FONDS DE COMPENSATION

SUSTAINABLE INVESTOR REPORT 2020

www.fdc.lu

Table of contents

2°C: 2 degrees Celsius • **2DS:** 2 Degree Scenario • **BM:** Benchmark, making reference to a specific benchmark • **BREEAM:** Building Research Establishment Environmental Assessment Methodology • **CDP:** Carbon Disclosure Project • **CO_2:** Carbon dioxide • **ESG:** Environment, Social and Governance • **FDC:** Fonds De Compensation commun au régime général de pension • **GDP:** Gross Domestic Product • **GEVA:** Greenhouse gas Emissions per unit of Value Added • **GRESB:** Global Real Estate Sustainability Benchmark • **ICMA:** International Capital Market Association • **IEA:** International Energy Agency • **IPCC:** Intergovernmental Panel on Climate Change • **LuxFLAG:** Luxembourg Finance Labelling Agency • **OECD:** Organisation for Economic Cooperation and Development • **PACTA:** Paris Agreement Capital Transition Assessment • **PEFC:** Program for the Endorsement of Forest Certification • **PRI:** Principles for Responsible Investment • **PTF Aggregate:** Aggregated portfolio, referring to FDC's aggregated equity and corporate bond portfolio • **PTF Equity:** Equity portfolio, referring to FDC's aggregated equity portfolio • **PTF Fixed Income:** Bond portfolio, referring to FDC's aggregated corporate bond portfolio • **RCP:** Representative Concentration Pathways • **S&P:** Standard & Poor's • **SBTI:** Science Based Targets Initiative • **SDA:** Sectoral Decarbonisation Approach • **SDG:** Sustainable Development Goal • **SICAV:** Société d'Investissement A Capital Variable • **SNHBM:** Société Nationale des Habitations à Bon Marché • **TCFD :** Task Force on Climate-related Financial Disclosures • **tCO_2e:** Carbon dioxide equivalent, expressed in tons.

1. Foreword

FDC was established by the amended law of 6 May 2004 concerning the administration of the assets of the general pension insurance scheme. It has the form of a public entity with a very specific mission: ensuring the management of the reserve through a diversified portfolio subject to strict risk and return criteria in order to guarantee the long-term viability of the general pension insurance scheme.

The Board of Directors, composed of twelve members based on the tripartite model[1], establishes the guidelines that define FDC's asset management principles and rules. A six-member investment committee, including three external experts appointed on the basis of their knowledge and experience in the financial sector, is assisting the Board of Directors in its financial asset investment decisions. In addition, the Board of Directors has set up a real estate committee responsible for preparing its decisions concerning real estate holdings.

FDC invests long-term and globally and therefore favours a healthy and sustainable economy. As an institutional asset manager, FDC is aware of its ecological, social and good governance responsibilities. Such considerations are being taken into account in FDC's investment strategy as well as in its investment decisions.

Whilst considering sustainable criteria gained considerable momentum especially in recent years, FDC had already started to formalise a responsible investor policy as early as 2010. At the beginning of 2011, the Board of Directors decided to set up and implement an exclusion list, based on international conventions ratified by the Grand Duchy of Luxembourg and covering the fields of environment as well as institutional, social and joint responsibility.

1 Fundamental mechanism of Luxembourg's economic and social model bringing together the government, employers and trade unions.

At the same time, FDC proactively started to pay more attention to sustainable criteria and aspects in its public tenders aiming to mandate external asset managers. In 2012 the first mandate with an investment approach exclusively based on ESG criteria was awarded. Since then, FDC's responsible investor policy has continuously evolved and deepened. At the end of 2019, the Board of Directors took the initiative to prepare a dedicated report which should set out in detail the scope, the different aspects and the implementation of FDC's responsible investor policy.

The Paris Agreement on climate change, the United Nations' 2030 Agenda for Sustainable Development or the European Commission's 2030 Climate and Energy Policy Framework include environmental and social targets as wells as objectives that will impact the financial sector as a whole. Being aware of the importance of these issues and complying with its fiduciary duty, FDC is issuing the present report and is complementing it with a climate analysis of its portfolios.

With this sustainable investor report, FDC endeavours to draw up a transparent inventory and thus to publicly confirm its commitment as a responsible investor.

Fernand LEPAGE
Chairman of the Board

2. Structure, legal mission and considerations

A major part of the reserve allocated to FDC is invested in the financial markets through its SICAV. This SICAV, created in 2007, invests in four asset classes: money market, bonds, equities and indirect real estate. The asset management within the SICAV is entirely entrusted to external asset managers. The off-SICAV balance is managed internally by FDC and is composed of shares of the SNHBM, a direct real estate portfolio with about 120,000 m^2 of total surface, forest holdings of almost 700 hectares, a loan portfolio, cash and the balance between accounts receivable and accounts payable essentially representing contributions not yet available for investment. At the end of 2019, FDC's reserve amounted to 21.3 billion euros, of which approximately 95% was invested through the SICAV across 24 sub-funds managed by 18 specific asset managers. Active and indexed management[2] is balanced. The detailed asset allocation within the SICAV can be found in Appendix 1.

FDC's legal mission is to prudentially manage the reserve of the general pension scheme and to earn an effective return while diversifying risks. In this way, Article 248 of the Social Security Code provides the following:

«The compensation reserve is invested in order to ensure the long-term viability of the general pension insurance scheme. In order to ensure the security of investments, account shall be taken of all the assets and liabilities, the financial situation, as well as the structure and foreseeable evolution of the pension scheme. Investments shall comply with the principles of appropriate risk diversification. To this end, the assets must be spread among different investment classes as well as among different economic and geographical sectors.»

When defining FDC's investment strategy, particular attention was paid to all criteria indicated above. Restrictions or limitations that do not stem from FDC's legal mission have not been taken into consideration. Thanks to the high quality of FDC's investments spread globally and across all economic sectors and the choice of its structure and management model, the security of FDC's investments is ensured. On top of that, the objective of maximising returns under acceptable risk conditions as legally set out is completely respected. It is within this well-defined framework that FDC intends to carry out its mission of managing the reserve and taking into account sustainable investments.

2 Indexed management consists of faithfully replicating the performance of a benchmark by investing in almost all the securities included in the given benchmark. Active management aims to outperform the performance of a benchmark by investing in a basket of securities selected on the basis of various criteria. In active management, portfolios are therefore generally more concentrated and have different risk and return characteristics.

Applying Article 248 to sustainable investments, return on such investments must be in line with the market. In terms of risk management, sustainable criteria and aspects must be taken into consideration provided that sustainability risks are relevant investment risks.

FDC is therefore well aware of the importance of taking into account sustainable criteria and aspects in the investment process. The latter are analysed by FDC in strategic discussions, the selection process of asset managers as well as their monitoring. Structured processes based on best practices ensure that the legal mission is entirely fulfilled and that the responsibility towards the society and the environment is assumed. **In this way, FDC's responsible investor policy has been designed to comply with the legal requirements while at the same time ensuring that the expected risk-adjusted return remains in line with market returns**.

In this context, **FDC's Board of Directors does not consider itself empowered to accept, beyond the restrictions imposed by the legal provisions and international conventions in force, the exclusions of companies or entire sectors from the authorised investment universe on the basis of choices not dictated by financial management criteria recognised by the profession, but instead inspired by specific thematic considerations**, and to take a position on issues that are the subject of philosophical, religious, political, climatological or societal controversies. **If such exclusions were to be taken into account, a modification of the current legal framework applicable to FDC will have to be considered**.

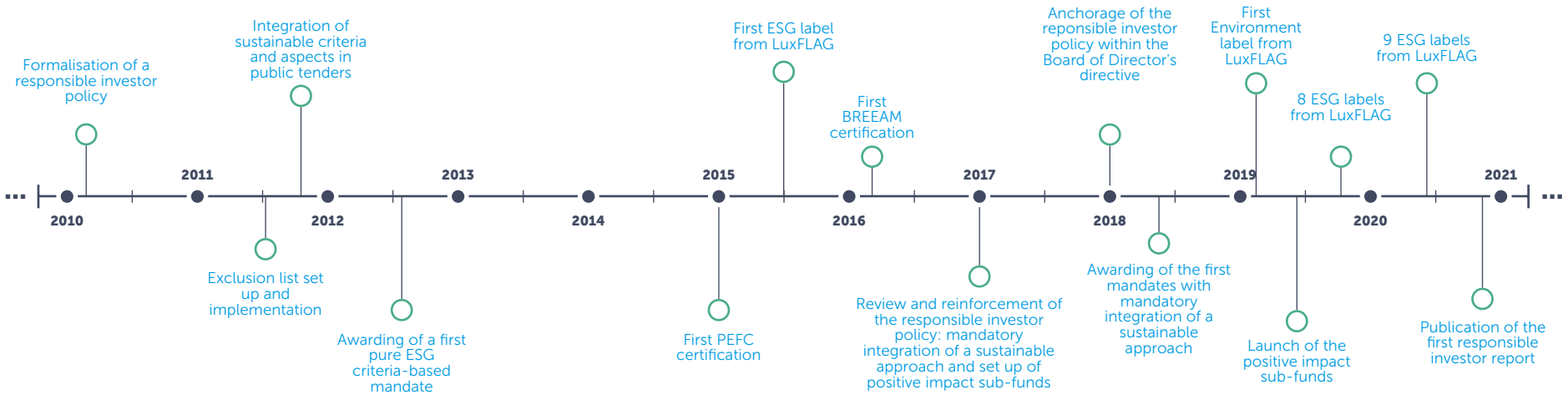
However, **a more restrictive legal framework could lead to a redefinition of FDC's investment strategy and jeopardise its current management model, while they have proven their worth since 2007** with an average annual return of more than 5% and a capital gain of more than 8 billion euros. Compared to the situation prior to 2007 and in terms of cumulative performance as of 30 June 2020, FDC's investment strategy generated an outperformance of more than 86% compared to simple short-term investments.[3]

3 Detailed performance figures can be accessed via FDC's published annual reports.

3. FDC's responsible investor policy

3.1. Chronological implementation

The timeline below shows that FDC integrated sustainable criteria and aspects into its investment process already at an early stage and that FDC is constantly evolving its responsible investor policy.



3.2. Pillars

Since 2010, FDC has been continuously analysing how and in what form a responsible investor policy in line with the legal framework could be integrated into its investment strategy and decision-making processes. **Today, sustainable criteria and aspects are incorporated at different levels, for instance within the authorised investment universe, the selection process of asset managers and the strategic allocation, and take different forms, such as negative screening, positive impact investments or the integration of sustainable approaches**. All these elements are part of a structure which respects the principle of cost-efficient and profitable investments. Moreover, since 2018 the pillars of FDC's responsible investor policy have been anchored in the Board of Directors' directive[4], which is subject to the approval of the Minister of Social Security.

3.2.1. Allowed investment universe and exclusion list

Since 2011, FDC has ensured that all its investments through its SICAV comply with international conventions. More precisely, the integration of such a principle is actually put into practice through **a normative exclusion of companies that do not comply with international standards as enshrined in the ten principles of the United Nations Global Compact** covering human rights, the environment, international labour standards and the fight against corruption.

The ten principles of the United Nations Global Compact

HUMAN RIGHTS

1 Businesses should support and respect the protection of internationally proclaimed human rights; and

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; and

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; and

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.

Source: www.unglobalcompact.org

Equally excluded are companies involved in activities related to controversial weapons, including anti-personnal mines, cluster bombs, nuclear weapons, depleted uranium weapons, white phosphorous weapons as well as chemical and biological weapons. **The implementation of exclusions or restrictions that go beyond these international norms and conventions, such as thematic or sectoral exclusions, would require a change in the legal framework applicable to FDC**.

4 The Board of Directors' directive is published on FDC's website.

In addition to the excluded non-compliant companies, some companies are under observation. This status is in principle granted to companies for which investigations are not yet completed or for which engagement is still ongoing in order to put an end to the litigious facts. Depending on the progress of these investigations and discussions, these companies can be classified as either compliant or non-compliant. Thus, with its financial weight, FDC supports an engagement process with the aim to change the policy and governance mode of the companies in question.

The exclusion list is periodically reviewed and updated on the basis of a systematic process in collaboration with the Dutch company Sustainalytics, a specialised, recognised and independent external service provider. Sustainalytics is a global leader in ESG and corporate governance research and ratings and supports many investors integrating ESG and good governance policies into their investment processes. As of 30 October 2020, the following 126 companies have been excluded from FDC's authorised investment universe.

FDC's exclusion list as of 30 October 2020

Business Ethics

- Business Ethics
- 63 Moons Technologies Ltd
- Danske Bank A/S
- Gitanjali Gems Ltd
- Indivior PLC
- JBS S.A.
- Kangmei Pharmaceutical Co Ltd
- Mitsubishi Motors Corporation
- Mumias Sugar Company Limited
- Pepkor Holdings Ltd.
- PT Tiga Pilar Sejahtera Food Tbk
- Steinhoff International Holdings N.V.
- TongYang Life Insurance Co Ltd
- Toshiba Corp.
- Uchumi Supermarkets Limited
- Wells Fargo & Company

Cluster Weapons

- Aselsan Elektronik Sanayi ve Ticaret Anonim Sirketi

Cluster Weapons & Nuclear Weapons

- China Aerospace International Holdings Ltd.
- China Spacesat Co Ltd

Cluster Weapons & White Phosphorus

- Aryt Industries Ltd.
- Hanwha Aerospace Co Ltd.
- Hanwha Chemical Corporation
- Hanwha Life Insurance Co., Ltd.
- Norinco International Co Ltd

Depleted Uranium & Nuclear Weapons

- Aerojet Rocketdyne Holdings Inc
- Northrop Grumman Corporation

Depleted Uranium, Nuclear Weapons & White Phosphorus

- General Dynamics Corp

Environment

- Adani Enterprises Limited
- Adani Ports & Special Economic Zone Ltd
- China Northern Rare Earth (Group) High-Tech Co Ltd
- Freeport-McMoRan Inc
- Inner Mongolia Baotou Steel Union Co. Ltd.
- Metallurgical Corporation of China Ltd.

Environment & Business Ethics

- AUDI AG
- Volkswagen AG

Human Rights

- Atlantia S.p.A.
- Autostrade Meridionali SpA

- China Petroleum & Chemical Corp.
- CNPC Capital Co., Ltd.
- Energy Transfer LP
- Equifax Inc
- Hangzhou Hikvision Digital Technology Co., Ltd.
- Johnson & Johnson
- MTN Group Limited
- MTN Nigeria Communications Ltd.
- Oil and Natural Gas Corporation Limited
- Orascom Investment Holding SAE
- Pan American Silver Corp.
- PetroChina Co Ltd
- PG&E Corp
- Ratch Group Public Co. Ltd.
- S&T Corp.
- Scancom Plc
- Sinopec Kantons Holdings Ltd
- SK Holdings Co Ltd

Human Rights & Anti-Personnel Mines

- S&T Dynamics Co. Ltd.
- S&T Holdings Co., Ltd.

Human Rights & Business Ethics

- Bausch Health Companies Inc
- Korea Electric Power Corporation
- Unitech Limited

Human Rights & Cluster Weapons

- Anhui GreatWall Military Industry Co., Ltd.
- LIG Nex1 Co Ltd
- Poongsan Corporation
- Poongsan Holdings Corporation

Human Rights & Environment

- Continental Gold Inc.
- PT Vale Indonesia Tbk
- Tokyo Electric Power Company Holdings, Incorporated
- Vale S.A.
- Zijin Mining Group Company Limited

Human Rights & Labour Rights

- G4S PLC

Human Rights & Nuclear Weapons

- Bharat Dynamics Limited
- L&T Finance Holdings Ltd
- L&T Technology Services Ltd.
- Larsen & Toubro Infotech Limited
- Larsen & Toubro Limited
- MindTree Limited
- Nelco Ltd.
- The Tata Power Company Limited
- Walchandnagar Industries Ltd.

Human Rights, Cluster Weapons & White Phosphorus

- Hanwha Corp

Labour Rights & Environment

- GMéxico Transportes SAB de CV
- Grupo México, S.A.B. de C.V.
- Southern Copper Corporation

Nuclear Weapons

- AECOM
- Airbus SE
- Alarko Carrier Sanayi ve Ticaret AS
- Avio S.p.A.
- Babcock International Group PLC
- Beijer Ref AB (publ)
- BWX Technologies, Inc.
- CACI International Inc
- Carmat Societe Anonyme
- China Isotope & Radiation Corp.
- China National Nuclear Power Co Ltd
- China Shipbuilding Industry Company Limited
- China Shipbuilding Industry Group Power Co., Ltd.
- CNNC International Limited
- Constructions Industrielles de la Mediterranee Societe Anonyme
- Ducommun Inc
- Fluor Corporation
- Honeywell Automation India Ltd.
- Honeywell International Inc
- Huneed Technologies
- Huntington Ingalls Industries, Inc.
- Jacobs Engineering Group Inc
- L3Harris Technologies, Inc.
- Leonardo S.p.a.
- Lockheed Martin Corp
- ManTech International Corporation
- Moog Inc
- Oceaneering International, Inc.
- PT Baramulti Suksessarana Tbk
- Raytheon Co
- Rolls-Royce Holdings PLC
- Safran SA
- Serco Group PLC
- Textron Inc.
- The Boeing Company
- Ultra Electronics Holdings PLC
- United Technologies Corp
- Zardoya Otis, S.A.

Nuclear Weapons & White Phosphorus

- BAE Systems PLC
- Dassault Aviation S.A.
- Thales
- Tronic's Microsystems SA

White Phosphorus

- Ashot Ashkelon Industries Ltd.
- Elbit Systems Ltd.

The two examples below illustrate the reasoning behind FDC's exclusion list and its practical application.

Volkswagen AG

Volkswagen AG is one of the world's largest automobile manufacturers. In 2015, it was revealed that Volkswagen AG had installed devices in millions of diesel vehicles worldwide to cheat emission tests. This software could detect when a car was undergoing an emission test and modified the engine's behaviour accordingly. However, on the road, Volkswagen's vehicles significantly exceeded legal emission standards and regulations which had been set to protect air quality and public health. This fraudulent action resulted in excess pollution known to be detrimental to human health and the environment. Furthermore, Volkswagen AG undermined global political efforts to promote sustainable and environmentally friendly mobility and to fight against air pollution and its dangerous effects on human health and the environment.

Consequently, FDC considers Volkswagen AG violating the Principle 7 of the United Nations Global Compact and Chapter VI of the OECD Guidelines for Multinational Enterprises. Consequently, this company is not eligible for investment and has been on FDC's exclusion list since the end of 2016.

Energy Transfer LP

Energy Transfer LP is an oil and gas storage and transportation company operating primarily in Texas, USA. Energy Transfer LP holds a large interest in the Dakota Access Pipeline and is its principal developer and operator. From the very start, the project to build the pipeline has been the subject of considerable controversy. More precisely, the pipeline was planned to pass underneath the Missouri River, the primary drinking water source for the Standing Rock Sioux, a tribe with a reservation in the North and South Dakota. The tribe also argued that the pipeline would damage sacred burial sites and that the federal government had not adequately engaged the tribe during the permitting process, as required by federal law. The United Nations Special Rapporteur on the rights of indigenous peoples also pointed to a significant threat to the drinking water of the tribe and their burial grounds and sacred sites. Environmental activists argued that the pipeline would contribute to climate change by expanding the country's oil infrastructure. The project was finally completed in 2017 with an unchanged route despite continued resistance.

During 2020, the Dakota Access Pipeline was ordered by a federal judge to stop production because of concerns about its environmental impact. The judge ruled that the construction of the pipeline had failed to meet environmental standards and therefore has to undergo a more thorough environmental assessment before its operations can continue.

Consequently, FDC considers Energy Transfer LP being in violation of Principle 1 of the UN Global Compact and Chapter IV of the OECD Guidelines for Multinational Enterprises. Consequently this company is not eligible for investment and has been on FDC's exclusion list since mid-2017.

3.2.2. Sustainability at asset manager level

It is important to FDC that its asset managers are committed to responsible investing as an organisation. It is therefore substantial that FDC integrates sustainable aspects and criteria already as early as during the selection process of its asset managers.

3.2.2.1. Selection process and inclusion of sustainable aspects and criteria

In 2010 FDC decided to pay more attention to sustainable aspects and criteria taken into account and implemented by the different tendering companies in their investment strategies and decision-making processes. **Since 2017, the integration of a sustainable approach into the investment strategy offered by a tendering company has been mandatory for FDC's actively managed mandates**. The type, scope and impact of such an approach on the investment strategy proposed are not predefined by FDC and can therefore take different forms (positive or negative screening, specific ESG approach (for example best-in-class), thematic investments, etc.). This way of proceeding allows an asset manager to tender with the strategy it deems most appropriate in relation to the tendered mandate and FDC's needs while remaining in compliance with the investment restrictions and guidelines imposed by FDC. Tendering companies must, among other things, provide the following elements evaluated according to predefined evaluation criteria with significant weighting.

Asset manager selection questionnaire: questions in relation to the sustainable approach integrated by the tendering company (extract)

1. Please characterise your sustainable approach in general.
2. Do you have a separate inhouse sustainable approach/research department? If yes, please describe the set up and resources of the given department and state the number of employees exclusively focusing on sustainable approach/research within your organisation as well as the number of analysts/portfolio managers exclusively focusing on sustainable approach/research within the product team.
3. Please describe what kind of sustainable approach/research you conduct in-house and what kind of sustainable approach/research or data you receive from external providers. Please list all external providers you work with.
4. Please describe the differences in a model portfolio incorporating a sustainable approach/sustainable research and a model portfolio without incorporation of a sustainable approach/sustainable research with regard to following portfolio characteristics: number of securities in the investment universe, number of securities in the portfolio, expected relative performance in % per annum and expected tracking error in % per annum.
5. Please provide the composition of a model portfolio with a sustainable approach/sustainable research and a model portfolio without a sustainable approach/sustainable research which complies with FDC's issue document.
6. Since when (year) does your company manage mandates incorporating a sustainable approach/sustainable research in the asset class of the product?
7. Do you incorporate the following aspects regarding sustainability in your investment approach: criteria based on one or more Sustainable Development Goals and/or criteria based on the 2015 Paris Agreement?
8. Are you able to create a client specific sustainable portfolio reporting for the mandate?
9. In general, do you publish your sustainable research?
10. Do you measure the carbon footprint of your investments?
11. Are there any other topics in the area of sustainability you consider important which have not been addressed by the previous questions?

Source: PPCmetrics AG

The sustainable approach pursued by an asset manager is an integral component of its investment strategy and process, particularly in terms of financial and risk analysis. Indeed, FDC's asset managers are professionally set up and specialised to assess and evaluate financial and extra-financial risks deemed relevant, including climate risks. Ecological, social and good corporate governance aspects and criteria are thus incorporated into the portfolio construction process. For example, if an asset manager considers certain sustainable criteria and aspects not being sufficiently taken into account by a company, it will underweight or, if necessary, exclude the company in question. Such allocation choices are mainly compatible within active management, but hardly conceivable with regard to indexed management. **Thus, in more than 90%[5] of FDC's actively managed sub-funds, sustainable aspects and criteria are integrated into the respective portfolio construction process**.

Some sustainable approaches of FDC's asset managers include internal exclusion lists. Those company exclusions are for instance based on low ESG ratings as well as normative or product-specific exclusions such as tobacco, gambling, nuclear power, shale drilling, fur and leather, thermal coal (including coal mining and power generation), oil sands or adult entertainment. **Detailed exclusion lists are applied in more than 85%[6] of the actively managed sub-funds, and this irrespective of FDC's exclusion list**. A more detailed description of some of the sustainable approaches put into practice by the respective asset managers can be found in Appendix 2.[7]

One result of FDC's efforts is that all its asset managers are PRI signatories. These principles were developed by a global initiative of an international network of investors supported by the United Nations. In 2019, it was announced that all PRI signatories will also be required to incorporate into their investment activities ESG criteria compliant with the recommendations of the TCFD by 2020. One of TCFD's aims is to develop a set of voluntary climate-related financial risk disclosures that can be adopted by companies to inform investors about these risks. By signing the PRIs, a manager is committed to integrating sustainable aspects into its financial analysis and decision-making process as well as to reporting on them.

In addition, FDC's asset managers are members of various projects, initiatives and associations active in the field of sustainable development and responsible investment, including for instance the CDP, the initiative Climate Action 100+, the United Nations Global Compact and the Global Impact Investing Network. The following table summarises the memberships and participations of FDC's asset managers.

5 Based on valorisations as of 31 December 2019.
6 Idem.
7 The full set of sustainable approaches put into practice by FDC's asset managers is published on FDC's website.

Initiatives, networks and industry associations of FDC's asset managers			
	100 Women in Finance	100 Women in Finance	https://100women.org/
	30% Club	30% Club	https://30percentclub.org/
	ACGA	Asian Corporate Governance Association	https://www.acga-asia.org/
	ACSI	Australian Council of Superannuation Investors	https://acsi.org.au/
	AIST	Australian Institute of Superannuation Trustees	https://www.aist.asn.au/
	BBP	Better Buildings Partnership	http://www.betterbuildingspartnership.co.uk/
	CDP	Carbon Disclosure Project	https://www.cdp.net/en
	CISL	Cambridge Institute for Sustainability Leadership	https://www.cisl.cam.ac.uk/
	Ceres Investor Network	Ceres Investor Network	https://www.ceres.org/networks/ceres-investor-network
	CICERO Climate Finance	CICERO Climate Finance	https://www.cicero.oslo.no/en/cicero-climate-finance
	Climate Action 100+	Climate Action 100+	http://www.climateaction100.org/
	Climate Bonds Initiative	Climate Bonds Initiative	https://www.climatebonds.net/about/funders
	Coalition for Inclusive Capitalism	Coalition for Inclusive Capitalism	https://www.inc-cap.com/
	CPIC	Coalition for Private Investment in Conservation	http://cpicfinance.com/
	CII	Council of Institutional Investors	https://www.cii.org/
	Energy Star Partner	Energy Star Partner	https://www.energystar.gov/buildings/about-us/become-energy-star-partner
	EP	Equator Principles	https://equator-principles.com/

	EFAMA	European Fund and Asset Management Association	https://www.efama.org/SitePages/Home.aspx
	finansol	Finance Solidaire	https://www.finansol.org/
	FSB	Financial Stability Board	https://www.fsb.org/
	FCLTGlobal	Focusing Capital on the Long Term	https://www.fcltglobal.org/
	FNG	Forum für nachhaltige Geldanlagen	https://www.forum-ng.org/de/
	GIIN	Global Impact Investing Network	https://thegiin.org/
	GRESB	Global Real Estate Sustainability Benchmark	https://gresb.com/
	GBP	Green Bond Principles	https://www.icmagroup.org/green-social-and-sustainability-bonds/green-bond-principles-gbp/
	HIIF	Harvard Law School Institutional Investor Forum	http://www.pii.law.harvard.edu/harvard-institutional-investors-forum.shtml
	IIGCC	Institutional Investor Group on Climate Change	https://www.iigcc.org/
	ICCR	Interfaith Center on Corporate Responsibility	https://www.iccr.org/
	ICGN	International Corporate Governance Network	https://www.icgn.org/
	IIRC	International Integrated Reporting Council	https://integratedreporting.org/
	ICI	Investment Company Institute	https://www.ici.org/
	IEHN	Investor Environmental Health Network	https://iehn.org/
	JIAA	Japan Investment Advisors Association	http://www.jiaa.or.jp/index_e.html
	Japan's Stewardship Code	Japan's Stewardship Code	https://www.fsa.go.jp/en/refer/councils/stewardship/20170529.html
	Montreal Pledge	Montréal Carbon Pledge	https://montrealpledge.org/

	NAREIM	National Association of Real Estate Investment Managers	https://www.nareim.org/
	PCAF	Partnership for Carbon Accounting Financials	https://carbonaccountingfinancials.com/
	PRI	Principles for Responsible Investment	https://www.unpri.org/
	RIA	Responsible Investment Association	https://www.riacanada.ca/
	RIAA	Responsible Investment Association Australasia	https://responsibleinvestment.org/
	RSPO	Roundtable on Sustainable Palm Oil	https://rspo.org/
	SASB	Sustainability Accounting Standards Board	https://www.sasb.org/
	SSF	Swiss Sustainable Finance	https://www.sustainablefinance.ch/
	TCFD	Task Force on Climate-related Financial Disclosures	https://www.fsb-tcfd.org/
	TPI	Transition Pathway Initiative	https://www.transitionpathwayinitiative.org/
	UK GBC	UK Green Building Council	https://www.ukgbc.org/
	UK Stewardship Code	UK Stewardship Code	https://www.frc.org.uk/investors/uk-stewardship-code
	UN Global Compact	UN Global Compact	https://www.unglobalcompact.org/
	UNEP FI	United Nations Environment Programme Finance Initiative	https://www.unepfi.org/
	ULI	Urban Land Institute	https://germany.uli.org/
	WDI	Workforce Disclosure Initiative	https://shareaction.org/wdi/

Source: FDC's asset managers and indicated websites, data as of 31 December 2019

Closely linked to the United Nations Global Compact are the United Nations 17 SDGs. They represent a political objective to be achieved worldwide. They also cover a wide range of sustainable development aspects and combine economic, environmental, social and good corporate governance objectives.

FDC is aware that these 17 goals cannot all be addressed in the same way and to the same extend but nevertheless considers all areas important. Although measuring the impact of investments on the basis of the given goals within the financial sector is still in its early days, FDC encourages its asset managers to report on the sustainable impact of their investments on such a basis. The following table shows that **each goal is taken into account in the management of FDC's SICAV**.

Coverage of the 17 Sustainable Development Goals by FDC's asset managers

SDG 1: No Poverty	
SDG 2: Zero Hunger	
SDG 3: Good Health and Well-Being	
SDG 4: Quality Education	
SDG 5: Gender Equality	
SGG 6: Clean Water and Sanitation	
SDG 7: Affordable and Clean Energy	
SDG 8: Decent Work and Economic Growth	
SDG 9: Industry, Innovation and Infrastructure	
SDG 10: Reduced Inequalities	
SDG 11: Sustainable Cities and Communities	
SDG 12: Responsible Consumption and Production	
SDG 13: Climate Action	
SDG 14: Life below Water	
SDG 15: Life on Land	
SDG 16: Peace, Justice and Strong Institutions	
SDG 17: Partnerships for the Goals	

SDG considered by 1 to 2 sub-funds SDG considered by 3 to 4 sub-funds SDG considered by more than 4 sub-funds

Source: FDC's asset managers, data as of 31 December 2019

Following concrete examples illustrate how FDC's asset managers cover the SDGs.

Good health and well-being are targeted by the third goal. CBRE Global Investment Partners, which manages an indirect real estate portfolio for FDC, is invested in a real estate fund that offers a new form of flexible workspace and uses smart building technologies to optimise well-being. On top of that, such technologies can improve safety and comfort.

Similarly, NN Investment Partners, which manages an equity portfolio for FDC, invests in the company Novo Nordisk, which provides low-priced human insulin in the world's 76 least developed countries. In particular, the guarantee of this company implies the supply of human insulin in vials at a guaranteed ceiling price.

The seventh goal addresses access to clean and affordable energy. A necessary step towards achieving this goal is to significantly increase the share of renewable energy in the global energy mix. The equity manager NN Investment Partners is invested in Siemens Gamesa Renewable Energy S.A. The company is a leader in the renewable energy industry providing onshore and offshore wind energy solutions worldwide. It thus supports the transition to clean energy. According to NN Investment Partners, Siemens Gamesa's wind turbines help eliminate 260 million tons of CO_2 emissions each year.

The thirteenth goal calls for immediate action to combat climate change and its effects on the environment and society. Allianz Global Investors, which manages FDC's green bond mandate, has confirmed that 100% of its holdings support this goal, with coverage being measured on the basis of the characteristics of the projects financed by the issuer. An example of a company financed is Ørsted, one of the largest renewable energy companies in the world. Ørsted set several targets in its decarbonisation programme. For example, the company aims to completely phase out coal-fired power generation by 2023. In addition, its operations and entire energy generation should be carbon neutral by 2025.

Last but not least, another important factor in responsible and sustainable investing is engagement. Engagement describes the process of actively seeking dialogue with the management of companies. This can happen in various forms, such as conference calls, face-to-face meetings or letters addressed to the management of a company in question. In particular, engagement is a variant of active ownership and aims to have a sustainable impact on companies. In practice, various topics are discussed with the management of the companies, such as climate change, corporate governance, requirements regarding sustainability reports, working conditions as well as compliance with human rights. FDC's responsible investor policy values asset managers who actively seek dialogue with companies and who have established a consistent and wide-ranging engagement policy. In that respect, **FDC's asset managers all pursue an engagement policy**.

FDC's asset managers pursuing engagement			
Allianz Global Investors	Allianz Global Investors	KBIGI	KBI Global Investors
Amundi ASSET MANAGEMENT	Amundi Asset Management	LaSalle INVESTMENT MANAGEMENT	LaSalle Investment Management
AXA Investment Managers	AXA Investment Managers	NATIXIS INVESTMENT MANAGERS	Natixis Investment Managers International
BLACKROCK	BlackRock Investment Management	NN investment partners	NN Investment Partners
BNP PARIBAS ASSET MANAGEMENT	BNP Paribas Asset Management	PICTET Asset Management	Pictet Asset Management
CBRE GLOBAL INVESTORS	CBRE Global Investment Partners	ROBECO The Investment Engineers	Robeco Institutional Asset Management
CREDIT SUISSE	Credit Suisse Asset Management	STATE STREET GLOBAL ADVISORS	State Street Global Advisors
Dimensional	Dimensional Fund Advisors	UBS	UBS Asset Management
HSBC Global Asset Management	HSBC Global Asset Management	WELLINGTON MANAGEMENT	Wellington Management International

Source: FDC's asset managers, data as of 31 December 2019

3.2.2.2. LuxFLAG labels

LuxFLAG is an independent and international non-profit association created in Luxembourg in July 2006. It aims at promoting the raising of capital for sustainable investments by awarding a recognisable, independent and transparent label to eligible investment vehicles. Hence, LuxFLAG awards a label in the areas of microfinance, environment, ESG, climate finance and green bonds in order to reassure investors that assets are invested following responsible criteria.

In order to obtain a LuxFLAG label, each applicant must meet predefined eligibility criteria assessed by an independent eligibility committee composed of industry academics, experts and analystics. For example, in order to obtain an ESG label, the applicant must describe its ESG investment strategy and demonstrate how it integrates these criteria throughout its investment process. In addition, the applicant must screen its overall portfolio on the basis of ESG criteria and apply an exclusion list. **As per the end of June 2020, ten sub-funds representing 72%[8] of FDC's actively managed transferable securities are holding a LuxFLAG label**.

8 Based on valorisations as of 30 June 2020.

LuxFLAG labelled sub-funds			
ESG	LuxFLAG ESG	FDC SICAV Global Equities - Active 1	Robeco Institutional Asset Management
ESG	LuxFLAG ESG	FDC SICAV Global Equities - Active 2	KBI Global Investors
ESG	LuxFLAG ESG	FDC SICAV Global Equities - Active 3	NN Investment Partners
ESG	LuxFLAG ESG	FDC SICAV EUR Money Market - Active 1	AXA Investment Managers
ESG	LuxFLAG ESG	FDC SICAV EUR Bonds - Active 1	Allianz Global Investors
ESG	LuxFLAG ESG	FDC SICAV EUR Bonds - Active 2	HSBC Global Asset Management
ESG	LuxFLAG ESG	FDC SICAV EUR Bonds - Active 3	Amundi Asset Management
ESG	LuxFLAG ESG	FDC SICAV EUR Green Bonds - Active 1	Allianz Global Investors
ESG	LuxFLAG ESG	FDC SICAV Global Bonds - Active 2	AXA Investment Managers
ENVIRONMENT	LuxFLAG Environment	FDC SICAV Global Equities Sustainable Impact - Active 1	BNP Paribas Asset Management (financial management of the sub-fund being sub-delegated to Impax Asset Management)

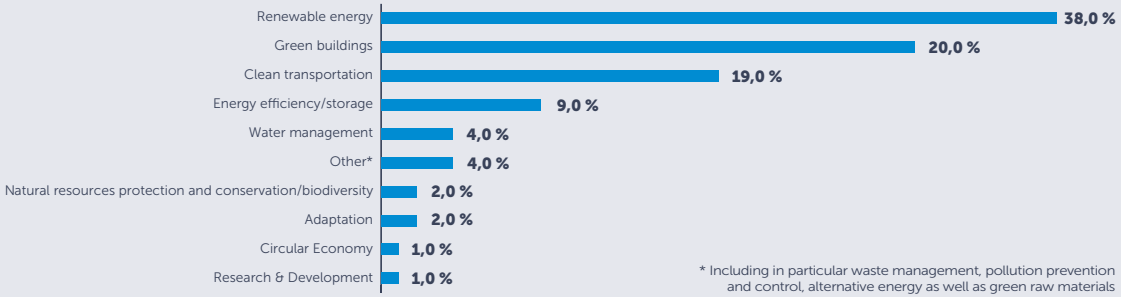
3.2.3. Dedicated investments with positive impact

By enabling companies to finance low-carbon projects, green bonds are a critical lever in financing the ecological transition. However, there is currently no standard and uniform classification of green bonds issued on the market. In order to enable a more sustained and sustainable growth of this market, a draft taxonomy has therefore been proposed by the European Commission. Good practices in terms of transparency as well as regular communication on the allocation of the funds are in fact essential to assess the environmental impact of such investments.

In early 2019 FDC launched a sub-fund investing exclusively in green bonds. In order to ensure the "greenness" of eligible bonds, these must be included in a benchmark whose inclusion criteria are based on ICMA's Green Bond Principles. These are based on four main pillars: use of funds, project selection and evaluation process, project management and reporting. **Via this sub-fund, amounting to 105 million euros at the end of June 2020, FDC is financing projects with a positive impact on the environment.**

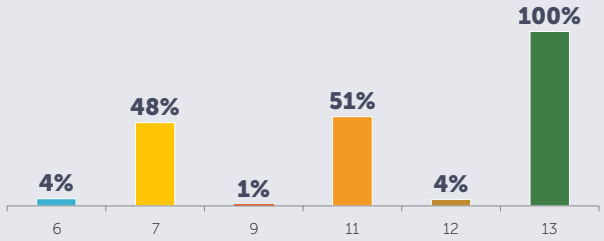
Type of projects financed and impact of the dedicated green bond investments for the year 2019

Projects financed



* Including in particular waste management, pollution prevention and control, alternative energy as well as green raw materials

Share of the portfolio contributing positively to the SDGs:



Impact of an investment of one million euros over a one year period:

0,27 MW
Installed renewable energy capacity

549 MW/h
Renewable energy generation

457 TONS
CO^2 emissions avoided/sequestered

Source: Allianz Global Investors, data as of 31 December 2019. The type of project is defined according to the data communicated by the issuer at the time of issue. Data is calculated for green bonds included in the portfolio during 2019, based on available reports or impact expectations communicated by the issuer (63% of the portfolio). Bonds for which reports or impact expectations are not communicated by the issuer are not included.

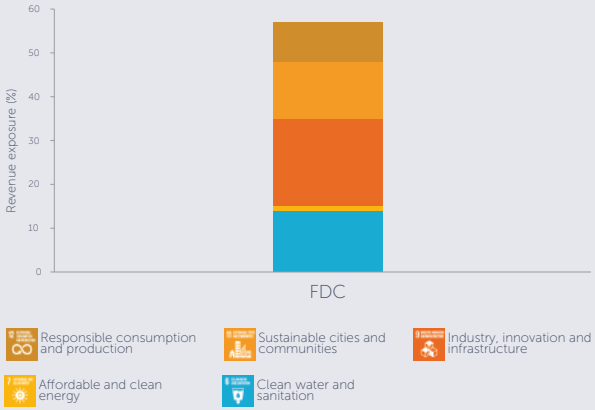
Looking at the previous graphs, FDC financed mainly renewable energy projects through its green bond mandate during 2019. Moreover, those investments were fully aligned with the 13th SDG (climate action) and half of them were aligned with the 7th SDG (affordable and clean energy) as well as the 11th SDG (sustainable cities and communities). Finally, the green bond portfolio, which averaged approximatively 100 million euros during 2019, avoided CO_2 emissions of at least 45,700 tons and generated about 54,900 megawatt hours of renewable energy during that year.

Equally, FDC launched in 2019 a sub-fund that invests only in equities of listed companies that intend to generate a social or environmental impact, in addition to a financial return. Moreover, the investments of the given sub-fund have to cover at least 5 of the 17 SDG's and the asset manager in charge of this mandate has to measure and report on the impact of its portfolio on the environment.

At the end of June 2020, almost 225 million euros were invested into that sub-fund. During 2019, these investments had a positive impact on various SDGs, namely the 6th (clean water and sanitation), the 7th (affordable and clean energy), the 9th (industry, innovation and infrastructure), the 11th (sustainable cities and communities) and the 12th (responsible consumption and production). Additionally and among other things, these investments avoided net CO_2 emissions equivalent to 17,800 tons and produced renewable energy representing 6,950 megawatt hours.

Impact of the dedicated sustainable impact equity investments for the year 2019

Mapping the FDC portfolio to the UN Sustainable Development Goals



Environmental impact of the FDC portfolio

Net CO_2 emissions avoided	**17,800 tCO_2**
Equivalent to taking 9,980 cars off the road in 2019	
Total renewable electricity generated	**6,950 MWh**
Equivalent to 1,930 households' electricity consumption in 2019	
Total water treated, saved, or provided	**10,500 Megalitres**
Equivalent to 67,810 households' water consumption in 2019	
Total materials recovered/waste treatment	**50,240 tonnes**
Equivalent to 53,130 households' waste arising in 2019	

Source: Impax Asset Management, data as of 31 December 2019

In order to fulfil its social commitment in Luxembourg, FDC is, besides the State, the most important shareholder of SNHBM. SNHBM is a social property developer specialised in constructing single-family homes and apartment buildings via the acquisition of construction land which is rented via a long-term lease over a period of 99 years. At FDC's initiative, SNHBM's shareholders carried out a capital increase in 2017. This was to ensure the continuity of SNHBM's activities and moreover, the expansion of its activities as a social property developer. It is in fact inconceivable to finance land acquisitions over such a long period of time with bank loans. FDC currently holds 22.6% of the shares of said company.

Additionally, in 2020 FDC acquired the residential building Kräizerbierg in Grevenmacher. That building, with a gross floor area of 3,730 m^2 and comprising 23 flats, is leased by FDC to the Fonds du logement for a period of 20 years. In the context of low-cost housing rental, the Fonds du logement ensures **the said units are made available to beneficiaries referred to in the amended law of 25 February 1979 on housing aid.**[9]

Finally, in the agricultural and forestry sector, FDC owns 691 hectares of forest. These woods are subject to the PEFC certification.

> The PEFC certification is a forest certification guaranteeing sustainable forest management that is environmentally friendly, socially beneficial and economically viable.

In order to determine the exact value of negative emissions (negative emissions permanently remove CO_2 already emitted into the atmosphere) of FDC's forest estate, further research (types of trees, distribution of the different types of trees, age of trees, etc.) would be required. However, considering the rule of thumb that one hectare of forest, all age groups combined, stores about 13 tons of CO_2 per year[10], FDC's forest estate should absorb about 9,000 tons of CO_2 on an annual basis.

9 This includes the rental of low-cost social housing to low-income households, large families, the elderly and the physically handicapped as well as the creation of hostels for immigrant workers. It also covers the renting of social housing to legal persons not engaged in profit-making activities and whose corporate purpose includes the provision of housing to disadvantaged population groups.
10 https://www.wald.de/wie-viel-kohlendioxid-co2-speichert-der-wald-bzw-ein-baum.

3.2.4. Sustainability at direct real estate level

Direct real estate investments also have an impact on society and the environment. Since 2010, **new buildings and building renovations launched by FDC have been subject to a BREEAM certification. Additionally, all have received a class B in energy performance.**

> BREEAM® The BREEAM label is the most widely used method for assessing and improving the environmental performance of buildings. Indeed, it evaluates the performance of buildings on management system, energy, health, well-being, pollution, transport, land use, biodiversity, materials and water. Points are awarded on each of these aspects according to the performance achieved. A weighting system allows these scores to be aggregated and an overall score awarded in the form of a label.

As a result, FDC's major buildings[11] are all labelled BREEAM Excellent. For the current major project, namely the Cité de la sécurité sociale, a BREEAM Excellent label is also targeted.

Lastly, **the electrical energy supply of all administrative buildings owned and managed directly by FDC is exclusively based on renewable energy.**

11 Building IAK located at the Kirchberg district and building Carrefour located at the Ville Haute district.

4. Climate analysis

Climate change is an important subject that affects all of us at the same time and to the same extent. The Paris Agreement, ratified by the Grand Duchy of Luxembourg on 4 November 2016, made this topic even more relevant. The Paris Agreement sets a long-term objective to limit global warming by 2100 to a maximum of 2°C compared to pre-industrial levels.

FDC pays particular attention to climate risks. These are mainly taken into account by its various asset managers when selecting and monitoring their investments as well as via their various memberships and engagement policies. The majority of FDC's asset managers confirmed to be considering climate issues throughout the management of the mandate(s) entrusted to them. Nevertheless, it was important to FDC to carry out a separate climate analysis in order to obtain a consolidated, independent and compiled assessment and evaluation of climate risks within its portfolios. The climate analysis is divided into three parts:

- the carbon footprints of the individual portfolios ;
- a climate analysis carried out by a well-known and independent external company duly mandated by FDC for this purpose, namely the English company Trucost, and
- a climate analysis carried out by FDC based on the PACTA tool.

4.1. Individual carbon footprints

To address climate risks in its investment process, FDC encourages its asset managers to periodically measure and report the carbon footprint of the portfolio(s) they manage on behalf of FDC.

In this manner, carbon footprints are available for more than 18.8 billion euros, representing approximately 95%[12] of the total portfolio. Only for 3 portfolios, a carbon footprint is currently still unavailable. However, it should be noted that the values provided by the asset managers cannot yet be compared due to different methods used and different bases of calculation taken into account. **For 16 portfolios, FDC is currently able to assess whether the carbon footprint is lower or higher than the value of the respective benchmark[13]. In this context, 11 portfolios had a lower carbon footprint than the benchmark**.

Inventory of individual carbon footprints

MONEY MARKET	
AXA Investment Managers	✓
EUR BONDS	
HSBC Global Asset Management	✓
Amundi Asset Management	✓
Credit Suisse Asset Management	✓
Allianz Global Investors	✓
Allianz Global Investors (green bonds)	✓
GLOBAL BONDS	
Natixis Investment Managers International	✓
AXA Investment Managers	✓
Wellington Management International	✓
BlackRock Investment Management	✓
EMERGING MARKETS BONDS	
Pictet Asset Management	✗
UBS Asset Management	✓
GLOBAL EQUITIES	
KBI Global Investors	✓
NN Investment Partners	✓
Robeco Institutional Asset Management	✓
State Street Global Advisors	✓
UBS Asset Management	✓
BNP Paribas Asset Management	✓
GLOBAL SMALL CAP EQUITIES	
Allianz Global Investors	✓
BlackRock Investment Management	✓
EMERGING MARKETS EQUITIES	
State Street Global Advisors	✓
Dimensional Fund Advisors	✗
GLOBAL REAL ESTATE	
CBRE Global Investment Partners	✓
LaSalle Investment Management	✗

Source: FDC's asset managers, data as of 31 December 2019

12 Based on valorisations as of 31 December 2019.
13 Benchmarks associated to the different portfolios: MSCI World Total Return Index, MSCI World IMI Total Return Index, MSCI Small Cap World Total Return Index, MSCI Emerging Markets Total Return Index, Bloomberg Barclays Euro Aggregate - Ex Securitized Total Return Index, Bloomberg Barclays MSCI Euro Green Bond Total Return Index, Bloomberg Barclays Global Aggregate - Ex Securitized Total Return Index and JP Morgan Government Bond Index - Emerging Markets Global Diversified Composite. Without money market as a carbon footprint of the benchmark associated to the given asset class cannot be calculated.

4.2. Climate analysis by Trucost

Trucost is part of S&P Global. As a leader in carbon and environmental data and risk analysis, Trucost assesses risks relating to climate change, natural resource constraints and broader environmental, social, and governance factors. Trucost's data, tools and services enable companies and financial institutions to:

- understand their exposure to ESG factors;
- be informed of their resilience; and
- identify solutions for a more sustainable global economy.

The transition to a low-carbon economy reinforces the need for investors to consider the environmental aspect of their investments but not only from an operational point of view. The investors also need to anticipate the impacts of this global political commitment on their portfolios. In this context, FDC mandated Trucost to carry out an analysis of its equity and bond portfolios (including corporate bonds, sovereign bonds and eligible money market instruments) in accordance with TCFD guidelines and the French Energy Transition Law. Carbon audits provide a systematic assessment of the carbon risks and opportunities within a portfolio at a specific point in time. Sovereign bonds were analysed separately by Trucost as the methodology applied is different.

4.2.1. Carbon footprint

4.2.1.1. Carbon footprint of the equity and corporate bond portfolios

This analysis includes both equities and corporate bonds based on valuations as of 31 December 2019, and covered more than 5,700 companies equivalent to approximately 12.33 billion euros.

Trucost's analysis takes into account direct emissions and first tier indirect emissions, greenhouse gas emissions being quantified by Trucost as tCO_2e. Direct emissions comprise:

- scope 1 emissions, namely emissions generated by direct company operations according to the Kyoto Protocol's definition of greenhouse gas emissions; and
- emissions from four additional sources not covered by the Kyoto Protocol.[14]

First tier indirect emissions include:

- scope 2 emissions, i.e. emissions generated by purchased electricity, heat or steam; and
- direct upstream scope 3 emissions, being other indirect emissions generated by the supply chain.

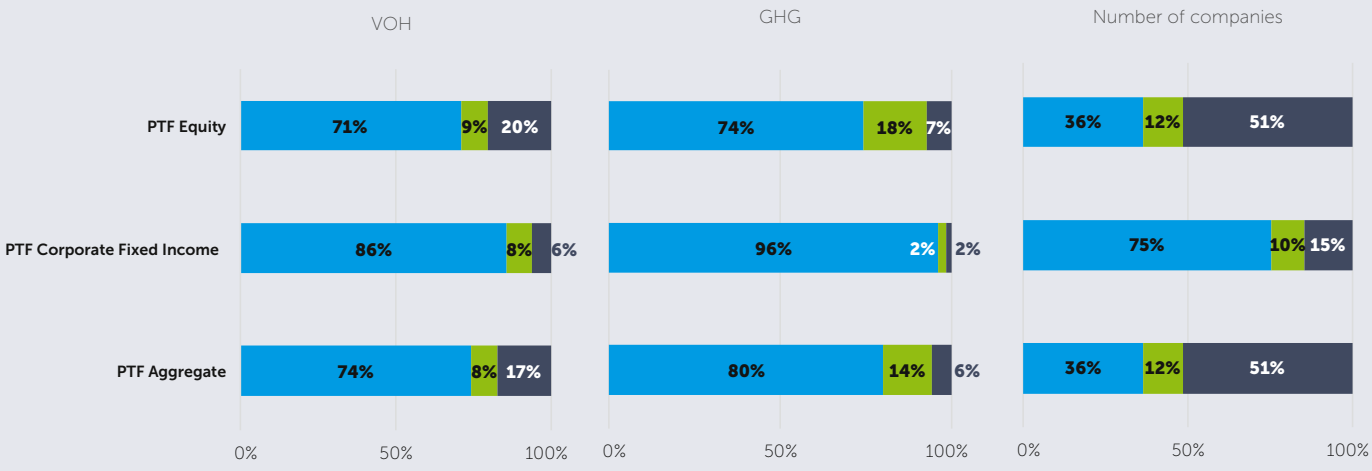
In order to provide an overview of the transparency of the data, the following graph shows the disclosure rate expressed in:

- % of the value of holdings (VOH) ;
- % of greenhouse gas emissions (GHG);
- % of the number of companies.

14 Emissions of carbon tetrachloride (CCl4), 1,1,2-trichloroethane (C2H3Cl3), bromotrifluoromethane (CBrF3) as well as CO_2 emissions from biomass.

It should be noted that the disclosure rate only takes into account scope 1 emissions of each company. With regard to FDC, the disclosure rate can be qualified as high due to the low rate of modelled data[15] at the level of the value of holdings as well as the greenhouse gas emissions.

Disclosure rate



Source:Trucost

Trucost is calculating the carbon footprint using three methods:

- the Carbon to Revenue (C/R) intensity per million euros of revenue generated is obtained by dividing the apportioned emissions of the companies in the portfolio by their respective apportioned revenues:

$$\text{Carbon intensity} = \frac{\sum_i^n \text{apportioned emissions company}_i}{\sum_i^n \text{apportioned revenues company}_i}$$

Source: Trucost

- the Carbon to Value (C/V) intensity per million euros invested is calculated by dividing the apportioned emissions of the companies in the portfolio by their total respective value:

$$\text{Carbon intensity} = \frac{\sum_i^n \text{apportioned emissions company}_i}{\sum_i^n \text{apportioned total value company}_i}$$

Source: Trucost

n = number of companies in the portfolio
i = specific company "i" in the portfolio

15 Modelled data refers to when Trucost has calculated estimates using its proprietary model due to the unavailability or unreliability of up-to-date disclosures. Full disclosure refers to when exact figures have been extracted from annual reports, financial account disclosures, CDP disclosures, environmental reports or from personal communication with a company. Partial disclosure refers to when Trucost has needed to derive, adjust or scale any of the data acquired from the sources described above.

n = number of companies in the portfolio
i = specific company "i" in the portfolio

- the Weighted Average Carbon Intensity (WACI) per million euros of revenues generated is calculated by summing the product of each company's weight in the portfolio with the company level carbon revenue intensity:

$$\text{Carbon intensity} = \sum_{i}^{n} \left[\frac{\text{emissions company}_i}{\text{revenues company}_i} \times \text{weight}_i \right]$$

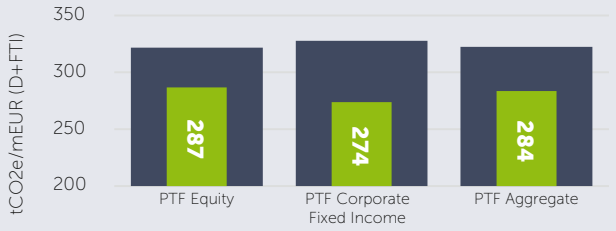
Source: Trucost

While the first two approaches serve as indicators of an investor's contribution to climate change or ecosystem degradation, the weighted average carbon intensity method provides an indication of an investor's exposure to carbon-intensive companies.

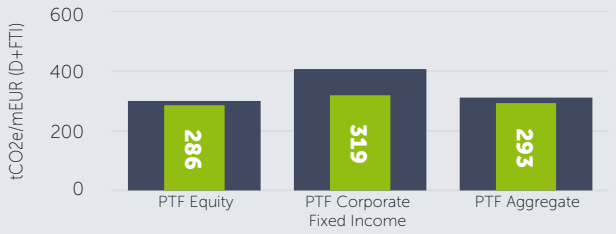
Trucost allocates a proportion of emissions to FDC's portfolios, i.e. the apportioned emissions. This proportion is obtained by multiplying a company's total emissions by an attribution factor. The attribution factor is obtained by dividing a company's value held by its market capitalisation (for equity portfolios) or the value of the company (for mixed or bond portfolios). The analysis further compares the carbon footprints of FDC's portfolios to different benchmarks [16] being representatives of the global markets in which FDC invests.

For this report, FDC decided to use the Carbon to Revenue approach as well as the Weighted Average Carbon Intensity approach, the latter being notably recommended by TCFD.[17] **The following graphs illustrate that FDC's portfolios have a positive performance compared to the benchmarks, regardless of the approach considered**.

Carbon to Revenue intensity per million euros of revenue generated



Weighted Average Carbon Intensity per million euros of revenue generated



D + FTI = direct and first tier indirect emissions
Source: Trucost

The first chart shows that FDC's consolidated portfolio produces 284 tCO_2e for each million euros of revenue generated. The corresponding value of the benchmark is 322 tCO_2e. **This means that for each million euros of revenue generated, FDC's consolidated portfolio produces 12% less tCO_2e than the benchmark**. Considering the second chart, FDC's consolidated portfolio has a weighted average carbon intensity of 293 tCO_2e. In other words, the companies within FDC's portfolio emit on average 293 tCO_2e per million euros of revenue generated. **Compared to the weighted average carbon intensity of the benchmark of**

16 Equity benchmark referenced by Trucost: composite benchmark 77% MSCI World Total Return Index, 14% MSCI Emerging Markets Total Return Index, 9% MSCI Small Cap World Total Return Index. Bond benchmark referenced by Trucost: S&P Global Developed Aggregate Ex-Collateralized Bond Index. Aggregated benchmark referenced by Trucost: 65% equity composite benchmark, 35% S&P Global Developed Aggregate Ex-Collateralized Bond Index.
17 TCFD, Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures, June 2017, page 43.

312 tCO_2e, FDC's consolidated portfolio shows a positive relative performance of almost 6%. Hence, FDC's consolidated portfolio contributes less to climate change and is less exposed to carbon-intensive companies. The same conclusions can be drawn at the level of the individual portfolios.

The following charts show that the carbon intensities by sector of the consolidated portfolio are lower than those of the benchmark for 9 of the 11 sectors considered by Trucost, and this again regardless of the approach considered. With regard to the carbon footprint attribution analysis, it should be noted that the total effect of sectoral under/overweight decisions and stock selection is positive for both approaches. For example, the weighting of the energy sector improves the carbon intensity per million euros of revenue generated in the consolidated portfolio by 2.79%. A selection of less carbon-intensive stocks improves the total performance of the portfolio within the energy sector by 2.90%. Especially in terms of stock selection, it can be concluded that FDC's asset managers choose, almost within each sector and in comparison with the benchmark, low carbon intensive companies to the detriment of high carbon intensive companies.

Carbon to Revenue intensity per million euros of revenue generated: sectoral allocation and performance

	Carbon to Revenue (tCO2e/mEUR)		Attribution Analysis		
Sector Allocation	Portfolio	Benchmark	Sector Allocation	Company Selection	Total Effect
Communication Services	49.30	53.61	0.14%	0.07%	0.21%
Consumer Discretionary	107.05	115.82	-0.27%	0.34%	0.08%
Consumer Staples	228.12	262.97	-0.29%	0.80%	0.51%
Energy	727.04	731.98	2.79%	0.12%	2.90%
Financials	21.65	28.46	2.04%	0.48%	2.53%
Health Care	33.90	46.12	2.20%	0.41%	2.61%
Industrials	210.73	209.56	0.07%	-0.05%	0.02%
Information Technology	93.76	96.29	-0.76%	0.07%	-0.69%
Materials	1,469.11	1,343.69	2.61%	-2.20%	0.41%
Real Estate	102.77	146.99	-0.04%	0.17%	0.13%
Utilities	1,630.67	2,427.46	-6.53%	9.88%	3.35%
	283.53	**322.42**	**1.97%**	**10.10%**	**12.06%**

Weighted Average Carbon Intensity per million euros of revenue generated: sectoral allocation and performance

	WACI (tCO2e/mEUR)		Attribution Analysis		
Sector Allocation	Portfolio	Benchmark	Sector Allocation	Company Selection	Total Effect
Communication Services	46.06	47.80	0.14%	0.05%	0.19%
Consumer Discretionary	96.31	101.45	-0.44%	0.16%	-0.27%
Consumer Staples	275.04	281.25	-0.03%	0.15%	0.12%
Energy	800.37	811.75	1.13%	0.17%	1.30%
Financials	23.95	32.54	2.20%	0.58%	2.78%
Health Care	57.59	64.71	-0.53%	0.23%	-0.29%
Industrials	239.18	231.67	-0.00%	-0.25%	-0.26%
Information Technology	74.88	77.76	-0.75%	0.14%	-0.62%
Materials	1,611.42	1,420.14	0.79%	-2.81%	-2.02%
Real Estate	125.48	160.44	0.02%	0.45%	0.47%
Utilities	2,049.35	2,821.25	-7.15%	11.65%	4.50%
	292.91	**311.25**	**-4.61%**	**10.51%**	**5.89%**

Source: Trucost

4.2.1.2. Carbon footprint of the sovereign portfolio

The analysed sovereign portfolio represented 6.23 billion euros based on the valorisations as of 31 December 2019 and comprised approximately 2,000 debt instruments [18].

Trucost measures the greenhouse gas emissions exposure of sovereign assets on the basis of total greenhouse gas emissions per country, reflecting the specific role of the public sector as both a key service provider to the economy and a legislator influencing carbon emissions. Therefore, the analysis is based on national emissions rather than exclusively on emissions directly related to public activities.

The proportion of emissions apportioned to FDC's sovereign portfolio is based on the level of financing of a country's government that can be calculated using the value invested in each bond and the corresponding country's gross general debt. Once this ratio is calculated, it can be multiplied by a country's emissions to derive the apportioned emissions:

$$\frac{\text{Sovereign Bond Investment}}{\text{Gross General Debt}} \times \text{Country Emissions } (tCO_2e)$$

Source: Trucost

Trucost's analysis aims to consider the emissions of a country's entire economy. This approach takes into account the impact that a government can have on current regulations as well as on the functioning of the economy.

In order to provide a most accurate picture of the contributions to climate change, the impacts related to production and consumption behaviour have been taken into account for each country. The perimeters used therefore include:

- domestic emissions, being the emissions embodied in all goods and services produced and consumed within a given territory;
- direct imports, meaning the emissions embodied in goods and services directly imported by a country;
- indirect imports, representing the emissions embodied in goods and services indirectly imported by a country, meaning they originated in another country than the one from where the goods and services are imported;
- direct exports, including the emissions embodied in goods and services produced in a country and exported to a foreign economy.

The emission ratio *[(domestic emissions + direct imports and exports) / GDP]* is the key indicator for assessing the carbon footprint of sovereign assets. This means that a country does not only contribute to the greenhouse gases emitted on its territory, but also to the greenhouse gases emitted during the production of goods and services imported. This approach is consistent with the approach of direct greenhouse gases and greenhouse gases from direct suppliers which was applied in the analysis of corporate carbon footprints.

Trucost's analysis includes carbon intensity measures calculated according to three methodologies:

18 Debt securities issued by governments, provinces, municipalities, central banks or (national) agencies are mapped by Trucost to the country of origin. Securities issued by international organisations are excluded from Trucost's analysis.

- the Carbon to Output metric describes the relationship between the average amount of tCO_2e generated per million euros GDP generated. This metric is calculated by dividing the sum of all portfolio-apportioned emissions by the sum of all portfolio-apportioned GDP:

$$\frac{tCO_2e'}{PIB'} = \frac{\sum_i^n tCO_2e'_{i,c}}{\sum_i^n PIB'_{i,c}}$$

Source: Trucost

- the Carbon to Value method describes the relationship between the average amount of tCO_2e generated per million euros of investments made in the portfolio. This metric is calculated by dividing the sum of all portfolio-apportioned emissions by the sum of millions of euros invested:

$$\frac{tCO_2e'}{Inv\ (€mn)} = \frac{\sum_i^n tCO_2e'_i}{\sum_i^n Inv\ (€mn)_i}$$

Source: Trucost

- the Weighted Average Carbon Intensity (WACI) method describes the portfolio exposure to specific countries' carbon intensities on portfolio weight basis. Portfolio weight is determined by value invested, which means the portfolio's overall carbon intensity is determined by individual country-level carbon intensities depending on how much is invested in the bonds of each country. This metric is calculated by performing a weighted-average of the portfolio weight of each bond and the territorial carbon intensity of the bond's mapped country:

$$\sum_i^n W_i \times \left[\frac{Country\ Emissions\ (tCO_2e)_c}{Real\ GDP\ (constant\ €mn)_c} \right]$$

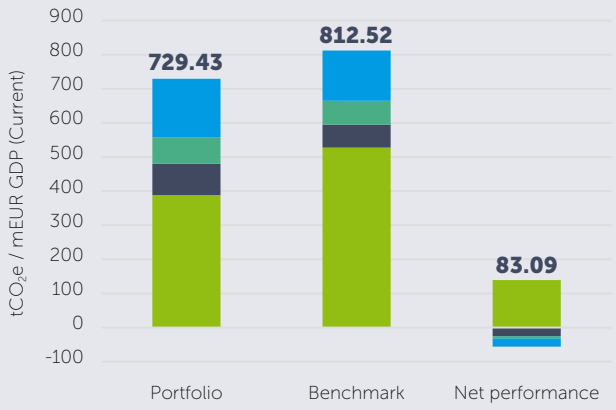
Source: Trucost

n = number of bonds in the portfolio
i = specific bond "i" in the portfolio
c = specific issuer country "c" of bond "i"
w = portfolio weight (%) of sovereign bond "i"
Inv (€mn) = total invested amount in million euros

Similar to the analysis at the level of equities and corporate bonds, the charts below highlight the carbon intensities of the sovereign portfolio according to the Carbon to Output and Weighted Average Carbon Intensity metric per million euros of GDP generated.

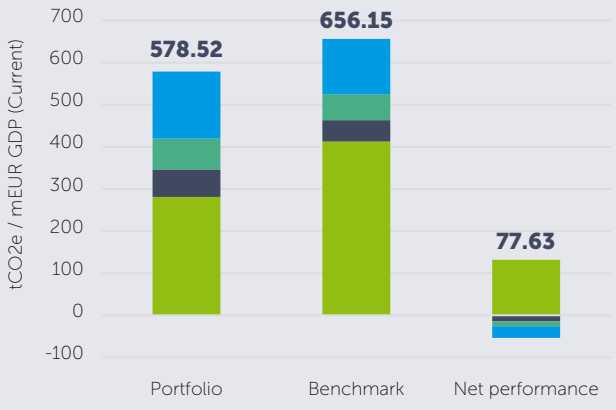
For both approaches, FDC's sovereign portfolio shows a positive relative performance with respect to the benchmark [19] and thus shows on average a lower dependence on the production and consumption of carbon-intensive goods and services and a lower exposure to carbon-intensive countries.

Carbon to Output intensity per million euros GDP generated



Source: Trucost

Weighted Average Carbon Intensity per million euros GDP generated



Source: Trucost

19 The sovereign benchmark referenced by Trucost is a composite benchmark whose countries are weighted by the amount of their issued debt in relation to the total debt issued in the world. The countries included are those from the MSCI All Country World Index.

4.2.2. Environmental footprint of the equity and corporate bond portfolios

Since the environmental impact of a portfolio cannot be reduced to its sole carbon emissions, Trucost can perform a more holistic analysis of equity and corporate bond portfolios, namely the environmental footprint. This footprint quantifies the environmental impact of greenhouse gas emissions, water, waste, air, land and water pollutants as well as the use of natural resources. To allow comparison between the different environmental impacts, Trucost assigns an environmental cost to each resource and each pollutant.

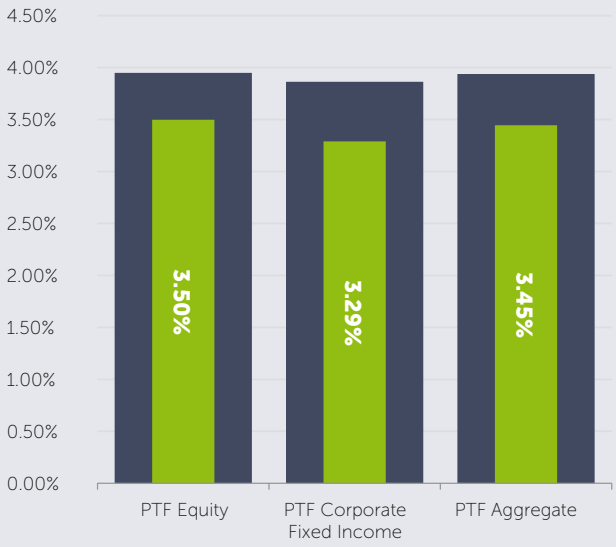
More specifically, Trucost carries out an environmental impact analysis by assigning values for each of the environmental impacts of a company and its supply chain. Within the framework of an environmental audit, the perimeters studied are the direct impacts of a company, those of its direct suppliers and those of its indirect suppliers (thus including the extraction of raw materials). Direct impacts result from a company's own operations and include emissions from fuel combustion (boilers and company owned vehicles), pollution from water abstraction, natural resource use and waste generated from industrial production. Indirect impacts from supply chains occur because of the goods or services a company procures.

The environmental variables studied by Trucost are as follows:

- greenhouse gases: CO_2, methane, nitrous oxide, sulphur hexaflouride, per fluoro carbons as well as hydro flouro carbons and nitrogen trifluoride;
- water abstraction: direct cooling water and process water, water taken directly from the natural environment, as well as purchased water (i.e. water acquired from utility companies);
- waste generation: waste incineration, landfill waste, nuclear waste (i.e. from the manufacture of products, the combustion of nuclear fuel or other industrial and medical processes) and recycled waste;
- air pollutants: all emissions released to air by the consumption and production processes of fossil fuels, acid rain precursors, ozone depleting substances, dust and particles, metal emissions, smog precursors and volatile organic compounds;
- land and water pollutants: pollutants from fertiliser and pesticides, metal emissions to land and water, acid emissions to water and nutrient and acids pollutants;
- natural resource use: extraction of minerals, metals, natural gas, oil, coal, forestry, agriculture and aggregates.

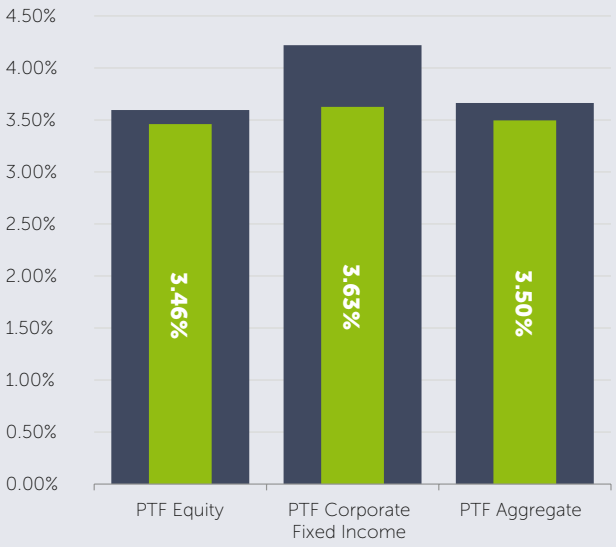
The same calculation approaches used for the carbon footprint are applied to the environmental footprint. The following graphs therefore show the performance of FDC portfolios according to the environmental intensity per million euros of revenue generated (EC to Revenue) and the weighted average environmental intensity (WAECI).

Environmental intensity per million euros of revenue generated



Source: Trucost

Weighted average environmental intensity per million euros of revenue generated



Source: Trucost

Referring to the first graph, an environmental intensity of 3.5% at the level of the equity portfolio means that the companies in the given portfolio consume natural resources of 35,000 euros per million euros revenue generated. **The analysis of the environmental intensity shows again a positive performance of FDC's portfolios compared to the benchmarks and a less pronounced exposure to environmentally intensive companies**. On the basis of the revenue generated approach, for example, FDC's consolidated portfolio exposes a positive relative performance of around 13%. This means that for each million euros of revenue generated by FDC's consolidated portfolio, FDC consumes on average 13% less natural resources than the benchmark.

The following charts further illustrate that the environmental intensities by sector of FDC's consolidated portfolio are lower than those of the benchmark for respectively 10 and 8 of the 11 sectors considered by Trucost, depending on the approach considered.

Environmental intensity per million euros of revenue generated: sectoral allocation and performance

	EC to Revenue (%)		Attribution Analysis		
Sector Allocation	**Portfolio**	**Benchmark**	**Sector Allocation**	**Company Selection**	**Total Effect**
Communication Services	0.69	0.72	0.14%	0.04%	0.18%
Consumer Discretionary	2.29	2.34	-0.17%	0.15%	-0.02%
Consumer Staples	9.55	10.68	2.73%	2.14%	4.86%
Energy	5.50	5.47	0.85%	-0.05%	0.80%
Financials	0.46	0.49	1.96%	0.15%	2.11%
Health Care	1.02	1.28	1.74%	0.71%	2.45%
Industrials	2.58	2.63	0.07%	0.18%	0.25%
Information Technology	1.34	1.41	-0.70%	0.14%	-0.56%
Materials	11.88	12.12	1.72%	0.35%	2.06%
Real Estate	1.94	2.09	-0.04%	0.05%	0.01%
Utilities	15.23	19.47	-3.94%	4.31%	0.37%
	3.45	**3.94**	**4.36%**	**8.16%**	**12.51%**

Weighted average environmental intensity per million euros of revenue generated: sectoral allocation and performance

	WAECI (%)		Attribution Analysis		
Sector Allocation	**Portfolio**	**Benchmark**	**Sector Allocation**	**Company Selection**	**Total Effect**
Communication Services	0.68	0.69	0.14%	0.03%	0.17%
Consumer Discretionary	2.05	2.09	-0.28%	0.10%	-0.17%
Consumer Staples	11.21	10.96	0.60%	-0.48%	0.12%
Energy	5.81	5.68	0.39%	-0.16%	0.22%
Financials	0.44	0.49	2.12%	0.29%	2.41%
Health Care	1.45	1.60	-0.37%	0.43%	0.06%
Industrials	2.65	2.62	-0.00%	-0.07%	-0.08%
Information Technology	1.04	1.11	-0.70%	0.29%	-0.41%
Materials	12.83	13.28	0.58%	0.56%	1.14%
Real Estate	1.57	1.68	0.03%	0.11%	0.14%
Utilities	17.53	21.68	-4.36%	5.33%	0.97%
	3.50	**3.66**	**-1.86%**	**6.42%**	**4.56%**

Source: Trucost

With regard to the environmental footprint attribution analysis, it should be noted that the total effect of sectoral under/overweight decisions and stock selection is again positive for both approaches. **Especially in terms of stock selection, it can once again be concluded that FDC's asset managers choose companies with a low environmental intensity at the expense of those with a high intensity, and this almost within each sector**.

4.2.3. Exposure to stranded assets and fossil activities

Industry experts refer to assets that may suffer from unanticipated or premature write-downs, devaluations or conversion to liabilities as "stranded assets". Significant and sudden changes in legislation, environmental constraints or technological innovations may be at the origin of such depreciations. Trucost assesses exposure to such assets by highlighting holdings with business activities in extractive industries[20] and power generation from fossil fuels[21]. This helps to identify potentially stranded assets that could become apparent as economies move towards a 2°C alignment.

Exposure to potential stranded assets was assessed by Trucost on the basis of:

- the sum of the weights of the companies in the portfolio exposed to such assets (expressed as % of holdings value). The given indicator is calculated by summing up the weights of holdings in companies that have a revenue dependency on the sectors in question. A revenue threshold may be defined to restrict the analysis. This threshold was set at 0% for the analysis of FDC's consolidated portfolio[22]:

$$\text{Exposure} = \sum_i^n [\text{weight}_i]$$

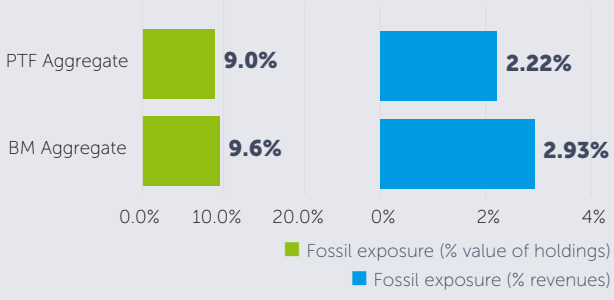
Source: Trucost

- the proportion of the revenues of the companies involved in the mentioned activities (expressed as a % of the revenues), being the ratio of the summed up apportioned revenues from the reference activity and the summed up total apportioned revenues of all companies in the portfolio [23]:

$$\text{Exposure} = \frac{\sum_i^n \text{apportioned revenues activity}_{\text{ref, i}}}{\sum_i^n \text{apportioned revenues}_i}$$

Source: Trucost

Exposure to fossil activities



Source: Trucost

The graph above illustrates a positive performance of FDC's consolidated portfolio because the given portfolio shows a lower exposure to fossil activities compared to the benchmark, regardless of the method of exposure considered.

n = number of bonds in the portfolio
i = specific bond "i" in the portfolio
$\text{activity}_{\text{ref}}$ = reference activity

20 Extraction-related activities include the following sectors: crude petroleum and natural gas extraction, tar sands extraction, natural gas liquid extraction, bituminous coal underground mining, bituminous coal and lignite surface mining, drilling oil and gas wells and support activities for oil and gas operations.
21 Electricity generation from fossil fuels includes the production of energy from coal, oil and natural gas.
22 This means that a company is taken into consideration as soon as it generates any revenue from an extractive activity or energy production from fossil fuels. The analysis is therefore as rigorous as possible.
23 Apportioned revenues are calculated pro rata to the enterprise value or market capitalisation held.

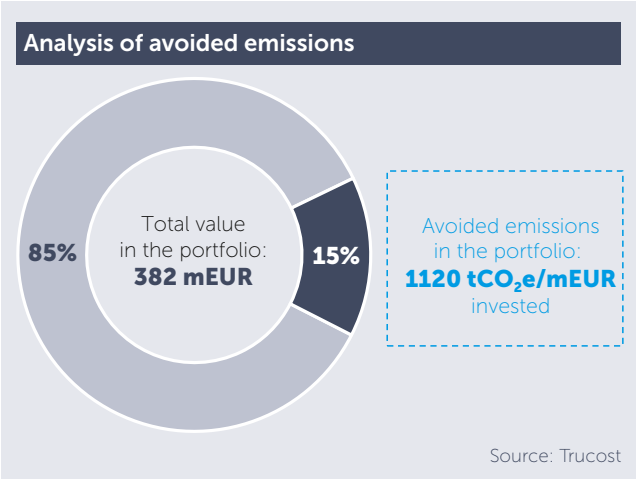
4.2.4. Avoided emissions: analysis of FDC's green bonds

Emissions can be avoided by financing environmentally friendly projects, such as the production of renewable electricity, heat or energy or buildings with zero net carbon emissions. By enabling companies to finance such projects, green bonds are a key lever in financing the ecological transition. However, there is currently no standard and uniform classification of green bonds. In order to enable a more sustained and sustainable growth of this market, a taxonomy project has been proposed by the European Commission. Good practices in terms of transparency and regular communication on the allocation of the funds are indeed essential when it comes to assessing the environmental impact of such investments.

FDC launched a dedicated sub-fund for investments in green bonds in line with the Green Bonds Principles developed by ICMA.[24] As more and more green bonds are being included in major benchmarks, FDC has an additional exposure to green bonds through its conventional bond sub-funds. All these green bonds have been included in Trucost's analysis.

In order to quantify the avoided carbon emissions, Trucost has assessed the carbon impact of the eligible projects financed by each green bond. The impact data covers the entire project life cycle, i.e. construction, operation and end-of-life phase. The impacts of all projects are then annualised according to their expected life span.

The valuation of green bonds included in FDC's bond portfolios at the end of 2019, i.e. some 140 green bonds, amounted to 382 million euros. However, avoided emissions were only disclosed for 29 of these 140 green bonds. At the time the analysis of FDC's portfolios was conducted, Trucost was not yet able to estimate avoided emissions in the absence of reporting. Therefore, the figure presented below only reflects a portion of the actual volume of emissions avoided by FDC through its investments in green bonds.



According to Trucost, the green bonds held by FDC mainly finance renewable energy projects and enable FDC to reduce its carbon footprint by at least 1120 tCO_2e per million euros invested.

24 The State of Luxembourg based itself on the same principles for the launch of its reference framework for sustainable bonds. This framework meets the highest market standards and fully complies with the new recommendations of the European taxonomy on green financing.

4.2.5. 2°C alignement

This section presents an analysis of the transition trajectories and energy mixes of FDC's portfolios and their alignment with a 2°C scenario.

4.2.5.1. 2°C alignment: transition trajectory

The aggregated equity and corporate bond portfolio as well as the benchmark were evaluated by Trucost both on the basis of their alignment with the objective of limiting global warming to a maximum of 2°C compared to pre-industrial levels and on the basis of different alternative climate scenarios.

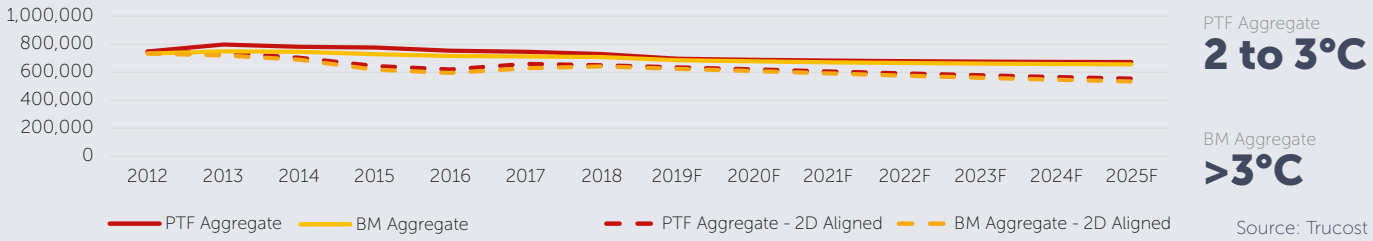
This approach can be described as an assessment of a company's transition trajectory, i.e. an analysis of the adequacy between each company's emission reductions and the reductions required to achieve a given scenario. The analysis takes into account historical carbon data as well as future carbon footprints based on scope 1 and scope 2 emissions.[25] One of the main advantages of Trucost's approach is that it can be applied to a wide range of securities, without being limited to the evaluation of a restricted number of sectors or business activities. Additionally, its results can be aggregated at portfolio level.

Historical data on greenhouse gas emissions and company activities have been compiled from 2012 onwards. Forward-looking data sources are used to track likely future transition trajectories up to 2025. For reasons of data quality and availability, Trucost does not go beyond 2025. The prospective data used in the analysis depends on the availability of the sources indicated below (listed in order of use):

- emission reduction targets reported by companies ;
- data by asset for certain sectors;
- historical emission trends for a group of companies with homogeneous business activities;
- average historical emission trends within a sub-industry;
- no change in emissions intensity assumptions.

More information on the methodology and scenarios considered by Trucost can be found in Appendix 3.

Current trajectories vs aligned trajectories



Source: Trucost

25 Companies that do not report data on their emissions during the historical period covered are excluded from the analysis by Trucost. The objective is to determine whether companies achieve a level of decarbonisation, from one year to the next, compatible with a carbon budget of 2°C. Since slight differences in trajectories can lead to significant differences in results, the modelled data is excluded in order to avoid potentially false inferences.

Considering the previous graph, **FDC's aggregated equity and corporate bond portfolio shows a transition path compatible with a warming between 2 and 3°C**. In terms of apportioned emissions, these are approximately 13% higher than the emissions officially allowed for a 2°C carbon balance over the period 2012 to 2025. **However, the corresponding benchmark is on a much higher level than the one of FDC's aggregated portfolio as it shows a trajectory compatible with a warming of more than 3°C**.

It should be noted that within Trucost's transition trajectory alignment study, avoided or negative emissions are not aggregated. For example, FDC's avoided emissions from its investments in positive impact equities and green bonds or negative emissions from its forest estate are not included. On the contrary, green bonds may have a penalising effect. This could happen when the issuers of such bonds taken into account in the alignment study have rather unfavourable carbon balances. This also affects the companies themselves. For example, they may have a significant carbon footprint and at the same time offer products that contribute favourably to the reduction of the global carbon footprint. Taking such elements into account would reduce FDC's overall carbon footprint.

The results of the analysis depend also on the base year chosen. This is particularly relevant for companies with highly volatile emissions, production levels or revenues. In the same way, it should be noted that at the time of the analysis, some of FDC's actively managed mandates had not yet been retendered with the requirement of a mandatory integration of a sustainable approach. Therefore, the results of the analysis do not reflect the overall impact of this commitment.

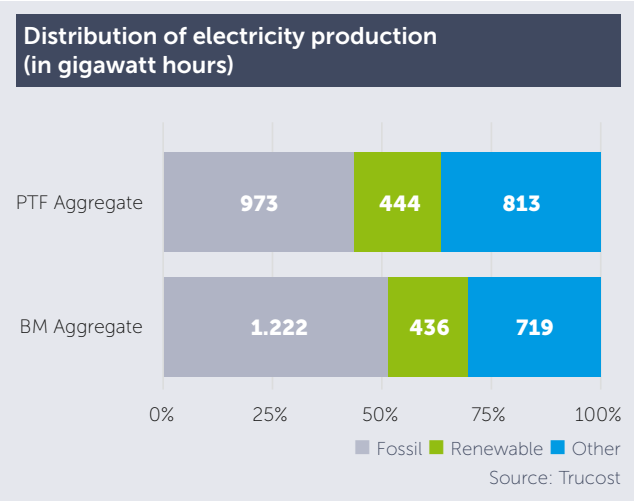
The selected time horizon may also impact the results, especially in a context where many companies have rather recently announced to reduce their carbon balance sheets, often in a staggered, progressive manner or with a medium or even long-term objective. The effects of changes in companies' behaviour and business model due to climate considerations are expected to gain momentum in the coming years and are not reflected neither in historical nor in current data. In this context and at the level of forward-looking data, an extended time horizon could bring more visibility and transparency, however, keeping in mind that any extension may increase the probability of errors in the estimates.

4.2.5.2. 2°C alignment: energy mix

The power generation sector will play a crucial role in any strategy which aims to achieve the 2°C alignment targets. In terms of energy mix, Trucost highlights the aggravating factors (fossil fuels) versus the mitigating factors (renewable energies). Electricity production can be divided into three groups:

- production of fossil fuel-based energy including coal, petroleum and natural gas;
- other energy production, including nuclear and landfill gas energy as well as other unclassified electricity production;
- renewable energy production, which includes solar, wind, wave and tidal, geothermal, hydroelectric and biomass energy.

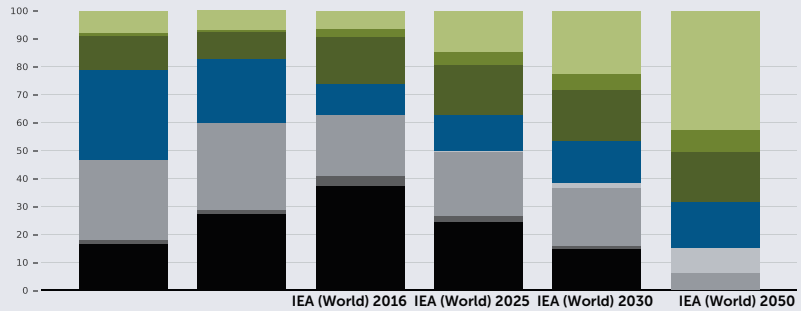
Trucost collects data on the physical units of energy (expressed in gigawatt hours) produced by the companies in a portfolio. The following chart shows the distribution of gigawatt hours of energy production allocated to FDC's aggregated equity and corporate bond portfolio. **Compared to the benchmark, FDC's portfolio is less exposed to fossil fuels in favour of renewable energy and other forms of energy production**.



Understanding a portfolio's energy mix enables it to be compared not only with benchmarks that reflect the current economy, but also with forward-looking benchmarks informing investors what efforts will be required to finance the energy transition and consequently, the economy of tomorrow. Therefore, analysing the energy mix of each issuer in the portfolio has a priority to ensure that the portfolio is aligned with the objectives of limiting global warming. From this perspective, the climate trajectories defined by the IEA, which is working with governments and the industry to shape a secure and sustainable energy future for all, are a very meaningful basis for comparison since they detail the energy mix of the main countries and regions in a climate scenario limiting global warming to 2°C. More information on the IEA's 2°C scenarios is available in Appendix 3.

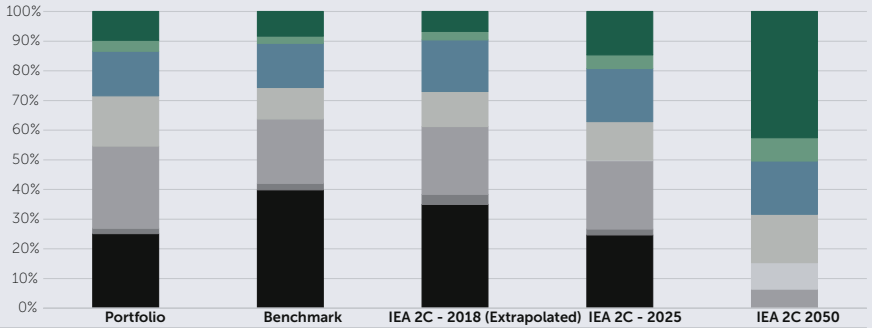
The analysis compares the energy mixes of FDC's aggregated equity and corporate bond portfolio as well as its sovereign portfolio with energy mixes that are consistent with different 2°C global warming scenarios as defined by the IEA.

Energy mix alignment: aggregated equity and corporate bond portfolio



	Portfolio	Benchmark	IEA (World) 2016 2 Degree Scenario	IEA (World) 2025 2 Degree Scenario	IEA (World) 2030 2 Degree Scenario	IEA (World) 2050 2 Degree Scenario
Other renewables	7.55%	6.81%	6.39%	14.60%	22.31%	42.52%
Biomass	1.22%	0.67%	2.63%	4.65%	5.92%	7.91%
Hydroelectric	12.06%	9.57%	16.67%	17.84%	18.16%	17.91%
Other sources (incl. landfill gas)	0.09%	0.06%	0.05%			
Nuclear	32.18%	22.72%	11.14%	12.97%	15.06%	16.29%
Fossil energy with CCS			0.04%	0.19%	1.62%	8.98%
Natural Gas	28.81%	31.38%	21.94%	23.07%	21.04%	6.04%
Petroleum	1.14%	1.12%	3.84%	2.00%	0.96%	0.27%
Coal	16.95%	27.67%	37.31%	24.68%	14.94%	0.08%

Energy mix alignment: sovereign portfolio



	Portfolio	Benchmark	IEA 2C - 2018 (Extrapolated)	IEA 2C - 2025	IEA 2C 2050
Other sources (incl. landfill gas)	0%	0%	0%	0%	0%
Other renewables	10%	8%	7%	15%	43%
Biomass	4%	2%	3%	5%	8%
Hydroelectric	15%	15%	17%	18%	18%
Nuclear	17%	11%	12%	13%	16%
Fossil energy with CCS	0%	0%	0%	0%	9%
Natural Gas	28%	22%	23%	23%	6%
Petroleum	2%	2%	3%	2%	0%
Coal	25%	40%	35%	25%	0%

CCS: carbon capture and storage

Source: Trucost*

*Note:
The content within these tables was prepared by S&P Trucost Limited, with data derived from the 2 Degree Scenarios developed by the International Energy Agency. ©OECDIEA 2017.
The content within the table above does not necessarily reflect the views of the International Energy Agency.

Generally speaking, the IEA scenarios show a substitution of fossil fuels (coal, petroleum and natural gas) in favour of renewable energies. This transition also involves an increase in nuclear energy.

Referring to FDC's aggregated portfolio, the share of the most carbon intensive sectors (coal and petroleum) is relatively low and well below the one of the benchmark. 18.1% of FDC's aggregated portfolio energy mix is derived from petroleum and coal-fired power generation, compared to 28.8% of the benchmark. This lower proportion allows FDC to be fully in line with the IEA 2025 scenario and almost in line with the 2030 scenario, which foresees thresholds of 26.7% and 15.9% respectively. Fossil fuels, including natural gas, represent 46.9% of the energy mix of FDC's aggregated portfolio. This exposure is also consistent with the IEA 2025 scenario, which foresees a share of 49.7%. However, the lower proportion of fossil fuels in the energy mix of FDC's aggregated portfolio is achieved through a more significant exposure to nuclear energy, to the detriment of renewable energies.

At the level of the sovereign portfolio, similar conclusions can be drawn. 27% of FDC's sovereign portfolio energy mix is derived from petroleum and coal-fired power generation while the benchmark exposes a value of 42%. On that basis, FDC's portfolio is in line with the IEA's 2025 scenario. Fossil fuels, including natural gas, account for 55% of the energy mix of FDC's sovereign portfolio. This rate is higher than the IEA 2025 scenario, which foresees a share of 50%. With regard to FDC's sovereign portfolio, the lower exposure to the most carbon intensive sectors is nevertheless achieved by an already more equal split between nuclear and renewable energy.

4.2.6. Transition and physical risks

In an asset management context, climate risks are often defined as physical and transition risks arising from climate change. The following section summarises Trucost's analysis of transition and physical risks within FDC's equity and corporate bond portfolios.

4.2.6.1. Transition risks

Carbon pricing mechanisms seem vital when it comes to reducing greenhouse gas emissions and redirecting capital towards low-carbon solutions. Trucost compiled a set of data on possible future carbon prices to enable investors manage the risks associated with a rising carbon price. The difference between what a company is paying today for a ton of carbon emissions and what it might have to pay in the future under different scenarios is determined by the so-called "risk premium", an indicator created by Trucost. This risk premium varies across geographic regions due to different government policies but also across sectors due to the different treatment of sectors in many climate change policies. Calculating such a risk premium allows to determine the future costs of carbon faced by companies. Consequently, these future carbon costs are the product of companies' carbon footprint and their risk premium[26]:

$$\text{Future carbon costs}_i = \text{Carbon footprint } (tCO_2e)_i \times \text{Risk premium}_i$$

Source: Trucost

To highlight a portfolio's exposure to an increase in the carbon price, Trucost considers three scenarios, i.e. a low, intermediate and high carbon price increase, for different reference years (2020, 2030, 2040 and 2050). For more information on the calculation methodology applied by Trucost, please consult Appendix 4.

Trucost presents the results in the form of five indicators, each of which can be integrated into financial analysis.

i = specific company "i" in portfolio

26 Companies that do not have sufficient financial data or that report negative earnings are excluded from the analysis.

FDC decided to show the results based on the scenario of a high carbon price increase in 2030 and on an indicator depending on earnings before interest, taxes, depreciation and amortisation of companies, called "EBITDA at risk". The EBITDA at risk is the share of a portfolio's earnings exposed to a carbon price increase. Hence, it is a good indicator of the vulnerability of companies to a price increase. The indicator results from the ratio of a company's future carbon costs to its benefits, weighted at portfolio level.

$$\text{EBITDA at risk} = \sum_{i}^{n} \left[\frac{\text{Future carbon costs}_i}{\text{EBITDA}_i} \times \text{Weight}_i \right]$$

Source: Trucost

Transition risks within FDC's portfolios: high carbon price increase in 2030

	Allocated future carbon costs (EUR)	EBITDA at risk (%)
PTF Equity	72,701,286	8.85
BM Equity	73,473,006	9.29
PTF Corporate Fixed Income	24,574,598	9.56
BM Corporate Fixed Income	27,118,405	11.71
PTF Aggregate	97,275,884	8.79
BM Aggregate	97,284,953	9.56

Source: Trucost

When considering the above table, it should be noted that FDC's portfolios show a lower level of allocated future carbon costs and EBITDA at risk than the respective benchmarks. The allocated future carbon costs highlight the future carbon costs incurred by companies in the portfolio and reflect the increase of the risk premium by 2030. For example, for the aggregated portfolio these costs are estimated at almost 97.3 million euros, representing approximately 0.5% of the total assets of FDC's SICAV as of end 2019. **Moreover, the share of earnings before interest, taxes and amortisation at risk in a scenario of a high carbon price in 2030 is estimated at 8.79% compared to 9.56% at benchmark level.**

4.2.6.2. Physical risks

Physical risks induced by climate change will have a considerable impact on financial markets. Severe disruptions are likely to materialise on a global scale through raw material shortages, price fluctuations or damage and loss of infrastructure.

Physical risks combine localised risks (which relate to sites) and risks relating to the value chain of affected companies (which relate to the supply chain and markets). Assets are then assessed based on their exposure and vulnerability to seven climatic events: water stress, wildfires, floods, heatwaves, coldwaves, hurricanes and rising sea levels. These assessments are carried out according to three climate scenarios, i.e. low, moderate and high warming, and for two reference years, i.e. 2030 and 2050. Should data at the level of a company's assets not be available, the analysis is performed based on the location of the head office, the geographical distribution of income and the average physical risk levels recorded in each country.

Companies are rated from 1 to 100 for each of the seven climatic events for all scenarios and reference years. A rating of 100 corresponds to the highest possible risk, while a rating of 1 corresponds to the lowest possible risk. By calculating the average of the seven scores, a composite score for the physical risk at company level is obtained. This is a so-called adjusted score. An adjusted score takes into account the relative sensitivity of companies to different climatic events and provides herewith a better understanding of the impact of different climatic events on the proper functioning of companies. The sensitivity indicators and their associated impacts are listed below.

EBITDA = earnings before interest, taxes, depreciation and amortization
n = number of companies in the portfolio
i = specific company "i" in the portfolio

Sensitivity factors and impacts

Sensitivity Indicator	Risk Type	Business Impact	Rationale
Water Intensity (Direct or Indirect)	• Drought	• Input Scarcity • Increased Operating Expenses • Stranded Assets	Businesses with high water dependency are more likely to be impacted by water scarcity.
Capital Intensity	• Flood • Sea level rise • Wildfire • Hurricane	• Asset Impairment • Lost Inventory • Production Disruption • Critical Infrastructure Damage	Businesses with high capital intensity are more likely to be impacted by risk types that cause physical damage.
Labour Intensity	• Heatwave • Coldwave	• Productivity Losses	Businesses with high labour intensity are more likely to be impacted by the impairment of optimal working conditions.

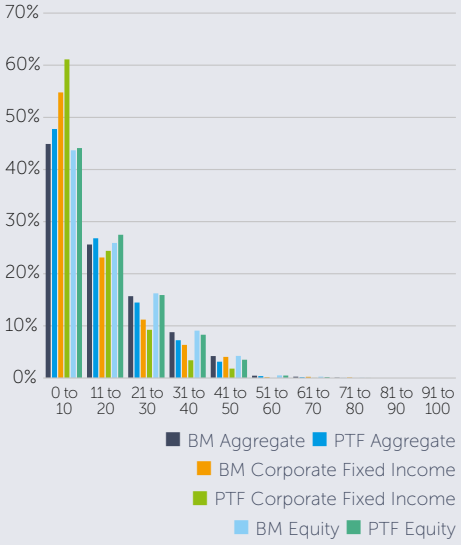
Source: Trucost

For more information on the methodology applied by Trucost, please consult Appendix 5.

The following graph illustrates the exposure of FDC's portfolios and the respective benchmarks in terms of adjusted scores to physical risks related to climate change, based on the high warming in 2050 scenario. The ratings can be interpreted as follows:

- score from 1 to 33: low risk;
- score from 34 to 66: medium risk;
- score from 67-100: high risk.

Physical risks within FDC's portfolios: high warming in 2050



Source: Trucost

Trucost's analysis shows that FDC's portfolios are largely constituted of companies with low risk score, and this in a higher proportion compared to the respective benchmarks. For example, FDC's aggregated equity and corporate bond portfolio includes approximately 48% of companies rated 0 to 10 whereas the associated benchmark is only composed of 45% of companies rated between 0 and 10. Generally speaking, more than 90% of each FDC portfolio is rated low risk. High risk scores are virtually non-existent.

4.3. PACTA analysis

The PACTA tool was developed by the global think tank 2° Investing Initiative, which set itself the task of aligning financial markets and regulations with the objectives of the Paris Agreement. The given initiative is financially supported by the Swiss Federal Office for the Environment, the German Federal Ministry of the Environment, the European Commission through its LIFE[27] program and the ClimateWorks[28] foundation, among others.

Drawing on an extensive climate-related financial database, the PACTA tool gathers prospective global asset data (such as the production plans of a manufacturing plant over the next five years) down to the level of the parent company. The tool then produces a report that allows investors to analyse the exposure of their equity and corporate bond portfolios to climate-related sectors as well as to assess the overall alignment of these portfolios with various climate scenarios and the Paris Agreement. In addition, the tool is designed to help investors comply with the TCFD recommendations and future European Union climate disclosure requirements.

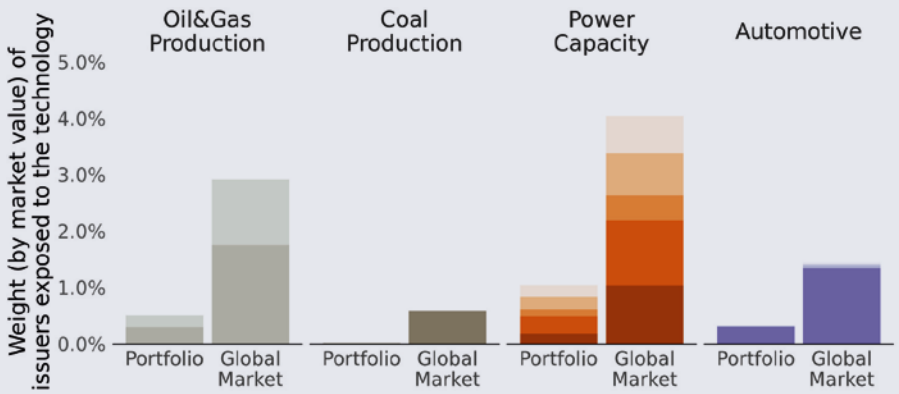
FDC transmitted its relevant portfolios valued at 31 December 2019 via that tool. 1.5 billion, representing approximately 7.5% of the total assets of FDC's SICAV, were retained as climate relevant. The analysis can be split into three parts, which are subsequently presented in a question and answer format.

4.3.1. What is the current exposure to economic sectors affected by the transition to a low carbon economy in FDC's portfolios?

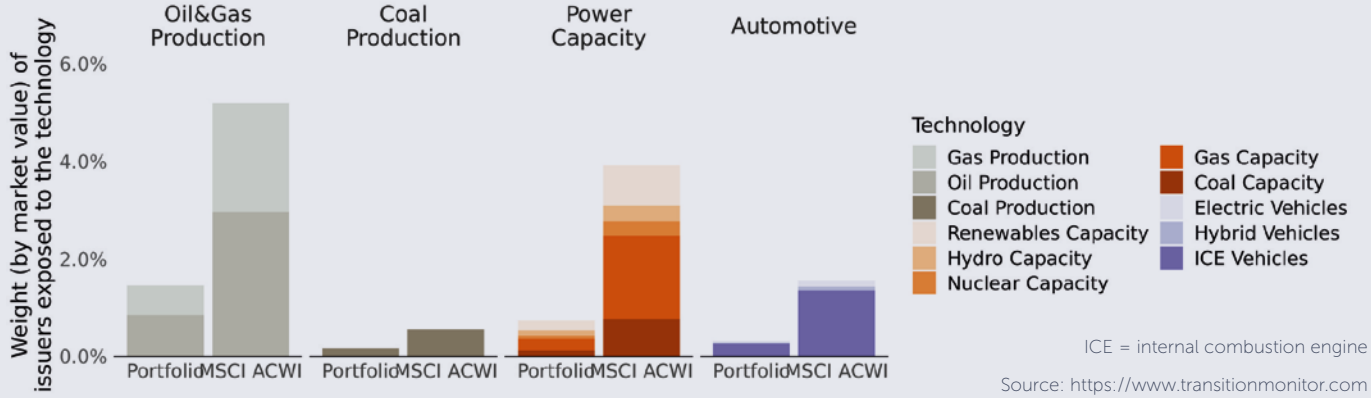
The sectors analysed by the PACTA tool generally represent around 75 to 85% of a portfolio's carbon emissions. In the following graphs, the exposure of FDC's portfolios to the fossil fuel, power and automobile sectors is presented and compared. For the bond portfolio it's compared to the global bond market[29] and at the equity level it's compared to the MSCI World All Countries benchmark, which is the most widely used and representative benchmark for equities.

27 The LIFE programme is the European Union's financing instrument for the environment and the fight against climate change.
28 ClimateWorks is a global philanthropic platform for innovating and accelerating climate solutions.
29 Being all companies with outstanding debt from Bloomberg at the end of 2018.

Corporate bond portfolio: current exposure to high-carbon and low-carbon activities



Equity portfolio: current exposure to high-carbon and low-carbon activities



ICE = internal combustion engine

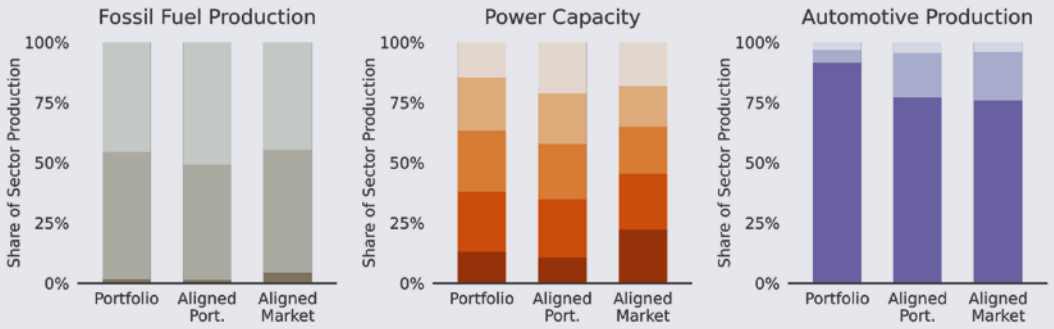
Source: https://www.transitionmonitor.com

The outcome shows that FDC's portfolios are significantly less exposed to climate-relevant sectors than the global markets, especially in the most carbon-intensive sectors (i.e. coal, oil and cars with combustion engines).

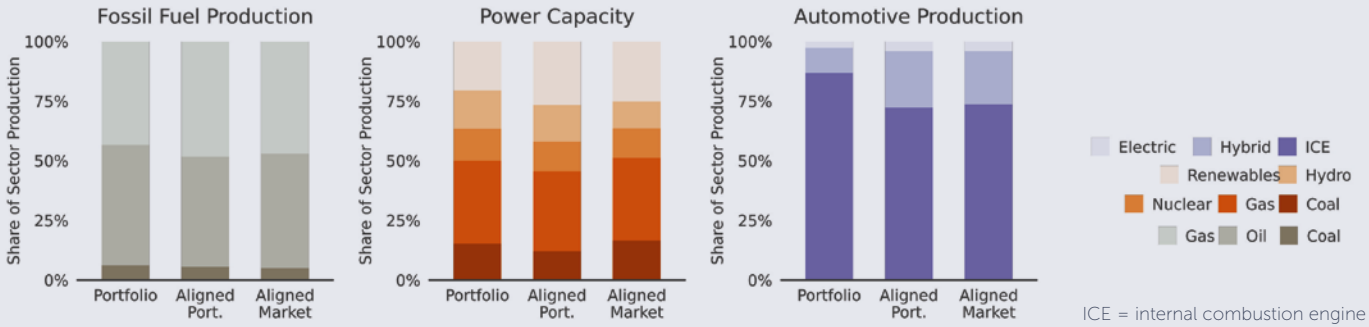
4.3.2. What significant differences exist between the technology mixes of FDC's portfolios and the technology mixes of portfolios aligned with the Paris Agreement?

The following graphs quantify the expected evolution of a portfolio's exposure to high-carbon and low-carbon activities in 5 years (2024) based on the current revealed investment and production plans of companies with business activities in the fossil fuel, power and automotive sectors. In other words, the graphs show the future technology mixes in each sector of FDC's portfolios, compared to the expected future technology mixes of portfolios and markets aligned with the Paris Agreement.

Aligned energy mix: equity portfolio



Aligned energy mix: corporate bond portfolio



ICE = internal combustion engine

Source: https://www.transitionmonitor.com

According to the PACTA analysis, the future technology mixes of FDC's portfolios and Paris Agreement aligned portfolios do not differ significantly in terms of fossil fuel production and power capacity. Drawing a conclusion, the proportion of internal combustion engines is still too high, to the detriment of cars with hybrid engines.

4.3.3. How will FDC's portfolio valuations change under different climate scenarios?

The PACTA tool also includes a stress test analysis. Specifically, the underlying stress test was developed by the Bank of England. It applies shock parameters to a portfolio based on three different climate transition scenarios[30]. Two types of climate risks are assessed in this context, namely physical risks and transition risks. To summarise, whatever transition scenario is considered, the projected loss by the PACTA tool for FDC's consolidated equity portfolio never exceeds 6.0%. The projected loss at the level of FDC's consolidated corporate bond portfolio is maximum 0.8%.

30 The three scenarios that the Bank of England applies are a sudden and disorderly transition resulting from rapid global action and policies (scenario A), an orderly long-term transition that is broadly in line with the Paris Agreement (scenario B) and a no-transition with a continuation of the current policy trends (scenario C). More information on the methodology applied at the scenario level can be accessed via the link: https://www.transitionmonitor.com/wp-content/uploads/2019/07/BoE-Stress-Test-Methodology.pdf.

5. Conclusions

FDC is required by law to build a broadly diversified portfolio with appropriate risk and return characteristics to ensure the long-term viability of the general pension insurance scheme. Therefore, the objective is to generate a return in line with the market while investing in several asset classes managed according to different management styles in order to spread the assets over a large number of regions, countries, sectors and currencies.

Within this framework, FDC considers sustainable aspects and criteria in its investment policy. The pillars of FDC's responsible investor policy can be summarised as follows:

- since 2011, an exclusion list has ensured that FDC's investments through its SICAV comply with international standards as enshrined in the ten principles of the United Nations Global Compact covering human rights, the environment, international labour standards and anti-corruption. Equally excluded are companies involved in controversial weapons-related activities. In addition to the restrictions imposed by the legal provisions and international conventions in force, FDC considers that thematic or sectoral exclusions require a change in the legal framework;
- the assets invested through the SICAV are managed by professional and approved asset managers duly designated by FDC. These asset managers are appointed in a transparent manner through public tenders. Since 2011, detailed questions have been incorporated in the asset manager selection questionnaire referring to sustainable aspects and criteria taken into consideration by the tendering companies, in particular with regard to their investment process and asset allocation. This aspect got strengthened over time so that from 2017 onwards, each tendering company participating in a tender for actively managed mandates has been obliged to integrate a sustainable approach into the investment strategy proposed to FDC. As a result, FDC's asset managers have all engagement policies in place, participate in various initiatives and are members of different organisations that promote, among others, sustainability and/or the transition to a low-carbon economy, are all signatories to the United Nations Principles for Responsible Investment and strive to align with the 17 Sustainable Development Goals of the United Nations. The sustainable approaches of the asset

managers are monitored and audited. Ten ESG and Environment labels have been awarded by the labelling agency LuxFLAG. These labels account for almost 75% of the assets in transferable securities actively managed within FDC's SICAV at mid-2020;

- FDC proceeds to dedicated positive-impact investments in various forms. Dedicated mandates were created within the SICAV to invest in green bonds as well as in equities of companies intending to generate, in addition to financial returns, an environmental or social impact. In this way, FDC contributes, for example, to the treatment and saving of water, the generation of renewable energy, the reduction of greenhouse gas emissions and the recycling and management of waste. Through its stakes in the SNHBM and specific real estate acquisitions, FDC supports low-cost housing. As an owner of almost 700 hectares of PEFC-certified forest, FDC contributes, among other things, to absorbing CO_2 emissions of about 9,000 tons per year ;
- with regard to FDC's direct real estate, high standards in terms of energy performance and sustainability are targeted and ensured in particular through high level BREEAM labels;
- on an individual basis, detailed analysis and assessment of climate risks are carried out by FDC's asset managers. The management of these risks forms an integral part of their investment process. At the same time, the use of external service providers such as Trucost or external tools such as PACTA allows FDC to have a more consolidated and independent view of climate risks and to monitor and assess them. In addition, an alignment to a global warming limited to 2°C can thus be analysed.

FDC is therefore well aware of the importance of taking into consideration sustainable aspects and criteria and climate analyses and making an assessment of the related risks. The results presented in this report confirm that these risks are well managed. Neither the analysis by Trucost nor the one by PACTA identified significant transition or physical risks.

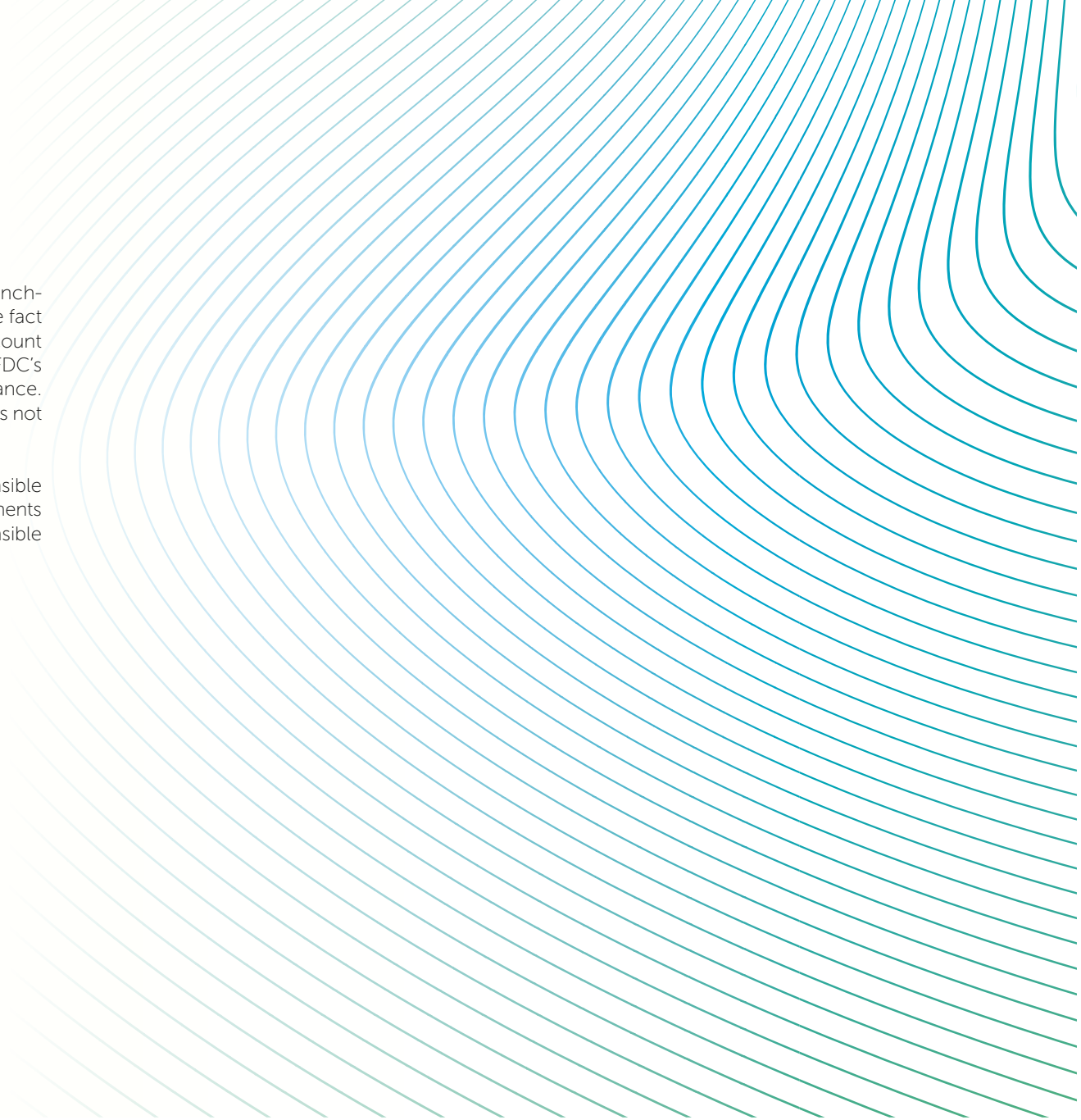
With regard to the carbon and environmental footprints, Trucost's analysis shows that FDC portfolios perform positively compared to benchmarks. In particular, the exposure to stranded assets as well as to fossil fuels and activities in the consolidated equity and corporate bond portfolio is lower compared to the respective benchmark. The PACTA analysis comes to similar conclusions.

The results have also shown that already today, the energy mixes of FDC's portfolios are close to the future energy mixes needed to meet the 2°C objective. According to Trucost, the carbon-intensive sectors, i.e. coal, oil and natural gas, within the energy mix of FDC's consolidated equity and corporate bond portfolio are already aligned with the energy mix needed in 2025, although currently this alignment is still achieved by an overweight of nuclear energy at the expense of renewable energy. With regard to FDC's sovereign portfolio, carbon-intensive sectors are currently slightly overweight, however, only because of a more pronounced exposure to natural gas. When looking at the exposure to coal and oil only, the portfolio is well aligned.

Considering the alignment in terms of transition trajectories highlighted by Trucost and based on carbon emissions over the period 2012 to 2025, FDC's consolidated equity and corporate bond portfolio is on a trajectory

equivalent to a warming of 2° to 3°C while the benchmark is on a trajectory well above 3°C. However, the fact that Trucost's alignment study does not take into account avoided or negative carbon emissions resulting from FDC's investments argues in favour of a lower carbon balance. Moreover, the entire impact of FDC's commitments is not fully reflected in the results of the analysis.

Being aware of the constant evolvement of responsible investing, FDC is going to regularly monitor developments in the field of sustainability and will adapt its responsible investor policy, if necessary.



6. Appendices

APPENDIX 1: ASSET ALLOCATION WITHIN FDC'S SICAV AS OF 31 DECEMBER 2019

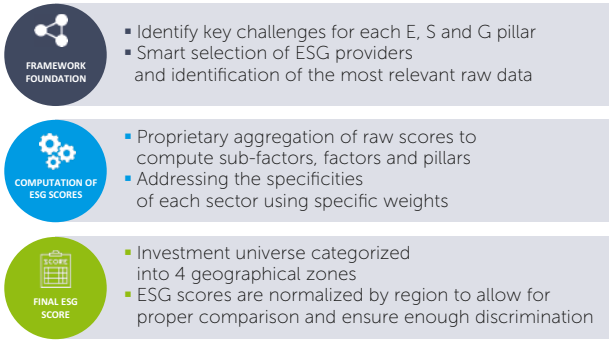
Sub-fund / Asset class	Total (€)	Total (%)	Management style
TOTAL SICAV	19.983.601.912	100,00%	
FDC SICAV EUR Money Market – Active 1	175.170.819		Active management
TOTAL MONEY MARKET	175.170.819	0,88%	
FDC SICAV EMMA Bonds – Active 1	289.069.562		Active management
FDC SICAV EMMA Bonds – Indexed	292.636.874		Indexed management
TOTAL EMERGING MARKETS BONDS	581.706.436		
FDC SICAV Global Bonds – Active 1	732.502.111		Active management
FDC SICAV Global Bonds – Active 2	747.850.843		Active management
FDC SICAV Global Bonds – Active 3	786.534.951		Active management
FDC SICAV Global Bonds – Indexed	2.234.071.848		Indexed management
TOTAL GLOBAL BONDS	4.500.959.753		
FDC SICAV EUR Bonds – Active 1	908.166.604		Active management
FDC SICAV EUR Bonds – Active 2	898.055.463		Active management
FDC SICAV EUR Bonds – Active 3	932.401.935		Active management
FDC SICAV EUR Bonds – Indexed	1.901.518.290		Indexed management
FDC SICAV EUR Green Bonds – Active 1	103.589.927		Active management
TOTAL EUR BONDS	4.743.732.220		
TOTAL BONDS	9.826.398.408	49,17%	
FDC SICAV Global Equities Small Cap – Active 1	415.582.753		Active management
FDC SICAV Global Equities Small Cap – Indexed	444.262.826		Indexed management
TOTAL GLOBAL SMALL CAP EQUITIES	859.845.579		
FDC SICAV EMMA Equities – Active 1	503.989.419		Active management
FDC SICAV EMMA Equities – Indexed	757.403.078		Indexed management
TOTAL EMERGING MARKETS EQUITIES	1.261.392.497		
FDC SICAV Global Equities – Active 1	817.257.017		Active management
FDC SICAV Global Equities – Active 2	992.688.979		Active management
FDC SICAV Global Equities – Active 3	1.008.137.806		Active management
FDC SICAV Global Equities – Indexed	2.106.219.848		Indexed management
FDC SICAV Global Equities – Indexed 2	1.993.666.584		Indexed management
FDC SICAV Global Equities Sustainable Impact – Active 1	232.497.753		Active management
TOTAL GLOBAL EQUITIES	7.150.467.987		
TOTAL EQUITIES	9.271.706.064	46,40%	
FDC SICAV Global Real Estate – Active 1	310.463.841		Active management
FDC SICAV Global Real Estate – Active 2	399.862.781		Active management
TOTAL REAL ESTATE	710.326.622	3,55%	

APPENDIX 2: FOCUS ON SOME SUSTAINABLE APPROACHES OF FDC'S ASSET MANAGERS

Below is a summary of some sustainable approaches applied to the main asset classes which FDC is invested in. It goes without saying that FDC's exclusion list always has to be respected, regardless of the sustainable approach pursued by an asset manager appointed by FDC. Currently, all actively managed sub-funds with an implemented sustainable approach have a LuxFLAG label.

Implementation at money market level

Money market instruments are managed by AXA Investment Managers. This asset manager is a signatory to the Principles for Responsible Investment and adheres to a number of other ESG initiatives and organisations. As part of its sustainable approach, AXA identifies and excludes from its eligible investment universe those issuers presenting "extreme" ESG risks in accordance with its exclusion policy on responsible investment. More specifically, when defining the eligible investment universe, the asset manager excludes issuers at risk on the basis of violations of ESG criteria, such as those of the United Nations Global Compact, climate risks, low ESG ratings and implications within controversial sectors, including for example controversial weapons, palm oil or defence. With regard to climate risks, this exclusion policy covers, among others, coal-fired power generation companies, mining companies operating in coal-related activities and pipeline and mining companies operating in oil-sands-related activities. The process for assigning an ESG profile to individual companies is described below:



Source: AXA Investment Managers as of February 2020

In addition, AXA pursues an engagement policy. In this respect, the said asset manager initiated a dialogue with 217 different companies in 2019. These 217 companies account for some 20%[31] of the portfolio managed by AXA on behalf of FDC. As an example, AXA held discussions with the CEO of Novartis to address controversies in relation to their business ethics. According to AXA, Novartis is currently taking key steps to address these challenges.

Implementation at bond level

Approximately 50%[32] of FDC's aggregated bond portfolio is managed on an indexed basis. Index asset managers fulfil their role as responsible investors primarily through FDC's exclusion list, engagement policies and membership of various initiatives and organisations supporting sustainability. However, active asset managers implement a distinct approach.

31 Based on valorisations as of 31 December 2019.
32 Based on valorisations as of 30 June 2020.

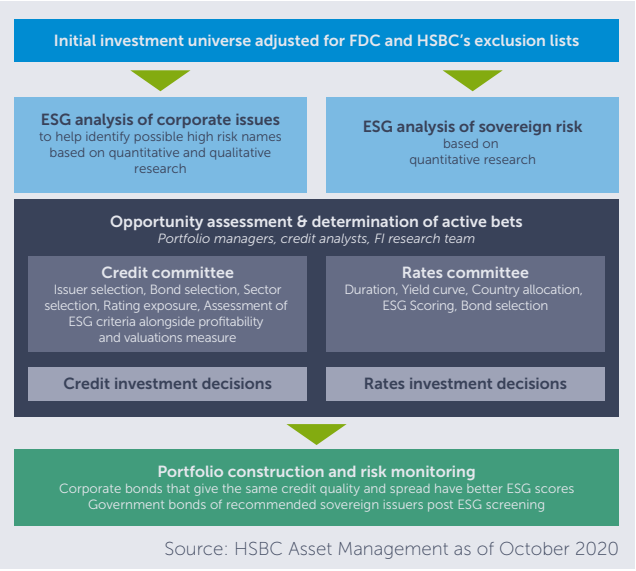
For example, Amundi Asset Management applies a proprietary "bestin-class" approach, which consists of rating companies according to their ESG performance within their specific sector of activity. To this end, Amundi has defined 36 ESG criteria, i.e. 15 generic criteria common to all companies, regardless of their sector of activity, as well as 21 sector-specific criteria:

	ENVIRONMENT	SOCIAL	GOVERNANCE
15 generic criteria	• Power consumption and greenhouse gas emissions • Water • Biodiversity, pollution,and waste	• Labour conditions and non-discrimination • Health & safety • Social relations • Client/supplier relations • Product responsibility • Local communities and human rights	• Independance of board • Audit and control • Compensation • Shareholders' rights • Ethics • ESG strategy
21 sectorspecific criteria	• Green vehicles (Automotive) • Development and production of alternative energy and biofuels (Energy/Utilities) • Responsible forestry (Paper & Forests) • Eco-responsible financing (Banks/ Financial Services/Insurance) • Green insurance (Insurance) • Sustainable construction (Construction IndustryProducts) • Packaging and eco-design (Food and Beverages) • Green chemistry (Chemistry) • Paper recycling (Paper & Forests)	• Bioethics (Pharmaceuticals) • Access to medicine (Pharmaceuticals) • Vehicle safety (Automotive) • Passenger safety (Transportation) • Healthy products (Food) • Digital divide (Telecommunications) • Responsible marketing (Pharma/ Banking/Misc. Financial Services/ Food and Beverages) • Access to financial services (Banking/ Misc. Financial Services) • Healthy product development (Food and Beverages) • Tobacco-related risks (Tobacco) • Editorial ethics (Media) • Personal data protection (Software)	

Source: Amundi Asset Management as of December 2019

Another example at the level of the bond asset class is HSBC Global Asset Management. HSBS has its own exclusion list of companies directly or indirectly related to weapons prohibited by international conventions. In addition, ESG risk assessment is integrated alongside financial considerations by the credit research teams into the fundamental analysis of issuing companies and their recommendations. To identify potential "high-risk" companies, portfolio managers use, among other indicators, a proprietary sector-specific score, a screening on the ten principles of the UN Global Compact and a filter using artificial intelligence to identify reputational risks. These potential "high-risk" companies are systematically subjected to further analysis and an ESG committee decides on the sanctions applied to these companies.

The diagram below shows the ESG approach implemented by HSBC:

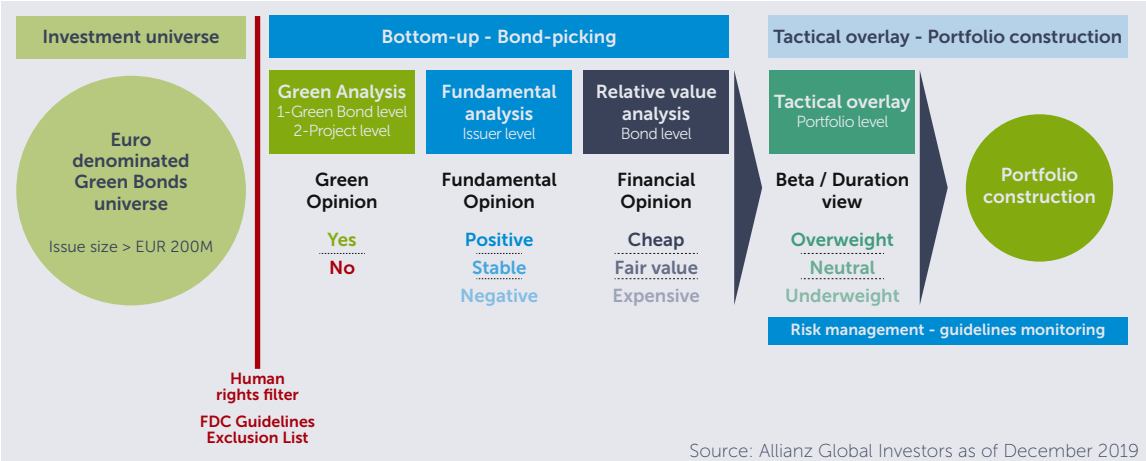


Source: HSBC Asset Management as of October 2020

The ESG analysis, as well as upstream data provided by external ESG data providers, is available to all management members via a proprietary intranet platform. The ESG scores and carbon footprint are integrated into the portfolio management tools, enabling HSBC's portfolio managers to track the portfolio's positioning on the E, S and G axis and the aggregate ESG score relative to benchmarks and to access the contribution of each issuer in the portfolio to these scores.

Engagement with issuers is also an important part of HSBC's approach. These engagement actions aim to encourage issuers to take better account of ESG dimensions in their production, development and risk management policies, and to monitor their efforts in this regard.

Green bonds are an opportunity to finance projects that benefit the environment. FDC's dedicated green bonds mandate is managed by Allianz Global Investors. The green analysis is complemented by fundamental financial and relative valuation analysis to ensure that FDC's legal and fiduciary obligation to generate market-conform returns is met. The following investment process is implemented by Allianz:



Source: Allianz Global Investors as of December 2019

Although FDC considers eligible all bonds included in the benchmark associated to the mandate, Allianz additionally applies a "green" analysis to further narrow down the eligible investment universe and to "impose" its own eligibility criteria. The latter include, among others:

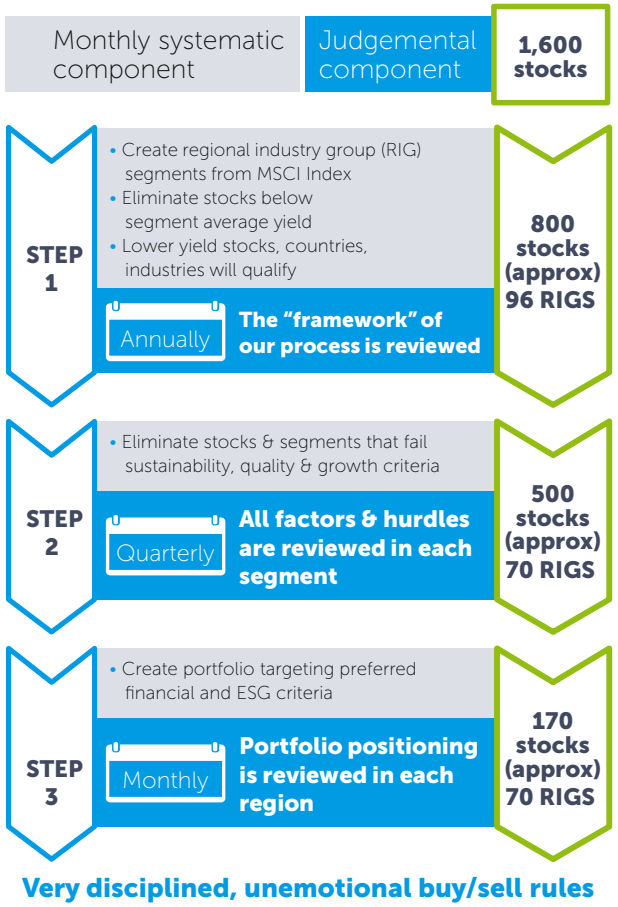
- formal communications on the use of funds to finance climate-related projects disclosed by the issuer;
- periodic and appropriate reports showing the current status of the project and the actual environmental impact disclosed by the issuer;
- taking into account the research carried out by the Climate Bond Initiative[33] in the definition of the eligible investment universe;
- the absence of any human rights violations by the issuer, as assessed by Allianz's internal ESG team.

All of these examples show that sustainability elements are taken into account within FDC's bond portfolio to a big extend.

Implementation at equity level

Almost 45%[34] of the equity investments are managed on an indexed basis. Similar to bonds, asset managers in charge of indexed mandates comply with FDC's exclusion list and assume their responsibility primarily through their respective engagement policies to deal with any controversy that may arise. Again, active asset managers implement more specific sustainable approaches.

For example, KBI Global Investors applies an extended internal exclusion list comprising not only exclusions based on the UN Global Compact but also coal producers. Sustainability and ESG considerations are fully integrated into the investment process. Portfolio construction and stock selection are based on a combination of financial and sustainability criteria, as shown in the illustration below:

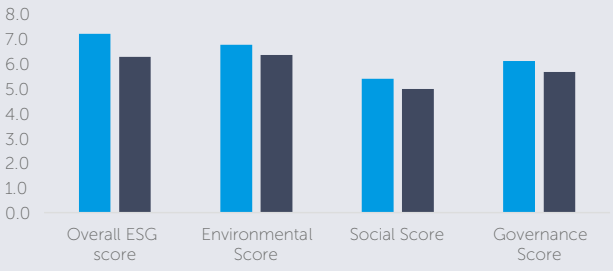


Source: KBI Global Investors as of December 2019

33 The Climate Bond Initiative is an international non-profit organisation working solely to mobilise the largest capital market of all, the 100 trillion US dollar bond market, for climate change solutions. Thus, it encourages investments in projects and assets needed for a rapid transition to a low-carbon economy and seeks to develop mechanisms to better align the interests of investors, the industry and governments to catalyse investments at a speed and scale sufficient to avert a dangerous climate change.
34 Based on valorisations as of 30 June 2020.

This process ensures that the portfolio entrusted to KBI Global Investors exceeds the ESG profile of the associated benchmark at all levels:

ESG Characteristics



Source: KBI Global Investors as of September 2020. Benchmark: MSCI World (NR) Index

Another example is the mandate under the responsibility of NN Investment Partners. The sustainable approach implemented by this asset manager on behalf of FDC has several components:

- engagement activities;
- investments in sustainable and innovation-based business models;
- an exclusion of the homeland defence sector and companies related to certain controversial activities or with controversial governance;
- inclusion of the United Nations 17 SDGs in the investment process;
- an alignment with the Paris Agreement;
- a carbon intensity of the portfolio six times lower than that of the benchmark associated to the mandate;
- lower ESG risk based on ESG ratings provided by a specialised external provider.

NN Investment Partners' approach is based on value creation. Sustainable solutions based on innovation, combined with responsible behaviour, ensure that the interests of all shareholders remain aligned and create the basis for a sustainable competitive position, which in turn creates value for the investor. This can be summarised by the following illustration:

Source: NN Investment Partners as of December 2019

A final example is the positive impact equity mandate entrusted to BNP Paribas Asset Management, knowing that the latter sub-delegates financial management to the English company Impax Asset Management. Throughout the investment process, Impax identifies companies that derive their revenues from high-growth environmental markets and then carries out an ESG analysis in which the following factors, among others, are analysed:

Sustainability criteria

E - Environment	S - Social	G - Governance
'Assessment of policies, processes, management systems, incentive structures and disclosures to address, such as greenhouse gas emissions, water stress energy use, waste and other metrics	'Assessment of policies, processes, management systems, incentive structures and disclosures to address, such as labour management, health and safety, human capital, product quality and community relations and other metrics	Each company is initially assigned a standard country level score which is then adjusted based on whether there are any deviations from local governance codes and practices. Governance criteria include board structure, shareholder rights, remuneration, ownership structure and internal controls

Source: Impax Asset Management as of December 2019

* **Note:** These documents have been approved by Impax Asset Management Limited and Impax Asset Management (AIFM) Limited ("Impax", authorised and regulated by the Financial Conduct Authority). Both companies are wholly owned subsidiaries of Impax Asset Management Group plc. The information and any opinions contained in these documents have been compiled in good faith, but no representation or warranty, express or implied, is made to their accuracy, completeness or correctness. Impax, its officers, employees, representatives and agents expressly advise that they shall not be liable in any respect whatsoever for any loss or damage, whether direct, indirect, consequential or otherwise however arising (whether in negligence or otherwise) out of or in connection with the contents of or any omissions from these documents. These documents do not constitute an offer to sell, purchase, subscribe for or otherwise invest in units or shares of any fund managed by Impax. It may not be relied upon as constituting any form of investment advice and prospective investors are advised to ensure that they obtain appropriate independent professional advice before making any investment in any such fund. Any offering is made only pursuant to the relevant offering document and the relevant subscription application, all of which must be read in their entirety. Prospective investors should review the offering memorandum, including the risk factors in the offering memorandum, before making a decision to invest. Past performance of a fund or strategy is no guarantee as to its performance in the future. These documents are not an advertisement and is not intended for public use or distribution. These documents are solely for the use of professionals, defined as Eligible Counterparties, Professional clients or Wholesale clients, within the meaning of the rules of the Financial Conduct Authority and Annex II of Directive 2014/65/EU. Under no circumstances should any information contained in these documents be regarded as an offer or solicitation to deal in investments in any jurisdiction including, but not limited to, the United States of America. These documents are strictly for private use by its recipients and may not be passed on to third parties or otherwise distributed publicly.

Once this ESG analysis is completed, companies receive the status "excellent", "good", "average", "fair" or "excluded". While "excluded" companies are not eligible for investment, a maximum permitted weighting within the total portfolio is associated with companies classified as "fair".

Subsequent adjustments within the portfolio are mainly based on valuation data, risk parameters, macroeconomic outlook and conclusions drawn in the context of Impax's commitment policy:

Key steps

Work undertaken

Revenue exposure to high growth Environmental Markets	Viper Analytics[a], 10-step process incorporating ESG analysis, valuation barometer, third party research	Low turnover approach. Additions based on: GARP [b]; risk limits including ESG; macro & thematic overlay	Sell discipline based on: valuation barometer; portfolio risk metrics; macro outlook; engagement outcomes

Number of stocks

~1,500 › **~300** › **40-60**

[a] VIPER Analytics: Proprietary financial quality, valuation and risk platform.
[b] GARP: Growth at a Reasonable Price.

Source: Impax Asset Management as of December 2019*

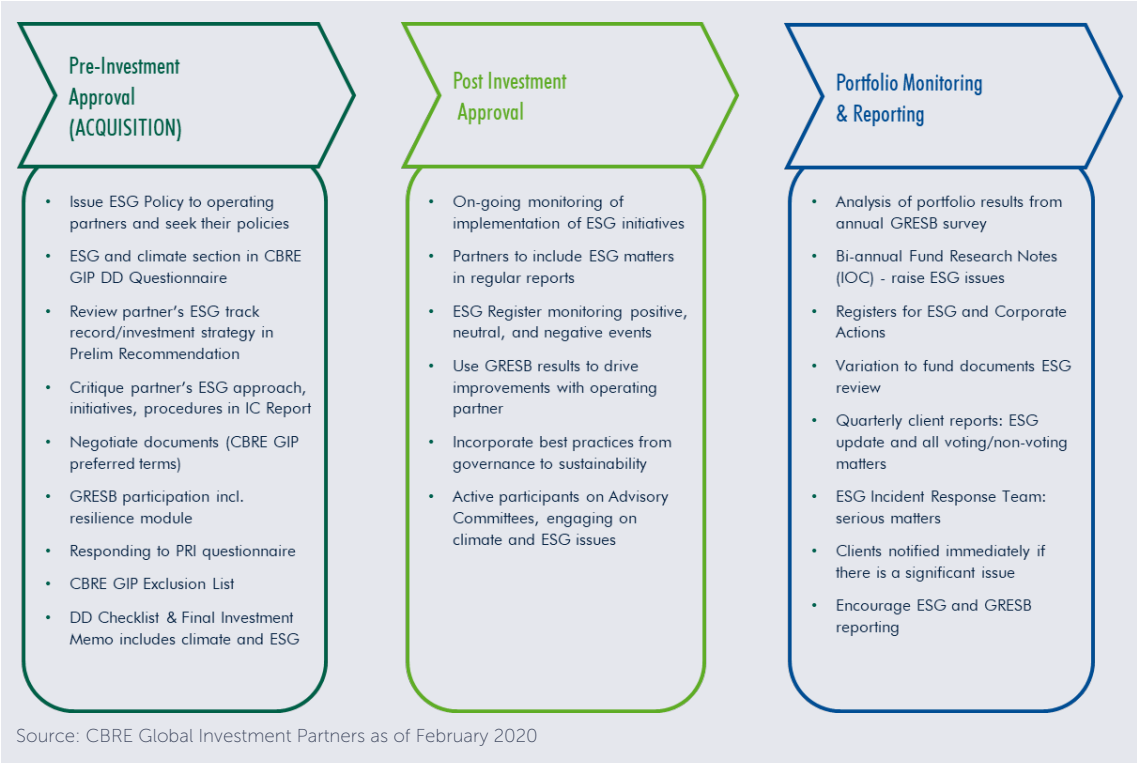
In this way, sustainable aspects and considerations are comprehensively addressed and integrated into the investment process at FDC's equity portfolio by the various responsible asset managers.

Implementation at indirect real estate level:

FDC's aggregated indirect real estate portfolio provides global and well-diversified real estate exposure through investments in unlisted real estate funds. The two asset managers in charge of this asset class are CBRE Global Investment Partners and LaSalle Investment Management. It should be noted that FDC was able to integrate its exclusion list also at the level of global real estate, so that in neither of the two real estate portfolios, a company on FDC's exclusion list can be a significant tenant[35].

CBRE integrates sustainable aspects and criteria in different ways. It is a member of several initiatives, such as the Institutional Investors Group on Climate Change[36] or the United Nations Global Compact, and publicly commits to support sustainability objectives. For real estate funds in which CBRE intends to invest, CBRE also requires a commitment from third-party portfolio managers to follow ESG considerations and to participate in the GRESB[37] survey. The GRESB survey is the "de facto standard" that institutional investors use to assess, measure and compare the environmental, social and governance performance of real estate assets worldwide and therefore identifies critical ESG and sustainability data. The mandate managed by CBRE on behalf of FDC currently exposes a GRESB score of 79 out of 100 points, while the average score of the associated benchmark is only 58 points.

CBRE's sustainable approach is an integral part of its investment process:



Source: CBRE Global Investment Partners as of February 2020

35 A significant tenant is any tenant whose rents represent more than 15% of total rents.
36 The mission of the Institutional Investors Group on Climate Change is to mobilise capital for the transition to a low-carbon economy and build resilience to the impacts of climate change by working with companies, policy makers and other investors.
37 The GRESB organisation was launched in 2009 with the aim of providing pension funds with more information on the "greenness" of their real estate investments. Conducted once a year, the survey collects and collates information on buildings for seven different categories including some 50 performance indicators relating, among others, to energy, water, greenhouse gas emissions and waste.

As a result, CBRE's investments cover a large part of the United Nations 17 SDGs:

Sustainable development goal (UN SDG)		Is the goal considered?	An example of an investment that addresses the SDG*
UN SDG 3: Good Health and Well-Being		✓	**Fund AAA:** FundSuiteX: a new type of flexible workspace. Wellplace: a suite of health and well-being services and amenities accessed through building community portals. Smart building technology to optimise productivity and well-being, and sustainability performance.
UN SDG 5: Gender Equality		✓	**Fund AAA:** Senior management ratio 40% female. Public target 40% female, 40% male, 20% any gender by 2021.
UN SGG 6: Clean Water and Sanitation		✓	**Fund BBB:** Annual water intensity reduction 7.64%. 3'271m^3 water use reduction in 2018.
UN SDG 7: Affordable and Clean Energy		✓	**Fund BBB:** Annual energy intensity reduction 5.53%. Annual green house gas intensity reduction 7.78%. 18'642 MWh renewable energy produced in 2018 across 74% of the portfolio.
UN SDG 8: Decent Work and Economic Growth		✓	**Fund CCC:** Comprehensive policy on child labour, diversity and equal opportunity, forced or compulsory labour, safety, labor-management relationships, career development and worker rights.
UN SDG 9: Industry, Innovation and Infrastructure		✓	**Fund AAA:** Achieved 96/100 under new construction and major renovations aspect , with projects aligned to Green Star Design & As Built green building certification achieving 5 stars (15%) and six stars (85%).
UN SDG 11: Sustainable Cities and Communities		✓	**Fund CCC:** Sustainable housing, monitoring impacts on community impacts - housing affordability, impact on crime levels, livability score, well-being, walkability. Community engagement on resilience, education, public spaces enhancement, well-being and effective communication.
UN SDG 12: Responsible Consumption and Production		✓	**Fund DDD:** 100% recycling rate for 100% managed waste.
UN SDG 13: Climate Action		✓	**Fund AAA:** Set Science Based Target for carbon emissions reduction (80% by 2050) with interim target of 10% by 2020. Performance on track.
UN SDG 17: Partnerships for the Goals		✓	**Fund EEE:** Commited and active in key ESG standards and groups: PRI, RE100, TCFD, GIIN, business for social responsibility, alliance for sustainable finance.

* underlying real estate funds have been anonymised.

Source: CBRE Global Investment Partners as of December 2019

The second asset manager LaSalle is in the process of creating a framework for the establishment of a broader tenant exclusion list that will overlap with FDC's exclusion list. Similar to CBRE, LaSalle is committed to improve corporate governance and ESG considerations in real estate. This asset manager is an active investor, particularly with regard to corporate actions at the level of companies in its portfolios. The sustainable approach pursued by LaSalle is also reflected in the latest GRESB scores. FDC's portfolio managed by LaSalle is exceeding not only the average consolidated score but also the section-specific scores:

79 GRESB Score
GRESB Average 72

69 Environment Score
GRESB Average 65

90 Social Score
GRESB Average 79

94 Governance Score
GRESB Average 84

Overall Score: Your portfolio outperformed the benchmark by 7 percentage points with a score of 88% for Management & Policy and 76% for Implementation & Measurement (up from 81% and 70% respectively in last year's survey).

Management & Policy (MP): In this section your portfolio scored 8 percentage points higher than the benchmark.

Implementation & Measurement (IM): In this section your portfolio scored 7 percentage points higher than the benchmark.

ESG Performance: In the "E" section your portfolio scored 4 percentage points higher than the benchmark, 11 percentage points higher in the "S" section and 10 percentage points higher in the "G" section.

Green Star Rating: Of the funds in which the portfolio is invested, and completed the survey, 100% were awarded Green Stars which is the quadrant rating of the portfolio.

Response rate: Your portfolio achieved a 100% response rate. Morgan Stanley Prime Property Fund Asia participated for the first time in 2018 achieving a very strong score of 77. We had agreed during the due diligence process with the manager that they could wait until the portfolio was largely invested before contributing to the GRESB survey.

Source: LaSalle Global Partner Solutions. Market Value Weighted as of Q3 2020, GRESB 2019 Results

APPENDIX 3: THE 2°C ALIGNMENT SCENARIOS

Methodology

Trucost relies on the methodologies highlighted by the SBTI initiative.

The SBTI is a joint project of the CDP, the United Nations Global Compact, the World Resources Institute and the World Wide Fund. Trucost adapted two of the approaches used by the SBTI for 2°C portfolio alignment assessments:

- the "sector-wide" approach SDA;
- the "economic" approach GEVA.

These approaches, recommended by the SBTI, are used by companies to define emission reduction targets, or transition trajectories, in accordance with the Paris Agreement. More than 400 companies worldwide set verified targets with the SBTI or made a formal commitment to set targets consistent with keeping global warming below 2°C in the future, by using these or similar approaches. Trucost enriched these two methodologies so that they can be used to evaluate portfolios that can even include thousands of companies.

The SDA methodology applies to companies with homogenous business activities and high emissions. It is based on the idea that all companies in a portfolio, regardless of the sector, should converge towards emission intensities consistent with a 2°C scenario by 2050. The methodology uses industry-specific 2°C transition scenarios. The performance of companies is measured in terms of their emissions intensity and their production level (for example tCO_2e per gigawatt hour or per ton of steel). Indeed, trajectories can vary from one sector to another (for example faster for energy and slower for cement), depending on available technologies, mitigation potential and mitigation costs. Consequently, companies with low base year emissions and low production growth can reduce their emissions at a gradual pace whereas companies with high emissions or high growth need to make faster reductions.

The GEVA methodology applies to companies whose activities are more heterogeneous or less emitting. This approach is based on the assumption that many companies have diverse commercial activities for which specific trajectories are not available at the scale of physical production. For these companies, the GEVA method assumes that all heterogeneous sectors of the economy must reduce their emissions at the same rate. Thus, if the global economy has to reduce its emissions by X% per year until 2050, then according to the GEVA approach, each company must also reduce its emissions at the same rate of X% per year, regardless of the initial intensity. In absolute terms, this condition logically implies that the most emitting companies must reduce their emissions much faster than the least emitting ones. As opposed to the first methodology, the GEVA approach is based on an economy-wide scenario, and emission intensity is measured against a financial denominator, not a physical one.

Each company's transition trajectories are measured in terms of carbon per unit of value added, adjusted for inflation, which represent their contribution to total global emissions (intensity). These results are then compared to the overall decarbonisation trajectories satisfying a given warming scenario.

Scenarios

The scenarios used in Trucost's 2°C alignment study are as follows:

- IEA scenarios from the Energy Technology Perspectives (ETP) 2017[38] report, providing SDA assessment parameters consistent with 1.75°, 2° and 2.7°C global warming, including the 2DS scenario;
- RCP scenarios used in the IPCC's Fifth Assessment Report[39] providing GEVA assessment parameters consistent with 2°, 3°, 4° and 5°C warming (RCP 2.6, 4.6, 6 and 8.5).

The IEA's 2DS scenario projects a global energy system compatible with at least a 50% probability of limiting the average global temperature increase to 2°C. The 2DS scenario limits the total carbon emissions from energy production to 1,000 gigatons of CO_2 between 2015 and 2100. The scenario also assumes that carbon emissions from fuel combustion and raw material production in the industry sector will be reduced by almost 60% by 2050 (compared to 2013). Carbon emissions would then continue to decline after 2050 until carbon neutrality is achieved.

GEVA companies are subject to the RCP scenarios created by the IPCC as well as the 1.5°C scenario of the SBTI[40]. In order to estimate their future temperature level, companies are tested against RCP scenarios 2.6, 4.6, 6 and 8.5. In order to accurately determine the carbon intensity reduction rates required for RCP scenarios 2.6, 4.6, 6, and 8.5, a time series of emissions from the different greenhouse gases in the RCP scenarios is first converted into CO_2 equivalents. The intensities are then calculated by dividing the time series of CO_2 equivalents by a time series of global GDP over the same time horizon. For the 1.5°C scenario, an intensity reduction rate of 7% per year is used. This is the rate recommended by the SBTI.

SDA companies are subject to the scenarios developed by the IEA in the Energy Technology Perspectives (ETP) 2017 report. In order to accurately determine the carbon intensity reductions required per scenario, carbon emissions per SDA sector are divided by production data for the period 2012 to 2023. The level of detail in terms of carbon emissions for these high intensity sectors is more granular and therefore allows a more accurate analysis of their 2°C alignment.

Why does Trucost use IPCC and IEA scenarios?

Trucost considers the IPCC and the IEA credible and internationally recognised organisations. Although there are a large number of scenarios published by many authors, the RCP scenarios are the most widespread and are the ones used in the latest report published by the IPCC. These scenarios were then supplemented with data from the SBTI 1.5°C scenario.

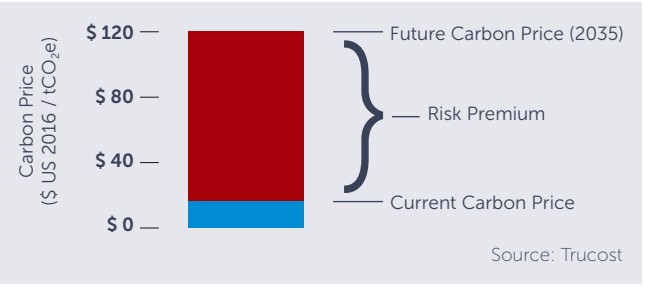
The scenarios developed by the IEA in the Energy Technology Perspectives (ETP) 2017 report are among the only ones that include sufficient detail at the sectoral level (production data and carbon emissions) to allow for the implementation of the SDA approach. It is also the source referenced by the scientific article in which the SDA methodology was first published. For the time being, Trucost does not have an alternative methodology that would allow the calculation of SDA sector intensities with the same level of detail.

38 Energy Technology Perspectives (ETP) 2017: https://www.iea.org/reports/energy-technology-perspectives-2017.
39 IPCC Fifth Assessment Report: https://www.ipcc.ch/assessment-report/ar5.
40 Science Based Target Initiative, Business Ambition for 1.5°C: https://sciencebasedtargets.org/methods.

APPENDIX 4: TRANSITION RISKS

Methodology

Trucost assembled a database of publically available information on current carbon prices across 44 jurisdictions as of January 2017 to calculate "carbon risk premiums". The risk premium is the estimated additional financial cost per metric ton of greenhouse gas emissions in a future year. It is the difference between the current and the future carbon price for a given sector, geography and year.



Source: Trucost

The rise in the carbon price will of course have direct financial consequences for companies whose main activity produces greenhouse gas emissions. Companies also face indirect financial risks associated with the pass-through of rising carbon prices applied to the emissions of suppliers who in-turn seek to recover the additional costs in part or in full through increased prices. Therefore, factors have been developed to estimate the proportion of additional costs that would be passed on from suppliers to companies.

The sectors are based on OECD research and include agriculture and fisheries, electricity, industry, international aviation, off-road transport, residential and commercial real estate as well as road transport.

Each of the 464 business activities considered by Trucost was assigned to one of these seven sectors to determine their risk premiums.

The below table projects a sample of future carbon prices by country group and scenario. The future carbon prices used in Trucost's analysis go beyond the example shown below. They are by year and by country. For countries that do not have sufficient information to estimate a future carbon price, a regional average is used.

Scenario	Country Group	Carbon Price (US$ 2016)		
		2020	2030	2050
High	OECD	$20	$120	$190
	Major Emerging	$10	$90	$170
	Other	$5	$30	$80
Moderate	OECD	Country Specific		$190
	Major Emerging			$170
	Other			$80
Low	OECD	$0	$38	$60
	Major Emerging	$3	$30	$56
	Other	$2	$9	$25

Source: Trucost

Scenarios

3 scenarios are taken into account, i.e. with a low, medium and high carbon price increase.

The first scenario represents the full implementation of countries nationally determined contributions under the Paris Agreement (RCP 8.5), based on research by the OECD and the IEA.

The second scenario assumes that policies will be implemented to reduce greenhouse gas emissions and limit climate change to 2 degrees Celsius in the long term, but with action delayed in the short term (RCP 4.5). This scenario draws on research by the OECD and the IEA[41] along with assessments of the viability of country nationally determined contributions realised by Ecofys, Climate Analytics and New Climate Team[42]. Countries with nationally determined contributions that are not aligned to the 2°C goal in the short term are assumed to increase their climate mitigation efforts in the medium and long term.

The third scenario represents the implementation of policies that are considered sufficient to reduce greenhouse gas emissions in line with the Paris Agreement, i.e. the goal of limiting climate change to 2°C by 2100 (RCP 2.6). This scenario is based on research by the OECD and the IEA.

41 OECD/IEA. (2016) Pricing CO_2 through Taxes and Emissions Trading Systems: http://www.oecd.org/tax/effective-carbon-rates-9789264260115-en.htm.
42 Ecofys, Climate Analytics and New Climate Institute. 2017. Climate Action Tracker: http://climateactiontracker.org/.

APPENDIX 5: PHYSICAL RISKS

The release of the TCFD recommendations highlighted the importance of climate change as a driver of material financial risks for companies and investors that should be assessed, disclosed and managed. The TCFD divided these risks into two major categories, the first being transitional risks (including policy and legal risk, technology risk, market risk and reputational risk), and the second being physical risks. In response, Trucost developed physical risk assessment datasets and analytics to complement the existing suite of transition-focused products. Key features include:

- a robust and science-based climate change physical hazard characterisation methodology drawing on both public and private datasets;
- coverage of seven key indicators including: water stress, wildfire, flood, heatwave, coldwave, hurricane, and sea level rise;
- coverage of three climate change scenarios (high, moderate, low) and three reference years (2020 (baseline), 2030 and 2050);
- built upon a proprietary database of almost 500,000 built assets linked to corporate entities and ultimate parent entities based on S&P Market Intelligence, and Trucost assembled datasets;
- an estimation methodology for companies without asset level information, enabling coverage of Trucost's CorePlus universe of over 15,000 companies.

Companies are scored 1 to 100 across all individual risk types, as well as for a composite score which provides an evaluation as to each company's overall level of risk. The scoring framework is based on four key analytical steps:

- climate hazard mapping;
- assets locations overlay and risk assessment;
- physical risk exposure scoring;
- sensitivity adjustment.

Details of each of these steps are outlined below.

Climate hazard mapping

Trucost assembled models and datasets representing the forecasted absolute risk of seven discrete climate change hazards globally across three climate change scenarios and three time periods, in order to produce global hazard maps specific to each issue. These maps form the foundation of the Trucost physical risk assessment framework and draw on climate change models from leading research groups, data providers, academic research papers and Trucost datasets. The three scenarios used are based on the Intergovernmental Panel on Climate Change RPCs and informed by the TCFD technical guidelines.

They include:

- high (RCP 8.5): continuation of business as usual with emissions at current rates. This scenario is expected to result in warming in excess of 4 degrees Celsius by 2100;
- moderate (RCP 4.5): strong mitigation actions to reduce emissions to half of current levels by 2080. This scenario is likely to result in warming of over 2 degrees Celsius by 2100;
- low (RCP 2.6): aggressive mitigation actions to halve emissions by 2050. This scenario is likely to result in warming of less than 2 degree Celsius by 2100.

Input data for all indicators under all scenarios and years was not always available. The table below highlights the current state of data availability:

Indicator	Low: RCP 2.6			Moderate: RCP 4.5			High: RCP 8.5			No Scenario	Note
	Base	2030	2050	Base	2030	2050	Base	2030	2050	Historical Only	
Water Stress											Base Year = 2020. 2040 replaces 2050.
Flood											
Heatwave											Base Year = 2010-2020 Average
Coldwave											Base Year = 2010-2020 Average
Hurricane											
Wildfire											Base Year = 2010-2020 Average
Sea Level Rise											Base Year = 2020

Data used in the assessment framework was taken from general circulation models (GCMs) from the CMIP5 project. The table below presents the sources and models used by Trucost for each of the individual risk types.

Risk Type	Risk Description	Hazard Indicator	Indicator Description	Model Provider	Model Name	Spatial Resolution
Water Stress	Expected future ratio of water withdrawals to total renewable water supply in a given area.	Baseline Water Stress Index	Baseline water stress is the ratio of total water extraction within an area to the surface and ground water available. The analysis covers water consumptive and non-consumptive withdrawals for domestic, industrial, irrigation and livestock use. Higher values indicate more competition among users for available water resources.	World Resource Institute	WRI Aqueduct	River Basin
Flood	Index representing the population weighted exposure to flooding from rivers in river basin.	Riverine Flood Risk	Riverine flood risk indicates the proportion of the population in each river basin that are expected to be affected by riverine flooding in an average year. The metric is focused on inundation caused by river overflow and accounts for existing flood protection measures.	World Resource Institute	WRI Aqueduct	River Basin

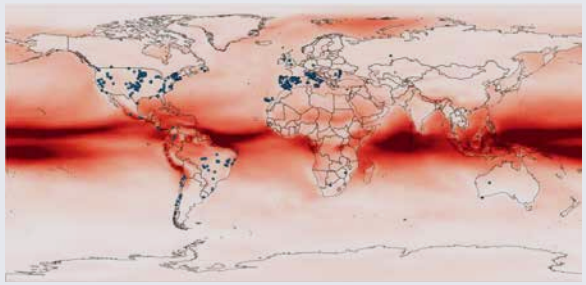
Source: Trucost

Heatwave	The occurrence and severity of periods of extreme heat relative to local climatic conditions, measured based on the Excess Heat Factor.	Excess Heat Factor (EHF)	The EHF index measures heatwave occurrence and intensity based on two factors: 1) if the daily mean temperature over a three day period is higher than the historical 95th percentile, and 2) how hot the daily mean temperature is with respect to the previous 30 days.	1. NOAA 2. Met Office Hadley Centre 3. Institut Pierre-Simon Laplace 4. Max Planck Institute for Meteorology 5. Meteorological Research Institute	1. GFDL-ESM2M 2. HadGEM-ES 3. IPSL-CM5A-LR 4. MPI-ESM-MR 5. MRI CGCM3 Multi-model average.	100x100km to 200x200km
Coldwave	The occurrence and severity of extreme cold relative to local climatic conditions, measured based on the Excess Cold Factor.	Excess Cold Factor ECF)	The ECF index measures heatwave occurrence and intensity based on two factors: 1) if the daily mean temperature over a three day period is lower than the historical 5th percentile and 2) how cold the daily mean temperature is with respect to the previous 30 days.	1. NOAA 2. Met Office Hadley Centre 3. Institut Pierre-Simon Laplace 4. Max Planck Institute for Meteorology 5. Meteorological	1. GFDL-ESM2M 2. HadGEM-ES 3. IPSL-CM5A-LR 4. MPI-ESM-MR 5. MRI CGCM3 Multi-model average.	100x100km to 200x200km
Hurricane	Composite index representing the historical incidence and severity / strength of hurricane, typhoon or cyclone activity at a given location.	Hurricane Index	The index is based on historical hurricane data compiled by NOAA between 2000 and 2019. It is calculated by multiplying the number of hurricanes transiting a given point on the globe by the intensity (category) of each hurricane. A weight-adjustment based on date of occurance is also applied in order to overweight the importance of more recent hurricanes.	Trucost	Trucost Model	Approx. 110x110km
Wildfire	Risk of wildfire occurrence by location based modelled area of	Burnt Area	The fraction of entire grid cells that is covered by burnt vegetation.	Max Planck Institute for Meteorology	CMIP5 - MPI-ESM-LR	100x100km to 200x200km
Sea Level Rise	The extent and depth of coastal flooding at a given location in a given year.	Coastal Inundation	The coastal inundation metric has been calculated by Climate Central and licenced by Trucost. It combines sea level rise projections from CMIP5 with CoastalDEM's digital elevation model to estimate land areas that are prone to inundation under given scenarios and periods.	Climate Central	Sea Level Rise Model	Approx. 5x5m (USA) Approx. 30x30m (Rest of World)

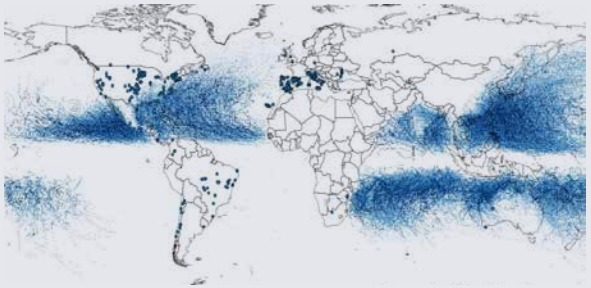
Source: Trucost

The result is a set of climate hazard maps such as those shown below.

Heatwave hazard map under a 'High' scenario in 2050.



Hurricane hazard map under a 'High' scenario in 2050.



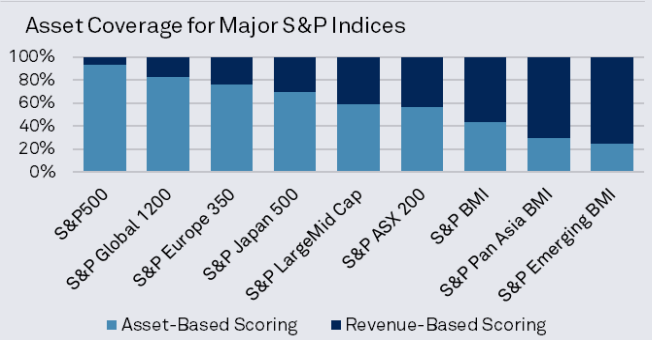
Source: Trucost

Asset allocation overlay

Trucost established a database of almost 500,000 physical asset locations - including asset descriptions - which have been mapped to a universe of over 15,000 listed and private corporate entities. Assets are overlaid on the climate hazard maps to characterise the level of risk in each time period under each scenario. Data sources used include S&P MI Real Estate, S&P MI Metals & Mining, S&P MI Power Plants, S&P MI Bank Branches, as well as data compiled by Trucost from government regulatory databases.

The tables below show the total number of assets available by sector, as well as the sources used. The right-hand chart shows the asset data coverage for a selection of S&P indices.

Data Source	Approximate Asset Count	Percent of Total
Consumer Staples	13,000	3%
Utilities	27,000	6%
Materials	21,000	5%
Industrials	44,000	11%
Other	47,000	11%
Health Care	7,000	2%
Consumer Discretionary	20,000	5%
Energy	11,000	3%
Real Estate	95,000	23%
Financials	128,000	31%
Information Technology	6,000	1%



Source: Trucost

Physical risk exposure scoring at asset, company and portfolio level

At asset level, each asset in the database is assigned a physical risk score from 1 (lowest risk) to 100 (highest risk), for each of the seven risk categories, based on their location on the climate hazard maps. The score is intended to represent the relative level of risk for each indicator at each location relative to global conditions across all scenarios and time periods.

If asset data is available for the company, then the company-level score for each risk type represents the average of the asset-level scores. If only headquarter location is available then the company-level score is a combination of the physical risk score for the company headquarters and a revenue weighted average of the average physical risk score in the countries in which the company generates revenue. The latter is calculated by multiplying the company's revenue share by country (as a percent of total revenues) with the average physical risk score for each country. The headquarter physical risk score is weighted at 20% and the revenue share based score is weighted at 80% of the final company score.

The portfolio-level scores are calculated on a weighted-average basis. This is calculated by the sum of each company's physical risk score multiplied by their weight in the portfolio.

Sensitivity adjustment

The "raw" physical risk exposure score described above indicates to the relative exposure of an asset, company or portfolio to each risk indicator relative to global conditions, but it does not indicate the degree to which the manifestation of each risk may be consequential to the operation of the asset or company. Alongside these scores, Trucost also provides a "sensitivity adjusted" physical risk score in order to adjust the potential materiality of the events to the asset owners' business.

Raw scores were adjusted using "sensitivity factors" calculated by Trucost by linking each physical risk indicator to a set of tangible business impacts and a metric that can be measured at the company level to reflect the relative sensitivity of each company to each risk indicator and its impacts. The table below describes the three company level sensitivity factors included in the sensitivity weighted physical risk score calculation.

Sensitivity Indicator	Risk Type	Business Impact	Rationale
Water Intensity (Direct or Indirect)	Drought	Input Scarcity Increased Operating Expenses Stranded Assets	Businesses with high water dependency are more likely to be impacted by water scarcity.
Capital Intensity	Flood Sea level rise Wildfire Hurricane	Asset Impairment Lost Inventory Production Disruption Critical Infrastructure Damage	Businesses with high capital intensity are more likely to be impacted by risk types that cause physical damage.
Labour Intensity	Heatwave Coldwave	Productivity Losses	Businesses with high labour intensity are more likely to be impacted by the impairment of optimal working conditions.

Source: Trucost

In addition to the individual risk scores, Trucost provides company-level composite risk scores which are intended to provide a combined measure of exposure to all seven risk indicators. The final composite score is calculated based on a logarithmic curve, designed to highlight companies with high exposure or sensitivity on any single indicator, which might otherwise be hidden when averaging across the seven physical risk indicators. In practice, this means that high exposure and sensitivity to each additional indicator diminishes in importance when calculating the final composite score.

Notes

FONDS DE
COMPENSATION

FONDS DE COMPENSATION
commun au régime général de pension

34 - 40, Avenue de la Porte-Neuve L-2227 Luxembourg
T : +352 26 20 34 83 **F :** +352 46 25 66 **E :** fondsdecompensation@fdc.lu

www.fdc.lu