# MSCI ESG CLIMATE CHANGE METRICS

Methodology and Definitions

MSCI ESG Research LLC

March 2023

MSCI

## Contents

# Introduction

Climate change presents one of the biggest economic and political challenges of the 21st century. In order to reduce the negative impacts of climate change, world leaders in December 2015 through the Paris Agreement decided to limit global warming this century to 2 degrees Celsius, compared with a pre-industrial period (1861-1880) benchmark, and to pursue efforts to limit the warming further to 1.5 degrees Celsius.[1] The Paris Agreement requires all member countries to reduce their greenhouse gas emissions (or carbon emissions[2]) and strengthen these efforts in the years ahead.

In 2018, the "Emission Gap Report" from the United Nations Environment Program (UNEP) reiterated that achieving the Paris Agreement warming-level target of 1.5 degrees Celsius would require unprecedented and urgent action to expedite the pace of "low carbon transition."[3,4]

In the event that the low carbon transition takes place, demand for carbon-intensive products would decline in favor of low/zero carbon products, which would put carbon-intensive companies and industries (for example, coal-based power generation; coal mining, fossil fuel-powered automobile manufacturers, etc.) at risk of having stranded assets. A company may be exposed to low carbon transition risks and opportunities through two transmission channels: (1) exposure through involvement in carbon-intensive operations, and (2) exposure through involvement in carbon-intensive products.

MSCI ESG Climate Change Metrics (formerly known as MSCI ESG Carbon Metrics) are designed to help investors understand companies' exposure to risks associated with both these transmission channels. It includes more than 500 data points across eight datasets:

1. Carbon emissions
2. Power generation
3. Fossil fuel exposure
4. Clean-tech exposure

[1] The Paris Agreement, https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement

[2] Greenhouse gas emissions, GHG emissions and carbon emissions are used interchangeably. In this document, we have primarily used "carbon emissions" to denote greenhouse gas emissions.

[3] United Nations Environment Program (UNEP), Emissions Gap Report 2018, November 2018, http://wedocs.unep.org/bitstream/handle/20.500.11822/26895/EGR2018_FullReport_EN.pdf?isAllowed=y&sequence=1

[4] The "low carbon transition" refers to the necessary transition of the global economy from carbon-intensive operations and energy sources to zero or low carbon operations and energy sources.

5. Risk exposure and forward-looking risk management assessment
6. Low carbon transition risk assessment
7. Carbon for Sovereigns
8. Carbon emissions estimation for private companies with low disclosure

Each of these datasets is explained in detail in the following sections.

## Carbon Emissions

In order to help investors screen their portfolios for companies with carbon-intensive operations, MSCI ESG Research provides carbon emissions (in other words, greenhouse gas emissions) data for the companies in our coverage universe. Please refer to Appendix 1 for more details on the coverage universe for each dataset.

Carbon emissions are classified per the Greenhouse Gas Protocol (GHG Protocol).[5] The greenhouse gases included in the GHG Protocol are:

1. Carbon Dioxide ($CO_2$)
2. Methane ($CH_4$)
3. Nitrous Oxide ($N_2O$)
4. Hydrofluorcarbons (HFCs)
5. Perfluorcarbons (PFCs)
6. Sulphur Hexafluoride ($SF_6$)
7. Nitrogen Trifluoride (NF3)

Per the GHG Protocol, emissions of these gases are grouped in three categories known as Scope 1, Scope 2 and Scope 3 (described below) and are often expressed as “carbon equivalent emissions” or “carbon dioxide equivalent emissions.”

- Scope 1 carbon emissions are those directly occurring "from sources that are owned or controlled by the institution, including: on-campus stationary combustion of fossil fuels; mobile combustion of fossil fuels by institution owned/controlled vehicles; and "fugitive" emissions. Fugitive emissions result from intentional or unintentional releases of GHGs, including the leakage of hydrofluorocarbons (HFCs) from refrigeration and air conditioning equipment as well as the release of methane (CH4) from institution-owned farm animals."
- Scope 2 carbon emissions are "indirect emissions generated in the production of electricity consumed by the institution."
- Scope 3 carbon emissions encompass all other indirect emissions that are "a consequence of the activities of the institution, but occur from sources not owned or controlled by the institution" such as commuting; waste disposal; embodied emissions from extraction, production, and transportation of

[5] Greenhouse Gas Protocol; https://ghgprotocol.org/corporate-standard;

purchased goods; outsourced activities; contractor-owned vehicles; and line loss from electricity transmission and distribution."

As per the GHG Protocol, Scope 3 carbon emissions can be classified into two broad categories:

- Upstream Scope 3 emissions: defined as indirect carbon emissions related to purchased or acquired goods and services; and
- Downstream Scope 3 emissions: defined as indirect carbon emissions related to sold goods and services.

The GHG Protocol further divides these two categories into 15 sub-categories, as described below:

**Upstream Scope 3 Emissions:**

1. Purchased goods and services
2. Capital goods
3. Fuel and energy-related activities
4. Upstream transportation and distribution
5. Waste generated in operations
6. Business travel
7. Employee commuting
8. Leased assets (upstream)

**Downstream Scope 3 Emissions**

9. Downstream transportation and distribution
10. Processing of sold products
11. Use of sold products
12. End-of-life treatment of sold products
13. Leased assets (downstream)
14. Franchises
15. Investments

## Carbon Emissions Data Collection: Disclosed vs. Estimates

### Data Collection Process

MSCI ESG Research collects carbon emissions data for the companies in the coverage universe. Data is collected once per year from most recent corporate sources, including annual reports, Corporate Social Responsibility reports or websites. In addition, MSCI ESG Research uses the carbon emissions data reported through CDP (formerly the Carbon Disclosure Project) or government databases when reported data is not available through direct corporate disclosure.

When companies do not disclose data, MSCI ESG Research uses proprietary methodologies to estimate Scope 1, Scope 2, Upstream Scope 3, and Downstream Scope 3[6] carbon emissions.

### Estimating Carbon Emissions: Scope 1+2

If a company does not report its Scope 1+2 carbon emissions data, we estimate it using our proprietary Scope 1+2 carbon emissions estimation model described below.

Under MSCI ESG Research's Scope 1+2 carbon emissions estimation approach, data disclosed by the companies (current and historical) is used to estimate carbon intensity at the company level and at the industry segment level. Our estimation model for Scope 1+2 carbon emissions has three distinct modules:

1. **Production model** - For power-generating electric utilities, we use fuel-mix (power generation mix) data to estimate Scope 1 carbon emissions from their power- generation activities. In the first step, we collect total power generation volume by fuel type, including:
    a. Coal
    b. Liquid Fuels
    c. Natural Gas
    d. Nuclear Power
    e. Renewable Energy

    In the next step, we then multiply the power-generation volume by fuel type by the respective average carbon emission factor to calculate the carbon emissions by fuel type. In the last step, we sum the estimated carbon

[6] For Automobile Manufacturers in MSCI ACWI Index involved in the light vehicle manufacturing.

emissions by fuel type to compute the company's Scope 1 emissions from power generation.

2. **Company-specific intensity model** - For companies that have reported carbon emissions data in the past but not for all years, we use a company-specific intensity model. First, we calculate the company's own carbon emissions intensity based on reported carbon emissions and revenue data from past years, where intensity = emissions / revenue. We then multiply this calculated intensity figure by the revenue for the year(s) missing reported carbon emissions to derive an estimated carbon emissions figure.

   Because these estimates are based on data previously reported by the company, they already reflect the specifics of the businesses and geographies in which the company operates and its own production processes. However, we do not use this model for companies that have undergone corporate actions (for example, mergers & acquisitions) even if such companies have reported data in the past because the reported data may not represent the company's current operational characteristics.

3. **Industry segment-specific intensity model** - For companies that have not reported any carbon emissions data in the past, we use an industry segment-specific intensity model. This model has the following steps:

   a. Estimate average carbon emissions intensity for 1,000+ industry segments using company specific carbon emission intensities.

   b. Apply these average intensities to each of the company's reported industry segments for the year in question and multiply each intensity figure by the relevant segment's revenue to calculate estimated emissions.

   c. Sum the estimated emissions for each industry segment to calculate the company's total estimated carbon emissions for the year in question.

Please note that prior to 2015 emissions estimates, industry-specific carbon intensities were estimated at Global Industry Classification Standard[7] (GICS®) Sub-Industry level rather than at industry segment level. For more information, please refer to the Carbon Estimation Methodology document on ESG Manager.

Appendix 2 contains a list of Scope 1+2 carbon emissions screening factors. For further details on the Scope 1+2 carbon emissions estimation methodology, please refer to the MSCI Carbon Emissions Estimation methodology document available on ESG Manager.

[7] GICS is the global industry classification standard jointly developed by MSCI and S&P Global Market Intelligence. For more information, please see http://www.msci.com/products/indices/sector/gics/)

## Estimating Carbon Emissions: Scope 3 Upstream

For estimating Scope 3 upstream emissions, we use an industry segment-specific intensity model. The model uses the following steps:

1. Estimate Scope 3 upstream carbon emissions intensity for 1,000+ industry segments using (1) the company-reported upstream Scope 3 emissions intensity data and (2) the carbon intensity data provided by the Comprehensive Environmental Data Archive (CEDA).[8]
2. Apply these average intensities to each of the company's reported industry segments for the year in question and multiply each intensity figure by the relevant segment's revenue to calculate estimated emissions.
3. Sum the estimated emissions for each business segment to calculate the company's total estimated carbon emissions for the year in question.
4. In addition to the total upstream Scope 3 emissions that include emissions associated with both direct (Tier 1) and indirect suppliers, we also provide the Tier 1 upstream Scope 3 emissions that consider direct suppliers only. In order to estimate the Tier 1 upstream Scope 3 emissions, we first compute the ratio of Tier 1 upstream Scope 3 emissions intensity and the total upstream Scope 3 emissions intensity using the CEDA data. In the next step, we estimate the Tier 1 upstream Scope 3 carbon emissions intensity for 1,000+ industry segments by multiplying this ratio with the Scope 3 upstream emissions intensity computed in Step 1. We then follow the calculations similar to Step 2 and Step 3 to estimate the Tier 1 upstream Scope 3 carbon emissions.

Appendix 3 contains a list of Scope 3 upstream carbon emissions screening factors.

## Estimating Carbon Emissions: Scope 3 Downstream for Automobile Manufacturers

For Automobile Manufacturers, Scope 3 downstream carbon emissions resulting from the use of their sold products could form a substantial part of their overall carbon footprint. In order to estimate this category of emissions (Scope 3 downstream emissions due to "use of sold products"), we follow the guidelines in the GHG Protocol[9], using the following formula:

[8] The Comprehensive Environmental Data Archive (CEDA) is a suite of environmentally extended input-output databases that are designed to assist various environmental systems analyses and Life Cycle Assessments (LCA), including carbon footprinting, water footprinting and embodied energy analysis. The dataset is developed by Industrial Ecology Research Services (IERS) LLC.

[9] http://www.ghgprotocol.org/sites/default/files/ghgp/standards/Scope3_Calculation_Guidance_0.pdf

***CO2 emissions from use of sold products =*** *∑total lifetime expected uses of product$_i$ x number of product sold in reporting period$_i$ x fuel consumed per use$_i$ x emission factor for fuel$_i$*

Here "i" refers to the product type.

For Automobile Manufacturers, the above formula is modified as:

***CO2 emissions from use of sold vehicles =*** *∑total lifetime expected uses of sold vehicles (kms)$_i$ x number of vehicles sold in reporting period by vehicle type (no.)$_i$ x carbon efficiency of the vehicle type (gCO2/km)$_I$*

Where carbon efficiency of a given vehicle type is computed as:

*= Fuel consumed per km (liters/km) x emission factor for fuel (gCO2/liter)*

Because there is less disclosure of data points required to estimate CO2 emissions for heavy vehicles, in the current dataset the estimates are provided for light vehicles (passenger cars and light commercial vehicles) only.

For light vehicles, the three factors in the above equation are estimated as follows:

1. **Total lifetime expected use of sold vehicles:** We assume the life of a light vehicle to be 10 years and per-year use of a light vehicle to be 15,000 km driven. The total lifetime expected use is thus estimated to be 150,000 kms driven. These values are in line with the lifetime mileage values used by some automobile manufacturers to estimate and report their Scope 3 downstream emissions (for "use of sold products" category).
2. **Number of vehicles sold by vehicle type:** We have defined five categories (vehicle types) under light vehicles. Please refer to Exhibit 1 for more details on the vehicle types and their definitions. In order to estimate the number of light vehicles sold by category / vehicle type, we refer to the company disclosures (annual reports, company website etc.).
3. **Carbon efficiency of the vehicle type:** In order to estimate the carbon efficiency of different vehicles types, we use the following sources:
    a. Company sources: emissions g/km for each type of vehicle; average fleet emissions etc.
    b. Regulatory sources such as the U.S. Environment Protection Agency (EPA), the European Environment Agency, the Ministry of Industry and Information Technology of the People's Republic of China, etc.

c. If no disclosures are available, we estimate the carbon efficiency based on the country emission standards and the geographic make-up of a company's revenue.

In order to estimate the carbon efficiency of vehicles, we consider only direct / tailpipe emissions.

**Exhibit 1: Light Vehicle Types & Definitions**

| Vehicle Type | Definition |
|---|---|
| Passenger Car | Passenger Cars excluding multi-utility vehicles, sport-utility vehicles (SUVs), and cars weighing more than 10,000 pounds (4,535 kg). |
| MPVs/SUVs/LCVs | Multi-purpose vehicles, Light Commercial Vehicles, SUVs, Cross Types, Pickups, with weight of more than 10,000 lbs (4,535 kg). If car is considered a MPV/SUV but weighs less than 10,000 pounds classify as "Passenger Car." |
| Sports Car | Car designed for spirited performance, usually two-seater, two-door automobile. |
| Hybrid Vehicles | Vehicle that is powered by a combustion and electric engine; there are different types of hybrid vehicles from mild to plug-in hybrid. Only vehicles emitting less than 50g carbon emissions per km are considered under this category. |
| Zero emission vehicles | Vehicle that is only powered by electric energy/ hydrogen and therefore emits zero direct emissions; not plug-in electric vehicles |

This dataset is available for Automobile manufacturers in the MSCI ACWI Index coverage universe. Please refer to Appendix 3 for more details on the Scope 3 downstream emissions data points available for Automobile Manufacturers.

Appendix 3 also contains a list of other company-reported Scope 3 downstream carbon emissions data.

## Ongoing Monitoring and Update Cycle

Carbon emissions data is updated throughout the year following the publication of companies' annual filings on a rolling schedule, within four months for

companies in the MSCI ACWI Index and a 12-month timeframe for all others in coverage.

For MSCI ACWI Index companies scheduled for annual update in a given month, data is generally available in ESG Manager five business days before the end of that month.

## Carbon Emission Estimates Update Cycle

The bulk update of carbon emissions and intensity estimates for companies with no disclosed data takes place at the beginning of each year. This bulk update is performed after completing full research of companies in the coverage from the previous year for the disclosed data and after obtaining the data from CDP, which is made available in the fourth quarter of each year.

Using MSCI ESG Research collected data and the CDP data, we generate emissions and intensity estimates for companies with no disclosed data. The carbon emission estimates generated are two fiscal years behind the current year (in other words, estimates for FY2017 are published in early 2019).

# Power Generation

In order to help clients screen their portfolios/universes for companies involved in carbon- intensive power-generation operations, MSCI ESG Research provides a power-generation module containing power-generation volumes, installed capacity data and power- generation revenue by fuel type for 9,300+ companies. Please refer to Appendix 1 for more details on the coverage universe. Appendix 4 contains a list of power-generation-related screening factors.

## Estimation Process: Installed Capacity, Power-Generation Volume and Fuel Mix

### Installed Capacity

We use company-reported installed capacity (MW) by fuel type, where available. Where companies report total installed capacity and percentages by fuel type rather than installed capacity by fuel type in MW, we multiply thetotal by the percentage for each fuel type to calculate MW figures.

### Power-Generation Volume

- We use company-reported power-generation volume (MWh) by fuel type, where available. Where companies report total power-generation volume and percentages by fuel type rather than power-generation volume by fuel type (MWh), we multiply the total by the percentage for each fuel type to calculate MWh figures.
- If the company reports total power-generation volume and % installed capacity by fuel type instead of power-generation volume by fuel type, then we first multiply the % installed capacity by fuel type to respective average plant load factors to estimate the proportion of power generation by fuel type. In the next step, we convert those proportion values to percentages and then multiply those percentages by the total power-generation volume to estimate the power-generation volume by fuel type.

### Fuel Mix

- We estimate a company's fuel mix by taking the ratio of power-generation volume by fuel type (reported or estimated) and the total power-generation volume.
- When total power-generation volume is not available but the installed capacity by fuel type is available, we first multiply the % installed capacity by fuel type to respective average plant load factors to estimate the proportion

of power generation by fuel type. In the next step, we re-scale these proportion values to estimate the fuel-mix percentages.

## Estimation Process: Revenue Derived from Power Generation by Fuel Type

Many companies do not disclose the revenue derived from power generation by fuel type; we use a two-step process to estimate these figures:

### Estimation of total power-generation revenue

- If the company reports power-generation volume by fuel type or if it reports power-generation volume and uses only one type of fuel for power generation, and it reports the price of electricity realized, then we estimate the power-generation revenue by fuel type as the product of generation volume and electricity price.
- When the revenue from power-generation business of a vertically integrated electric utility company, involved in both electricity generation and transmission and distribution business, is not disclosed but the combined revenue of both the businesses is disclosed, we estimate the power-generation revenue for that company in the proportion of its own electricity generation (MWh) to total electricity transmitted (MWh).
- When the revenue from power generation is not disclosed or is not possible to estimate using the above methods, we first estimate the revenue proportion of different business segments by multiplying the asset turnover ratios[10] of different business segments by total assets employed in respective businesses. In the next step, we convert these proportion values to percentages and multiply the total revenue to estimate the revenue at the business segment level (including for power-generation business).

### Estimation of power-generation revenue by fuel type

- If the company reports revenue from power generation by fuel type or if it reports revenue from power generation and uses only one type of fuel, we use this figure.
- If a company's total power generation revenue is known (either reported or estimated), but its make-up by fuel type is not known, then we multiply the total power-generation revenue by that company's fuel mix to estimate the power-generation revenue by fuel type.

[10] For a company, asset turnover ratio of a given business activity is the ratio of its revenue from and its assets employed in that particular business activity.

### Treatment of Discontinued Operations- Power

The decommission of power plants (Coal, Liquid Fuel, Natural gas, Nuclear, Hydropower or renewables, etc), suspension of power plants, or divestment/ selling ownership of power plants have an impact to energy generation by fuel type.

If such an event happens at any point during a financial year, MSCI uses the percentage share of energy generation to calculate the power generation revenue by fuel type if granular revenue by fuel type is not directly reported.

Impact of revenue from such discontinued operations will be removed from Power generation revenues provided at company level once the company stops reporting any operations from a particular fuel type in its disclosures.

Installed capacity flags will be removed immediately when MSCI is informed about the decommissioning, suspension, or sale of the asset in question.

## Treatment of Subsidiaries Involved in Power Generation

In cases where a subsidiary's power generation revenue and volume (in MWh/MW) are not accounted for by the parent company in its disclosure, we first check whether the subsidiary's financial data is consolidated by the parent company. If it is being consolidated, we map 100% of its power-generation revenue and volume to the parent company. Otherwise, the parent company is allocated power-generation revenue and volume proportionate to its equity ownership in the subsidiary.

## Ongoing Monitoring and Update Cycle

Power generation data is updated throughout the year following the publication of companies' annual filings on a rolling schedule, within four months for companies in the MSCI ACWI Index and in a 12-month time frame for all others in coverage.

For MSCI ACWI Index companies scheduled for annual update in a given month, data is generally available in ESG Manager five business days before the end of that month

# Fossil Fuel Exposure

In order to help clients screen their portfolios/universes for companies with fossil fuel exposure, MSCI ESG Research identifies companies with fossil fuel reserves and revenue.

## Fossil Fuel Reserves Data

MSCI ESG Research provides reported fossil fuel reserves data under the following reserve categories for 9,300+ companies (including the MSCI ACWI IMI).

1. Metallurgical coal
2. Thermal coal
3. Conventional oil
4. Shale oil
5. Oil shale & tar sands
6. Natural gas
7. Shale gas

Please refer to Appendix 5 for a detailed description of these categories. Also refer to Appendix 6 for the full list of fossil fuel reserves screening factors.

### Data Collection Process

MSCI ESG Research has a dedicated team of analysts responsible for identifying companies with fossil fuel reserves and revenue. Sources include company publications (e.g. annual reports, 10K, 20F) and other public records (such as sustainability reports). Fossil fuel reserves data is updated annually.

As part of our research for fossil fuel reserves, we first identify potential companies with fossil fuel reserves by applying certain criteria including:

- Companies that previously were identified as having fossil fuel reserves
- Companies from likely GICS sub-industries (for example, Diversified Metals & Mining, Oil & Gas Exploration and Production)
- Companies with business segments indicating involvement in oil and gas or mining activities
- Keywords in the company's business description indicating involvement in fossil fuel reserves

In order to achieve consistency with industry reporting standards, MSCI ESG Research collects proved and probable reserves (in other words, 2P) for coal and proved reserves (1P) for oil and natural gas. In some cases, we also consider 2P reserve values for oil and natural gas, if a company does not disclose its 1P reserves. To convert these reserves to potential emissions, we use the following formula from the Potsdam Institute for Climate Impact Research:[11]

$E = R \times V \times C \times f$

Where:

**E** : Potential emissions ($MtCO_2$ = Megatons / Million tons of carbon dioxide),

**R** : Proven recoverable reserves (Gg = gigagrams),

**V** : Net calorific value of the fuel (TJ/Gg = terajoules per gigagram), (Exhibit 2)

**C** : Carbon content of the fuel (tC/TJ = tons of carbon per terajoule) (Exhibit 2)

**f** : a conversion factor ($MtCO_2/tC$, which is the ratio of the molecular weight of carbon dioxide to carbon divided by $10^6 = (44/12)/10^6 = 3.6667 \times 10^{-6}$).

**Exhibit 2: Net Calorific Value and Carbon Content of Different Types of Fossil Fuels[12]**

| Fossil Fuel Type | Net calorific value of the fuel (terajoules per gigagram) | Carbon content of the fuel (tons of carbon per terajoule) |
|---|---|---|
| Thermal Coal | 18.9 | 26.3 |
| Metallurgical Coal | 28.2 | 25.8 |
| Conventional Oil | 42.3 | 20.0 |
| Shale Oil | 38.1 | 20.0 |
| Oil Shale and Tar Sands | 8.9 | 29.1 |
| Natural Gas | 48.0 | 15.3 |
| Shale Gas | 48.0 | 15.3 |

[11] http://www.nature.com/nature/journal/v458/n7242/extref/nature08017-s1.pdf; page 7, Last accessed on February 21, 2018.

[12] *Source: MCSI ESG Research, Intergovernmental Panel on Climate Change (2006 IPCC Guidelines for National Greenhouse Gas Inventories; https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf; Table 1.2 and 1.3)*

## Fossil Fuel Revenue Data

### Oil and Gas Revenue related to Extraction and Production

To help clients screen their portfolios for companies involved in various types of oil and gas production, MSCI ESG Research provides an oil and gas revenue exposure module for Integrated Oil and Gas and Exploration and Production companies for the coverage universe described below:

MSCI ESG Research aims to report percentage of revenue (reported or estimated) generated from oil and gas production activities listed below as a percentage of total reported revenue. Specifically, oil and gas revenue is broken down into the following categories:

- Oil & gas extraction and production revenue (%) – available for 9,300+ companies including the MSCI ACWI IMI.

The following data points are available for the MSCI ACWI Index universe, expanding to MSCI ACWI IMI by late 2019, unless stated otherwise:

- Conventional oil and gas extraction and production revenue (%)
- Unconventional oil and gas extraction and production revenue (%)
- Oil sands extraction and production revenue (%) (available for 9,300+ companies including the MSCI ACWI IMI)
- Shale oil extraction and production revenue (%)
- Shale gas extraction and production revenue (%)
- Arctic oil extraction and production revenue (%)
- Arctic gas extraction and production revenue (%)

These revenue factors do **not** include:

- Revenue from non-extraction activities (for example, exploration, surveying, processing, refining);
- Ownership of fossil fuel reserves with no associated extraction and production revenues (as for companies with reserves not yet explored or exploited); Revenue from intra-company sales;
- Revenue from royalties.

**Estimation Process: Oil & Gas Extraction and Production Revenue by Category**

We use company-reported extraction and production revenue by category, if available. In other cases, when there is no disclosure, we provide estimates. The estimation process is described below:

- If the revenue from oil and gas production is reported and the company reports only one type of proven fossil fuel reserve (100% oil sands, 100% oil shale etc.), then we use this reserve type to determine the revenue category.
- If total production volume is reported and the company reports only one type of proven fossil fuel reserve (100% oil sands, 100% oil shale etc.), and if the realized price by geographic location is reported by the company, then we estimate the revenue as the product (multiplication) of production volume and the respective reported realized prices.
- If production volume by oil & gas type or field is reported and if the realized price by type and by geographic location is reported by the company, then we estimate the revenue by category as the multiplication of production volume and the respective reported realized prices.
- If the production volume is not reported, then we estimate the relevant production volume using the number of productive wells reported by the company for that specific type of production, field or geographic location.
    - To estimate the production volume by type, we first estimate the split between oil & gas productive wells based on the company's reserves, and then multiply the number of productive wells by the Energy Information Administration (EIA) average wells production number.[13]
- If the total production volume cannot be estimated or if the company is not disclosing realized prices but the company is involved in the production, then the company is flagged for evidence of corresponding oil & gas production type. However, no revenue estimates are provided for such cases.

**Conventional vs. Unconventional Oil and Gas Production**

Conventional oil and gas production:

- Includes production related to hydrocarbon liquids and gas found in conventional reservoirs and extracted using traditional onshore or offshore drilling techniques (in other words, vertical drilling)
- This category also includes the Arctic oil and gas production, deep-water offshore oil & gas production, offshore shallow water oil and gas production found in conventional reservoirs and extracted using traditional drilling techniques[14]

Unconventional oil and gas production:

[13] The EIA reports that in 2017 the average oil well production was 19 barrels/ day and the average gas production 132000 scf/day. https://www.eia.gov/petroleum/wells/pdf/full_report.pdf

[14] Please note that we are introduced in April 2019 some "Febelfin"-specific factors to tailor for the Belgian financial sector federation's definition of conventional and unconventional Oil & Gas.

- Includes shale oil & gas, oil sands production. Please refer to Appendix 5 for detailed definitions of shale oil & gas and oil sands.
- Includes production related to hydrocarbon liquids and gas found in conventional reservoirs, but extracted using unconventional drilling techniques (i.e. horizontal drilling, hydraulic fracking etc.).
- It also includes any other kind of production activity classified by the company as unconventional oil & gas production.

### Treatment of Discontinued Operations- Oil & Gas

Suspension of oil and gas operations or selling an oil/gas division are likely to have an impact to the maximum revenue percentage provided at company level. If such an event occurs during a financial year, MSCI uses the revenues contributed by the operations in question to calculate the maximum revenue percentage (for that year).

Impact of revenue from such discontinued operations will be removed from maximum revenue percentage provided at company level once the company stops reporting any revenue from these operations in its disclosures.

In case the suspension, decommissioning or sale of an oil and gas asset has an impact on its reserves, reserves flags and volumes will be removed immediately when MSCI is informed about the suspension, decommissioning, or sale of the asset in question.

### Oil & Gas Revenue related to Other Business Activities in the ValueChain

MSCI ESG Research collects data on revenue derived from following oil & gas-related business activities (beyond Extraction and Production):

- Oil & Gas equipment and services;
- Oil & Gas refining;
- Oil & Gas pipelines and transportation;
- Oil & Gas distribution and retailing;
- Petrochemical products;
- Trading of Oil & Gas and related products; and
- Biofuel

## Thermal Coal Mining Revenue Data

In addition to Oil & Gas revenue, MSCI ESG Research also identifies revenue associated with thermal coal mining. Screen definitions and revenue estimation

process for thermal coal mining are provided below.

### Screen Definitions

This screen identifies the percentage of revenue (either reported or estimated) that companies derive from the mining of thermal coal (including lignite, bituminous, anthracite and steam coal) and its sale to external parties, and contract mining services.

MSCI ESG Research's thermal coal revenue research does not include:

- Revenue from metallurgical coal (in other words, coal used in the production of steel);
- Coal mined for internal power generation (for example, in the case of vertically integrated power producers);
- Intra-company sales of mined thermal coal;

- Revenue from coal trading;
- Royalty income for companies not involved in thermal coal extraction operations.

**Revenue Estimation Process**

MSCI ESG Research relies on company-reported information in public documents, investor presentations, websites, etc. to estimate revenues derived only from mining thermal coal.

Revenue may be reported by production type, project or region. Revenue derived from joint ventures is included in the estimation; companies are attributed production volume or revenue equivalent to their ownership share. To determine when coal mined by the company is relevant to this screen, we review information about its customers and operations as well as directly reported revenue figures.

- ***By production type*:** If revenue from thermal coal is reported directly, this figure is used. Where necessary, we make adjustments to exclude revenue from intra-company sales of thermal coal or other coal-related revenues that are not included in this screen.
- ***By project*:** If revenue is reported by project, we identify which (including joint ventures) are thermal coal projects and sum the revenues associated with them.
- ***By region*:** If revenue is reported by region, we map which company projects (including joint ventures) are located in each region. Where possible, we then use project production volumes and average sales price data for the fiscal year in question to estimate revenues for each relevant project. Please refer to the Appendix 7 for the complete list of Thermal Coal and Oil & Gas revenue screening factors and definitions.

### Treatment of Discontinued Operations- Thermal & Metallurgical Coal

Sale of coal mines, suspension of operations at a mine, or selling a coal division have an impact to the maximum revenue percentage provided at company level. If such an event happens during a financial year, MSCI uses the revenues contributed by the respective operations to calculate the maximum revenue percentage (for that year).

Impact of revenue from such discontinued operations will be removed from maximum revenue percentage once the company stops reporting any revenue from these operations in its disclosures.

In case the suspension, decommissioning or sale of a mine has an impact on its reserves, reserves flags and volumes will be removed immediately when MSCI

is informed about the suspension, decommissioning, or sale of the asset in question.

## Ownership and Fossil Fuel Reserves

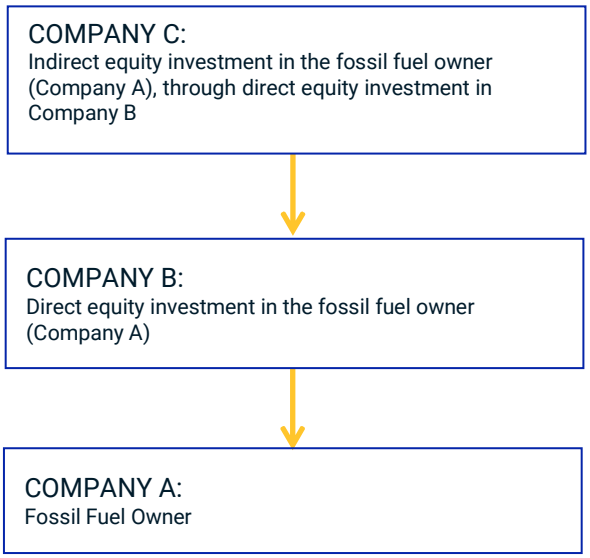
A company may have exposure to fossil fuels through its direct or indirect equity investment in other companies owning fossil fuel reserves. We use the following guidelines to flag such companies.

A company (Company B, refer to Exhibit 3) with direct equity investment in another company owning fossil fuel reserves (Company A) is allocated fossil fuel reserves and revenues proportionate to its equity ownership in the latter.

A company (Company C) with indirect equity investment in another company owning fossil fuel reserves (Company A) is flagged for fossil fuel reserve and revenue evidence subject to following two thresholds:

- Fossil fuel owner (Company A) accounts for more than 10 percent of its total assets or;
- It has a more than 20-percent interest in the fossil fuel owner (Company A).

**Exhibit 3: Ownership and Fossil Fuel Reserves**




## Pre-Defined Fossil Fuel Screens

MSCI ESG Climate Change Metrics offers pre-defined screens to measure and help clients identify exposure to fossil fuels. Please refer to Appendix 8 for more details on pre-defined screens.

## EU Paris Alignment – Minimum Exclusion Components supporting template 1 for the EBA Pillar 3 ESG disclosure

These screens have been developed as a tool to support compliance of banks with climate-related regulations, specifically alignment to the Paris Climate Agreement as defined per the EU Paris-aligned Benchmarks and referenced in the climate disclosure regulations from the European Banking Authority (EBA Pillar 3 – disclosure of ESG risk). The screens identify the exposure of companies under climate change metrics coverage from revenues from fossil fuel related sectors, companies involved in significant environmental controversies and identify exposure to companies excluded from EU Paris-aligned Benchmarks.

The European Banking Authority (EBA) from December 2023 will require banks

to disclose specific information about climate-related risks and how they plan to address them. The EBA will require banks to disclose their exposure to transition risks, including their exposure to carbon-intensive activities, fossil fuels and financed emissions and physical risks, in the form of assets directly at risk from the impacts of climate change. Banks will also be required to disclose to what extent their financing activities are likely to meet net zero goals. As part of the template 1, banks would be required to identify their exposure to companies excluded from EU Paris-aligned Benchmarks.

The below screens are built on MSCI's Climate Change Metrics fossil fuel data set

Paris Aligned minimal exclusion criteria (EBA Pillar III Template 1)

- Thermal Coal revenue: All companies deriving 1% or more revenue (either reported or estimated) from the exploration, mining, extraction, and distribution of hard coal (including lignite, bituminous, anthracite and steam coal) and its sale to external parties. It excludes revenue from metallurgical coal, coal mined for internal power generation (e.g., in the case of vertically integrated power producers), intracompany sales of mined thermal coal, and revenue from coal trading (either reported or estimated). It also excludes revenue from the refining of hard coal.

- Oil revenue: All companies deriving 10% or more revenue from oil related activities, including distribution / retail, extraction and production, pipelines and transportation and refining but excluding biofuel production, petrochemicals production, revenue from equipment and services companies and sales and trading activities.

- Gas revenue: All companies deriving 50% or more revenue from gas related activities, including exploration, extraction, manufacturing, or distribution of gaseous fuels.

- Power Generation revenue: All companies deriving 50% or more revenue from power generation with Carbon emissions intensity higher than 100 gCO2e/kWh. MSCI's factor to address these criteria considers intensity on a total company basis, considering all publicly disclosed information on total Scope 1 and 2 emissions and total power generation.

- Environmental controversies: Companies involved in significant environmental controversy and in violation of one or more of the environmental objectives referred to in Article 9 of Regulation EU (2020/852). These are defined as environmental controversies of severe and very severe nature based on MSCI's assessment

- Exclusion from EU Paris Aligned Benchmarks: All companies that are involved in the activities marked above, hence excluded from EU Paris Aligned benchmarks in accordance with points (d) to (g) of Article 12.1 and in accordance with Article 12.2 of Climate Benchmark Standards Regulation.

| Data | Factor Name | Description |
|---|---|---|
| **>=1% revenue: coal involvement** | **REV_COAL_INVLVMT_1PCT** | This factor identifies companies with revenue from exploration, mining, extraction or distribution of hard coal and lignite totaling at least to 1% or more of annual revenues |
| **>=10% revenue: oil involvement** | **REV_OIL_INVLVMT_10PCT** | This factor identifies companies with revenue from exploration, extraction, distribution and refining of oil fuels totaling at least to 10% or more of annual revenues |
| **>=50% revenue : gas involvement** | **REV_GAS_INVLVMT_50PCT** | This factor identifies companies with revenue from exploration, extraction, manufacturing or distribution of gaseous fuels totaling at least to 50% of annual revenue. |
| **>=50% revenue: power generation with intensity >100 gCO2e/kWH** | **REV_PWRGEN_50PCT** | This factor identifies companies that generate at least 50% annual revenue from power generation with GHG intensity above 100 gCO2e/kWh |
| **Significant Environmental Controversy** | **ENVRNMNT_CONTRO** | This factor identifies companies that are involved in significant harm against one or more of the environmental objectives referred to in Article 9 of Regulation EU (2020/852)-Defined as companies with a severe or very severe Environmental Controversy Score of 0 or 1 |
| **Exclusion from EU Paris aligned Benchmarks** | **EU_PAB_EXCLUSION** | This factor identifies companies that excluded from EU Paris aligned benchmarks in accordance with points (d) to (g) of Article 12.1 and in accordance with Article 12.2 of Climate Benchmark Standards Regulation |

### Ongoing Monitoring and Update Cycle

Data for Fossil Fuel Exposure is updated throughout the year following the publication of companies' annual filings on a rolling schedule, within two months for companies in the MSCI ACWI Index and a three-month time frame for all other companies in coverage.

For companies scheduled for an annual update in a given month, data is generally available in ESG Manager five business days before the end of that month.

## Clean Tech Exposure

In order to understand companies' exposure to clean technology products and services, MSCI ESG Research provides revenue estimates for the following categories through its Sustainable Impact Metrics product:

- Alternative Energy
- Energy Efficiency
- Green Building

- Sustainable Water
- Pollution Prevention

For further details, please refer to the MSCI ESG Sustainable Impact Metrics methodology document available on ESG Manager. The coverage universe forthis dataset is the MSCI ACWI IMI.

## Capital Expenditure Data and Renewable Energy CapEx Ratio

Company capital expenditure (CapEx) plans are available as part of this data set. The latest reported historical CapEx values are also provided for companies where forward-looking plans are not available. Company-disclosed CapEx plans are captured within the below categories.

Factor descriptions are available in Appendix 9.

**Exhibit 4: Business Activity Categorization of CapEx Data**

| Business activity | Description of Business Activity | Reference |
|---|---|---|
| Electric networks | Electricity distribution and transmission | 1 |
| Gas networks | Utility gas distribution and transmission (excludes unregulated oil and gas transportation) | 2 |
| Heat networks | District heating and/or cooling networks | 3 |
| **Total networks** | **Sub-total** | **4 = 1+2+3** |
| Coal | Coal-fired power generation | 5 |
| Oil | Oil-fired power generation | 6 |
| Gas | Gas-fired power generation | 7 |
| Nuclear | Nuclear power generation | 8 |
| **Total thermal generation** | **Sub-total** | **9=5+6+7+8** |
| Hydro | Hydro-power generation | 10 |
| Wind | Wind power generation | 11 |
| Solar | Solar power generation | 12 |
| Biomass | Biomass power generation | 13 |
| Other renewables | Unspecified renewables technology or not specified as wind, solar and/or biomass | 14 |
| **Total Renewables generation** | **Sub-total** | **15=10+11+12+13+14** |

| Business activity | Description of Business Activity | Reference |
|---|---|---|
| Other 'green' | Electric vehicles charging infrastructure, smart grids and networks, low carbon customer solutions (energy efficiency, customer renewables installation, etc.) | 16 |
| Other | All other expenditure | 17 |
| **Total capital expenditure** | **Sub-total** | **18=4+9+10+16+17** |

## Data Collection

We use the company-disclosed CapEx amount by business activity and by fuel type for power generation, where available. Where companies disclose total capital expenditure and proportions by business activity and/or fuel type expressed in percentage terms, we multiply the total value by the proportion for each category to calculate CapEx per business activity and fuel type.

Where a company's disclosure is not available at the most granular level, we capture the data at an aggregated category level if possible (e.g. if capital expenditure in thermal power plants is available, but the exact fuel is unspecified, the amount would be captured within 'Total thermal generation' sub-total. We would not estimate the split by fuel and would leave those categories blank. Therefore, a null value may not signify zero CapEx in a category, rather it may signify a lack of information at that level of granularity.

Where a company has no disclosed capital expenditure in a given business activity and we have evidence that the company's business mix does not include this activity, this is indicated as a zero in the dataset (e.g. a company has no gas transportation network business and there is no mention of capital expenditure in gas networks in its disclosures).

Sectors currently covered by the dataset include companies classified as integrated oil and gas, oil and gas exploration and production, and utilities following the Global Industry Classification Standard.1

For the purpose of this dataset, technologies considered 'renewable' include hydro-power generation (regardless of scale), wind, solar, biomass, geothermal, wave. This set of technologies may not fully correspond to some regulatory classifications, including EU regulations such as the EU Taxonomy on Sustainable Finance. Our selection of technologies has been driven by data availability. Companies often disclose CapEx in renewable technologies without specifying the technology breakdown. Hydro-power and biomass are often included as renewable in company disclosures and as a result are included as such in our data template.

Where there is no forward-looking disclosure available, a breakdown of the latest

[1] The Global Industry Classification Standard (GICS) was developed by and is the exclusive property of MSCI and Standard & Poor's. "Global Industry Classification Standard (GICS)" is a service mark of MSCI and Standard & Poor's.

reported historical capital expenditure is used. Allocation of latest reported CapEx follows the same principles as described above. The timeframe of CapEx data captured for each company is indicated in the supporting data fields (forward-looking or historical and CapEx plan start and end year).

## Renewable Energy Capex Ratio

The renewable energy CapEx ratio is calculated following the guidance in the EU Commission Delegated Regulation 2020/1816. This is defined as capital expenditure in renewable energy as a share of total company capital expenditure (e.g. category 15 divided by category 18 as per Exhibit 4 above). The calculation uses MSCI ESG Research's definition of renewable energy as defined above.

**Exhibit 5: Renewable CapEx Ratio Calculations for Two Companies**

| Sector | Company | Renewable energy CapEx (EUR billion) | Total CapEx (EUR billion) | Renewable energy CapEx ratio | Source |
|---|---|---|---|---|---|
| Utilities | Enel Spa | 12.5 | 29 | **43%** = 12.5/29 | CapEx plan for 2020-2022 |
| Energy | ENI Spa | 2.6 | 29 | **9% =** 2.6/29 | CapEx plan for 2020-2023 |

**Caveats and assumptions:**

1. **Ratio is dependent on the definition of 'renewable energy'** - The ratio captures a limited set of lower carbon intensity activities, i.e. lower carbon power generation technologies only. Diversification into all other low carbon solutions or business activities such as electric vehicles infrastructure, energy efficiency, low carbon customer solutions, biofuels and others are currently excluded from the ratio.
2. **Ratio should be interpreted with caution for diversified businesses** - Comparison of investments in renewable energy generation against total company CapEx could lead to varying interpretations, especially for diversified utilities.

   For example, Enel's renewable energy CapEx ratio is calculated at 43%. This differs materially from its share of planned renewable power generation capacity additions relative to total company capacity additions (11,900 MW of solar, wind and hydro capacity additions represent 100% of Enel's planned capacity additions for the period 2020-2022). The reason for the difference is the denominator – the renewable energy CapEx ratio measures renewable energy CapEx against total company CapEx (including CapEx earmarked for business other than power generation). The ratio using capacity additions data measures renewables investments as a share within the power

generation segment only.

Each approach may have merits and limitations depending on the intended use. Granular CapEx data by business segment and by fuel type (subject to data availability) is available through this dataset to provide transparency and to inform other ratios calculated by the user.

## Risk Exposure & Forward-Looking Risk Management Assessment

As part of MSCI ESG Ratings, we assess companies' exposure to and management of several climate-related "issues." An issue is considered to be a "Key Issue" for a company if the company may be forced to internalize associated unanticipated costs related to it in the future. The risk exposure assessment is intended to assess the extent to which a company is exposed to a material issue (or Key Issue). Under risk management assessment, we assess the strength of a company's strategy and other-forward looking measures to mitigate the risk. We provide risk exposure and risk management assessment on several climate-related Key Issues:

1. Carbon Emissions
2. Product Carbon Footprint
3. Financing Environmental Impact
4. Climate Change Vulnerability
5. Water Stress
6. Opportunities in Clean Tech
7. Opportunities in Renewable Energy
8. Opportunities in Green Building

## Risk Exposure Assessment

Our assessment of risk exposure may comprise three areas of analysis, depending on the Key Issue:

1. **Business Segment Risk Exposure** – analyzes the breakdown of a company's business in terms of revenues, assets or operations to understand its exposure to risks driven by climate change.
2. **Geographic Segment Risk Exposure** – analyzes the breakdown of a company's geographic segments in terms of revenues, assets or operations to understand its exposure to risks driven by climate change.
3. **Company-Level Risk Exposure factors** – such as number of employees, size, reliance on government contracts or reliance on outsourced production to understand its exposure to risks driven by climate change.

To assess **Business Segment Risk Exposure**, we collect data on the breakdown of a company's revenues and/or operations by Standard Industry Classification (SIC) Code. Each of over 1,000 SIC Codes receives a risk (or opportunity) score based on our analysis of large amounts of data relevant to each Key Issue. Business segment risk scores typically measure the expected external impact of a given business activity, for example, expected carbon emissions per dollar of revenue, expected accident or fatality rate, expected water consumption, expected toxicity of output, etc.

To assess **Geographic Segment Risk Exposure**, we analyze the geographic segmentation of sales, assets and operations. In general, segments are defined as countries of operations, but for some Key Issues we assess geographic exposure at a sub-national level, for example mapping facilities to distinct water basins. Furthermore, when country-level segmentation is not available, we estimate country exposure by using the gross domestic product (GDP)-weighted breakdown of regions. Geographic Segment Exposure Scores are assigned to each country for Key Issues in which we observe differences across countries in the level of risk or opportunity, based on factors such as:

- Stringency and expected change in regulations
- Country-level risk factors such as differential employee fatality rates or corruption levels
- For opportunities, differences in incentive structures and subsidies by country

Finally, for certain Key Issues we assess **additional measures of exposure**, including number of employees, reliance on government contracts, volume of sensitive commodities sourced, estimated percentage of production that is outsourced, etc.

## Forward-Looking Risk Management Assessment

The management assessment of the above Key Issues typically falls into three broad categories:

1. **Strategy & Governance:** Although specific indicators differ across Key Issues, the Strategy & Governance section typically evaluates organizational capacity and company management's level of commitment to addressing the key risks and opportunities, including the level and extent of organizational responsibility for the specific risks/opportunities, strength and scope of policy commitments and strength and scope of commitment to standards.
2. **Initiatives & Programs:** The Initiatives section typically evaluates the strength and scope of the initiatives, programs and targets in place to improve performance on the issue.
3. **Performance:** The Performance section evaluates the company's track record on managing the specific risk or opportunity. Performance involves collecting, standardizing and benchmarking a range of quantitative indicators, where applicable, as well as an evaluation of qualitative indications of performance. As part of the qualitative indication of a company's performance, we incorporate information on controversies in which a company has been implicated.

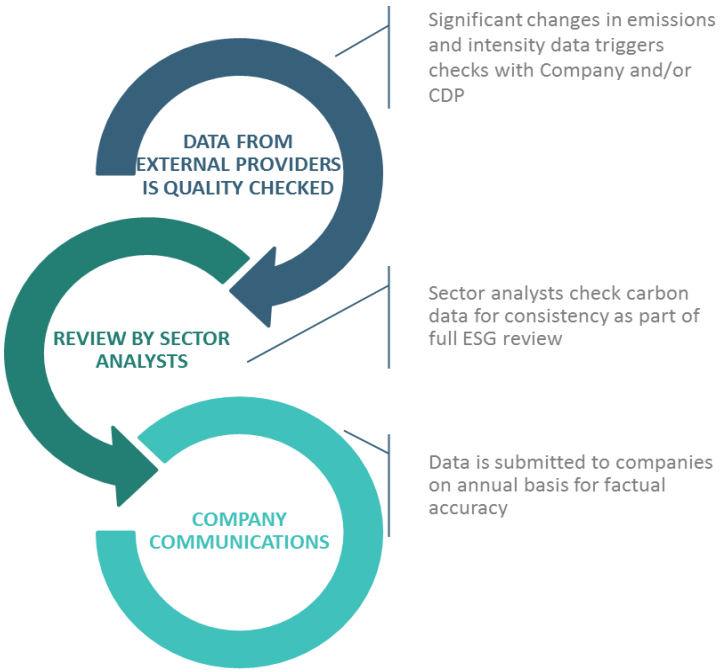
For further details, please refer to the MSCI ESG Ratings and MSCI ESG Metrics methodology documents available on ESG Manager.

## Quality Review Process

MSCI ESG Research's quality review process includes:

- Peer Review: Carbon emissions, power-generation and fossil fuel reserves data is cross-checked by peers.
- Industry Leads Review: data is reviewed by senior analysts covering the Energy, Utility and Materials sectors.
- Company Data Verification: companies reporting carbon emissions, power generation and fossil fuel reserves data are invited to confirm the data.

**Exhibit 6: MSCI ESG Research's Process to Address Data Quality**



## Low Carbon Transition Risk Assessment

MSCI ESG Research provides the Low Carbon Transition Risk Assessment for companies covered. This assessment is designed to identify potential leaders and laggards by holistically measuring companies' exposure to and management of risks and opportunities related to low carbon transition.

This assessment uses previously discussed datasets (for example, carbon emissions, power generation, fossil fuel revenue, clean-tech exposure, forward-looking risk management etc.) as input and provides comprehensive assessment of low carbon transition risk at the company level. The final output of this assessment is two company-level factors, as described below:

**(1) Low Carbon Transition Category:** This factor groups companies in five categories that highlight the risks and opportunities they are most likely to face in the transition (Exhibit 7).

**(2) Low Carbon Transition Score:** This score is based on a multi-dimensional risks and opportunities assessment and considers both predominant and secondary risks a company faces. It is industry-agnostic and represents an absolute assessment of a company's position vis-à-vis the transition.

For further details, please refer to the "Climate Change Metrics – Low Carbon Transition Risk Assessment" methodology document available on ESG Manager.

**Exhibit 7: Low Carbon Transition Categories and Scores**

| LOW CARBON TRANSITION SCORE | LOW CARBON TRANSITION CATEGORY | | LOW CARBON TRANSITION RISK / OPPORTUNITY | COMPANY EXAMPLES |
|---|---|---|---|---|
| Score = 0 | ASSET STRANDING | | Potential to experience "stranding" of physical / natural assets due to regulatory, market, or technological forces arising from low carbon transition. | Coal mining & coal based power generation; Oil sands exploration/production |
| | TRANSITION | PRODUCT | Reduced demand for carbon-intensive products and services. Leaders and laggards are defined by the ability to shift product portfolio to low-carbon products. | Oil & gas exploration & production; Petrol/diesel based automobile manufacturers, thermal power plant turbine manufacturers etc. |
| | | OPERATIONAL | Increased operational and/or capital cost due to carbon taxes and/or investment in carbon emission mitigation measures leading to lower profitability of the companies. | Fossil fuel based power generation, cement, steel etc. |
| | NEUTRAL | | Limited exposure to low carbon transition carbon risk. Though companies in this category could have exposure to physical risk and/or indirect exposure to low carbon transition risk via lending, investment etc. | Consumer staples, healthcare, etc. |
| Score = 10 | SOLUTIONS | | Potential to benefit through the growth of low-carbon products and services. | Renewable electricity, electric vehicles, solar cell manufacturers etc. |

## Carbon for Sovereigns

MSCI ESG Research provides 28 data points for sovereign issuers to highlight a country's exposure to transition risk and physical and economic vulnerability related to climate change (Appendix 10). The data is collected from sources suchas the United Nations (UN), World Bank, Central Intelligence Agency (CIA), etc. and is updated annually. It also includes a number of carbon emissions factors (CO2 and GHG), their corresponding intensities and trend calculation that can beused to calculate the carbon footprint of sovereign investments. This dataset covers 198 sovereign issuers.

## Carbon Emissions Estimation for Private Companies with Low Disclosure

This section details the methodological approach adopted for estimating the Scope 1 and Scope 2 carbon emissions for private companies with low levels of disclosure.[16] This estimation approach requires following company level data points:

1. Company's industry[17]
2. Revenue (in USD)

Scope 1, Scope 2 and Scope 1+2 carbon emissions are estimated using the following formulas:

*Scope 1 Carbon emissions (metric tons) = Scope 1 industry intensity (metric tons / USD million revenue) x Revenue (USD million)*

*Scope 2 Carbon emissions (metric tons) = Scope 2 industry intensity (metric tons / USD million revenue) x Revenue (USD million)*

*Scope 1+2 Carbon emissions (metric tons) = Scope 1+2 industry intensity (metric tons / USD million revenue) x Revenue (USD million)*

To inform Scope 1, Scope 2 and Scope 1+2 industry intensities in the above formulas, we use emission intensities from our GICS Sub-Industry (GICS SI) Intensity Model.

**GICS Sub-Industry (GICS SI) Intensity Model**

Below are the steps we take to estimate Scope 1, Scope 2, and Scope 1+2 emissions intensity at the GICS Sub-Industry (GICS SI) level.

1. We use "company specific carbon emission intensities" of companies reporting their carbon emissions data to compute the GICS SI level intensities. Refer to page 9 for more details on "company specific carbon emissions intensities" estimation methodology.
2. Within a given GICS SI, we first remove outliers by excluding the companies with "company specific carbon emission intensities" below the 10th percentile or above the 90th percentile.
3. After removing the outliers, we calculate the GICS SI level intensity as the average of remaining values.

**Confidence level of GICS SI carbon intensities**

To determine the confidence level of the estimated GICS SI emission intensities, we calculate the coefficient of variance (CV) as the ratio of standard deviation (SD) of company-specific carbon intensities and estimated GICS SI intensity. Here, the standard deviation is computed after removing the outliers. We have

[16]This dataset, Carbon Emissions Estimates for Private Companies, is not a part of standard Climate Change Metrics package and is licensed to users separately.
[17] Refers to company's GICS sub-industry. If the GICS sub-industry information is not available, then the industry is assigned according to principal business activity of the company.

set five levels of confidence in the results, as shown in the table below, the highest when the coefficient of variance is less than 0.25, and the lowest when it is above 1.00.

**Exhibit 8: Confidence levels of GICS SI intensities**

| Coefficient of Variance | Confidence Level |
|---|---|
| 0.00 to less than 0.25 | High |
| 0.25 to less than 0.50 | Moderately High |
| 0.50 to less than 0.75 | Moderate |
| 0.75 to less than 1.00 | Moderately Low |
| Above 1.00 | Low |

To assign the estimation key for Scope 1+2 emissions, we take a combination of the scope 1 and scope 2 estimation keys. The logic is described in below table.

**Exhibit 9: Estimation key combination logic for Scope 1+2 (GICS-SI intensity model)**

| KEY Combinations | | Scope 1 Key | | | | |
|---|---|---|---|---|---|---|
| | | E.GICSSI-High | E.GICSSI-Moderately High | E.GICSSI-Moderate | E.GICSSI-Moderately Low | E.GICSSI-Low |
| Scope 2 Key | E.GICSSI-High | E.GICSSI-High | E.GICSSI-Moderately High | E.GICSSI-Moderate | E.GICSSI-Moderately Low | E.GICSSI-Low |
| | E.GICSSI-Moderately High | E.GICSSI-Moderately High | E.GICSSI-Moderately High | E.GICSSI-Moderate | E.GICSSI-Moderately Low | E.GICSSI-Low |
| | E.GICSSI-Moderate | E.GICSSI-Moderate | E.GICSSI-Moderate | E.GICSSI-Moderate | E.GICSSI-Moderately Low | E.GICSSI-Low |
| | E.GICSSI-Moderately Low | E.GICSSI-Moderately Low | E.GICSSI-Moderately Low | E.GICSSI-Moderately Low | E.GICSSI-Moderately Low | E.GICSSI-Low |
| | E.GICSSI-Low | E.GICSSI-Low | E.GICSSI-Low | E.GICSSI-Low | E.GICSSI-Low | E.GICSSI-Low |

The table below provides brief description of the carbon emissions factors available for private companies:

**Exhibit 10: Carbon Emissions factors for Private Companies**

| Output Factors | Factor Short Names | Description |
|---|---|---|
| Carbon Emissions - Scope 1 (metric tons) | CARBON_EMISSIONS_SCOPE_1 | Company's most recently reported or estimated Scope 1 carbon emissions. |
| Carbon Emissions - Scope 1 KEY | CARBON_EMISSIONS_SCOPE_1_KEY | Indicates whether the Scope 1 emissions figure was reported by the company or estimated. |
| Carbon Emissions - Scope 1 Intensity (t/USD million EVIC) | CARBON_EMISSIONS_EVIC_SCOPE_1_INTEN | Represents the company's most recently reported or estimated Scope 1 greenhouse gas emissions normalized by enterprise value including cash in million USD. |
| Carbon Emissions - Scope 2 (metric tons) | CARBON_EMISSIONS_SCOPE_2 | Company's most recently reported or estimated Scope 2 carbon emissions. |
| Carbon Emissions - Scope 2 KEY | CARBON_EMISSIONS_SCOPE_2_KEY | Indicates whether the Scope 2 emissions figure was reported by the company or estimated. |
| Carbon Emissions - Scope 2 Intensity (t/USD million EVIC) | CARBON_EMISSIONS_EVIC_SCOPE_2_INTEN | Represents the company's most recently reported or estimated Scope 2 greenhouse gas emissions normalized by enterprise value including cash in million USD. |
| Carbon Emissions - Scope 1+2 (metric tons) | CARBON_EMISSIONS_SCOPE_12 | Company's most recently reported or estimated Scope 1+2 carbon emissions. |
| Carbon Emissions - Scope 1+2 Intensity (t/USD million sales) | CARBON_EMISSIONS_SCOPE_12_INTEN | Represents the company's most recently reported or estimated Scope 1 + Scope 2 carbon emissions normalized by sales in million USD. |
| Carbon Emissions - Scope 1+2 Intensity (t/USD million EVIC) | CARBON_EMISSIONS_EVIC_SCOPE_12_INTEN | Represents the company's most recently reported or estimated Scope 1 and 2 emissions normalized by the most recently available enterprise value including cash (EVIC) in million USD. |
| Carbon Emissions - Scope 1+2 KEY | CARBON_EMISSIONS_SCOPE_12_KEY | Indicates whether the Scope 1+2 emissions figure was reported by the company or estimated. |
| Carbon Emissions - Scope 1+2 Intensity Year | CARBON_EMISSIONS_INTENSITY_YEAR | Represents the most recent year for Scope 1+2 Intensity. |

# Appendices

## Appendix 1: Coverage & Introduction Date

| Dataset | Introduction Date | Coverage (As of March 2021) |
|---|---|---|
| Carbon Emissions: Scope 1+2 (reported and estimated), and reported data for Scope 3. Includes time series starting in FY2008 | October 2014 | 10,000+ companies, including MSCI ACWI Investable Market Index (IMI), over 95% of equity and fixed income market value |
| Carbon Emissions: Scope 3 Upstream Estimates (legacy model) | September 2018, no longer updated since 2020 | |
| Carbon Emissions: Scope 3 Downstream (Automobile Manufacturers) (legacy model) | April 2018, no longer updated since 2020 | MSCI ACWI IMI |
| Carbon Emissions: Scope 3 upstream and downstream estimation model | May 2020 | 9,300+ companies, including MSCI ACWI Investable Market Index (IMI) |
| Power Generation Volume & Fuel Mix | MSCI ACWI: September 2016<br>MSCI ACWI IMI: Feb. 2017 | 10,000+ companies, including MSCI ACWI Investable Market Index (IMI)<br><br>Over 95% of equity and fixed income market value |
| Power Generation Revenue | May 2017 | |
| Fossil Fuel Reserves | October 2014 | |
| Fossil Fuel Revenue: Thermal Coal & Oil Sands | 5% and up: April 2016<br>0% and up: March 2017 | |
| Fossil Fuel Revenue: Oil & Gas (except Oil Sands, & Arctic and Shale Oil & Gas, ) | May 2017 | |

| Dataset | Introduction Date | Coverage (As of March 2021) |
|---|---|---|
| Fossil Fuel Revenue: Arctic and Shale Oil & Gas | October 2018 | |
| Clean-Tech Exposure | October 2014 | |
| Green Capital Expenditure | April 2021 | MSCI ACWI IMI (Utilities sector and Oil and Gas Exploration and production and Integrated Oil and Gas sub-industries) |
| Forward Looking Risk Management | Q2 2019 within Climate Change Metrics product, Part of ESG Ratings dataset since 2007 and expanded over the years | 10,000+ for Carbon Emission Key Issue, ESG Ratings universe for the other Key Issues, if weighted in ESG Ratings model |
| Low Carbon Transition Risk Assessment | Q1 2019 | 10,000+ companies, including MSCI ACWI Investable Market Index (IMI), over 95% of equity and fixed income market value |
| Carbon for Sovereigns (emissions and other metrics) | June 2017 | 198 Sovereign Issuers |
| Sovereign Warming Potential | December 2020 | 162 sovereign issuers, 44 local authorities |

## Appendix 2: Scope 1 + 2 Carbon Emissions Factors

| Factor Name | Description | Column Header |
|---|---|---|
| **Carbon Emissions** | | |
| Carbon Emissions - Scope 1 (metric tons) | This figure represents the company's most recently reported or estimated Scope 1 greenhouse gas emissions (if available). Scope 1 emissions are those from sources owned or controlled by the company, typically direct combustion of fuel as in a furnace or vehicle. | CARBON_EMISSIONS_SCOPE_1 |
| Carbon Emissions - Scope 1 KEY | This field indicates whether the Scope 1 emissions figure was reported by the company or estimated. See the Carbon Estimation Methodology for details. | CARBON_EMISSIONS_SCOPE_1_KEY |
| Carbon Emissions - Scope 2 (metric tons) | This figure represents the company's most recently reported or estimated Scope 2 greenhouse gas emissions (if available). Scope2 emissions are those caused by the generation of electricity purchased by the company. | CARBON_EMISSIONS_SCOPE_2 |
| Carbon Emissions - Scope 2 KEY | This field indicates whether the Scope 2 emissions figure was reported by the company or estimated. See the Carbon Estimation Methodology for details. | CARBON_EMISSIONS_SCOPE_2_KEY |

| Factor Name | Description | Column Header |
|---|---|---|
| Carbon Emissions - Scope 1+2 (metric tons) | This figure represents the company's most recently reported or estimated Scope 1 + Scope 2 greenhouse gas emissions (if available). Scope 1 emissions are those from sources owned or controlled by the company, typically direct combustion of fuel as in a furnace or vehicle. Scope 2 emissions are those caused by the generation of electricity purchased by the company. | CARBON_EMISSIONS_SCOPE_12 |
| Carbon Emissions - Scope 1+2 KEY | This field indicates whether the Scope 1 + 2 emissions figure was reported by the company or estimated. See the Carbon Estimation Methodology for details. | CARBON_EMISSIONS_SCOPE_12_KEY |
| Carbon Emissions - Year | This figure represents the most recent year for Scope 1, Scope 2, Scope 1+2. | CARBON_EMISSIONS_YEAR |
| Carbon Emissions - Source | Source of carbon emission data, when reported. | CARBON_EMISSIONS_SOURCE |
| Carbon Emissions Change Notes | Field should explain why most recent carbon emissions data has been changed. This is updated when a company's most recent Scope 1 & 2 emissions/intensity has changed and when the change occurred. | CARBON_CHANGE_NOTES |
| **Carbon Emissions Intensity** | | |
| Carbon Emissions - Scope 1 Intensity (t/USD million EVIC) | This figure represents the company's most recently reported or estimated Scope 1 greenhouse gas emissions normalized by enterprise value including cash (USD). This ratio facilitates portfolio analysis by allocating emissions across equity and debt. | CARBON_EMISSIONS_EVIC_SCOPE_1_INTEN |

| Factor Name | Description | Column Header |
|---|---|---|
| Carbon Emissions - Scope 1 Intensity Projection for 2030 (tCO2e/USD million sales) | Scope 1 emissions intensity projection for 2030 in tons CO2e / million USD. If normalized targets are available for the company in this scope, those targets are used to calculate the carbon emissions intensity projection. In the absence of targets, the projection assumes the current carbon emissions intensity for the scope remains constant. | CARBON_EMISSIONS_INTENSITY_SCOPE_1_PROJECTED |
| Carbon Emissions - Scope 2 Intensity (t/USD million EVIC) | Scope 2 emissions intensity projection for 2030 in tons CO2e / million USD. If normalized targets are available for the company in this scope, those targets are used to calculate the carbon emissions intensity projection. In the absence of targets, the projection assumes the current carbon emissions intensity for the scope remains constant. | CARBON_EMISSIONS_INTENSITY_SCOPE_2_PROJECTED |
| Carbon Emissions - Scope 2 Intensity Projection for 2030 (tCO2e/USD million sales) | Scope 2 emissions intensity projection for 2030 in tons CO2e / million USD. If normalized targets are available for the company in this scope, those targets are used to calculate the carbon emissions intensity projection. In the absence of targets, the projection assumes the current carbon emissions intensity for the scope remains constant. | CARBON_EMISSIONS_INTENSITY_SCOPE_2_PROJECTED |
| Carbon Emissions - Scope 1+2 Intensity (t/USD million sales) | This figure represents the company's most recently reported or estimated Scope 1 + Scope 2 greenhouse gas emissions normalized by sales in USD, which allows for comparison among companies of different sizes. | CARBON_EMISSIONS_SCOPE_12_INTEN |

| Factor Name | Description | Column Header |
|---|---|---|
| Carbon Emissions - Scope 1+2 Intensity Year | This figure represents the most recent year for Scope 1+2 Intensity. | CARBON_EMISSIONS_INTENSITY_YEAR |
| Carbon Emissions - Scope 1+2 Average Intensity (t/USD million sales) 2017-2019 | This figure represents average three-year carbon emissions intensity (2017 - 2019). | CARBON_EMISSIONS_SCOPE_12_INTEN_3YAVG |
| Carbon Emissions - Scope 1+2 Industry Intensity (t/USD million sales) | This figure represents the most recent year for average carbon emissions intensity at the GICS Sub-industry level, which allows for comparison of carbon emissions intensities of different industries. It also allows for comparison between a company's intensity and average industry intensity. | CARBON_EMISSIONS_SCOPE_12_INDUSTRY_INTENSITY |
| Carbon Emissions - Scope 1+2 Intensity (t/USD million EVIC) | This figure represents the company's most recently reported or estimated Scope 1 and 2 emissions normalized by the most recently available enterprise value including cash (EVIC) in million USD. This ratio facilitates portfolio analysis by allocating emissions across equity and debt. | CARBON_EMISSIONS_EVIC_SCOPE_12_INTEN |
| Sales - Aligned with Carbon Intensity | This figure represents the company's sales (USD) used for calculating the most recent Carbon Intensity. | CARBON_SALES_INTENSITY_RECENT |

| Factor Name | Description | Column Header |
|---|---|---|
| Enterprise Value including cash (million USD) - Most Recent Value | Most recent available fiscal year-end enterprise value including cash (million USD). Enterprise Value Including Cash (EVIC) is an alternate measure to Enterprise Value (EV) to value a company by adding cash and cash equivalents to EV. Enterprise value is calculated as total company value (market capitalization of the company, preferred equity, minority interest, total debt) minus cash and cash equivalents. i.e. EVIC = Market capitalization at fiscal year-end date + preferred stock + minority interest + total debt | EVIC_USD_RECENT |
| Enterprise Value Including Cash (USD) - Most Recent Fiscal Year | Fiscal year of the most recently available enterprise value including cash (taken at fiscal year-end). | EVIC_USD_YEAR |
| Enterprise Value Including Cash (EVIC) Intensity Calculation Date | Date on which the Scope 1+2 Intensity based on enterprise value including cash (USD) was calculated. | CBN_EVIC_PUB_DATE |
| Cooling-related Intensity Projection for 2030 (tCO2e/USD million sales) | Cooling-related intensity projection for 2030 in tons CO2e / million USD. Please refer to the MSCI Warming Potential methodology document for more details. | CARBON_EMISSIONS_INTENSITY_COOLING_PROJECTED |

The above-mentioned factors are available for the historical carbon emissions data, which spans 2008 to the current year.

## Appendix 3: Scope 3 Carbon Emissions Factors

| Factor Name | Description | Column Header |
|---|---|---|
| **Scope 3 Reported Emissions** | | |
| Carbon Emissions - Scope 3 Upstream Reported (metric tons) | This figure represents the company's most recently reported Scope 3 Upstream emissions, in metric tons CO2e. | CARBON_EMISSIONS_SCOPE_3_UPSTREAM_REPORT |
| Carbon Emissions - Scope 3 Upstream Reported Intensity (tCO2e/USD million sales) | This figure represents the company's most recently reported Scope 3 Upstream emissions normalized by sales in USD million, which allows for comparison among companies of different sizes. | CARBON_EMISSIONS_SCOPE_3_UPSTREAM_INTENSITY_REPORT |
| Carbon Emissions – Sales – Aligned with Scope 3 Upstream Intensity | This figure represents the company's sales (USD) used for calculating the most recent Scope3 Upstream Intensity and Scope 3 Upstream Tier 1 Intensity. | CARBON_EMISSIONS_SCOPE_3_UPSTREAM_INTENSITY_SALES_RECENT |
| Carbon Emissions - Scope 3 Upstream Year | This figure represents the most recent year for Scope 3 Upstream Reported/Estimated, Scope 3 Undefined Reported, Scope 3 Upstream Tier 1 Estimated and intensity figures. | CARBON_EMISSIONS_SCOPE_3_UPSTREAM_YEAR |
| Carbon Emissions – Scope 3 Downstream Reported (metric tons) | This figure represents the company's most recently reported Scope 3 downstream emissions, in metric tons CO2e. | CARBON_EMISSIONS_SCOPE_3_DOWNSTREAM_REPORT |
| Carbon Emissions – Scope 3 Reported (metric tons) | This figure represents the company's most recently reported Scope 3 greenhouse gas emissions, as reported. Scope 3 emissions include an array of indirect emissions resulting from activities such as business travel, distribution of products by third parties and downstream use of a | CARBON_EMISSIONS_SCOPE_3 |

| Factor Name | Description | Column Header |
|---|---|---|
| | company's products (i.e. by customers). Most reports of Scope 3 emissions include only some portion of these. | |
| Carbon Emissions – Scope 3 Undefined Reported (metric tons) | This figure represents the company's most recently reported Scope 3 undefined emissions, in metric tons CO2e | CARBON_EMISSIONS_SCOPE_3_UNDEFINED_REPORT |
| Carbon Emissions – Scope 3 Downstream Year | This figure represents the most recent year for Scope 3 downstream and Scope 3 downstream intensity. | CARBON_EMISSIONS_SCOPE_3_DOWNSTREAM_YEAR |
| **Scope 3 Estimated Emissions** | | |
| Scope 3 - Categories 01 & 02: Purchased Goods | Estimated emissions from purchased goods, services and capital goods, as defined by the Greenhouse Gas Protocol [tCO2e/yr] | CARBON_EMISSIONS_SCOPE_3_CAT_1_2 |
| Scope 3 - Categories 04 & 09: Transportation | Estimated emissions from upstream and downstream transportation and distribution as defined by the Greenhouse Gas Protocol [tCO2e/yr] | CARBON_EMISSIONS_SCOPE_3_CAT_4_9 |
| Scope 3 - Category 03: Energy-related Activities | Estimated emissions from fuel- and energy related activities (not included in scope 1 or scope 2) as defined by the Greenhouse Gas Protocol [tCO2e/yr] | CARBON_EMISSIONS_SCOPE_3_CAT_3 |
| Scope 3 - Category 05: Waste | Estimated emissions from waste generated in operations as defined by the Greenhouse Gas Protocol [tCO2e/yr] | CARBON_EMISSIONS_SCOPE_3_CAT_5 |
| Scope 3 - Category 06: Business Travel | Estimated emissions from business travel as defined by the Greenhouse Gas Protocol [tCO2e/yr] | CARBON_EMISSIONS_SCOPE_3_CAT_6 |

| Factor Name | Description | Column Header |
|---|---|---|
| Scope 3 - Category 07: Commuting | Estimated emissions from employee commuting as defined by the Greenhouse Gas Protocol [tCO2e/yr] | CARBON_EMISSIONS_SCOPE_3_CAT_7 |
| Scope 3 - Category 08: Upstream Leased Assets | Estimated emissions from upstream leased assets as defined by the Greenhouse Gas Protocol [tCO2e/yr] | CARBON_EMISSIONS_SCOPE_3_CAT_8 |
| Scope 3 - Category 10: Processing of Products | Estimated emissions from processing of sold products as defined by the Greenhouse Gas Protocol [tCO2e/yr] | CARBON_EMISSIONS_SCOPE_3_CAT_10 |
| Scope 3 - Category 11: Use of Products | Estimated emissions from use of sold products as defined by the Greenhouse Gas Protocol [tCO2e/yr] | CARBON_EMISSIONS_SCOPE_3_CAT_11 |
| Scope 3 - Category 12: Final Treatment Products | Estimated emissions from end-of-life treatment of sold products as defined by the Greenhouse Gas Protocol [tCO2e/yr] | CARBON_EMISSIONS_SCOPE_3_CAT_12 |
| Scope 3 - Category 13: Downstream Leased Assets | Estimated emissions from downstream leased assets as defined by the Greenhouse Gas Protocol [tCO2e/yr] | CARBON_EMISSIONS_SCOPE_3_CAT_13 |
| Scope 3 - Category 14: Franchises | Estimated emissions from franchises as defined by the Greenhouse Gas Protocol [tCO2e/yr] | CARBON_EMISSIONS_SCOPE_3_CAT_14 |
| Scope 3 - Category 15: Investments (all) | Estimated emissions from investments as defined by the Greenhouse Gas Protocol [tCO2e/yr]. This category includes both emissions associated with the types of investments required to be accounted for by the GHG Protocol guidance (debt investments with known use of proceeds) as well as those types that companies may optionally report (debt investment without known use of proceeds, managed investments). | CARBON_EMISSIONS_SCOPE_3_CAT_15_ALL |

| Factor Name | Description | Column Header |
|---|---|---|
| Scope 3 - Category 15: Investments (required only) | Estimated emissions from investments as defined by the Greenhouse Gas Protocol [tCO2e/yr]. This category only includes emissions associated with debt investments with known use of proceeds required to be accounted for by the GHG Protocol guidance | CARBON_EMISSIONS_SCOPE_3_CAT_15 |
| Scope 3 - Downstream EVIC Intensity | This figure represents the company's most recently estimated Scope 3 downstream emissions normalized by the most recently available entreprise value including cash (EVIC) in million USD. This ratio facilitates portfolio analysis by allocating emissions across equity and debt. | CARBON_EMISSIONS_SCOPE_3_DOWN_EVIC_INTEN |
| Scope 3 - Downstream Estimated | Estimated scope 3 downstream emissions [tCO2e/yr]. It includes emissions from categories 9, 10, 11, 12, 13, 14 and 15. | CARBON_EMISSIONS_SCOPE_3_DOWN |
| Scope 3 - Downstream Sales Intensity | This figure represents the company's most recently estimated Scope 3 downstream emissions normalized by sales in million USD, which allows for comparison between companies of different sizes. The ratio uses estimates and sales of the same year. [t/million USD] | CARBON_EMISSIONS_SCOPE_3_DOWN_SALES_INTEN |
| Scope 3 - Total EVIC Intensity | This figure represents the company's most recently estimated Scope 3 total emissions normalized by the most recently available entreprise value including cash (EVIC) in million USD. This ratio facilitates portfolio analysis by allocating emissions across equity and debt. [t/million USD] | CARBON_EMISSIONS_SCOPE_3_TOT_EVIC_INTEN |
| Scope 3 - Total Emissions Estimated | Estimated scope 3 emissions (total) as defined by the Greenhouse Gas Protocol [tCO2e/yr]. | CARBON_EMISSIONS_SCOPE_3_TOTAL |

| Factor Name | Description | Column Header |
|---|---|---|
| Scope 3 - Total Sales Intensity | This figure represents the company's most recently estimated Scope 3 total emissions normalized by sales in million USD, which allows for comparison between companies of different sizes. The ratio uses estimates and sales of the same year. [t/million USD] | CARBON_EMISSIONS_SCOPE_3_TOTAL_SALES_INTEN |
| Scope 3 - Upstream EVIC Intensity | This figure represents the company's most recently estimated Scope 3 upstream emissions normalized by the most recently available entreprise value including cash (EVIC) in million USD. This ratio facilitates portfolio analysis by allocating emissions across equity and debt. [t/million USD] | CARBON_EMISSIONS_SCOPE_3_UPST_EVIC_INTEN |
| Scope 3 - Upstream Estimated | Estimated scope 3 upstream emissions [tCO2e/yr]. It includes emissions from categories 1&2, 3, 4, 5, 6, 7 and 8 | CARBON_EMISSIONS_SCOPE_3_UPST_PROF |
| Scope 3 - Upstream Sales Intensity | This figure represents the company's most recently estimated Scope 3 upstream emissions normalized by sales in million USD, which allows for comparison between companies of different sizes. The ratio uses estimates and sales of the same year. [t/million USD] | CARBON_EMISSIONS_SCOPE_3_UPST_INTEN_PROF |
| Carbon Emissions - Scope 3 Calculation Date | This figure represents the date when the scope 3 estimations were computed. | CARBON_EMISSIONS_SCOPE_3_CALCULATION_DATE |

| Factor Name | Description | Column Header |
|---|---|---|
| Carbon Emissions - Scope 3 Intensity Projection for 2030 (tCO2e/USD million sales) | Scope 3 emissions intensity projection for 2030 in tons CO2e / million USD. If normalized targets are available for the company in this scope, those targets are used to calculate the carbon emissions intensity projection. In the absence of targets, the projection assumes the current carbon emissions intensity for the scope remains constant. | CARBON_EMISSIONS_INTENSITY_SCOPE_3_PROJECTED |
| Carbon Emissions - Scope 3 Year | This figure represents the fiscal year for scope 3 estimates. | CARBON_EMISSIONS_SCOPE_3_ESTIMATES_YEAR |
| **Scope 3 Legacy Estimation Model** | | |
| Carbon Emissions - Sales - Aligned with Scope 3 Downstream Intensity | This figure represents the company's sales (USD) used for calculating the most recent Scope 3 Downstream Sub-Industry Specific Intensity | CARBON_EMISSIONS_SCOPE_3_DOWNSTREAM_INTENSITY_SALES_RECENT |
| Carbon Emissions - Scope 3 Downstream Sub-Industry Specific Emissions (metric tons) | This figure represents the company's most recently reported or estimated Scope 3 downstream emissions associated with the most relevant emissions category for a given sub-industry, in metric tons CO2e. | CARBON_EMISSIONS_SCOPE_3_DOWN_SUB_IND_EMISSIONS |
| Carbon Emissions - Scope 3 Downstream Sub-Industry Specific Emissions / Intensity Key | This field indicates whether the Scope 3 downstream sub-industry specific emissions and intensity figures are reported or estimated. | CARBON_EMISSIONS_SCOPE_3_DOWN_SUB_IND_EMISSIONS_INTENSITY_KEY |
| Carbon Emissions - Scope 3 Downstream Sub-Industry Specific Emissions Category | This field indicates the most relevant Scope 3 downstream emissions category for a given sub-industry. There are 7 possible scope 3 downstream categories as per the Greenhouse Gas Protocol. | CARBON_EMISSIONS_SCOPE_3_DOWN_SUB_IND_EMISSIONS_CATEGORY |

| Factor Name | Description | Column Header |
|---|---|---|
| Carbon Emissions - Scope 3 Downstream Sub-Industry Specific Intensity | This figure represents the company's most recently reported or estimated Scope 3 downstream emissions intensity associated with the most relevant emissions category for a given sub-industry. The associated unit is available as a separate factor as this can vary depending on the sub-industry. | CARBON_EMISSIONS_SCOPE_3_DOWN_SUB_IND_INTENSITY |
| Carbon Emissions - Scope 3 Downstream Sub-Industry Specific Intensity Unit | This field indicates the unit associated with the Scope 3 downstream sub-industry specific intensity figure. This unit may vary from one sub-industry to another. | CARBON_EMISSIONS_SCOPE_3_DOWN_SUB_IND_INTENSITY_UNIT |
| Carbon Emissions - Scope 3 Upstream Tier 1 Estimated (metric tons) | This figure represents the company's most recently estimated Scope 3 Upstream Tier 1 emissions in metric tons CO2e. Tier 1 upstream carbon emissions for a company are the direct emissions of its tier 1 (direct) suppliers which are associated with the goods and services procured by the company (excluding purchased electricity). | CARBON_EMISSIONS_SCOPE_3_UPSTREAM_TIER1 |
| Carbon Emissions - Scope 3 Upstream Tier 1 Estimated Intensity (tCO2e/USD million sales) | This figure represents the company's most recently estimated Scope 3 Upstream Tier 1 emissions normalized by sales in USD million, which allows for comparison between companies of different sizes. Tier 1 upstream carbon emissions for a company are the direct emissions of its tier 1 (direct) suppliers which are associated with the goods and services procured by the company (excluding purchased electricity). | CARBON_EMISSIONS_SCOPE_3_UPSTREAM_TIER1_INTENSITY |
| Carbon Emissions - Scope 3 Upstream Total Estimated (metric tons) | This figure represents the company's most recently estimated Scope 3 Upstream total emissions, in metric tons CO2e. | CARBON_EMISSIONS_SCOPE_3_UPSTREAM |

| Factor Name | Description | Column Header |
| --- | --- | --- |
| Carbon Emissions - Scope 3 Upstream Total Estimated Intensity (tCO2e/USD million sales) | This figure represents the company's most recently estimated Scope 3 Upstream Total emissions normalized by sales in USD million, which allows for comparison between companies of different sizes. | CARBON_EMISSIONS_SCOPE_3_UPSTREAM_INTENSITY |

## Appendix 4: Power Generation: Screening Factors

| Factor Name | Description | Column Header |
|---|---|---|
| GENERATION FOLDER | | |
| Generation Fossil Fuels (%) | Percentage of power generation from thermal coal, liquid fuel and natural gas | GENERAT_FOSSIL_FUELS_PCT |
| Generation Hydro (%) | Percentage of power generation from hydro power | GENERAT_HYDRO_PCT |
| Generation Liquid Fuel (%) | Percentage of power generation from liquid fuel | GENERAT_LIQUID_FUEL_PCT |
| Generation Natural Gas (%) | Percentage of power generation from natural gas | GENERAT_NATURAL_GAS_PCT |
| Generation Nuclear (%) | Percentage of power generation from nuclear power | GENERAT_NUCLEAR_PCT |
| Generation Oil & Gas (%) | Percentage of power generation from liquid fuel and natural gas | GENERAT_OIL_GAS_PCT |
| Generation Output Fossil Fuels (MWh) | Generation Output in MWh from thermal coal, liquid fuel and natural gas | GENERAT_OUTP_FOSSIL_FUELS |
| Generation Output Hydro (MWh) | Generation Output in MWh from hydro | GENERAT_OUTP_HYDRO |
| Generation Output Liquid Fuel (MWh) | Generation Output in MWh from liquid fuel | GENERAT_OUTP_LIQUID_FUEL |
| Generation Output Natural Gas (MWh) | Generation Output in MWh from natural gas | GENERAT_OUTP_NATURAL_GAS |
| Generation Output Nuclear (MWh) | Generation Output in MWh from nuclear power | GENERAT_OUTP_NUCLEAR |

| Factor Name | Description | Column Header |
|---|---|---|
| Generation Output Renewables (MWh) | Generation Output in MWh from renewables | GENERAT_OUTP_RENEWABLES |
| Generation Output Thermal Coal (MWh) | Generation Output in MWh from thermal coal | GENERAT_OUTP_THERMAL_COAL |
| Generation Renewables (%) | Percentage of power generation from renewable energies | GENERAT_RENEWABLES_PCT |
| Generation Thermal Coal (%) | Percentage of power generation from thermal coal | GENERAT_THERMAL_COAL_PCT |
| Total Generation (MWh) | Total generation for all fuels in MWh | GENERAT_TOTAL |
| INSTALLED CAPACITY FOLDER | | |
| Installed Capacity Fossil Fuels (%) | Aggregate installed capacity for coal, liquid fuel, natural gas as maximum percentage of total | INSTAL_CAP_FOSSIL_FUELS_PCT |
| Installed Capacity Fossil Fuels (MW) | Aggregate installed capacity for coal, liquid fuel, natural gas in MW | INSTAL_CAP_FOSSIL_FUELS |
| Installed Capacity Hydro (%) | Installed capacity for hydro power as maximum percentage of total | INSTAL_CAP_HYDRO_PCT |
| Installed Capacity Hydro (MW) | Installed capacity for hydro power in MW | INSTAL_CAP_HYDRO |
| Installed Capacity Liquid Fuel (%) | Installed capacity for liquid fuel as maximum percentage of total | INSTAL_CAP_LIQUID_FUEL_PCT |

| Factor Name | Description | Column Header |
|---|---|---|
| Installed Capacity Liquid Fuel (MW) | Installed capacity for liquid fuel in MW | INSTAL_CAP_LIQUID_FUEL |
| Installed Capacity Natural Gas (%) | Installed capacity for natural gas as maximum percentage of total | INSTAL_CAP_NATURAL_GAS_PCT |
| Installed Capacity Natural Gas (MW) | Installed capacity for natural gas in MW | INSTAL_CAP_NATURAL_GAS |
| Installed Capacity Nuclear (%) | Installed capacity for nuclear power as maximum percentage of total | INSTAL_CAP_NUCLEAR_PCT |
| Installed Capacity Nuclear (MW) | Installed capacity for nuclear power in MW | INSTAL_CAP_NUCLEAR |
| Installed Capacity Renewables (%) | Installed capacity for renewable energy as maximum percentage of total | INSTAL_CAP_RENEWABLES_PCT |
| Installed Capacity Renewables (MW) | Installed capacity for renewable energy in MW | INSTAL_CAP_RENEWABLES |
| Installed Capacity Thermal Coal (%) | Installed capacity for thermal coal as maximum percentage of total | INSTAL_CAP_THERMAL_COAL_PCT |
| Installed Capacity Thermal Coal (MW) | Installed capacity for thermal coal in MW | INSTAL_CAP_THERMAL_COAL |

| Factor Name | Description | Column Header |
|---|---|---|
| Installed Capacity Oil & Gas (%) | Aggregate installed capacity for liquid fuel and natural gas as maximum percentage of total. Added in April 2019. | INSTAL_CAP_OIL_GAS_PCT |
| Installed Capacity Total (MW) | Aggregate installed capacity for power utility generation in MW | INSTAL_CAP_TOTAL |
| REVENUE FOLDER | | |
| Generation Fossil Fuels - Maximum Percentage of Revenue | This factor identifies the maximum percentage of revenue (either reported or estimated) that a company derives from fossil fuel (thermal coal, liquid fuel and natural gas) based power generation. | GENERAT_MAX_REV_FOSSIL_FUELS |
| Generation Hydro - Maximum Percentage of Revenue | This factor identifies the maximum percentage of revenue (either reported or estimated) that a company derives from hydropower generation. | GENERAT_MAX_REV_HYDRO |
| Generation Liquid Fuel - Maximum Percentage of Revenue | This factor identifies the maximum percentage of revenue (either reported or estimated) that a company derives from liquid fuel-based power generation. | GENERAT_MAX_REV_LIQUID_FUEL |
| Generation Natural Gas - Maximum Percentage of Revenue | This factor identifies the maximum percentage of revenue (either reported or estimated) that a company derives from natural gas-based power generation. | GENERAT_MAX_REV_NATURAL_GAS |

| Factor Name | Description | Column Header |
|---|---|---|
| Generation Oil & Gas - Maximum Percentage of Revenue | This factor identifies the maximum percentage of revenue (either reported or estimated) that a company derives from liquid fuel and natural gas-based power generation. Added in April 2019. | GENERAT_MAX_REV_OIL_GAS |
| Generation Nuclear - Maximum Percentage of Revenue | This factor identifies the maximum percentage of revenue (either reported or estimated) that a company derives from nuclear energy-based power generation. | GENERAT_MAX_REV_NUCLEAR |
| Generation Renewables - Maximum Percentage of Revenue | This factor identifies the maximum percentage of revenue (either reported or estimated) that a company derives from renewable energy-based power generation. | GENERAT_MAX_REV_RENEWABLES |
| Generation Thermal Coal - Maximum Percentage of Revenue | This factor identifies the maximum percentage of revenue (either reported or estimated) that a company derives from thermal coal-based power generation. | GENERAT_MAX_REV_THERMAL_COAL |

## Appendix 5: Fossil Fuel Reserve Categories: Description

| Reserve Category | Description |
|---|---|
| Metallurgical Coal | This category includes:<br>• Coal reserves explicitly reported as either Metallurgical Coal or Coking Coal.<br>• In cases where the coal type is not reported by the company, the company falls in the Steel GICS sub-industry.<br>• In cases where the company reports its coal reserves as both Metallurgical (or Coking) & Thermal (or Steam) without providing the breakdown of these two types, we account for 22% of the total coal reserves as Metallurgical Coal and the rest, 78%, as Thermal Coal. |
| Thermal Coal | This category includes:<br>• Coal reserves explicitly reported as Thermal Coal, Steam Coal, Lignite or Sub-bituminous Coal.<br>• If the coal type is not reported by the company and the company does not fall in the Steel GICS sub-industry, the reported coal reserves are considered to be Thermal Coal.<br>• In cases where the company reports its coal reserves as both Metallurgical (or Coking) & Thermal (or Steam) without providing the breakdown of these two types, we account for 22% of the total coal reserves as Metallurgical Coal and the rest, 78%, as Thermal Coal. |

| Reserve Category | Description |
|---|---|
| Conventional Oil | This category includes:<br>• Oil reserves explicitly reported as Conventional Oil reserves and extracted using conventional extraction methods such as vertical drilling, etc.<br>• Oil reserves in conventional reservoirs and extracted using conventional extraction methods such as vertical drilling, etc.<br>• Natural gas liquids (NGLs) and condensates from conventional reservoirs. |
| Shale Oil | This category includes:<br>• Oil reserves explicitly reported as Shale Oil reserves.<br>• Oil reserves in un-conventional reservoirs or in shale fields.<br>• Natural gas liquids (NGLs) and condensates from un-conventional reservoirs or from shale fields.<br>• Oil reserves extracted using unconventional extraction methods such as horizontal drilling, hydraulic fracturing etc.<br>• Reserves reported as “tight oil”. |
| Oil Shale & Tar Sands | This category includes:<br>• Oil reserves explicitly reported as Oil Shale, Kerogen, Oil Sands, Tar Sands, Synthetic Crude Oil, Extra Heavy Oil and Bitumen Reserves.<br>• Oil reserves in oil-sands fields. |

| Reserve Category | Description |
|---|---|
| Natural Gas | This category includes:<br>• Natural Gas reserves explicitly reported as Conventional Gas or Conventional Natural Gas reserves and extracted using conventional extraction methods such as vertical drilling, etc.<br>• Natural Gas reserves in conventional reservoirs and extracted using conventional extraction methods such as vertical drilling, etc.<br>• Liquefied Natural Gas (LNG) or Compressed Natural Gas (CNG) from conventional reservoirs (if reported as reserves by the company). |
| Shale Gas | This category includes:<br>• Natural Gas reserves explicitly reported as Shale Gas or Un-conventional Gas reserves.<br>• Natural Gas reserves in un-conventional reservoirs or in shale fields.<br>• Liquefied Natural Gas (LNG) or Compressed Natural Gas (CNG) from un-conventional reservoirs (if reported as reserves by the company).<br>• Natural Gas reserves extracted using unconventional extraction methods such as horizontal drilling, hydraulic fracturing, etc.<br>• Reserves reported as Tight Gas, Coal Bed Methane or Coal Seam Gas. |

## Appendix 6: Fossil Fuel Screening Factors: Reserves

| Factor Name | Description | Column Header |
|---|---|---|
| COAL - RESERVES | | |
| Evidence of Metallurgical Coal Reserves | This field identifies companies that provide evidence of owning Metallurgical Coal, also sometimes referred to as Coking Coal Reserves, including those that own less than 50% of a reserves field. Evidence of owning reserves includes companies providing the exact volume of reserves, and companies making a statement about their ownership of reserves. | METALLURGICAL_COAL_RESERVES |
| Evidence of Thermal Coal Reserves | This field identifies companies that provide evidence of owning Thermal Coal, including those that own less than 50% of a reserves field. Evidence of owning reserves includes companies providing the exact volume of reserves, and companies making a statement about their ownership of reserves. Thermal coal is used to fire power plants that produce steam for electricity and industrial uses. | THERMAL_COAL_RESERVES |
| Evidence of Total Coal Reserves | This field identifies companies that provide evidence of owning coal reserves, including those that own less than 50% of a reserves field. Evidence of owning reserves includes companies providing the exact volume of reserves, and companies making a statement about their ownership of reserves. | COAL_RESERVES |

| Factor Name | Description | Column Header |
|---|---|---|
| Metallurgical Coal - Comments | This field includes the analyst's comments on the reserves data. It may include year of reserves data, underlying assumptions in case of estimated reserve volumes, or comments on significant changes in a company's reserves ownership, where relevant. | MET_COAL_ANALYST_COMMENTS |
| Metallurgical Coal - Potential Emissions (MtCO2) | This field represents the potential carbon emissions of the Metallurgical Coal reserves owned by a company using a formula from the Potsdam Institute for Climate Impact research. | MET_COAL_POTENTIAL_EMISSIONS |
| Metallurgical Coal - Reserves KEY (Reported/Estimated) | This field indicates whether the reserve volumes of Metallurgical Coal were reported by the company or estimated by MSCI ESG Research. | MET_COAL_RESERVES_KEY |
| Metallurgical Coal - Reserves Volume (metric tons) | This field represents the total volume of proved and probable reserves (1P+2P) of metallurgical coal owned by a company. | MET_COAL_RESERVES_VOLUME |
| Thermal Coal - Comments | This field includes the analyst's comments on the reserves data. It may include year of reserves data, underlying assumptions in case of estimated reserve volumes, or comments on significant changes in a company's reserves ownership, where relevant. | TH_COAL_ANALYST_COMMENTS |
| Thermal Coal - Potential Emissions (MtCO2) | This field represents the potential carbon emissions of the Thermal Coal reserves owned by a company using a formula from the Potsdam Institute for Climate Impact research. | TH_COAL_POTENTIAL_EMISSIONS |

| Factor Name | Description | Column Header |
|---|---|---|
| Thermal Coal - Reserves KEY (Reported/Estimated) | This field indicates whether the reserve volumes of thermal coal was reported by the company or estimated by MSCI ESG Research. | TH_COAL_RESERVES_KEY |
| Thermal Coal - Reserves Volume (metric tons) | This field represents the total volume of proved and probable reserves (1P+2P) of thermal coal owned by a company. | TH_COAL_RESERVES_VOLUME |
| Total Coal - Potential Emissions (MtCO2) | This field represents the potential carbon emissions of the coal reserves owned by a company. It is computed as the sum of the potential carbon emissions of the metallurgical coal reserves and thermal coal reserves owned by the company. | COAL_POTENTIAL_EMISSIONS |
| Total Coal - Reserves Volume (metric tons) | This field represents the total volume of proved and probable reserves (1P+2P) of coal owned by a company. It is computed as the sum of metallurgical coal and thermal coal reserves owned by the company. | COAL_RESERVES_VOLUME |
| OIL & GAS RESERVES - CONVENTIONAL | | |
| Conventional Oil - Reserves KEY (Reported/Estimated) | This field indicates whether the reserve volumes of conventional oil was reported by the company or estimated by MSCI ESG Research. | CONV_OIL_RESERVES_KEY |
| Conventional Oil - Comments | This field includes the analyst's comments on the reserves data. It may include year of reserves data, underlying assumptions in case of estimated reserve volumes, or comments on significant changes in a company's reserves ownership, where relevant. | CONV_OIL_ANALYST_COMMENTS |

| Factor Name | Description | Column Header |
|---|---|---|
| Conventional Oil - Potential Emissions (MtCO2) | This field represents the potential carbon emissions of the Conventional Oil reserves owned by a company using a formula from the Potsdam Institute for Climate Impact research. | CONV_OIL_POTENTIAL_EMISSIONS |
| Conventional Oil - Reserves Volume (mmboe) | This field represents the total volume of proved reserves (1P) of Conventional Oil owned by a company. | CONV_OIL_RESERVES_VOLUME |
| Evidence of Conventional Oil Reserves | This field identifies companies that provide evidence of owning Conventional Oil reserves, including those that own less than 50% of a reserves field. Evidence of owning reserves includes companies providing the exact volume of reserves, and companies making a statement about their ownership of reserves. | CONV_OIL_RESERVES |
| Evidence of Natural Gas Reserves | This field identifies companies that provide evidence of owning conventional Natural Gas Reserves, including those that own less than 50% of a reserves field. Evidence of owning reserves includes companies providing the exact volume of reserves, and companies making a statement about their ownership of reserves. | NATURAL_GAS_RESERVES |

| Factor Name | Description | Column Header |
|---|---|---|
| Natural Gas - Comments | This field includes the analyst's comments on the reserves data. It may include year of reserves data, underlying assumptions in case of estimated reserve volumes, or comments on significant changes in a company's reserves ownership, where relevant. | NATURAL_GAS_ANALYST_COMMENTS |
| Natural Gas - Potential Emissions (MtCO2) | This field represents the potential carbon emissions of the conventional natural gas reserves owned by a company using a formula from the Potsdam Institute for Climate Impact research. | NATURAL_GAS_POTENTIAL_EMISSIONS |
| Natural Gas - Reserves Key (Reported/Estimated) | This field indicates whether the reserve volumes of Natural Gas (conventional) was reported by the company or estimated by MSCI ESG Research. | NATURAL_GAS_RESERVES_KEY |
| Natural Gas - Reserves Volume (mmboe) | This field represents the total volume of proved reserves (1P) of Natural Gas (conventional) owned by a company. | NATURAL_GAS_RESERVES_VOLUME |
| OIL & GAS RESERVES - SUMMARY | | |
| Evidence of Total Gas Reserves | This field identifies companies that provide evidence of owning Gas reserves, including those that own less than 50% of a reserves field. Evidence of owning reserves includes companies providing the exact volume of reserves, and companies making a statement about their ownership of reserves. | NAT_GAS_RESERVES |

| Factor Name | Description | Column Header |
|---|---|---|
| Evidence of Total Oil & Gas Reserves | This field identifies companies that provide evidence of owning oil and/or gas reserves, including those that own less than 50% of a reserves field. Evidence of owning reserves includes companies providing the exact volume of reserves, and companies making a statement about their ownership of reserves. | OIL_NAT_GAS_RESERVES |
| Evidence of Total Oil Reserves | This field identifies companies that provide evidence of owning oil reserves, including those that own less than 50% of a reserves field. Evidence of owning reserves includes companies providing the exact volume of reserves, and companies making a statement about their ownership of reserves. | OIL_RESERVES |
| Total Gas - Potential Emissions (MtCO2) | This field represents the potential carbon emissions of the gas reserves owned by a company. It is computed as the sum of the potential carbon emissions of the Natural Gas reserves and Shale Gas reserves owned by the company. | NAT_GAS_POTENTIAL_EMISSIONS |
| Total Gas - Reserves KEY (Reported/Estimated) | This field indicates whether the split between Oil & Gas reserves was reported by the company or estimated by MSCI ESG Research. Where a company with both Oil & Gas reserves did not report separate volume figures for the two types of reserves, MSCI used the average split for the Integrated Oil & Gas sector: 53% for Oil reserves and 47% for Gas reserves. | NAT_GAS_RESERVES_KEY |

| Factor Name | Description | Column Header |
|---|---|---|
| Total Gas - Reserves Volume (mmboe) | This field represents the total volume of proved reserves (1P) of gas owned by a company. It is computed as the sum of Natural Gas and Shale Gas reserves owned by the company. | NAT_GAS_RESERVES_VOLUME |
| Total Oil & Gas - Potential Emissions (MtCO2) | This field represents the potential carbon emissions of the Oil &d Gas owned by a company. It is computed as the sum of the potential carbon emissions of the total Oil and total Gas reserves owned by the company. | OIL_NAT_GAS_POTENTIAL_EMISSIONS |
| Total Oil & Gas - Reserves Volume (mmboe) | This field represents the total volume of proved reserves (1P) of Oil & Gas owned by a company. It is computed as the sum of total Oil reserves and total Gas reserves owned by the company. | OIL_NAT_GAS_RESERVES_VOLUME |
| Total Oil - Potential Emissions (MtCO2) | This field represents the potential carbon emissions of the Oil reserves owned by a company. It is computed as the sum of the potential carbon emissions of the Conventional Oil, Oil Shale & Tar Sands, and Shale Oil Reserves owned by the company. | OIL_POTENTIAL_EMISSIONS |
| Total Oil - Reserves KEY (Reported/Estimated) | This field indicates whether the split between Oil & Gas reserves was reported by the company or estimated by MSCI ESG Research. Where a company with both Oil & Gas reserves did not report separate volume figures for the two types of reserves, MSCI used the average split for the Integrated Oil & Gas sector: 53% for Oil reserves and 47% for Gas reserves. | OIL_RESERVES_KEY |

| Factor Name | Description | Column Header |
|---|---|---|
| Total Oil - Reserves Volume (mmboe) | This field represents the total volume of proved reserves (1P) of oil owned by a company. It is computed as the sum of Conventional Oil reserves, Oil Shale & Tar Sands reserves, and Shale Oil reserves owned by the company. | OIL_RESERVES_VOLUME |
| OIL & GAS RESERVES - UNCONVENTIONAL | | |
| Evidence of Oil Shale & Tar Sands Reserves | This field identifies companies that provide evidence of owning Oil Sands reserves, including those that own less than 50% of a reserves field. Evidence of owning reserves includes companies providing the exact volume of reserves, and companies making a statement about their ownership of reserves. | OIL_SANDS_RESERVES |
| Evidence of Shale Gas Reserves | This field identifies companies that provide evidence of owning Shale Gas reserves, including those that own less than 50% of a reserves field. Evidence of owning reserves includes companies providing the exact volume of reserves, and companies making a statement about their ownership of reserves. | SHALE_GAS_RESERVES |
| Evidence of Shale Oil & Shale Gas Reserves | This field identifies companies that provide evidence of owning Shale Gas and/or Shale Oil reserves, including those that own less than 50% of a reserves field. Evidence of owning reserves includes companies providing the exact volume of reserves, and companies making a statement about their ownership of reserves. | SHALE_OIL_GAS_RESERVES |

| Factor Name | Description | Column Header |
|---|---|---|
| Evidence of Shale Oil Reserves | This field identifies companies that provide evidence of owning Shale Oil reserves, including those that own less than 50% of a reserves field. Evidence of owning reserves includes companies providing the exact volume of reserves, and companies making a statement about their ownership of reserves. | SHALE_OIL_RESERVES |
| Oil Shale & Tar Sands - Comments | This field includes the analyst's comments on the reserves data. It may include year of reserves data, underlying assumptions in case of estimated reserve volumes, or comments on significant changes in a company's reserves ownership, where relevant. | OIL_SANDS_ANALYST_COMMENTS |
| Oil Shale & Tar Sands - Potential Emissions (MtCO2) | This field represents the potential carbon emissions of the Oil Shale & Tar Sands reserves owned by a company using a formula from the Potsdam Institute for Climate Impact research. | OIL_SANDS_POTENTIAL_EMISSIONS |
| Oil Shale & Tar Sands - Reserves KEY (Reported/Estimated) | This field indicates whether the reserve volumes of Oil Shale & Tar Sands was reported by the company or estimated by MSCI ESG Research. | OIL_SANDS_RESERVES_KEY |
| Oil Shale & Tar Sands - Reserves Volume (mmboe) | This field represents the volume of proved reserves of Oil Shale & Tar Sands owned by a company. | OIL_SANDS_RESERVES_VOLUME |

| Factor Name | Description | Column Header |
|---|---|---|
| Shale Gas - Comments | This field includes the analyst's comments on the reserves data. It may include year of reserves data, underlying assumptions in case of estimated reserve volumes, or comments on significant changes in a company's reserves ownership, where relevant. | SHALE_GAS_ANALYST_COMMENTS |
| Shale Gas - Potential Emissions (MtCO2) | This field represents the potential carbon emissions of the Shale Gas reserves owned by a company using a formula from the Potsdam Institute for Climate Impact research. | SHALE_GAS_POTENTIAL_EMISSIONS |
| Shale Gas - Reserves KEY (Reported/Estimated) | This field indicates whether the reserve volumes of Shale Gas was reported by the company or estimated by MSCI ESG Research. | SHALE_GAS_RESERVES_KEY |
| Shale Gas - Reserves Volume (mmboe) | This field represents the total volume of proved reserves (1P) of Shale Gas owned by a company. | SHALE_GAS_RESERVES_VOLUME |
| Shale Oil - Reserves KEY (Reported/Estimated) | This field indicates whether the reserve volumes of Shale Oil were reported by the company or estimated by MSCI ESG Research. | SHALE_OIL_RESERVES_KEY |
| Shale Oil & Shale Gas - Potential Emissions (MtCO2) | This field represents the potential carbon emissions of the Shale Gas and/or Shale Oil reserves owned by a company. It is computed as the sum of the potential carbon emissions of the Shale Oil and Shale Gas reserves owned by the company. | SHALE_OIL_GAS_POTENTIAL_EMISSIONS |

| Factor Name | Description | Column Header |
|---|---|---|
| Shale Oil & Shale Gas - Reserves Volume (mmboe) | This field represents the volume of proved reserves of Shale Gas and/or Shale Oil owned by a company. This also includes Tight Gas, Coal Bed Methane and Coal Seam Gas. It is computed as the sum of the Shale Oil and Shale Gas reserves owned by the company. | SHALE_OIL_GAS_RESERVES_VOLUME |
| Shale Oil - Comments | This field includes the analyst's comments on the reserves data. It may include year of reserves data, underlying assumptions in case of estimated reserve volumes, or comments on significant changes in a company's reserves ownership, where relevant. | SHALE_OIL_ANALYST_COMMENTS |
| Shale Oil - Potential Emissions (MtCO2) | This field represents the potential carbon emissions of the Shale Oil reserves owned by a company using a formula from the Potsdam Institute for Climate Impact research. | SHALE_OIL_POTENTIAL_EMISSIONS |
| Shale Oil - Reserves Volume (mmboe) | This field represents the total volume of proved reserves (1P) of Shale Oil owned by a company. | SHALE_OIL_RESERVES_VOLUME |
| Total Unconventional Oil & Gas - Potential Emissions (MtCO2) | This field represents the potential carbon emissions of the Unconventional Oil & Gas reserves owned by a company. It is computed as the sum of the potential carbon emissions of the Shale Oil reserves, Shale Gas reserves, and Oil Shale & Tar Sands reserves owned by the company. | UNCONV_OIL_GAS_POTENTIAL_EMISSIONS |

| Factor Name | Description | Column Header |
|---|---|---|
| Total Unconvention-al Oil & Gas - Reserves Volume (mmboe) | This field represents the total volume of proved reserves (1P) of Unconventional Oil & Gas owned by a company. It is computed as the sum of Shale Oil reserves, Shale Gas reserves and Oil Shale & Tar Sands reserves owned by the company. | UNCONV_OIL_GAS_RESERVES_VOLUME |
| FOSSIL FUEL SUMMARY FOLDER | | |
| Carbon intensity of fossil fuel reserves (MtCO2/mmboe) | This field represents the carbon intensity of fossil fuel reserves owned by a company. Fossil reserves are defined as proved and probable reserves (i.e. 1P and 2P) for coal and proved reserves (i.e. 1P) for Oil and Natural Gas. | INTENSITY_OF_FF_RESERVES |
| Fossil Fuel Reserves | This field identifies companies with evidence of owning fossil fuel reserves regardless of their industries, including companies that own less than 50% of a reserves field. Fossil reserves are defined as proved and probable reserves (i.e. 1P and 2P) for Coal and proved reserves (i.e. 1P) for Oil and Natural Gas. Evidence of owning reserves includes companies providing the exact volume of reserves, and companies making a statement about their ownership of reserves. | FOSSIL_FUEL_RESERVES |
| GICS Sub-Industry | GICS Sub-Industry | GICS_SUB_IND |

| Factor Name | Description | Column Header |
|---|---|---|
| Industry - Energy Application | Companies with fossil fuel reserves used for energy application. This includes companies with reserves in the following industries (GICS): Oil & Gas and Consumable Fuels; Metals and Mining; Energy Equipment & Services and Utilities. | INDUSTRY_ENERGY_APPLICATION |
| Industry - Energy Producer | Companies involved in the exploration and production of Oil & Gas as well as in the refining and marketing of oil and gas products. This includes companies that may not have reserves in the following GICS sub-industries: Integrated Oil & Gas; Oil & Gas Exploration & Production; Oil & Gas Refining & Marketing. | INDUSTRY_ENERGY_PRODUCER |
| Industry - Energy Supplier | Companies involved in the manufacturing of equipment and the provision of supplies and services to the energy producers. This includes companies which may not have fossil fuel reserves in the following GICS sub-industries: Oil & Gas Drilling; Oil & Gas Equipment & Services; Oil & Gas Storage & Transportation. | INDUSTRY_ENERGY_SUPPLIER |
| Industry - Industrial Application | Companies involved in fossil fuel mining for use in industrial applications such as Coking Coal used for steel production or Oil used to produce chemicals. This includes companies with fossil fuel reserves in the following GICS sub-industries: Steel, Diversified Chemicals, and Commodity Chemicals. | INDUSTRY_INDUSTRIAL_APPLICATION |

| Factor Name | Description | Column Header |
|---|---|---|
| Industry - Other Application | Companies with fossil fuel reserves used for other applications than industrial and energy. This includes companies with reserves in the following GICS sub-industries: Industrial Conglomerate, Marine or Multiline Insurance. | INDUSTRY_OTHER_APPLICATION |
| Low Carbon Reduction | This field identifies companies with the largest contributions to climate change, e.g. largest owners of fossil fuel reserves; those with the largest carbon footprint; those with the highest carbon intensity. The largest contributions have been defined through a client consultation and refer to companies whose reserves account for more than 1% of the remaining global carbon budget (about 940 gtCO2), or that have a carbon footprint greater than 0.33% of the annual world carbon emissions (35 gtCO2), or with carbon intensity that exceeds 3,000 tCO2/m USD. | LOW_CARBON_REDUCTION |
| Reserves Sources | Sources | FOSSIL_FUEL_RESERVES_SOURCES |
| Total Potential Emissions (MtCO2) | This field represents the potential carbon emissions of the Coal, Oil and Gas Reserves owned by a company. It is computed as the sum of the potential carbon emissions of the total Coal, total Oil and total Gas reserves owned by the company. | TOTAL_POTENTIAL_EMISSIONS |

| Factor Name | Description | Column Header |
|---|---|---|
| Total energy content of the reserves (mmboe) | This field represents the total energy content of fossil fuel reserves (in terms of mmboe) owned by a company. Fossil reserves are defined as proved and probable reserves (i.e. 1P and 2P) for Coal and proved reserves (i.e. 1P) for Oil and Natural Gas. | TOTAL_ENERGY_CONTENT |
| Total potential emissions excluding metallurgical coal (MtCO2) | This field represents the potential carbon emissions of the fossil fuel reserves, excluding Metallurgical Coal reserves, owned by a company. It is computed as the sum of the potential carbon emissions of the Thermal Coal, total Oil and total Gas reserves owned by the company. | TOTAL_POTENTIAL_EMISSIONS_EX_MET_COAL |

## Appendix 7: Fossil Fuel Screening Factors: Revenue

| Factor Name | Description | Column Header |
|---|---|---|
| COAL - REVENUES | | |
| Thermal Coal - Involvement - 0% | Companies that derive some annual revenues (>0%) from Thermal Coal. | THERMAL_COAL_INVOLVEMENT_ANYPCT |
| Thermal Coal - Involvement - 10% | Companies that derive 10% or more of total annual revenues from Thermal Coal. | THERMAL_COAL_INVOLVEMENT |
| Thermal Coal - Maximum Percentage of Revenue | This factor identifies the maximum percentage of revenue (either reported or estimated) greater than 0% that a company derives from the mining of Thermal Coal (including lignite, bituminous, anthracite and steam coal) and its sale to external parties. It excludes: revenue from Metallurgical Coal; Coal mined for internal power generation (e.g. in the case of vertically integrated power producers); intra-company sales of mined Thermal Coal; and revenue from Coal trading. | THERMAL_COAL_MAX_REV_PCT |
| Thermal Coal - Revenues comments | This field contains notes related to a company's Thermal Coal revenues. | THERMAL_COAL_PROFILE |
| OIL & GAS - REVENUES | | |
| O&G - Extraction and Production - Maximum Percentage of Revenue | This factor identifies the maximum percentage of revenue (either reported or estimated) that a company derives from the extraction and production of Oil & Gas. | OG_REV_EXTRACTION_PROD |

| Factor Name | Description | Column Header |
|---|---|---|
| Conventional Oil & Gas Revenue (reported/estimated) | This factor identifies the maximum percentage of revenue (either reported or estimated) greater than 0% that a company derives from Conventional Oil & Gas production | CONV_OIL_GAS_MAX_REV_PCT |
| Unconventional oil and gas Revenue (reported/estimated) | This factor identifies the maximum percentage of revenue (either reported or estimated) greater than 0% that a company derives from Unconventional Oil & Gas production | UNCONV_OIL_GAS_MAX_REV_PCT |
| Oil Sands revenue (reported/estimated) | This factor identifies the maximum percentage of revenue (either reported or estimated) greater than 0% that a company derives from the production of Oil Sands | OIL_SANDS_MAX_REV_PCT |
| Shale oil Revenue (reported/estimated) | This factor identifies the maximum percentage of revenue (either reported or estimated) greater than 0% that a company derives from Shale Oil production. | SHALE_OIL_MAX_REV_PCT |
| Shale gas Revenue (reported/estimated) | This factor identifies the maximum percentage of revenue (either reported or estimated) greater than 0% that a company derives from Shale Gas production. | SHALE_GAS_REV_KEY |
| Shale Gas Revenue - Key | This field indicates whether the Shale Gas revenue figure was reported by the company or estimated. | SHALE_GAS_REV_KEY |
| Shale Oil Revenue - Key | This field indicates whether the Shale Gas revenue figure was reported by the company or estimated. | SHALE_OIL_REV_KEY |

| Factor Name | Description | Column Header |
|---|---|---|
| Arctic oil Revenue (reported/esti-mated) | This factor identifies the maximum percentage of revenue (either reported or estimated) greater than 0% that a company derives from Arctic Oil production. Arctic Oil production is currently considered any Oil production north of the 66.5° parallel. | ARCTIC_OIL_MAX_REV_PCT |
| Arctic gas Revenue (reported/esti-mated) | This factor identifies the maximum percentage of revenue (either reported or estimated) greater than 0% that a company derives from Arctic Gas production. Arctic Gas production is currently considered any Gas production north of the 66.5° parallel. | ARCTIC_GAS_MAX_REV_PCT |
| Arctic Gas Revenue - Key | This field indicates whether the revenue figure was reported by the company or estimated. | ARCTIC_GAS_REV_KEY |
| Arctic Oil Revenue - Key | This field indicates whether the revenue figure was reported by the company or estimated. | ARCTIC_OIL_REV_KEY |
| Evidence of Arctic Gas Production | This field identifies companies that provide evidence of producing Arctic Gas. This factor does not capture revenue from non-extraction activities (e.g. exploration, surveying, processing, refining); ownership of Arctic Gas reserves with no associated extraction revenue; revenue from intra-company sales. | ARCTIC_GAS_PRODUCTION |

| Factor Name | Description | Column Header |
|---|---|---|
| Evidence of Arctic Oil Production | This field identifies companies that provide evidence of producing Arctic Oil. This factor does not capture revenue from non-extraction activities (e.g. exploration, surveying, processing, refining); ownership of Arctic Oil reserves with no associated extraction revenue; revenue from intra-company sales. | ARCTIC_OIL_PRODUCTION |
| Evidence of Oil Sands Production | This field identifies companies that provide evidence of producing Oil Sands (mining or in situ). This factor does not capture revenue from non-extraction activities (e.g. exploration, surveying, processing, refining); ownership of Oil Sands reserves with no associated extraction revenue; revenue from intra-company sales. | OIL_SANDS_PRODUCTION |
| Evidence of Shale Gas Production | This field identifies companies that provide evidence of producing Gas using the method of hydraulic fracking. This factor does not capture revenue from non-extraction activities (e.g. exploration, surveying, processing, refining); ownership of shale gas reserves with no associated extraction revenue; revenue from intra-company sales. | SHALE_GAS_PRODUCTION |

| Factor Name | Description | Column Header |
|---|---|---|
| Evidence of Shale Oil Production | This field identifies companies that provide evidence of producing Oil using the method of hydraulic fracking. This factor does not capture revenue from non-extraction activities (e.g. exploration, surveying, processing, refining); ownership of shale oil reserves with no associated extraction revenue; revenue from intra-company sales. | SHALE_OIL_PRODUCTION |
| Oil Sands - Involvement - 0% | Companies that derive some annual revenue (>0%) from Oil Sands. | OIL_SANDS_INVOLVEMENT_ANYPCT |
| Oil Sands - Involvement - 10% | Companies that derive 10% or more of total annual revenues from Oil Sands. | OIL_SANDS_INVOLVEMENT |
| Oil Sands - Maximum Percentage of Revenue | This factor identifies the maximum percentage of revenue (either reported or estimated) greater than 0% that a company derives from Oil Sands extraction for a set of companies that own Oil Sands reserves and disclose evidence of deriving revenue from Oil Sands extraction. This factor does not include revenue from non-extraction activities (e.g. exploration, surveying, processing, refining); ownership of Oil Sands reserves with no associated extraction revenues; revenue from intra-company sales. | OIL_SANDS_MAX_REV_PCT |
| Oil Sands - Revenue comments | This field contains notes related to a company's Oil Sands revenue. | OIL_SANDS_PROFILE |

| Factor Name | Description | Column Header |
|---|---|---|
| Biofuel - Maximum Percentage of Revenue | This factor identifies the maximum percentage of revenue that a company derives from biofuel production and/or sales. | REV_BIOFUELS |
| O&G - Distribution / Retail - Maximum Percentage of Revenue | This factor identifies the maximum percentage of revenue (either reported or estimated) that a company derives from the distribution and retailing of Oil &Gas and related products. It includes revenues from crude and petroleum products storage facilities and terminals, bulk stations, gasoline and fuel oil retail stations as well as Liquefied Petroleum Gas stations and Natural Gas distribution. | OG_REV_DISTRIBUTION |
| O&G - Equipment and Services - Maximum Percentage of Revenue | This factor identifies the maximum percentage of revenue (either reported or estimated) that a company derives from equipment and services for the exploration and production of Oil and Natural Gas. It includes revenue from Oil & Gas exploration services, related equipment manufacturing, seismic surveys, engineering services and heavy construction related to Oil & Gas exploration activities. It excludes revenue from extraction & production. | OG_REV_EQUIPMT_SERVICES |

| Factor Name | Description | Column Header |
|---|---|---|
| O&G - Petrochemicals - Maximum Percentage of Revenue | This factor identifies the maximum percentage of revenue (either reported or estimated) that a company derives from petrochemical products. It includes revenue from industrial organics, inorganics, not elsewhere classified and lubes and greases. | OG_REV_PETROCHEMICALS |
| O&G - Pipelines and Transportation - Maximum Percentage of Revenue | This factor identifies the maximum percentage of revenue (either reported or estimated) that a company derives from Oil & Gas pipelines and transportation. It includes revenue from midstream operations but excludes revenues from terminals and storage facilities. | OG_REV_PIPELINES_TRANSP |
| O&G - Refining - Maximum Percentage of Revenue | This factor identifies the maximum percentage of revenue (either reported or estimated) that a company derives from refining Oil & Gas. | OG_REV_REFINING |
| O&G - Trading - Maximum Percentage of Revenue | This factor identifies the maximum percentage of revenue (either reported or estimated) that a company derives from the trading of Oil & Gas and related products. | OG_REV_TRADING |

| Factor Name | Description | Column Header |
|---|---|---|
| O&G Related Activities - Maximum Percentage of Revenue | This factor identifies the maximum percentage of revenue (either reported or estimated) that a company derives from Oil & Gas-related activities, including distribution / retail, equipment and services, extraction and production, petrochemicals, pipelines and transportation and refining but excluding biofuel production and sales and trading activities. | OG_REV |
| O&G - California State Department of Insurance (CA DOI) Maximum Percentage of Revenue | Maximum percentage of revenue derived from Oil & Gas activities as per the definition of California State Department of Insurance (CA DOI). It includes revenue from extraction and production, pipelines and transportation and refining but excludes revenue from distribution / retail, equipment and services, petrochemicals, biofuel production and sales and trading activities. This factor returns figures for all companies with relevant revenue regardless of the amount; the disclosure threshold recommended by the CA DOI is 50%. Note: more granularity at the O&G activity level is provided in the standard O&G revenue factors. | DOI_OIL_GAS_REV |

| Factor Name | Description | Column Header |
|---|---|---|
| Febelfin - Unconvention-al Oil &Gas - Maximum Percentage of Revenue | This factor identifies the maximum percentage of revenue (either reported or estimated) greater than 0% that a company derives from Unconventional Oil & Gas as per the definition of Febelfin. It includes revenue from Oil Sands, Oil Shale (kerogen-rich deposits), Shale Gas, Shale Oil, Coal Seam Gas, Coal Bed Methane as well as Arctic onshore/offshore. It excludes Conventional Oil & Gas production, deepwater, shallow water and other onshore/offshore. This factor returns figures for all companies with relevant revenue, regardless of the amount; the disclosure threshold recommended by Febelfin is 10% (as of 2019). Added in April 2019. | FEBELFIN_UNCONV_OIL_GAS_MAX_REV_PCT |
| Febelfin - Conventional Oil & Gas - Maximum Percentage of Revenue | This factor identifies the maximum percentage of revenue (either reported or estimated) greater than 0% that a company derives from Conventional Oil & Gas per the definition of Febelfin. It includes revenue from Conventional Oil & Gas production, deepwater, shallow water and other onshore/offshore. It excludes Unconventional Oil & Gas production (Sands, Oil Shale (kerogen-rich deposits), Shale Gas, Shale Oil, Coal Seam Gas, Coal Bed Methane) as well as Arctic onshore/offshore. Added in April 2019. | FEBELFIN_CONV_OIL_GAS_MAX_REV_PCT |

## Appendix 8: Pre-Defined Fossil Fuel Screens

MSCI ESG Climate Change Metrics offers the following pre-defined screens to measure and help clients identify exposure to fossil fuels:

| Factor Name | Description | Column Header |
|---|---|---|
| Fossil Fuel Reserves | This screen identifies companies with reported fossil fuel reserves, with a volume of reserves greater than 0, including Oil, Natural Gas and Coal in the coverage universe. | FOSSIL_FUEL_RESERVES |
| Fossil Fuel Reserves – Energy Application | This screen identifies companies, regardless of their industries, with evidence of owning fossil fuel reserves used most likely for energy applications. For high-intensity industries (belonging to Energy and Utilities GICS Sector & Diversified Metals & Mining GICS Sub-Industry), this factor flags companies with evidence of fossil fuel reserves (excluding Metallurgical Coal). For other industries, it flags companies with evidence of fossil fuel reserves (excluding Metallurgical Coal) and deriving revenue from business segments associated with energy application of fossil fuels such as Thermal Coal mining, Oil & Gas exploration & production and downstream activities e.g. refining; distribution & retail; pipeline & transportation; trading and fossil fuel- based power generation. | FF_RESERVES_ENERGY_APPLICATION |

| Factor Name | Description | Column Header |
|---|---|---|
| Low Carbon Reduction | This screen identifies companies with the largest contributions to climate change using the following criteria:<br>• Largest owners of fossil fuel reserves<br>• Those with the largest carbon footprint<br>• Those with the highest carbon intensity<br>This option is designed to identify any company whose reserves account for more than 1% of the remaining global carbon budget (about 940 GtCO2, as of 2013), or that has a carbon footprint greater than 0.33% of the annual world carbon-dioxide emissions (~35 GtCO2), or with carbon intensity that exceeds 3,000 tCO2/m USD of sales. | LOW_CARBON_REDUCTION |
| Total Potential Emissions (MtCO2) | This field represents the potential carbon emissions of the Coal, Oil & Gas reserves owned by a company. It is computed as the sum of the potential carbon emissions of the total Coal, total Oil and total Gas reserves owned by the company. | TOTAL_POTENTIAL_EMISSIONS |
| Thermal Coal – Any Tie | This factor identifies companies with an industry tie to Thermal Coal, in particular reserve ownership, production and power generation.<br>Note: available for ACWI, to be expanded to ACWI IMI by Q4 2019. | THERMAL_COAL_ANY_TIE |

| Factor Name | Description | Column Header |
|---|---|---|
| Oil & Gas – Any Tie | Companies with an industry tie to Oil & Gas, in particular reserve ownership, Oil & Gas-related revenue and power generation. It does not flag companies generating revenue from biofuels.<br>Note: available for ACWI, to be expanded to ACWI IMI by Q4 2019. | OIL_GAS_ANY_TIE |
| Oil Sands – Any Tie | This factor identifies companies with an industry tie to Oil Sands, in particular reserve ownership and production activities.<br>Note: available for ACWI, to be expanded to ACWI IMI by Q4 2019. | OIL_SANDS_ANY_TIE |
| Shale Gas/Shale Oil – Any Tie | This factor identifies companies with an industry tie to Shale Gas and Shale Oil, in particular reserve ownership and production activities.<br>Note: this factor is available for MSCI ACWI IMI universe; within MSCI ACWI universe it is flagging companies involved in either reserve ownership and/or production; for remaining companies of MSCI ACWI IMI universe it is only flagging companies owning reserves, as production revenue will be expanded by Q4 2019. | SHALE_GAS_SHALE_OIL_ANY_TIE |
| Fossil Fuels – Any Tie | Companies with an industry tie to fossil fuels (Thermal Coal, Oil & Gas), in particular reserve ownership, related revenue and power generation. It does not flag companies providing evidence of owning Metallurgical Coal | FOSSIL_FUELS_ANY_TIE |

## Appendix 9: Capital Expenditure and Renewable Energy Capex Ratios

| Factor name | Description | Column Header |
|---|---|---|
| CapEx plan - currency | Reporting currency of the company's most recently reported capital expenditure plan. | CAPEX_CCY |
| CapEx plan - start year | Start year of the company's most recently reported capital expenditure plan. | CAPEX_START_YEAR |
| CapEx plan - end year | The year the company's most recently reported capital expenditure plan ends. When the start year equals the end year, this indicates CapEx for a single fiscal year. | CAPEX_END_YEAR |
| Time horizon (forward looking or historical) | Indicates the time-horizon of the most recently reported capital expenditure plan - forward-looking planned capital expenditure or historically reported capital expenditure for a prior time period. If a forward-looking capital expenditure plan is available, this would be considered the most recent plan. | CAPEX_HORIZON |
| CapEx in electric networks infrastructure (millions) | Capital expenditure in electric networks infrastructure (transmission and distribution) in the most recently reported capital expenditure plan, expressed in the reporting currency (CAPEX_CCY) in millions. | CAPEX_NETWORKS_ELEC_CCY |

| Factor name | Description | Column Header |
|---|---|---|
| CapEx in gas networks infrastructure (millions) | Capital expenditure in natural gas networks infrastructure (transmission and distribution) in the most recently reported capital expenditure plan, expressed in the reporting currency (CAPEX_CCY) in millions. | CAPEX_NETWORKS_GAS_CCY |
| CapEx in district heating (millions) | Capital expenditure in district heating in the most recently reported capital expenditure plan, expressed in the reporting currency (CAPEX_CCY) in millions. | CAPEX_NETWORKS_HEAT_CCY |
| Total CapEx in network infrastructure (millions) | Total capital expenditure for networks infrastructure (including electric, gas, and heating, as applicable to the company's business mix) in the most recently reported capital expenditure plan, expressed in the reporting currency (CAPEX_CCY) in millions. | CAPEX_NETWORKS_TOTAL_CCY |
| CapEx in coal-fired power generation assets (millions) | Capital expenditure in coal-fired power generation assets in the most recently reported capital expenditure plan, expressed in the reporting currency (CAPEX_CCY) in millions. | CAPEX_GENERAT_COAL_CCY |
| CapEx in natural gas-fired power generation assets (millions) | Capital expenditure in natural gas-fired power generation assets in the most recently reported capital expenditure plan, expressed in the reporting currency (CAPEX_CCY) in millions. | CAPEX_GENERAT_NAT_GAS_CCY |

| Factor name | Description | Column Header |
|---|---|---|
| CapEx in liquid fuel-fired power generation assets (millions) | Capital expenditure in liquid fuel-fired power generation assets in the most recently reported capital expenditure plan, expressed in the reporting currency (CAPEX_CCY) in millions. | CAPEX_GENERAT_LIQUID_FUEL_CCY |
| CapEx in nuclear power generation assets (millions) | Capital expenditure in nuclear power generation assets in the most recently reported capital expenditure plan, expressed in the reporting currency (CAPEX_CCY) in millions. | CAPEX_GENERAT_NUCLEAR_CCY |
| Total CapEx in thermal power generation assets (millions) | Capital expenditure in thermal power generation assets (including coal, natural gas, liquid fuels and nuclear) in the most recently reported capital expenditure plan, expressed in the reporting currency (CAPEX_CCY) in millions. | CAPEX_GENERAT_THERMAL_CCY |
| CapEx in hydro power generation assets (millions) | Capital expenditure in hydro power generation assets in the most recently reported capital expenditure plan, expressed in the reporting currency (CAPEX_CCY) in millions. | CAPEX_GENERAT_HYDRO_CCY |
| CapEx in wind power generation assets (millions) | Capital expenditure in wind power generation assets (onshore and offshore) in the most recently reported capital expenditure plan, expressed in the reporting currency (CAPEX_CCY) in millions. | CAPEX_GENERAT_WIND_CCY |

| Factor name | Description | Column Header |
|---|---|---|
| CapEx in solar power generation assets (millions) | Capital expenditure in solar power generation assets in the most recently reported capital expenditure plan, expressed in the reporting currency (CAPEX_CCY) in millions. | CAPEX_GENERAT_SOLAR_CCY |
| CapEx in biomass power generation assets (millions) | Capital expenditure in biomass power generation assets in the most recently reported capital expenditure plan, expressed in the reporting currency (CAPEX_CCY) in millions. | CAPEX_GENERAT_BIOMASS_CCY |
| CapEx in other renewable power generation assets (millions) | Capital expenditure in other renewable power generation assets (wave, tidal, etc. - excluding hydro, wind, solar and biomass) in the most recently reported capital expenditure plan, expressed in the reporting currency (CAPEX_CCY) in millions. | CAPEX_GENERAT_OTHER_RES_CCY |
| CapEx in renewable power generation assets (millions) | Total capital expenditure in renewable power generation assets (including wind, solar, biomass, hydro and other renewables) in the most recently reported capital expenditure plan, expressed in the reporting currency (CAPEX_CCY) in millions. | CAPEX_GENERAT_RENEW_CCY |
| Total CapEx in power generation assets (millions) | Total capital expenditure attributed to any power generation assets (including all thermal and all types of renewables) in the most recently reported capital expenditure plan, expressed in the reporting currency (CAPEX_CCY) in millions. | CAPEX_GENERAT_TOTAL_CCY |

| Factor name | Description | Column Header |
|---|---|---|
| Total CapEx (millions) | Total company capital expenditure in the most recently reported capital expenditure plan, expressed in the reporting currency (CAPEX_CCY) in millions. | CAPEX_TOTAL_COMPANY_CCY |
| Renewable power generation CapEx as a proportion of total CapEx (%) | Capital expenditure in renewable power generation assets (wind, solar, biomass, hydro and other renewables) as a proportion of total company capital expenditure (including networks infrastructure, all power generation assets and other capital expenditure) in the most recently reported capital expenditure plan. | RENEW_ENERGY_CAPEX_VS_TOTAL_CAPEX_PCT |
| Thermal power generation CapEx as a proportion of total CapEx (%) | Capital expenditure in thermal power generation assets (coal, gas, oil and nuclear) as a proportion of total company capital expenditure (including networks infrastructure, all power generation assets and other capital expenditure) in the most recently reported capital expenditure plan. | THERMAL_ENERGY_CAPEX_VS_TOTAL_CAPEX_PCT |

## Appendix 10: Carbon for Sovereigns

| Factor name | Description | Column Header |
|---|---|---|
| GENERAL DATA | | |
| GDP nominal (USD) | The data point represents nominal GDP of a country in USD terms. (Source: WDI, CIA) | CARBON_GOVERNMENT_GDP_NOMINAL_USD |
| Public debt (% of nominal GDP) | The data point represents the latest public debt values, and is expressed as % of GDP. Public debt is the cumulative total of all government borrowings less repayments that are denominated in a country's home currency. (Source: WDI, CIA) | CARBON_GOVERNMENT_RAW_PUBLIC_DEBT |
| PHYSICAL AND ECONOMIC VULNERABILITY | | |
| Agricultural and forest land | Availability of agriculture and forest land in a country. Represented in square km per 1,000 person (Source: WDI) | GOVERNMENT_RAW_AG_FOREST |
| Energy consumption per capita (kgoe per capita) | Represented in “kg of oil equivalent per capita.” Energy use refers to use of primary energy before transformation to other end-use fuels, which is equal to indigenous production plus imports and stock changes, minus exports and fuels supplied to ships and aircraft engaged in international transport. (Source: WDI) | GOVERNMENT_RAW_EN_CONS |

| Factor name | Description | Column Header |
|---|---|---|
| Energy imports (Net, % of Energy Use) | Energy imports as % of total energy use. Net energy imports are estimated as energy use less production, both measured in oil equivalents. A negative value indicates that the country is a net exporter. Energy use refers to use of primary energy before transformation to other end-use fuels, which is equal to indigenous production plus imports and stock changes, minus exports and fuels supplied to ships and aircraft engaged in international transport. (Source: WDI) | GOVERNMENT_RAW_EN_IMP |
| Energy productivity | GDP per unit of energy use. GDP is presented in constant 2011 PPP USD. Unit of energy use is - kg of oil equivalent (kgoe). (Source: WDI) | GOVERNMENT_RAW_EN_PROD |
| Energy resource depletion (% of GNI) | Energy resource depletion is the ratio of the value of the stock of energy resources to the remaining reserve lifetime (capped at 25 years). It covers Coal, Crude Oil, and Natural Gas. Represented in terms of % of GNI. (Source: WDI) | GOVERNMENT_RAW_EN_RES_DEP |

| Factor name | Description | Column Header |
|---|---|---|
| Environmental Vulnerability Index (EVI) | The Environmental Vulnerability Index reflects the extent to which the natural environment of a country is prone to damage and degradation. This index contains indicators on weather and climate, geology, geography, ecosystem resources and services, high winds, dry periods, endemics, frequency of earthquake, tsunamis, volcanic eruptions, etc. Score indications are: below 215 (Resilient), above 215 (at Risk), above 265 (Vulnerable), above 315 (Highly vulnerable) and above 365 (Extremely vulnerable). (Source: Vulnerability Index) | CARBON_GOVERNMENT_ENV_VULNERABILITY_INDEX |
| Forest cover change (3-year CAGR) | % change in forest cover (3-year trend - CAGR) in a country. Negative value indicates depleting forest cover. Source: WDI | GOVERNMENT_RAW_FOR_COV |
| Fuel exports (% of total exports) | The data point represents mineral fuels exports as % of total exports of a country (in USD terms). (Source: WDI) | CARBON_GOVERNMENT_FUEL_EXPORTS |
| Net forest depletion (% of GNI) | Represents the depletion rate of forest resources as a percentage of Gross National Income (GNI). (Source: WDI) | GOVERNMENT_RAW_NET_FOR_DE |

| Factor name | Description | Column Header |
|---|---|---|
| Population affected by natural disasters (average per year per million) | People (average per year per million people) requiring immediate assistance during a period of emergency as the result of a natural disaster (drought, extreme temperature, flood, mass movement, wet storm and wildfire), including displaced, evacuated, homeless and injured people. (Sources: WDI, UNDP, HDR) | GOVERNMENT_RAW_POP_NAT_DIS |
| Proven fossil fuel reserves (kg of oil equivalent/capita) | Per capita availability of fossil fuel reserves (in kg of oil equivalent per person), such as Coal, Oil & Gas. (Source: EIA, CIA, WDI) | CARBON_GOVERNMENT_FOSSIL_RESERVE |
| TRANSITION RISKS | | |
| CO2 emissions (tons) | Total CO2 emissions per year in a country. Represented in tons. This data contains CO2 emission related to fossil fuel use and industrial processes (e.g. cement production etc.). (Source: EDGAR) | CARBON_GOVERNMENT_CO2 |
| CO2 emissions (tons) trend, 3-year CAGR (%) | % change in Total CO2 emissions (3-year trend - CAGR) in a country. This data contains CO2 emission related to fossil fuel use and industrial processes (e.g. cement production etc.). (Source: EDGAR) | CARBON_GOVERNMENT_CO2_TREND |
| CO2 emissions per capita | CO2 emissions per capita per year in a country. Represented in tons per capita. This data contains CO2 emissions related to fossil fuel use and industrial processes (e.g. cement production etc.). Source: EDGAR | GOVERNMENT_RAW_CO2 |

| Factor name | Description | Column Header |
|---|---|---|
| CO2 emissions per capita (tons) trend, 3 year CAGR (%) | % change in CO2 emissions per capita (3-year trend - CAGR) in a country. This data contains CO2 emission related to fossil fuel use and industrial processes (e.g. cement production etc.). (Source: EDGAR) | CARBON_GOVERNMENT_CO2_CAPITA_TREND |
| CO2 intensity (kg per USD GDP nominal) | This data point represents CO2 intensity of an economy (in kg per USD GDP nominal). The higher the value the more carbon-intensive the economy is. It considers CO2 emission related to fossil fuel use and industrial processes (e.g. cement production etc.). (Sources: EDGAR, WDI) | CARBON_GOVERNMENT_CO2_INTENSITY_GDP |
| CO2 intensity (kg per USD GDP nominal) trend, 3-year CAGR (%) | % change in the CO2 intensity of an economy (3- year trend - CAGR). It considers CO2 emission related to fossil fuel use and industrial processes (e.g. cement production etc.). (Source: EDGAR) | CARBON_GOVERNMENT_CO2_INTENSITY_GDP_TREND |
| CO2 intensity (t/USD million GDP nominal) | This data point represents CO2 intensity of an economy (in tons per USD million GDP nominal). The higher the value the more carbon-intensive the economy is. It considers CO2 emission related to fossil fuel use and industrial processes (e.g. cement production etc.). (Sources: EDGAR, WDI). | CARBON_GOVERNMENT_CO2_INTENSITY_GDP_TONPERMN |

| Factor name | Description | Column Header |
|---|---|---|
| GHG emissions (% of world total) | Greenhouse gas emissions (represented in "% of world total"). Three out of six greenhouse gases, considered under Kyoto Protocol, are considered for this data point. These gases are carbon dioxide, methane and nitrous oxide. (Source: WDI, UNFCCC) | GOVERNMENT_RAW_GHG_PCT |
| GHG emissions (tons of CO2 eq) | Total Greenhouse gas emissions in a country represented in terms of tons CO2 equivalent. Three out of six greenhouse gases, considered under Kyoto Protocol, are considered for this data point. These gases are carbon dioxide, methane and nitrous oxide. (Source: EDGAR) | CARBON_GOVERNMENT_GHG |
| GHG emissions (tons of CO2 eq) trend, 3 year CAGR (%) | % change in Total GHG emissions (3-year trend - CAGR) in a country. (Source: EDGAR) | CARBON_GOVERNMENT_GHG_TREND |
| GHG emissions per capita (tons of CO2 eq) | Tons CO2e per capita. Three out of six greenhouse gases, considered under Kyoto Protocol, are considered for this data point. These gases are carbon dioxide, methane and nitrous oxide. (Source: EDGAR) | GOVERNMENT_RAW_GHG_CAPITA |
| GHG emissions per capita (tons of CO2e) trend, 3-year CAGR (%) | % change in per capita GHG emissions (3-year trend - CAGR) in a country. (Source: EDGAR) | CARBON_GOVERNMENT_GHG_CAPITA_TREND |

| Factor name | Description | Column Header |
|---|---|---|
| GHG intensity (kg per 2011 PPP USD of GDP) | This data point represents GHG intensity of an economy. The higher the value, the more carbon-intensive the economy is. Three out of six greenhouse gases, considered under Kyoto Protocol, are considered for this data point. These gases are carbon dioxide, methane and nitrous oxide. GDP is in 2011 PPP USD terms. (Source: WDI) | CARBON_GOVERNMENT_GHG_INTENSITY_PPS |
| GHG intensity (kg per 2011 PPP USD of GDP) trend, 3 year CAGR (%) | This data point represents % change in GHG intensity of an economy (3-year trend - CAGR). Three out of six greenhouse gases, considered under Kyoto Protocol, are considered for this data point. These gases are carbon dioxide, methane and nitrous oxide. GDP is in 2011 PPP USD terms. (Source: WDI) | CARBON_GOVERNMENT_GHG_INTENSITY_PPS_TREND |
| GHG intensity (kg per USD GDP nominal) | This data point represents GHG intensity of an economy (in kg per USD GDP nominal). The higher the value, the more carbon intensive the economy is. Three out of six greenhouse gases, considered under Kyoto Protocol, are considered for this data point. These gases are carbon dioxide, methane and nitrous oxide. GDP is in nominal terms. (Sources: EDGAR, WDI) | CARBON_GOVERNMENT_GHG_INTENSITY_GDP |
| **SOVEREIGN WARMING POTENTIAL** | | |
| Sovereign Warming Potential – BAU scenario [°C] | A country's alignment temperature when referencing a business as usual scenario. This metric could be used to assess a country's alignment to a global stabilization goal, based on the | GOVERNMENT_SOV_WARMING_BAU |

| Factor name | Description | Column Header |
|---|---|---|
| | current emission profile of the country.<br>Source: MSCI ESG Research United Nations Environment Programme (2019). Emissions Gap Report 2019. UNEP, NairobiUnited Nations Population Prospects (2019), Median Variant Scenario Institute for Global Environmental Strategies | |
| Sovereign Warming Potential – NDC scenario [°C] | A country's alignment temperature when referencing the country's Nationally Determined Contribution (NDC). This metric could be used to assess a country's alignment to a global stabilization goal, based on the country's commitments to reduce its emission profile. NDCs embody efforts by each country to reduce national emissions and adapt to the impacts of climate change. The Paris Agreement requests each Party to prepare, communicate and maintain successive NDCs that it intends to achieve.<br>Source: MSCI ESG Research United Nations Environment Programme (2019). Emissions Gap Report 2019. UNEP, Nairobi United Nations Population Prospects (2019), Median Variant Scenario Institute for Global Environmental Strategies | GOVERNMENT_SOV_WARMING_NDC |

| Factor name | Description | Column Header |
|---|---|---|
| GHG intensity (kg per USD GDP nominal) trend, 3-year CAGR (%) | This data point represents % change in GHG intensity of an economy (3-year trend - CAGR). Three out of six greenhouse gases, considered under Kyoto Protocol, are considered for this data point. These gases are carbon dioxide, methane and nitrous oxide. (Source: EDGAR, WDI) | CARBON_GOVERNMENT_GHG_INTENSITY_GDP_TREND |
| GHG intensity (t/USD million GDP nominal) | This data point represents GHG intensity of an economy (in tons per USD million GDP nominal). The higher the value, the more carbon-intensive the economy is. Three out of six greenhouse gases, considered under Kyoto Protocol, are considered for this data point. These gases are carbon dioxide, methane and nitrous oxide. GDP is in nominal terms. (Sources: EDGAR, WDI). The unit used is aligned with the one for corporates intensity data (Scope 1+2 Intensity (t/USD million sales)) | CARBON_GOVERNMENT_GHG_INTENSITY_GDP_TONPERMN |

# Contact us

msci.com/contact-us

**AMERICAS**

| | |
|---|---|
| Americas | 1 888 588 4567 * |
| Atlanta | + 1 404 551 3212 |
| Boston | + 1 617 532 0920 |
| Chicago | + 1 312 675 0545 |
| Monterrey | + 52 81 1253 4020 |
| New York | + 1 212 804 3901 |
| San Francisco | + 1 415 836 8800 |
| São Paulo | + 55 11 3706 1360 |
| Toronto | + 1 416 628 1007 |

**EUROPE, MIDDLE EAST & AFRICA**

| | |
|---|---|
| Cape Town | + 27 21 673 0100 |
| Frankfurt | + 49 69 133 859 00 |
| Geneva | + 41 22 817 9777 |
| London | + 44 20 7618 2222 |
| Milan | + 39 02 5849 0415 |
| Paris | 0800 91 59 17 * |

**ASIA PACIFIC**

| | |
|---|---|
| China North | 10800 852 1032 * |
| China South | 10800 152 1032 * |
| Hong Kong | + 852 2844 9333 |
| Mumbai | + 91 22 6784 9160 |
| Seoul | 00798 8521 3392 * |
| Singapore | 800 852 3749 * |
| Sydney | + 61 2 9033 9333 |
| Taipei | 008 0112 7513 * |
| Thailand | 0018 0015 6207 7181 * |
| Tokyo | + 81 3 5290 1555 |

* toll-free

## About MSCI

MSCI is a leading provider of critical decision support tools and services for the global investment community. With over 50 years of expertise in research, data and technology, we power better investment decisions by enabling clients to understand and analyze key drivers of risk and return and confidently build more effective portfolios. We create industry-leading research-enhanced solutions that clients use to gain insight into and improve transparency across the investment process.

## About MSCI ESG Research Products and Services

MSCI ESG Research products and services are provided by MSCI ESG Research LLC, and are designed to provide in-depth research, ratings and analysis of environmental, social and governance-related business practices to companies worldwide. ESG ratings, data and analysis from MSCI ESG Research LLC. Are also used in the construction of the MSCI ESG Indexes. MSCI ESG Research LLC is a Registered Investment Adviser under the Investment Advisers Act of 1940 and a subsidiary of MSCI Inc.

To learn more, please visit www.msci.com.

# Notice and disclaimer

This document and all of the information contained in it, including without limitation all text, data, graphs, charts (collectively, the "Information") is the property of MSCI Inc. or its subsidiaries (collectively, "MSCI"), or MSCI's licensors, direct or indirect suppliers or any third party involved in making or compiling any Information (collectively, with MSCI, the "Information Providers") and is provided for informational purposes only. The Information may not be modified, reverse-engineered, reproduced or redisseminated in whole or in part without prior written permission from MSCI. All rights in the Information are reserved by MSCI and/or its Information Providers.

The Information may not be used to create derivative works or to verify or correct other data or information. For example (but without limitation), the Information may not be used to create indexes, databases, risk models, analytics, software, or in connection with the issuing, offering, sponsoring, managing or marketing of any securities, portfolios, financial products or other investment vehicles utilizing or based on, linked to, tracking or otherwise derived from the Information or any other MSCI data, information, products or services.

The user of the Information assumes the entire risk of any use it may make or permit to be made of the Information. NONE OF THE INFORMATION PROVIDERS MAKES ANY EXPRESS OR IMPLIED WARRANTIES OR REPRESENTATIONS WITH RESPECT TO THE INFORMATION (OR THE RESULTS TO BE OBTAINED BY THE USE THEREOF), AND TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, EACH INFORMATION PROVIDER EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES (INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF ORIGINALITY, ACCURACY, TIMELINESS, NON-INFRINGEMENT, COMPLETENESS, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE) WITH RESPECT TO ANY OF THE INFORMATION.

Without limiting any of the foregoing and to the maximum extent permitted by applicable law, in no event shall any Information Provider have any liability regarding any of the Information for any direct, indirect, special, punitive, consequential (including lost profits) or any other damages even if notified of the possibility of such damages. The foregoing shall not exclude or limit any liability that may not by applicable law be excluded or limited, including without limitation (as applicable), any liability for death or personal injury to the extent that such injury results from the negligence or willful default of itself, its servants, agents or sub-contractors.

Information containing any historical information, data or analysis should not be taken as an indication or guarantee of any future performance, analysis, forecast or prediction. Past performance does not guarantee future results.

The Information should not be relied on and is not a substitute for the skill, judgment and experience of the user, its management, employees, advisors and/or clients when making investment and other business decisions. All Information is impersonal and not tailored to the needs of any person, entity or group of persons.

None of the Information constitutes an offer to sell (or a solicitation of an offer to buy), any security, financial product or other investment vehicle or any trading strategy.

It is not possible to invest directly in an index. Exposure to an asset class or trading strategy or other category represented by an index is only available through third party investable instruments (if any) based on that index. MSCI does not issue, sponsor, endorse, market, offer, review or otherwise express any opinion regarding any fund, ETF, derivative or other security, investment, financial product or trading strategy that is based on, linked to or seeks to provide an investment return related to the performance of any MSCI index (collectively, "Index Linked Investments"). MSCI makes no assurance that any Index Linked Investments will accurately track index performance or provide positive investment returns. MSCI Inc. is not an investment adviser or fiduciary and MSCI makes no representation regarding the advisability of investing in any Index Linked Investments.

Index returns do not represent the results of actual trading of investible assets/securities. MSCI maintains and calculates indexes, but does not manage actual assets. The calculation of indexes and index returns may deviate from the stated methodology. Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the index or Index Linked Investments. The imposition of these fees and charges would cause the performance of an Index Linked Investment to be different than the MSCI index performance.

The Information may contain back tested data. Back-tested performance is not actual performance, but is hypothetical. There are frequently material differences between back tested performance results and actual results subsequently achieved by any investment strategy.

Constituents of MSCI equity indexes are listed companies, which are included in or excluded from the indexes according to the application of the relevant index methodologies. Accordingly, constituents in MSCI equity indexes may include MSCI Inc., clients of MSCI or suppliers to MSCI. Inclusion of a security within an MSCI index is not a recommendation by MSCI to buy, sell, or hold such security, nor is it considered to be investment advice.

Data and information produced by various affiliates of MSCI Inc., including MSCI ESG Research LLC and Barra LLC, may be used in calculating certain MSCI indexes. More information can be found in the relevant index methodologies on www.msci.com.

MSCI receives compensation in connection with licensing its indexes to third parties. MSCI Inc.'s revenue includes fees based on assets in Index Linked Investments. Information can be found in MSCI Inc.'s company filings on the Investor Relations section of msci.com.

MSCI ESG Research LLC is a Registered Investment Adviser under the Investment Advisers Act of 1940 and a subsidiary of MSCI Inc. Neither MSCI nor any of its products or services recommends, endorses, approves or otherwise expresses any opinion regarding any issuer, securities, financial products or instruments or trading strategies and MSCI's products or services are not a recommendation to make (or refrain from making) any kind of investment decision and may not be relied on as such, provided that applicable products or services from MSCI ESG Research may constitute investment advice. MSCI ESG Research materials, including materials utilized in any MSCI ESG Indexes or other products, have not been submitted to, nor received approval from, the United States Securities and Exchange Commission or any other regulatory body. MSCI ESG and climate ratings, research and data are produced by MSCI ESG Research LLC, a subsidiary of MSCI Inc. MSCI ESG Indexes, Analytics and Real Estate are products of MSCI Inc. that utilize information from MSCI ESG Research LLC. MSCI Indexes are administered by MSCI Limited (UK).

Please note that the issuers mentioned in MSCI ESG Research materials sometimes have commercial relationships with MSCI ESG Research and/or MSCI Inc. (collectively, "MSCI") and that these relationships create potential conflicts of interest. In some cases, the issuers or their affiliates purchase research or other products or services from one or more MSCI affiliates. In other cases, MSCI ESG Research rates financial products such as mutual funds or ETFs that are managed by MSCI's clients or their affiliates, or are based on MSCI Inc. Indexes. In addition, constituents in MSCI Inc. equity indexes include companies that subscribe to MSCI products or services. In some cases, MSCI clients pay fees based in whole or part on the assets they manage. MSCI ESG Research has taken a number of steps to mitigate potential conflicts of interest and safeguard the integrity and independence of its research and ratings. More information about these conflict mitigation measures is available in our Form ADV, available at https://adviserinfo.sec.gov/firm/summary/169222.

Any use of or access to products, services or information of MSCI requires a license from MSCI. MSCI, Barra, RiskMetrics, IPD and other MSCI brands and product names are the trademarks, service marks, or registered trademarks of MSCI or its subsidiaries in the United States and other jurisdictions. The Global Industry Classification Standard (GICS) was developed by and is the exclusive property of MSCI and S&P Global Market Intelligence. "Global Industry Classification Standard (GICS)" is a service mark of MSCI and S&P Global Market Intelligence.

MIFID2/MIFIR notice: MSCI ESG Research LLC does not distribute or act as an intermediary for financial instruments or structured deposits, nor does it deal on its own account, provide execution services for others or manage client accounts. No MSCI ESG Research product or service supports, promotes or is intended to support or promote any such activity. MSCI ESG Research is an independent provider of ESG data.

Privacy notice: For information about how MSCI collects and uses personal data, please refer to our Privacy Notice at https://www.msci.com/privacy-pledge.