions (S1+2+3, Gt)	N/A	19.014	N/A
Current Total Capitalisation (FF, M\$)	N/A	37,050,779	N/A
Carbon Footprint (S1+2, kt/B\$)	84k	126k	-33%
Carbon Footprint (S1+2+3, kt/B\$)	362k	513k	-29%
Carbon Intensity (S1+2, t/M\$)	112	225	-50%
Carbon Intensity (S1+2+3, t/M\$)	484	915	-47%

Analytics are calculated at the end of the latest quarter and with emissions data updated annually in June on the basis of the figures reported at the end of the previous year. For Carbon Intensity calculations, corporate revenues are those of the year for which greenhouse gas emissions are reported. For Carbon Footprint calculations, corporate capitalisations are taken at end-of-quarter. Constituent weights used for all carbon footprinting metrics are end-of-quarter weights. Emissions data are provided by Institutional Shareholder Services.

## 2. Climate Change Reporting

### Context and Definitions

The three most common carbon footprinting metrics are: Total Emissions, Carbon Footprint and Carbon Intensity. Total Emissions represents the absolute footprint of the portfolio, whereas Carbon Footprint normalises Total Emissions by the current market value of the portfolio and Carbon Intensity by the revenues controlled by the portfolio (it is also known as financed emissions to financed revenues). Being an absolute carbon footprint, Total Emissions should not be used to compare portfolios of different market values without proper normalisation.

The Taskforce on Climate-related Financial Disclosure (TCFD) regards all three metrics as worthy of consideration for reporting by asset owners and asset managers to their beneficiaries and clients (TCFD, 2017). As Carbon Footprinting measures, they can be used to report on a portfolio in a manner consistent with the GHG Protocol Corporate Standard. These metrics also allow for portfolio decomposition and attribution analysis.

For an equity portfolio with n constituents and using equity ownership for allocation of emissions, these metrics are as follows:

<p><u>Total (Carbon) Emissions</u>                  Absolute greenhouse gas emissions associated with a portfolio, as allocated based on equity ownership, expressed in tons of CO2e.</p>	$\sum_i^n \frac{\text{Current market value of investment}_i}{\text{Current market capitalisation}_i} \times \text{emissions}_i$	Useful to report absolute Carbon Footprint of portfolio. Does not control for portfolio size, making comparisons across time or portfolios difficult.
<p><u>Carbon Footprint</u>                  Greenhouse gas emissions associated with a portfolio, as allocated based on equity ownership and normalised by the market value of the portfolio, expressed in tons of CO2e per (USD) billion (or million) invested.</p>	$\frac{\sum_i^n \frac{\text{Current market value of investment}_i}{\text{Current market capitalisation}_i} \times \text{emissions}_i}{\text{Current market value of portfolio}}$ <p>or with <math>w_i</math> the weight of constituent <math>i</math> in the portfolio and market capitalisation <math>i</math> expressed in billions (millions):</p> $\sum_i^n w_i \times \frac{\text{emissions}_i}{\text{Current market capitalisation}_i}$	Useful for comparisons across portfolios or time. Affected by changes in market value of portfolio, e.g. changes in capitalisation of revenues.
<p><u>Carbon Intensity (aka financed emissions/financed revenue)</u>                  Greenhouse gas emissions associated with a portfolio, as allocated based on equity ownership and normalised by the revenues associated with the portfolio, expressed in tons of CO2e per (USD) million of revenues.</p>	$\frac{\sum_i^n \frac{\text{Current market value of investment}_i}{\text{Current market capitalisation}_i} \times \text{emissions}_i}{\sum_i^n \frac{\text{Current market value of investment}_i}{\text{Current market capitalisation}_i} \times \text{revenues}_i}$	Useful for comparisons across portfolios or time. Informs on carbon efficiency at the portfolio level. Affected by changes in revenues.

Note that, given two companies with the same emissions and revenues, the company that has a higher price-to-revenue ratio will have a lower Carbon Footprint. In this regard, Carbon Footprint favours (punishes) sectors and companies with high (low) price-to-revenue ratios. Likewise, given two companies with the same emissions and capitalisation, the company that has a lower price-to-revenue ratio will have a lower Carbon Intensity. In this regard, Carbon Intensity favours (punishes) sectors and companies with low (high) price-to-revenue ratios.

## 2. Climate Change Reporting

### *Implementation*

Scientific Beta procures greenhouse gas emissions data that respect the GHG Protocol definitions and reports carbon footprinting metrics in respect of Scope 1+2 emissions as well as Scope 1+2+3 emissions. Emissions data are updated annually in June on the basis of the figures reported at the end of the previous year.

Total Emissions are provided for the capitalisation-weighted index of the parent universe under the assumption of ownership of the entire free-float of each index constituent, an assumption that is broadly consistent with the weighting scheme of the index. No such assumption can be made for alternative-weighted indices to determine a level of investment and the corresponding figure for Total Emissions - investors that wish to compute the Total Emissions related to the investment in an alternatively weighted index should multiply the Carbon Footprint of the index by the desired investment level.

Carbon Footprint and Carbon Intensity are reported for each index, both in absolute terms and relative to the capitalisation-weighted benchmark.

### **2.2. Assessing Exposure to Transition Risks**

The Scientific Beta Climate Change Reporting includes several reports to support analysis of exposure to transition risks:

- The Carbon Exposure Report measures portfolio exposure to carbon-intensive companies and sectors and includes the Exposure to Carbon-related assets and Weighted Average Carbon Intensity (WACI).
- The WACI Decomposition Report provides additional insights on the difference between the index WACI relative to that of its benchmark by breaking it down into sector-weighting, intra-sector stock-selection and interaction effects.
- The Reserved Emissions, Fossil Fuel and Power Generation Reports allow for a finer-grain assessment of investment exposure to carbon-related assets and sectors with high stranding risk potential and includes breakdowns of relevance for gauging stranding risk.

#### **2.2.1. Carbon Exposure Report**

The Carbon Exposure Report measures portfolio exposure to carbon-intensive companies and sectors and includes the two Carbon Exposure metrics that the TCFD sees as worthy of consideration for reporting by asset owners and asset managers to their beneficiaries and clients, i.e. Weighted Average Carbon Intensity and Exposure to Carbon-related Assets (TCFD, 2017).

Weighted Average Carbon Intensity relies on emissions and is the carbon metric that the TCFD recommends for portfolio reporting. Exposure to Carbon-related Assets is the aggregation of holdings from sectors or industries with the highest direct or indirect emissions. The former is typically used as an indicator of exposure to carbon-intensive companies across the portfolio and the latter as an indicator of portfolio exposure to carbon-intensive sectors or industries.

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## 2. Climate Change Reporting

These Carbon Exposure metrics should not be regarded as risk exposure metrics<sup>19</sup> although they are typically used as proxies for portfolio exposure to Transition Risk and Stranding Risk, respectively.

Table 14: Carbon Exposure Report for sample flagship index at December 2018

SciBeta Developed Low Carbon HFI MBMS 6F4S EW	Index	Broad CW	Change
Weighted Average Carbon Intensity (S1+2, t/M\$)	101	215	-53%
Weighted Average Carbon Intensity (S1+2+3, t/M\$)	461	957	-52%
Exposure to Carbon-Related Assets	7.75%	8.80%	-12%
of which Fossil Fuels	4.32%	6.03%	-28%
of which Fossil Fuel Utilities and IPPs	0.25%	0.16%	+52%
of which Other Utilities and IPPs	3.18%	2.61%	+22%
WACI of Carbon-Related Assets (S1+2, t/M\$)	606	1369	-56%

Analytics are calculated at the end of the latest quarter and with emissions data updated annually in June on the basis of the figures reported at the end of the previous year. For Weighted Average Carbon Intensity calculations, corporate revenues are those of the year for which greenhouse gas emissions are reported. Constituent weights used for all carbon exposure metrics are end-of-quarter weights. Emissions data are provided by Institutional Shareholder Services.

### 2.2.1.1 Weighted Average Carbon Intensity

Weighted Average Carbon Intensity measures exposure to carbon-intensive companies.

#### Context and Definition

Weighted Average Carbon Intensity (WACI) is the ratio of the investment-weighted sum of the constituent-level Carbon Intensities, i.e. company emissions normalised by company revenues, to total portfolio investment. Stated differently, it is the portfolio-weighted average of constituent-level Carbon Intensities. Consistent with the unit used for Carbon Intensity, it is expressed in tons of CO<sub>2</sub>e per USD million of revenues.

For an equity portfolio with n constituents, Weighted Average Carbon Intensity is given by the following formula:

$$\frac{\sum_i^n \frac{\text{Current market value of investment}_i}{\text{revenues}_i} \times \text{emissions}_i}{\text{Current market value of portfolio}}$$

or equivalently, with w<sub>i</sub> the weight of constituent i in the portfolio:

$$\sum_i^n w_i \times \frac{\text{emissions}_i}{\text{revenues}_i}$$

Because it is both simple and related to emissions, Weighted Average Carbon Intensity is the carbon metric that the TCFD recommends for reporting by asset owners and asset managers to their beneficiaries and clients (TCFD, 2017). The TCFD considers only Scope 1 plus Scope 2 GHG emissions for the computation of emissions-based carbon metrics.

While this metric is based on emissions, allocation to the portfolio does not respect the equity ownership approach of the Greenhouse Gas Protocol Corporate Standard and as such, it is not a carbon footprint (unlike Total Emissions; Carbon Footprint and Carbon Intensity).

19 - Determining the carbon risk exposure of a portfolio would require determining the risk exposure for each constituent and availing of a model for their aggregation. Commonly used constituent-level carbon metrics are indeed key inputs for the determination of constituent-level carbon risk exposures but should not be mistaken for risk exposures which also depend on geographic (carbon regulation and taxes remain jurisdiction-specific) as well as sector and company-specific factors (notably pricing power and operating margin). Thus, two companies that lack comparability may have very different carbon risk exposures despite having identical carbon metrics. For portfolios of diverse companies, carbon footprints and Weighted Average Carbon Intensity are thus theoretically severely lacking as risk metrics. This notwithstanding, carbon footprints measure the contribution to climate change of portfolio holdings and as such can be used to assess, or report on, the climate friendliness of investments, in a cross-sectional context or over time. Likewise, Weighted Average Carbon Intensity is an acceptable measure of exposure to Carbon Intensive companies.

## 2. Climate Change Reporting

While a measure of exposure to carbon-intensive companies, Weighted Average Carbon Intensity is often used as a proxy for exposure to carbon-price risk.

Note that, given two companies with the same emissions and capitalisation, the company that has a lower price-to-revenue ratio will have a lower Carbon Intensity. In this regard, Carbon Intensity favours (punishes) sectors and companies with low (high) price-to-revenue ratios.

### Implementation

Scientific Beta procures greenhouse gas emissions data that respect the GHG Protocol definitions and reports portfolio-wide Weighted Average Carbon Intensity in respect of Scope 1+2 emissions as well as Scope 1+2+3 emissions. Emissions data are updated annually in June on the basis of the figures reported at the end of the previous year.

For analysis of sectors and groups of assets, reported WACI is in respect of Scope 1 plus Scope 2 emissions unless otherwise indicated.

#### *2.2.1.2. Exposure to Carbon-related Assets*

Exposure to Carbon-related Assets measures exposure to carbon-intensive sectors.

### Context and Definition

Exposure to Carbon-related Assets is the aggregate measure of portfolio holdings of assets from sectors with relatively high direct or indirect greenhouse gas emissions, expressed in currency terms or as a percentage of portfolio value.

The top-three sectors by Weighted Average Carbon Intensity or carbon footprinting metrics are Utilities, Energy and Basic Materials; however, the high-carbon Iron and Steel Industry or the Cement and Concrete Manufacturing Activity that are part of the Basic Materials Economic Sector do not have low-carbon competitors.

The Taskforce on Climate-related Financial Disclosures notes that the term carbon-related assets is not well defined and suggests it be defined as comprising “those assets tied to the energy and utilities sectors under the Global Industry Classification Standard (GICS), excluding water utilities and independent power and renewable electricity producer industries” (TCFD, 2017).

This definition is consistent with zooming in on assets in the fossil fuel sector (coal mining, oil and natural gas production, refining); on the infrastructure concerned with the storage and transportation of such fuels; and on a type of high-carbon sector that is particularly threatened by the transition to a low carbon economy since low-emissions technologies exist as alternatives to traditional, fossil-fuelled fired Utilities.

This metric is typically used for broad-brush estimation of stranding risk in the portfolio. As a crude multi-sector aggregate metric, it leaves certain relevant carbon-related assets out of the picture,

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## 2. Climate Change Reporting

e.g. companies that operate or manufacture equipment for fossil-fuel dependent infrastructure, and does not allow cross-sector and intra-sector differences in transition risk exposure to be appreciated.

### Implementation

At the level of granularity suggested by the TCFD, low-carbon fuels are included in Energy and the treatment of Utilities is inconsistent. As far as Energy is concerned, Scientific Beta considers that investments in companies, if any, whose activities are dominated by: i) Uranium or ii) Renewable Fuels should not count towards Exposure to Carbon-related assets when granularity allows these companies to be recognised. As far as Utilities are concerned, we consider that, when granularity so allows: i) Nuclear Utilities, if any, should not count towards Exposure to Carbon-related assets; ii) Fossil Fuel Independent Power Producers, if any, should count towards this exposure; and iii) consistency should be sought in the treatment of diversified utilities.

Scientific Beta relies on the Thomson Reuters Business Classification (TRBC) for sector analyses. In porting the Exposure to Carbon-related Assets metric to TRBC, we recognised differences with GICS and made conservative adjustments: i) while the GICS Water Utilities industry is excluded, the corresponding industry under TRBC includes Heating & Air-Conditioning Supply as a category, which we consider should not be excluded from the scope; ii) the TRBC framework recognises Nuclear, Fossil and Renewable as activities under Electric Utilities whereas the GICS framework treats Renewable Utilities separately; hence companies classified as diversified in the TRBC framework should be expected to have an energy mix that is less exposed to fossil fuels than the companies classified as Electric Utilities in the GICS framework. We nevertheless elected to be conservative and kept TRBC diversified utilities (NEC) in scope under the assumption that they may still have significant exposure to fossil fuels (analysis performed at end 2018, confirmed that more than half of these companies had indeed more than a third of their revenues linked to fossil fuels, which was also true of Multiline Utilities, which were in the scope of the implementation proposed by the TCFD).

The Scientific Beta implementation of Exposure to Carbon-related Assets aggregates investments into i) the TRBC Energy - Fossil Fuels business Sector, where fossil fuels (Oil & Gas Related Equipment and Services are included); ii) Fossil Fuel Utilities and Independent Power Producers (IPPs); and iii) other Utilities and IPPs with the exception of those identified under Nuclear or Renewable Utilities or IPPs.

TRBC code	Denomination
<b>Fossil Fuels</b>	
5010	Energy – Fossil Fuels
<b>Fossil Fuel Utilities and IPPs</b>	
5910101012	Fossil Fuel Electric Utilities
5910102011	Fossil Fuel IPPs
591020	Natural Gas Utilities
<b>Other Utilities and IPPs (exc. Nuclear &amp; Renewable)</b>	
5910101010	Electric Utilities (NEC)
5910102010	Independent Power Producers (NEC)
5910301013	Heating & Air-Conditioning Supply
591040	Multiline Utilities

## 2. Climate Change Reporting

To allow stakeholders to have a finer-grain understanding of exposure, we report i) the breakdown of total exposure into these three categories; ii) the Weighted Average Carbon Intensity for each category.

The Reserved Emissions, Fossil Fuels and Power Generation Reports allow for finer-grain analysis of Stranding Risk.

### 2.2.2. WACI Decomposition

WACI Decomposition is a single-period, holding-based method that breaks down the Weighted Average Carbon Intensity of the index relative to that of its cap-weighted reference into sector-weighting, intra-sector stock-selection and interaction effects.

Table 15: Carbon Exposure Report for sample flagship index at December 2018

SciBeta Developed HFI MBMS 6F4S EW	Index Sector Weight	Index Sector WACI	Index Sector Contr.	Broad CW Sector Weight	Broad CW WACI	Broad CW Contr.	Excess	Stock	Sector	Inter.
Energy	4.43%	449	20	6.08%	793	48	-28.35	-20.91	-13.13	5.69
Basic Materials	3.53%	446	16	4.19%	835	35	-19.22	-16.29	-5.48	2.55
Industrials	12.17%	70	8	11.83%	135	16	-7.46	-7.70	0.46	-0.22
Cyclical Consumer	16.89%	47	8	12.49%	61	8	0.27	-1.79	2.69	-0.63
Non-Cyclical Consumer	13.21%	69	9	8.84%	60	5	3.86	0.84	2.61	0.41
Financials	18.32%	25	5	19.62%	35	7	-2.18	-1.85	-0.45	0.12
Healthcare	12.72%	26	3	13.72%	25	3	-0.21	0.04	-0.25	0.00
Technology	11.97%	30	4	17.15%	22	4	-0.10	1.47	-1.13	-0.44
Telecoms	3.00%	34	1	2.85%	41	1	-0.17	-0.22	0.06	-0.01
Utilities	3.77%	738	28	3.23%	2711	87	-59.69	-63.67	14.61	-10.64
<b>Total</b>		<b>Index WACI</b>	<b>101</b>		<b>Ref. WACI</b>	<b>215</b>	<b>-113</b>	<b>-110</b>	<b>-0</b>	<b>-3</b>

Analytics are calculated at the end of the latest quarter and with emissions data updated annually in June on the basis of the figures reported at the end of the previous year. For Weighted Average Carbon Intensity calculations, corporate revenues are those of the year for which greenhouse gas emissions are reported. Constituent weights used for all carbon exposure metrics are end-of-quarter weights. The sector classification used is the Thomson Reuters Business Classification. The analysis is performed over the latest quarter. Emissions data are provided by Institutional Shareholder Services.

#### Context and Definition

Brinson, Hood, and Beebower (1986) introduced a holding-based decomposition of benchmark-relative portfolio performance into sector-based market timing and security selection. Typically, the model is used to describe a single period. This approach is suitable for short-term periods.

In this spirit, WACI Decomposition decomposes the benchmark-relative WACI of a portfolio into sector effects (underweighting/overweighting of high/low WACI sectors) and (in-sector) stock-selection effects (underweighting/overweighting of high/low Carbon Intensity stocks in each sector); interaction effects capture the impact of the combination of sector and stock effects. This decomposition allows light to be shed on the relative WACI of a portfolio and, where relevant, to assess the quality of its decarbonisation.

## 2. Climate Change Reporting

### Implementation

Scientific Beta decomposes the WACI of an index between sector effects, stock effects and interaction effects, in reference to the ten Economic Sectors in the Thomson Reuters Business Classification (TRBC).

Let  $w_i^P$  and  $w_i^B$  be the weight of the i-th sector in the index and the benchmark, respectively.

Let  $WACI_i^P$  and  $WACI_i^B$  be the WACI of the i-th sector in the index and the benchmark, respectively, then:

The excess contribution to the portfolio WACI for the index and the i-th sector is written as:

$$w_i^P \cdot WACI_i^P - w_i^B \cdot WACI_i^B$$

And it can be decomposed into:

a stock selection effect:	$w_i^B \cdot (WACI_i^P - WACI_i^B)$
a sector effect:	$(w_i^P - w_i^B) \cdot WACI_i^B$
an interaction effect:	$(w_i^P - w_i^B) \cdot (WACI_i^P - WACI_i^B)$

In the WACI Decomposition table, the excess contribution per sector is found under the 'Excess' column and the stock, sector and interaction effects under 'Stock', 'Sector' and 'Inter.'

Found in the 'Total' row of the table, the sum of the excess contribution across the ten sectors (i.e. the cell at the intersection with the 'Excess' column) is the difference between the WACI of the index and the WACI of the portfolio on which the analysis tries to shed light. The net contribution attributable to the stock selection, sector and interaction effects is found at the intersection of the 'Stock', 'Sector' and 'Inter.' columns, respectively.

In the illustration in Table 15 above, the stock effect contributes 97% to the improved WACI of the Low Carbon version of the flagship index, the sector effect 0% and the interaction effect 3%. This demonstrates that the decarbonisation relative to the benchmark is not explained by underweighting of carbon-intensive sectors.

### 2.2.3. Deep-dive into Carbon-related Assets: Reserved Emissions, Fossil Fuels and Power Generation Reports

Global warming is primarily driven by the accumulation in the atmosphere of greenhouse gases (GHG). This concentration has significantly increased since the Industrial Revolution and the rate of increase has accelerated dramatically since the mid-twentieth century when emissions from fossil fuels became the dominant source of human emissions. Emissions from fossil fuels are now some seven times larger than the other significant source of greenhouse gases, deforestation and other land use changes (Le Quéré et al., 2018).

## 2. Climate Change Reporting

Today's energy system is based on fossil fuels; even assuming wildly optimistic scaling-up of Carbon Capture and Storage (CCS) technologies (as in most climate change mitigation scenarios), the consumption of fossil fuels must fall dramatically in the next few decades to have more than a 50% chance of keeping global warming within 2 degrees above pre-industrial times.

Fossil fuel-use must fall from a third (assuming ambitious CCS deployment) to a half (without CCS) by 2040 to make a 2-degree pathway realistic (Copenhagen Economics, 2017). Under rosy CCS assumptions, whereby capture capacity grows 100-fold by 2040 (from the current 30 million tons of CO<sub>2</sub> p.a.), coal consumption must still fall by two-thirds by 2040; oil consumption must fall by over 30% and gas consumption must remain stable (Copenhagen Economic, 2017).

In this context, deep-dive reporting into carbon-related assets allows for finer-grain assessment of investment exposure to assets and sectors with high stranding risk potential due to their involvement in fossil fuels, on the supply or demand sides.

### 2.2.3.1. Reserved Emissions Report

The Reserved Emissions Report shows the potential carbon dioxide emissions associated with the burning of fossil-fuel reserves controlled by an investment portfolio.

Table 16: Carbon Exposure Report for sample flagship index at December 2018<sup>20</sup>

SciBeta Developed Low Carbon HFI MBMS 6F4S EW	Index	Broad CW	Change
Potential CO <sub>2</sub> Emissions (Mt/B\$)	0.85	2.503	-66%
Of which from Coal reserves	0.051	1.192	-96%
Of which from Oil and Gas reserves	0.799	1.310	-39%

Analytics are calculated at the end of the latest quarter and with ESG data updated at the beginning of the penultimate month of the quarter. Reserved Emissions data are provided by Institutional Shareholder Services.

### Context and Definition

The Greenhouse Gas potential of Earth's proven fossil-fuel reserves greatly exceeds the amount of such gases the world can emit in the next few decades while limiting warming to internationally agreed-upon temperature goals this century ("carbon budget"). McGlade and Ekins (2015) estimate that 82% of coal reserves need to remain unburned before 2050 to have at least a 50% chance of keeping global warming within two-degrees Celsius above pre-industrial times, along with half of the gas reserves and a third of the oil reserves. Even though the majority of coal, oil and gas production and reserves are in not in the hands of private investors (Heede and Oreskes, 2016), the reserves of the top 100 listed coal companies and the top 100 listed oil and gas companies (by reserves size) exceed the "carbon budget" (Carbon Tracker Initiative, 2011).

Without technological breakthroughs allowing for at-scale Carbon Capture and Storage, the bulk of fossil-fuel reserves are at a high risk of stranding in the transition to a low emissions economy. If such impairments are not correctly anticipated by the average investor, the companies recording these will be repriced on the markets. In this regard, the Association of Chartered Certified Accountants

20 - The sample index includes a Core ESG filter that includes negative screening in respect of coal involvement defined by any of the following criteria: classification in the Coal Industry Group; turnover of 30% or more derived from thermal coal; ownership of coal reserves (for companies outside the Iron & Steel Industry); and reliance on coal for 30% or more of the power generation capacity (for power-generating companies in the Utilities and Financials Economic Sectors).

## 2. Climate Change Reporting

(ACCA) considers that typical accounting of fossil fuel reserves “does not factor in the risk that some current reserves may not be combusted” (ACCA and Carbon Tracker, 2013).

Against this backdrop, divesting from companies holding fossil-fuel reserves sends a clear signal to stakeholders regarding the urgency of a transition towards cleaner fuels and contributes to delegitimising the fossil-fuel industry. It can also be justified from a risk management angle as avoidance of stranding risk exposure in respect of fossil-fuel reserves.

While investors and campaigners have called on companies to disclose their potential emissions, there has been considerable pushback on the part of fossil-fuel companies and the extent of such reporting remains limited – at end 2016, not a single fossil-fuel company in the world was disclosing reserved emissions according to the World Resources Institute (Russell, 2016).

In the absence of corporate disclosures of reserved emissions, these need to be estimated from reserves figures that are reported by, or attributed to, companies; reserves figures need to be converted into potential emissions. This approach focuses on emissions from combustion, which by far generate most of the life-cycle emissions of reserves; finer-grain analyses would factor in emissions from production and processing, which can differ significantly by type of fuel reserve and extraction technology (Russell, 2016).

### Implementation

Scientific Beta reports the potential carbon dioxide emissions from the combustion of the fossil-fuel reserves that are allocated to an investment of USD1bn according to index weights and following the ownership (or economic interest) principle in the GHG Protocol Corporate Standard, whereby corporate emissions are proportionally allocated “per share” to the investor and portfolio level aggregation is based on the respective ownership of each holding.

In the context of an index with  $n$  constituents, Reserved Emissions are given by:

$$\sum_i^n w_i \times \frac{\text{potential emissions}_i}{\text{Current market capitalisation}_i}$$

with  $w_i$  the weight of constituent  $i$  in the portfolio; for the avoidance of doubt, the current market capitalisation refers to the total capitalisation of the company (rather than its free-float capitalisation). Scientific Beta expresses Reserved Emissions in Millions of tons of CO<sub>2</sub> per USD billion.

Total potential emissions are disaggregated into emissions from Coal reserves vs. emissions from Oil and Gas reserves (including Natural Gas Liquids and Bitumen). This decomposition is justified by the fact that Coal is the least efficient fuel in terms of conventional fossil fuels (i.e. it has the lowest heating value normalised by emissions) and as such, the urgent focus of decarbonisation trajectories. Since coal reserves also represent the bulk of overall fossil-fuel reserves, they are at a particularly high risk of stranding.

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## 2. Climate Change Reporting

The emissions data underlying the computation cover the largest oil and gas publicly traded reserves holders globally ranked by the potential carbon emissions content of their reported reserves; coverage is about 500 companies. The calculation of CO<sub>2</sub> emission potential requires several conversions to the raw reserves figures, which are performed according to the methodological framework presented in the IPCC Revised Guidelines for National Greenhouse Gas Inventories (IPCC, 1996). Coal reserves are the sum of proven and probable reserves based on the last reported reserves amount by mine and are allocated to companies based on percentage ownership of individual mines. Oil and gas reserves are proven reserves (1P) net of royalty payments.

### 2.2.3.2. Fossil Fuels Report

The Fossil Fuels Report measures investment exposure to the fossil fuels industry and companies with significant fossil fuel involvement.

Table 17: Carbon Exposure Report for sample flagship index at December 2018

SciBeta Developed Low Carbon HFI MBMS 6F4S EW	Index	Broad CW	Change	Index WACI	Broad CW WACI	Change
Companies classified in the Energy Sector	4.43%	6.08%	-27%	449	793	-43%
Companies classified in the Energy - Fossil Fuels Bus Sector	4.32%	6.03%	-28%	454	799	-43%
Of which in the Coal Industry Group	0.00%	0.11%	-100%	0	233	N.A.
Of which in the Oil & Gas Industry Groups	4.14%	4.88%	-15%	467	708	-34%
Companies with 25-50% of turnover from Fossil Fuels	2.61%	1.61%	+62%	610	831	-27%
Companies with 50-100% of turnover from Fossil Fuels	5.57%	8.17%	-32%	537	1526	-65%
Companies with 30% or more of turnover from thermal coal mining	0.00 %	0.00 %	n/r	0	0	n/r

Analytics are calculated at the end of the latest quarter. Emissions data are updated annually in June on the basis of the figures reported at the end of the previous year; other ESG data updated at the beginning of the penultimate month of the quarter. For Weighted Average Carbon Intensity calculations, corporate revenues are those of the year for which greenhouse gas emissions are reported. Constituents weights used for all metrics are end-of-quarter weights. The sector classification used is the Thomson Reuters Business Classification. Emissions data and Energy and Extractive Industry data provided by Institutional Shareholder Services are used to prepare this report.

### Context

The necessary transition to a low-emissions economy requires a dramatic reduction in the traditional Energy sector in a mere two decades. In the process, the assets of Fossil Fuels Business Sector companies may become stranded and the value of the companies with significant fossil fuel business may be affected; if such impairments and evolutions have not been correctly anticipated by the average investor, the companies affected will be repriced on the markets.

### Implementation

To assist in the assessment of carbon-related assets and their stranding risk, Scientific Beta reports the cumulated percentage weight of index constituents with significant involvement in fossil fuels, in aggregate and for specific fuels. Exposure is measured according to industry classification as a first step and, to support finer-grain analysis according to turnover from fossil fuels, irrespective of industry classification. Finally, Scientific Beta reports the Weighted Average Carbon Intensity

## 2. Climate Change Reporting

of each group of assets defined as per industry classification or turnover band to allow investors to gain insight into the carbon efficiency of each group. The same figures are presented for the capitalisation-weighted benchmark of the parent universe to support benchmark-relative analyses. Scientific Beta relies on the Thomson Reuters Business Classification (TRBC) for sector analyses. The Fossil Fuels report includes measures of exposure to the Energy Economic Sector and the Energy – Fossil Fuels Business Sector (the other two Business Sectors in the Energy Economic Sector covering low emissions technologies, i.e. Renewable Energy and Uranium). The Energy – Fossil Fuel Business Sector is disaggregated into the Coal Industry Group and the Oil & Gas Industry Groups (comprising Oil & Gas and Oil & Gas Related Equipment and Services).

Turnover-based metrics distinguish between companies with 25% to 50% of turnover from fossil fuels and companies with majority revenues from fossil fuels (which may find it more challenging to reorient their activities). Exposure to companies with 30% or more of their turnover from thermal coal mining is also reported as involvement in thermal coal at this threshold is a typical requirement in current coal divestment campaigns and phase-out programmes (other such coal indicators can be found in the Coal Report of ESG Norms Reporting).

### 2.2.3.3. Power Generation

The Power Generation Report measures investment exposure to power-generation along with its fuel mix and Weighted Average Carbon Intensity.

Table 18: Carbon Exposure Report for sample flagship index at December 2018

SciBeta Developed Low Carbon HFI MBMS 6F4S EW	Index	Broad CW	Change
Controlled Power Generation Capacity (MW/B\$)	17.85	28.18	-37%
Brown share	53.51%	57.59%	-7%
Of which Coal	12.56%	21.59%	-42%
Of which Gas	33.29%	30.61%	+9%
Of which Oil	7.66%	5.39%	+42%
Renewables	25.08%	24.28%	+3%
Nuclear	20.04%	15.25%	+31%
Others	1.38%	2.88%	-52%
Weight of analysed utilities	2.80%	3.84%	-27%
WACI of analysed utilities	906	2,324	-61%

Analytics are calculated at the end of the latest quarter and with ESG data updated at the beginning of the penultimate month of the quarter. Emissions data and Energy and Extractive Industry data provided by Institutional Shareholder Services are used to prepare this report.

### Context

As previously mentioned, the consumption of fossil fuels must fall dramatically in the next few decades to align with decarbonisation pathways consistent with the objective of the Paris Agreement. Unabated use of fossil fuels for energy generation, where low carbon alternatives exist, are to fall even lower than the overall consumption of fossil fuels: coal is to be phased out completely and even the use of gas must fall measurably.

## 2. ESG Incorporation Philosophy, ESG Screens and Decarbonisation Approaches

The necessary transition to a low emissions economy thus requires dramatic changes in fuel mix for the electricity generation sector in a mere two decades. In the process, assets may become stranded and if such impairments have not been correctly anticipated by the average investor, the companies affected will be repriced on the markets.

### Implementation

To assist in the assessment of carbon-related assets and their stranding risk, Scientific Beta reports the cumulated percentage weight of index constituents from the Utilities and Financials sectors that generate power along with the power-generation capacity that they command (for a USD1bn investment in the index) and their capacity-weighted fuel mix. The Weighted Average Carbon Intensity of this group of assets is also reported.

Categories used for fuel mix analysis are: i) Coal, ii) Gas and iii) Oil, which are collectively referred to as “Brown Share,” iv) Renewables, which cover Geothermal, Solar, Wind, Biomass and Hydroelectricity and v) Others, which is marginal and notably includes non-organic waste-to-energy production.

The equity share method is used to allocate the relevant share of a company’s total power generation capacity to the index (averaging power mixes of companies without accounting for the control enjoyed over this power generation capacity would be misleading):

The normalised power generation capacity controlled by the index comprised of n constituents is:

$$\sum_i^n w_i \cdot \frac{\text{Total Capacity}_i}{\text{Total Capitalisation}_i}$$

-where i is a company for which we have information on power generation and with all capitalisation figures expressed in million dollars.

The share of the different fuels in the total fuel capacity is given by:

$$\frac{\sum_i^n w_i \cdot \frac{\text{Selected Fuel Capacity}_i}{\text{Total Capitalisation}_i}}{\sum_i^n w_i \cdot \frac{\text{Total Capacity}_i}{\text{Total Capitalisation}_i}}$$

The resulting fuel mix can then be compared to fuel mixes under different transition scenarios. For illustration, Figure 2 shows the power generation decarbonisation pathway prepared by the International Energy Agency (IEA) in the context of its Sustainable Development Scenario (SDS).<sup>21</sup>

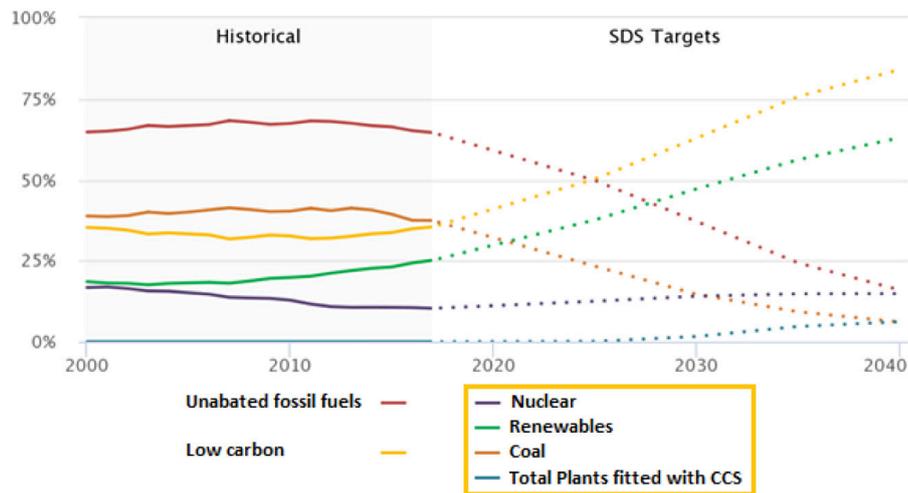
Under the IEA SDS, the share of fossil fuels (unabated by carbon capture, utilisation and storage technology) in global power generation falls from 64.2% in 2018 to below 50% in 2025 and is 37.2% in 2030, 23.8% in 2035 and 14.4% in 2040 – unabated coal is at 25% in 2025, 16% in 2030 and 5% in 2040.<sup>22</sup> Relative to this scenario, Table 17 suggests that the Low Carbon version of the flagship index has a coal share that is already lower than that targeted for 2030 and a brown share that is close to the 2025 objective.

21 - The SDS combines compliance with the 2015 Paris Agreement with another two energy-related strategic goals: universal energy access and substantial reduction of air pollution. These three dimensions correspond to the UN Sustainable Development Goals (SDGs) most closely related to energy: “Take urgent action to combat climate change and its impacts” (SDG13); “Ensure access to affordable, reliable, sustainable and modern energy for all” (SDG 7), and “Ensure healthy lives and promote well-being for all at all ages” (SDG 3).

22 - These fuel mixes allow the carbon intensity of energy production to fall from 478g of CO<sub>2</sub> per kWh in 2018 to 332g in 2025 (-30%), to 221g in 2030 (-54% relative to 2018), to 126g in 2035 (-74%), to 69g in 2040 (-86%).

## 2. ESG Incorporation Philosophy, ESG Screens and Decarbonisation Approaches

Figure 2: Electricity Generation by Source in the IEA Sustainable Development Scenario (IEA, 2019b)



### 2.3. Assessing Exposure to Physical Risks

The Physical Risks Report presents the estimated exposure of index constituents to the long-term and acute physical risks from climate change.

SciBeta Dev LCrb HFInt MBeta MStrat 6F4S-EW	Index	Broad CW	Change
<b>Exposure to long-term physical risks</b>			
Low	76.62%	80.18%	-4.43%
Medium	23.38%	19.82%	+17.94%
High	0.00%	0.00%	N/A
<b>Exposure to acute physical risks</b>			
Low	62.67%	59.36%	+5.57%
Medium	31.14%	31.92%	-2.44%
High	6.20%	8.72%	-28.97%

The table shows the cumulated weight of index constituents that are classified as having Low, Medium or High exposure to long-term and acute physical risks from climate change, respectively. The corresponding figures for the Broad cap-weighted reference index (Broad CW) are also reported, along with the exposure of the index relative to that of the Broad cap-weighted reference. Physical Risk data are provided by Institutional Shareholder Services.

#### Context

From an investment standpoint, Physical Risks refer to the potential impacts from the physical effects of Climate Change on the values of holdings.

These Physical Risks may be linked to climate hazards of an acute nature or a chronic nature. For the Taskforce on Climate-related Financial Disclosures (TCFD, 2017), Acute Physical Risks are event driven, notably from extreme weather events (e.g. cyclones, hurricanes or floods) while Chronic Physical Risks are linked to longer-term shifts in (the mean and variability of) climate patterns (e.g. leading to a rise in sea level or chronic heat waves).

## 2. ESG Incorporation Philosophy, ESG Screens and Decarbonisation Approaches

Physical Risks linked to climate hazards depend on the likelihood and magnitude of these hazards, but also on the exposure of the affected system and its vulnerability. The impact of such risks on a company may be direct or through the supply chain and market conditions as shown in Table 19 below and could be reflected in revenues, expenditures, assets and liabilities or, as suggested by the TCFD, access to funding (TCFD, 2017).

Table 19: Direct and Indirect Impact of Acute and Chronic Physical Risks

	Acute	Chronic
Direct	Partial or total loss of or reduced access to factors of production	Change to availability, capacity, efficiency, lifespans, or operating costs of factors of production
Indirect	Non-persistent change in availability and prices of resources or inputs Non-persistent changes in demand for product and services	Persistent changes in availability and prices of resources or inputs Persistent changes in demand for product and services

Investors can only encourage companies in which they invest to manage their exposure and vulnerability to climate hazards. The current level of physical risk disclosure is extremely limited, which does not bode well for their management.

### Implementation

Scientific Beta reports the cumulated weight of index constituents that are classified as having Low, Medium or High exposure to long-term and acute physical risks from climate change, respectively. The corresponding figures for the Broad cap-weighted reference index are also reported to support benchmark-relative analyses.

The assessment of risk exposure at index-constituent level is based on a sector and geographic approach. Based on its main field of activity, a company is allocated to a sector in the proprietary classification system of the data provider and attributed the corresponding risk level. The same is done in terms of geography based on the company's main region of activity, proxied by headquarter location. Risk calculations are based on research by Moody's, the Sustainable Accounting Standard Board (SASB) and CICERO.

# Conclusion

# Conclusion

The incorporation of Environmental, Social and Governance (ESG) dimensions into investment analysis and decision-making processes and reporting has traditionally been optional and a low priority for institutional investors outside the ethical and socially responsible investment sphere.

However, this is changing rapidly owing to both push and pull factors. On the one hand, institutional investors are increasingly required, or expected, to explain how they factor in ESG dimensions – and notably Climate Change – into investment decisions and to report on their ESG incorporation processes and the ESG performance of their investments. On the other hand, a growing number of institutional investors consider that the ESG characteristics of investments may have a material impact on investment risks and returns or recognise that an increasing share of end-investors wish to see the environmental and social impacts of investments considered together with their financial characteristics.

Comprised of ESG Norms and Climate Change analytics, Scientific Beta's Enhanced ESG Reporting assists investors with the incorporation of ESG dimensions in investment management.

The ESG Norms analytics measure index exposure to companies that are found to fall short of global standards of responsible business conduct and corporate governance or to have involvement in activities that conflict with global norms or their objectives.

Reporting in respect of fundamental norms of ethical and responsible business is anchored on the global conventions underlying the United Nations Global Compact and measures exposure to companies with current or recent implication in critical ESG controversies in respect of their fundamental responsibilities in the areas of Human Rights, Labour, Environment and Anti-Corruption or associated with a high risk of future serious violations of fundamental ethical norms. Reporting in respect of corporate governance measures exposure to companies that fail to respect basic shareholder rights under the OECD/G20 Principles of Corporate Governance by denying voting rights to public investors.

Reporting in respect of controversial products covers involvement in weapons that violate specific international treaties or fundamental humanitarian principles; involvement in tobacco production and distribution which runs counter to the objectives of the World Health Organization Framework Convention on Tobacco Control; and coal involvement that needs to be rapidly phased out to align with the objectives of the United Nations Framework Convention on Climate Change and its Paris Agreement.

The Climate Change Analytics support assessments of the indirect contribution of index-tracking portfolios to Climate Change, assessment of index exposure to companies and sectors with high potential to Transition Risks, and assessment of index constituent exposure to Physical Risks.

Carbon Footprinting and Carbon Exposure analytics include and complement the common carbon metrics that the Taskforce on Climate-related Financial Disclosures recommends or considers worthy

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of consideration for reporting by asset owners and asset managers to their beneficiaries and clients (TCFD, 2017). While these are not risk metrics, they provide information on exposure of investments to the risks of the transition to a low-carbon economy. Deep-dive reporting into carbon-related assets covers Reserved Emissions, Fossil Fuels and Power Generation to allow for finer-grain assessment of investment exposure to assets and sectors with high stranding risk potential. Physical Risks reporting estimates exposure of index constituents to the acute and chronic physical risks from Climate Change.

Scientific Beta’s researchers have accompanied investors with the incorporation of ESG objectives and constraints in passive investment for ten years and a third of the assets tracking Scientific Beta indices track indices that incorporate ESG dimensions.

The offering of Enhanced ESG Reporting on a complimentary basis across the index offering demonstrates Scientific Beta’s commitment to transparency on the risks of its index strategies and to assisting investors in meeting the challenges and seizing the opportunities of ESG incorporation.

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# About Scientific Beta

## About Scientific Beta

EDHEC-Risk Institute set up Scientific Beta in December 2012 as part of its policy of transferring know-how to the industry. Scientific Beta is an original initiative which aims to favour the adoption of the latest advances in “smart beta” design and implementation by the whole investment industry. Its academic origin provides the foundation for its strategy: offer, in the best economic conditions possible, the smart beta solutions that are most proven scientifically with full transparency of both the methods and the associated risks. Smart beta is an approach that deviates from the default solution for indexing or benchmarking of using market capitalisation as the sole criterion for weighting and constituent selection.

Scientific Beta considers that new forms of indices represent a major opportunity to put into practice the results of the considerable research efforts conducted over the last 30 years on portfolio construction. Although these new benchmarks may constitute better investment references than poorly-diversified cap-weighted indices, they nevertheless expose investors to new systematic and specific risk factors related to the portfolio construction model selected.

Consistent with a full control of the risks of investment in smart beta benchmarks, Scientific Beta not only provides exhaustive information on the construction methods of these new benchmarks but also enables investors to conduct the most advanced analyses of the risks of the indices in the best possible economic conditions.

Lastly, within the context of a Smart Beta 2.0 approach, Scientific Beta provides the opportunity for investors not only to measure the risks of smart beta indices, but also to choose and manage them. This new aspect in the construction of smart beta indices has led Scientific Beta to build the most extensive smart beta benchmarks platform available which currently provides access to a wide range of smart beta indices.

# Scientific Beta Publications

# Scientific Beta Publications

## 2019 Publications

- Ducoulombier, F. and V. Liu. Scientific Beta Enhanced ESG Reporting – Supporting Incorporation of ESG Norms and Climate Change Issues in Investment Management. (July).
- Aguet, D., and N. Amenc. How to reconcile single smart factor indices with strong factor intensity (June).
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