Trucost
ESG Analysis

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Climate Related Portfolio Assessment

In line with TCFD Recommendations

CONTENTS

GENERAL

Portfolio Name	IVO Fixed Income UCITS
Benchmark Name	JPM CEMBI High Yield Plus
Original Portfolio Size (millions)	365
Portfolio Currency	EUR
Analysis Date	16 December 2020
Holding Date	30 October 2020

COVERAGE

	Portfolio	Benchmark
Paris Alignment - Carbon	23%	27%

INTRODUCTION

The effects of climate change pose considerable and far-reaching risks to the global economy. Among those most directly affecting businesses include physical risks posed by increased climate variability and more frequent extreme weather events, which may result in property damage, challenges linked to business continuity, and the disruption to global supply chains. Businesses also face risks associated with the transition to a low-carbon economy, including policy changes designed to discourage carbon-intensive energy use or favour more resource-efficient industries and operations.

At the request of the G20, the Financial Stability Board (FSB) reviewed how the reporting on climate-related issues in financial reporting could be improved in order to better reflect the risks and opportunities facing financial institutions and non-financial businesses alike. In June 2017, the FSB Taskforce for Climate-Related Financial Disclosure (TCFD) published recommendations on the disclosure of "information needed by investors, lenders, and insurance underwriters to appropriately assess and price climate-related risks and opportunities."

The TCFD provides a voluntary disclosure framework organized around four themes, designed to facilitate better disclosure. These are governance, strategy, risk management, and metrics and targets. In order for organizations to disclose in line with TCFD recommendations, they must be able to quantify or qualify the risks and opportunities facing them, linked to climate-related issues, and be able to describe policies, procedures and systems in place to monitor and address climate-related issues on an on-going basis. This report by Trucost provides both forward-looking and historical metrics that may be used by asset owners and/or asset managers to support their climate-related disclosures in line with TCFD recommendations, and inform internal processes for risk management and

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Paris Alignment

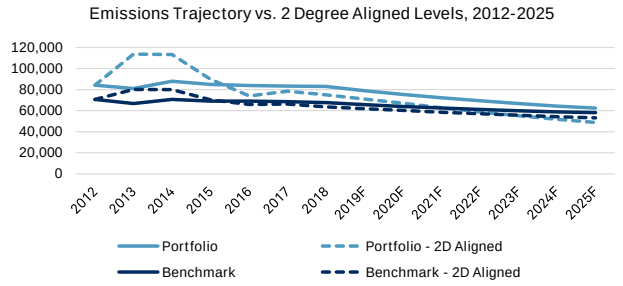
UNDERSTANDING PARIS ALIGNMENT

Trucost's 'Transition Pathway Assessment' enables investors to track their portfolios against the goal of limiting global warming to 2°C above pre-industrial levels. The assessment examines the adequacy of emissions reductions made over time, by investees, in meeting these targets. It incorporates both historical performance as well as forward-looking indicators (over a medium-term time horizon). This avoids the uncertainties of using only forward-looking data, and is of a sufficient time horizon to make the effect of any year-on-year volatility less significant. Historical data on greenhouse gas emissions and company activity levels is incorporated from a base year of 2012. Forward-looking data sources are used to track likely future transition pathways from the most recent year of disclosed data through to 2025.

Trucost's approach is adapted from two methodologies highlighted by the Science Based Targets Initiative (SBTi), these being the Sectoral Decarbonization Approach (SDA) and the Greenhouse gas Emissions per unit of Value Added (GEVA) approach. The SDA is applied to companies with high-emitting, homogeneous business activities, while GEVA is applied to those with lower emitting, heterogeneous business activities. For more information on the methodology please refer to Appendix 3.

EMISSIONS TRAJECTORY

The chart shows the portfolio and benchmark's 2012-2025 trajectory and compares that to its own 2 degree aligned trajectory.



LEVEL OF WARMING

The boxes below show the level of warming associated with the portfolio and benchmark, based on performance over the period assessed.

Portfolio (°C)

2 to 3

Benchmark (°C)

2 to 3

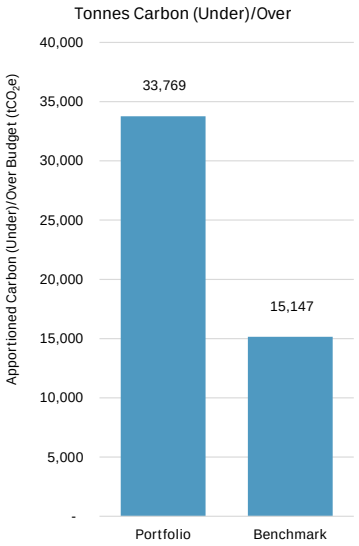
	Portfolio	Benchmark
Tonnes Carbon (Under)/Over	33,769	15,147
Percent of Total (Under)/Over	3.2%	1.7%
Carbon/mInvested (Under)/Over	405	182

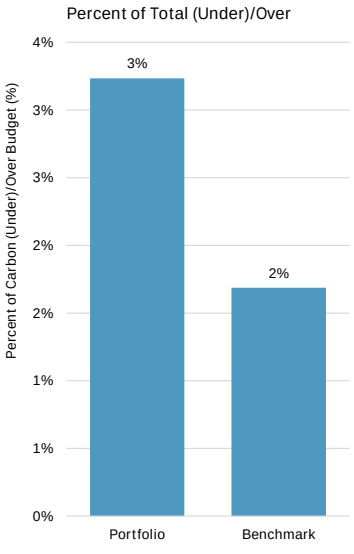
SECTOR CONTRIBUTIONS

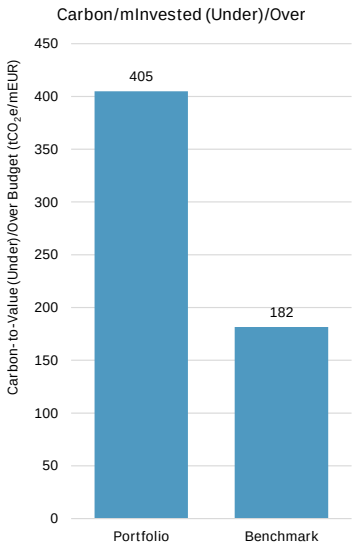
Companies with predominantely homogenous business activites that fall into one of the 5 sectors in the table below were assessed using the SDA approach. This means that the required carbon intensity reductions were calculated in sector specific units of production (for example tonnes of steel produced, or number passenger miles flown), and each company's share of the overall sector budget is calculated relative to its market share.

Companies with low emitting or heterogeneous business activities were assessed using the GEVA approach. This means that required carbon intensity reductions were calculated in carbon-per-dollar of value added (gross profit), and each company's share of the overall sector budget is calculated using its progress against required reduction rates.

Method	Sector	Contribution (tCO_2e)	Pathway (°C)
SDA	Power Generation	0	
	Cement	0	
	Steel	0	
	Airlines	0	
	Aluminum	0	
GEVA	Communication Services	3,331	>5
	Consumer Discretionary	-3,486	1.5 to 2
	Consumer Staples	2,385	>5
	Energy	62,119	>5
	Financials	0	
	Health Care	0	
	Industrials	7,829	>5
	Information Technology	0	
	Materials	-34,427	1.5 to 2
	Real Estate	0	
	Utilities	-1,114	1.5 to 2







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UNDERSTANDING PARIS ALIGNMENT

The tables below show the best (those emitting less than their 2 degree aligned carbon budget) and worst (those emitting more than their 2 degree aligned carbon budget).

BEST PERFORMERS

Name	Sub-Industry	2012 tCO_2e Intensity	2025E tCO_2e Intensity	Unit	Forecast Source	Total Carbon (tCO_2e)	App'd Carbon (tCO_2e)	Pathway
Sasol Limited	Materials	12,430.4	8867	US$m infl	Sub-Industry trend	-37,415,495	-32,213	1.5-2°C
Braskem S.A.	Materials	7,223.3	1775	US$m infl	Company target	-90,752,348	-26,198	<1.5°C
Carnival Corporation & Plc	Consumer Discretionary	2,228.3	1384	US$m infl	Sub-Industry trend	-12,546,985	-3,486	1.5-2°C
Infraestructura Energetica Nc	Utilities	0.0	2912	US$m infl	Sub-Industry trend	-6,692,696	-1,114	1.5-2°C
Suzano S.A.	Materials	1,436.6	616	US$m infl	Sub-Industry trend	-4,364,047	-769	<1.5°C

WORST PERFORMERS

Name	Sub-Industry	2012 tCO_2e Intensity	2025E tCO_2e Intensity	Unit	Forecast Source	Total Carbon (tCO_2e)	App'd Carbon (tCO_2e)	Pathway
Petrobras SA	Energy	2,068	3863	US$m infl	Company target	391,708,845	41,873	>5°C
Methanex Corporation	Materials	0	4695	US$m infl	Sub-Industry trend	22,385,824	21,197	>5°C
Tullow Oil plc	Energy	449	1,074	US$m infl	Sub-Industry trend	9,147,747	18,607	>5°C
Alfa, S. A. B. de C. V.	Industrials	1,548	1,596	US$m infl	Sub-Industry trend	12,062,901	7,554	>5°C
Oi S.A.	Communication Services	24	165	US$m infl	Sub-Industry trend	2,199,534	3,331	>5°C
First Quantum Minerals Ltd.	Materials	901	2,321	US$m infl	Sub-Industry trend	11,946,412	3,246	>5°C
Casino Guichard-Perrachon	Consumer Staples	164	193	US$m infl	Company target	5,866,641	2,385	>5°C
Ecopetrol S.A.	Energy	457	1,208	US$m infl	Sub-Industry trend	77,654,508	1,639	>5°C
Klabin S.A.	Materials	759	949	US$m infl	Sub-Industry trend	4,445,982	310	>5°C
VINCI SA	Industrials	402	216	US$m infl	Sub-Industry trend	1,666,576	257	2-3°C
Embraer S.A.	Industrials	110	60	US$m infl	Sub-Industry trend	32,865	18	2-3°C

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Appendices

APPENDIX 1a: CARBON DIOXIDE EQUIVALENT

Each greenhouse gas differs in its ability to absorb heat in the atmosphere. HFCs and PFCs are the most heat-absorbent. Calculations of greenhouse gas emissions are presented in units of millions of metric tons of carbon equivalents (MMTCE), which weights each gas by its GWP value, or Global Warming Potential. The Global Warming Potentials used in Trucost analysis are:
Carbon Dioxide - 1
Methane - 21
Nitrous Oxide - 310
Sulphur Hexaflouride - 23,900
Per Fluoro Carbons - 7,850
Hydro Flouro Carbons - 5,920

These conversion figures are taken from the publically available 2006 Intergovernmental Panel on Climate Change's (IPCC) 'Guidelines for National Greenhouse Gas Inventories'.

APPENDIX 1b: CARBON SCOPES

- Direct (Scope 1): CO_2e emissions based on the Kyoto Protocol greenhouse gases generated by direct company operations.
- Direct (Other): Additional direct emissions, including those from CCl_4, $C_2H_3Cl_3$, $CBrF_3$, and CO_2 from Biomass.
- Purchaced Electricity (Scope 2): CO_2e emissions generated by purchased electricity, heat or steam.
- Non-Electricity First Tier Supply Chain (Scope 3): CO_2e emissions generated by companies providing goods and services in the first tier of the supply chain.
- Other Supply Chain (Scope 3): CO_2e emissions generated by companies providing goods and services in the second to final tier of the supply chain.

APPENDIX 1c: APPORTIONING

Apportioning, as an approach, is built on the principle of ownership. That is, if an investor owns - or in the case of debt holdings, finances - 1% of a company, then they also 'own' 1% of the company's emissions.

For equity only portfolios the apportioning factor is usually obtained by dividing the value of holding by the company's market capitalisation on the date of analysis. For debt only, or mixed portfolios, the larger of enterprise value and market capitalization on the date of holding is used as the denominator. This approach is used to minimize the risk of apportioning 'spikes' when an enterprise value approaches zero (or is negative).

The company level emissions are then multiplied by the apportioning factor to arrive at emissions quantities specific to each holding. The portfolio level emissions are the sum of all of these quantities.

APPENDIX 1d: CARBON INTENSITY

Portfolios with larger assets under management will typically also have larger absolute carbon footprints than smaller portfolios due to their size. In order to facilitate fair comparison between portfolios, benchmarks and across years, it is therefore important to normalize the totals, either by revenues or by value invested. The three most common approaches to normalization are:

- Carbon to Revenue (C/R): Dividing the apportioned CO2e by the apportioned annual revenues.
- Carbon to Value Invested (C/V): Dividing the apportioned CO2e by the value invested.
- Weighted Average Carbon Intensity (WACI): Summing the product of each holding's weight in the portfolio with the company level C/R intensity (no apportioning).

C/R gives an indication of carbon efficiency with respect to output (as revenues are closely linked to productivity). C/V gives an indication of efficiency with respect to shareholder value creation. The WACI approach circumvents the need for apportioning ownership of carbon or revenues to individual holdings. Whilst the first two methods act as indicators of an investor's contribution to climate change, the weighted average method seeks only to show an investor's exposure to carbon intensive companies, i.e. is not an additive in terms of carbon budgets.

APPENDIX 1e: DATA COLLECTION & CARBON DISCLOSURE

Trucost's unique approach to environmental data collection and modelling enables near complete coverage of most investment universes, despite often low levels of reporting among investees. A four step process is used as part of our data gathering exercise.

1. Analyse Financial and Sector Data - A company's financials are analysed, collecting consolidated revenues for all companies and specifying their reporting scopes and operational boundaries.
2. Map Activities to Trucost's Environmentally Extended Input-Output (EE-IO) Model - Trucost's EE-IO model uses 450+ business activities (broadly aligned to the NAICS, with some additional sectors included to distinguish key activities with materially different physical impacts) to model a company's environmental impacts by assigning portions of each company's revenues to one or more of these activities. The EE -IO model then estimates the pollutant emissions and resource use associated with each business activity, both directly (for a company's own operations) and across the supply chain, using the revenue sector breakdown.
3. Incorporate Disclosures and Public Registry Data - Trucost searches all publically disclosed data sources of companies to find usable environmental data that will be used to overwrite Trucost's modelled estimates. Trucost ensures the scope and time horizon of any environmental data found matches that of its financials.
4. Company Engagement and Data Verification - Trucost analysts quality check the entire research process internally, then share the results with each company directly via a secure online portal. Companies are given one month to respond to Trucost to verify its data or direct ly engage to provide either refined, additional or non-public information. If appropriate and applicable data is provided, Trucost will integrate this into its analysis before publishing the data to our subscribers.

All data collected as part of the process described above will be assigned a 'disclosure flag', indicating the source of each specific data-point. These flags will fall into one of three possible 'disclosure categories', Full Disclosure, Partial Disclosure or Modelled.

- Full Disclosure - Trucost has used data disclosed by a company in an un-edited form as it matches the reporting scope and accuracy required by the research process.
- Partial Disclosure - Trucost has used data disclosed by a company but has made adjustments to match the reporting scope required by its research p rocess (e.g. where a company discloses its emissions deriving from 85% of its operational sites, this data is used to model 100% of its emissions). Values may also be derived from a previous year's disclosed data using changes in business activities and consolidated revenues.
- Modelled - In the absence of usable disclosures, the data has been modelled using Trucost's EE-IO model.

At the portfolio level, disclosure may be evaluated using the the following three methods:

- VOH: The sum of the weights of each holding within each of the three disclosure categories.
- GHG: The sum of each holding's share of the total apportioned Scope 1 CO2e within each of the three disclosure categories.

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APPENDIX 2: PARIS ALIGNMENT

Trucost's transition pathway analysis adapts two approaches prominent in literature produced and referenced by the Science-Based Targets Initiative (SBTi). These are the Sectoral Decarbonization Approach (SDA), and the Greenhouse Gas Emissions per unit of Value Added (GEVA) approach.

SDA Approach
The SDA is applied to companies with high-emitting, homogeneous business activities. Its core principle is that companies in each industry must converge toward emissions intensities consistent with a 2°C scenario by 2050 from their unique starting points. It uses industry-specific 2°C scenario pathways, with companies measured using industry-specific emissions intensities and physical production levels (eg. tCO2e per GWh or per tonne of steel). Industry-specific transition pathways may be faster (eg. power), or slower (eg. cement) depending on an industry's available technologies, specific mitigation potential and costs of mitigation. Within a given industry, companies with low base year emissions and low production growth can reduce emissions at a gradual rate. Companies with high emissions or high production growth must make faster reductions.

The scenarios used in SDA assessments are International Energy Agency (IEA) scenarios from Energy Technology Perspectives (ETP) 2017. These provide SDA assessment parameters consistent with 1.75°, 2°, and 2.7°C of warming.

GEVA Approach
GEVA is applied to companies with lower emitting or heterogeneous business activities. It recognizes that many companies have diverse business activities, most of which do not have distinct transition pathways defined in climate scenarios. For these companies, GEVA entails applying a contraction of carbon intensity principle under which a company should make emissions reductions consistent with rates required for the overall economy, from each company's unique base year emissions intensity. It uses a non-industry specific, economy-wide 2°C scenario, and emissions intensities with a financial, not physical or production denominator. Each company's transition pathway is measured as its GHG per unit of inflation-adjusted gross profit, representing its contribution to total global emissions and emissions intensity. This is compared with a global economy-wide emissions intensity pathway required for achieving below 2°C of warming.

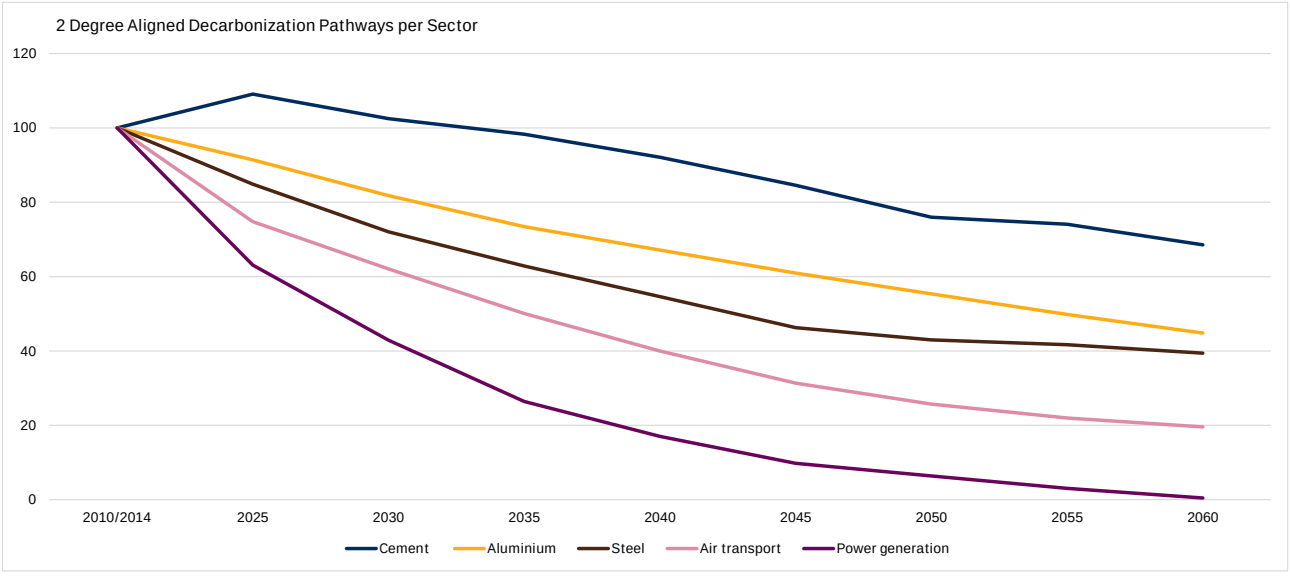
The scenarios used in GEVA assessments are Representative Concentration Pathway (RCP) scenarios used in the AR5 report from the IPCC. These provide GEVA assessment parameters consistent with 2°, 3°, 4°, and 5°C of warming.

Assessment horizon and data sources
Transition pathways assessed incorporate both historical and forward-looking data in order to provide an assessment that has a medium term outlook. This minimizes the uncertainties involved in using only forward-looking data, and is of a sufficient time horizon to make the effect of any year-to-year volatility less significant. Historical data on greenhouse gas emissions and company activity levels is incorporated from a base year of 2012. Forward-looking data sources are used to track likely future transition pathways beyond the most recent year of disclosed data through to 2023. Forward-looking data is incorporated based on an established data hierarchy made up of the following sources:

1. Disclosed emissions reduction targets.
2. Asset-level data sources that provide signals of potential future changes in production from high-emitting sources.
3. Company-specific historical emissions trends for companies assessed on the basis of homogeneous business activities.
4. Subindustry-specific average historical emissions trends for companies assessed on the basis of heterogeneous business activities.
5. No change in emissions intensity beyond the latest year.

The portfolio assessments use combined Scope 1 and Scope 2 emissions as the assessment boundary.

The chart below illustrates the different decarbonization pathways for the five sectors covered in the SDA approach, as well as that used for the remaining sectors in the GEVA approach ('Global Economy' in the legend). Each sector's unique intensity unit has been indexed to 100 to allow for easy comparison. Sectors in which carbon saving technologies and/or processes are most cost effective are expected to decarbonize more rapidly, and terminate on a lower overall intensity, than sectors where such measures are not. For example, carbon intensity reductions are expected to be greater in the field of power generation than



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APPENDIX 3: UNPRICED CARBON COSTS

Trucost has assembled a database of publically available information on current carbon prices across over 43 jurisdictions as of January 2017. The Unpriced Cost of Carbon (UCC) is the estimated additional financial cost per tonne of greenhouse gas emissions in a future year. It is the difference between current carbon prices and possible future carbon prices for a given sector, geography and year.

Rising carbon prices entail direct financial implications for businesses where regulations impose a higher price on greenhouse gas emissions from the direct operations of the business. 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 regulatory costs in part or in full through increased prices. Pass-through factors are used to estimate the proportion of the increased carbon prices on scope 2 emissions that are passed through from suppliers to companies.

The Carbon Price Risk Premium varies by geography due to government policy differences, and by sector due to the differential treatment of sectors in many climate change policies. The sectors are based on OECD's research and include:

1. Agriculture and Fisheries
2. Electricity
3. Industry
4. Air Transportation
5. Offroad Transport
6. Residential and Commercial Real Estate
7. Road Transport

Each of Trucost's 464 business activities have been mapped to one of these seven categories.

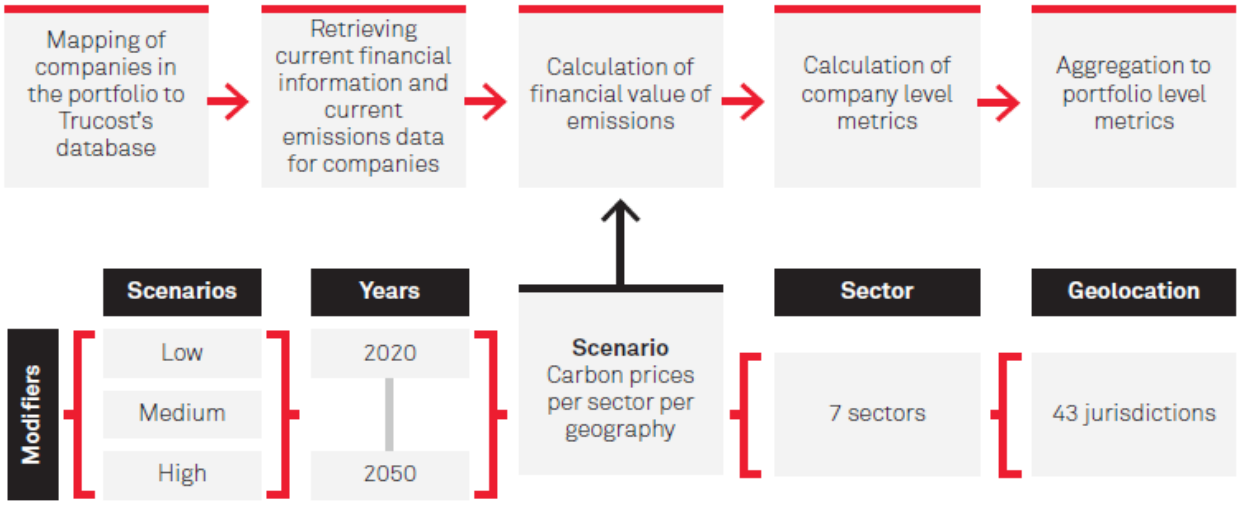
SCENARIOS

High Carbon Price Scenario:
This scenario represents the implementation of policies that are considered sufficient to reduce greenhouse gas emissions in line with the goal of limiting climate change to 2°C by 2100 (the Paris Agreement). This scenario is based on research by OECD and IEA.

Moderate Carbon Price Scenario:
This 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. This scenario draws on research by OECD and IEA along with assessments of the sufficiency of country Nationally Determined Contributions by Climate Action Tracker by Ecofys, Climate Analytics and New Climate Team. 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.

Low Carbon Price Scenario:
This scenario represents the full implementation of country Nationally Determined Contributions under the Paris Agreement, based on research by OECD and IEA.

Which Carbon Price Risk Premium is applicable for individual companies will depend on the choice of scenario, companies' sector of operations as well as their geographical exposure. The analysis covers Trucost's standard 464 sectors used for classification of companies that were mapped to the sectors based on OECD's classification for carbon pricing. The geographical exposure to different Carbon Price Risk Premiums is derived based on companies' geographical emissions as reported through the Carbon Disclosure Project (CDP). In case companies do not report to the CDP, Trucost uses the geographical breakdown of companies' revenues as a proxy for emissions' distribution. Together the sector exposure and country level emissions profiles allow for a very granular level bottom up calculation of carbon price risk exposure.



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APPENDIX 4: PHYSICAL RISK ASSESSMENT FRAMEWORK

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 Taskforce 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 Risk. In response, Trucost has 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 characterization methodology drawing on both public and private datasets.
- Coverage of seven key indicators including: water stress, wildfire, flood, coastal flood, heatwave, coldwave, and hurricanes.
- 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 1-100 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:

1. Climate Hazard Mapping
2. Assets Locations Overlay and Risk Assessment
3. Physical Risk Exposure Scoring
4. Sensitivity Adjustment

Details of each of these steps is outlined below.

1. CLIMATE HAZARD MAPPING

Trucost has 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, 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 IPCC Representative Concentration Pathways (RCP) 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
Coastal Flood											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

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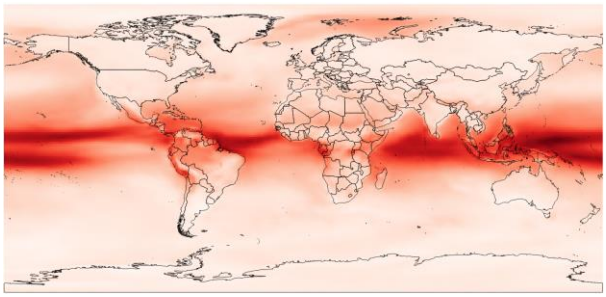
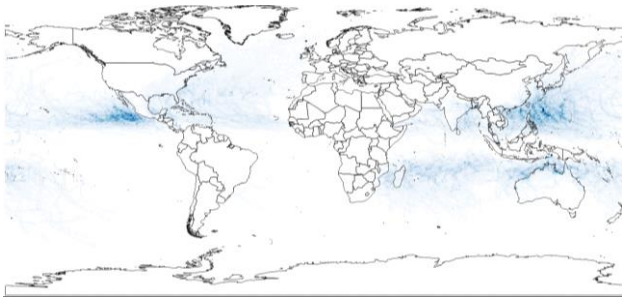
Heatwave	The occurrence and severity of periods of extreme heat relative to local climatic conditions, measured based on the Excess Heat Factor.	Excess Heat Factor (EHF)	The EHF index measures heatwave occurrence and intensity based on two factors: 1) if the daily mean temperature over a three day period 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 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
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 vegetation.	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
Coastal Flood	Index representing the population weighted exposure to flooding from the coast	Coastal Flood Risk	Coastal flood risk indicates the proportion of the population in each river basin that are expected to be affected by coastal flooding in an average year.	World Resources In	WRI Aqueduct	River Basin

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.



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Appendicies

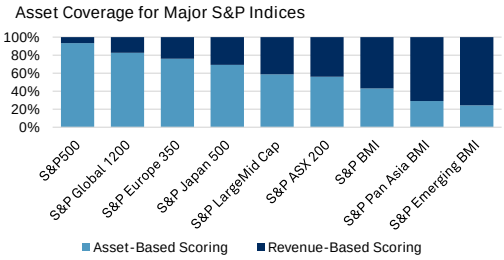
APPENDIX 4: PHYSICAL RISK ASSESSMENT FRAMEWORK

2. ASSET LOCATIONS OVERLAY

Trucost has 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 shows 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%



3. PHYSICAL RISK EXPOSURE SCORING

- 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.
- Company Level: 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 HQ 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 averae 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 HQ physical risk score is weighted at 20% and the revenue share based score is weighted at 80% of the final company score.
- Portfolio Level: Portfolio-level scores are calculated on a weighted-average basis. This is calculated by summing each company's physical risk score multiplied by their weight in the portfolio.

4. SENSITIVITY ADJUSTMENT

The 'raw' Physical Risk Exposure Score described above speaks to the relative exposure of an asset, company or portfolio to each risk indicator relative to global conditions, bjut it does not speak to 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 for 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 indicatir 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 Coastal Flood 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.

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 accross 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.

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