Principal Adverse Impact Indicators
Methodology

Introduction
The EU’s sustainability finance disclosure regulation, or SFDR, mandates that certain financial market participants have to disclose the principal adverse impacts, or PAIs, of their holdings. The regulation provides a list of mandatory and voluntary indicators related to the holdings that need to be disclosed at the aggregated group level annually.

Although the regulation only mandates the disclosure of these PAIs at the group level, they are of interest to consumers at a product level. A full list of the PAIs calculated can be found in Appendix 1.

Calculation Timings
The calculation will be performed upon the collection of the portfolio, regardless of date and so will be calculated on intramonth and month-end portfolios. Only data that is available to the market on the portfolio date will be used in the calculation of the aggregate values.

Portfolio ‘Look Through’
Morningstar will first attempt to "look through" any funds that are held by the portfolio to find underlying, indirectly held holdings. The "look though" function goes up to 10 portfolios "deep," — that is, when a portfolio holds a fund and in turn that fund hold other funds, the "look through" process will assess 10 "levels" of portfolios. The exception to this rule is for funds that are synthetically replicated; for the purpose of the PAI calculations, they will be treated as being equivalent to a portfolio holding derivatives. The derivative holding will not be "looked through" and for the purposes of the calculations are treated as "other holdings" — that is, not corporate nor sovereign holdings.

Portfolio Weights
Morningstar calculates portfolio weights based on the proportion of a portfolio a holding represents once any fund holdings have been "looked through." The weights are based on the market value of the securities. For the EU Principal Adverse Impact calculations, some additional steps will be taken to calculate the final portfolio weight:

1. Any securities that have both long and short positions will be "netted out" — that is, the short position weight will be subtracted from the long position weight.
2. Any remaining short positions will be removed.
3. Any currency offsets will be removed.
4. The portfolio weight will then be recalculated on the netted-out long positions only.
\[ W_R = \frac{\text{Portfolio Weight}_i}{\sum_{i=1}^{n} \text{Portfolio Weight}_i} \]

Where

\[
\begin{align*}
W_R & = \text{Rescaled portfolio weight} \\
\text{Portfolio Weight}_i & = \text{Original portfolio weight} \\
i=1, n & = \text{All long, noncash offset holdings}
\end{align*}
\]

The portfolio following these amendments will from here on be referred to as the adjusted portfolio.

**Holding Types**

Different PAIs are applicable to different holding types. The regulation outlines PAIs based on three holding types:
1. Investee companies — Applicable to corporate issuances like equities or corporate bonds.
2. Sovereign or Supranational — Applicable to government, some agency, and supranational bonds.
3. Real estate — Applicable to direct physical property holdings.

Morningstar applies a detailed type identifier, or DTID, to portfolio holdings, and these are then used to map the holding to the relevant holding type. Portfolio holdings will therefore be mapped to corporate, sovereign, or other as a holding type for the purposes of the PAI calculations.

- Equity and equitylike securities will be mapped to the corporate type.
- Bonds issued by corporations, including Freddie Mac and Frannie Mae, will be mapped to the corporate type. [Note: Green bonds will use the same underlying PAI data as a standard corporate bond—that is, the data of the issuing entity. They will not have their own separate underlying PAI data.] Government bonds, government agency bonds (except for Freddie Mac and Frannie Mae), and supranational bonds will be mapped to the sovereign type.
- All other security types (including cash, commodities, real estate, derivatives, and unknown securities) will be mapped to the other type.

Details of the DTIDs that map to corporates and sovereign or supranationals can be found in Appendix 2. All other DTIDs will map to other.
Coverage Calculations
Different PAIs apply to different types of holdings, and not all holdings disclose the relevant data required for the individual PAIs. Because of this, Morningstar will provide the field "eligible holding type" for each PAI to identify which PAI holding type is applicable for that particular PAI (corporate or sovereign).

For all PAIs, coverage statistics will be calculated to enable users to see the proportion of the adjusted portfolio that is eligible and covered. In this context, "eligible" means those holdings that are the relevant type for the PAI in question (so, a corporate holding for a corporate PAI), and "covered" means those holdings for which the relevant underlying data has been obtained or estimated. A field indicating the number of holdings covered (that is, that have the relevant data for the PAI statistic) will also be calculated for all PAIs.

To start, the proportions of the adjusted portfolio that are eligible, not eligible, covered, not covered, and eligible but not covered will be calculated.

\[ Portfolio_{Eligible} = \sum_{i=1}^{E} W_R \]

Where

- \( Portfolio_{Eligible} \) = The proportion of the adjusted portfolio that is held in securities the PAI in question is relevant to.
- \( i = 1, E \) = Securities in the adjusted portfolio that are of the relevant holding type (eligible) for the PAI in question.

\[ Portfolio_{NotEligible} = \sum_{i=1}^{NE} NotEligible_W_R \]

Where

- \( Portfolio_{NotEligible} \) = The proportion of the adjusted portfolio that is not held in securities the PAI in question is relevant to. These may be securities where the holding type is not relevant for the PAI or where the type is not known.
- \( i = 1, NE \) = Securities in the adjusted portfolio that are not of the relevant holding type (eligible) for the PAI in question.
\[ \text{PortfolioCovered}_R = \sum_{i=1}^{EC} W_R \]

Where

\( \text{PortfolioCovered}_R \) = The proportion of the adjusted portfolio that is held in securities for which the underlying data is available for the calculation.

\( i = 1, EC \) = Securities in the adjusted portfolio that are of the relevant holding type (eligible) for the PAI in question and where the relevant underlying data is known.

\[ \text{PortfolioNotCovered}_R = \sum_{i=1}^{NC} W_R \]

Where

\( \text{PortfolioNotCovered}_R \) = The proportion of the adjusted portfolio that is held in securities for which the underlying data is not available for the calculation.

\( i = 1, NC \) = Securities in the adjusted portfolio where the relevant underlying data is not known (regardless of whether the holding type is relevant [eligible] or not).

\[ \text{PortfolioEligibleNotCovered}_R = \sum_{i=1}^{ENC} W_R \]

Where

\( \text{PortfolioEligibleNotCovered}_R \) = The proportion of the adjusted portfolio that is held in securities the PAI in question is relevant to but where the underlying data is not available for the calculation.

\( i = 1, ENC \) = Securities in the adjusted portfolio that are of the relevant holding type (eligible) for the PAI in question and where the relevant underlying data is not known.
Next, the proportion of the eligible part of the adjusted portfolio where the relevant data is known (covered) and not known (not covered) is calculated.

This is calculated by taking the proportion of the adjusted portfolio that is covered (or not covered) and dividing it by the proportion of the portfolio that is eligible.

\[7\]
\[
\text{EligiblePortfolioCovered}_R = \frac{\text{PortfolioCovered}_R}{\text{PortfolioEligible}_R}
\]

Where

\(\text{EligiblePortfolioCovered}_R\) = The proportion of only the eligible part of the adjusted portfolio where the underlying data is available for the calculation.

\[8\]
\[
\text{EligiblePortfolioNotCovered}_R = \frac{\text{PortfolioEligibleNotCovered}_R}{\text{PortfolioEligible}_R}
\]

Where

\(\text{EligiblePortfolioNotCovered}_R\) = The proportion of only the eligible part of the adjusted portfolio where the underlying data is not available for the calculation.

The number of holdings where the underlying data (covered) is known is also calculated

\[9\]
\[
\text{Number of Holdings Covered} = \text{A simple count of the holdings in the adjusted portfolio where the underlying data is available.}
\]
PAI Calculation Types
In total, there are 64 PAIs described in the regulation; however, some of them have more than one indicator associated with them. The PAIs can be grouped into those that follow certain calculation methodologies:
1. Average value calculations
2. Involvement calculations
3. Policy calculations
4. Emission calculations
5. Social violation calculations
6. Anticorruption/bribery violation calculations

Average Value PAI Calculations
These PAIs require a calculation of the average value of the holdings; as such, only holdings with the relevant underlying data can be used in the calculation. Except for the gender diversity PAI, Morningstar calculates the weighted average value of the holdings.

\[10\]
\[
AverageValue_R = \frac{\sum_{i=1}^{EC} W_{R_i} \times UnderlyingPAIValue}{PortfolioCovered_R}
\]

Where

- **AverageValue\(_R\)** = The weighted average amount (for the PAI in question) of the covered holdings (that is, holdings where the data is known) in the portfolio.
- **UnderlyingPAIValue** = The value for the individual holding for the underlying PAI in question.

For the gender diversity PAI, the regulation asks for the "average ratio of female to male board members." If a company has no male board members, that ratio would be impossible to calculate. Considering this, the harmonic average of the number of females on the board is calculated by taking the weighted average number of females for the portfolio and dividing by the weighted average total number of board members. It does not need to be rescaled by the percentage covered. The technique reduces the effect of outliers on the average.

\[10a\]
\[
AverageValue\%Female_R = \frac{\sum_{i=1}^{EC} W_{R_i} \times \text{number of females on the board}}{\sum_{i=1}^{EC} W_{R_i} \times \text{total number of board members}}
\]

Where

- **AverageValue\%Female\(_R\)** = The harmonic average of the percentage of females on the board for the portfolio.
- **number of females on the board** = The number of people who identify as female on the board for the individual holding.
**total number of board members** = The total number of board members for the individual holding.

**Involvement and Policy Calculations**

These PAIs require a calculation of the share of the investments that are involved with (or exposed to) certain industries or activities. The proportion that is involved is calculated as a percentage of the total adjusted portfolio (that is, all long positions after being netting out), the eligible portion of the portfolio (those holdings that could have data), and the covered portfolio of the portfolio (those holdings that do have data).

For the adjusted portfolio, the involved/not involved statistics only include those holdings where the information is known. So, combining the involved/not involved statistics (as a percentage of the adjusted portfolio) with the percentage of the portfolio not covered (or percentage eligible not covered and percentage not eligible) will sum to 100%.

Policy calculations are identical to the involvement calculations but describe the proportions of the portfolio that have or lack the relevant policy or process and are generally denoted as "with policy" or "lacking policy."

\[12\]

\[
Portfolio_{Involved} = \sum_{i=1}^{CI} W_R 
\]

Where

\[
Portfolio_{Involved} = \text{The proportion of the adjusted portfolio that is held in securities which are exposed to or involved in the relevant industry/activity.}
\]

\[
i = 1, CI = \text{Securities in the adjusted portfolio that are exposed to or involved in the relevant industry/activity.}
\]

\[13\]

\[
Portfolio_{NotInvolved} = \sum_{i=1}^{CNI} W_R 
\]

Where

\[
Portfolio_{NotInvolved} = \text{The proportion of the adjusted portfolio that is held in securities which are not exposed to or involved in the relevant industry/activity.}
\]

\[
i = 1, CNI = \text{Securities in the adjusted portfolio that are not exposed to or involved in the relevant industry/activity. This does not include securities where it is not known if the security is involved or not.}
\]
For eligible portfolios, the involved and not involved statistics only include those holdings where the information is known, and so combining the involved/not involved statistics (as a percentage of the eligible portfolio) with the percentage eligible not covered of the portfolio will sum to 100%.

\[ [14] \]

\[
\text{EligiblePortfolioInvolved}_R = \frac{\text{PortfolioInvolved}_R}{\text{Portfolio Eligible}_R}
\]

Where

\[
\text{EligiblePortfolioInvolved}_R = \text{The proportion of the eligible portion of the portfolio that is held in securities that are exposed to or involved in the relevant industry/activity.}
\]

\[ [15] \]

\[
\text{EligiblePortfolioNotInvolved}_R = \frac{\text{PortfolioNotInvolved}_R}{\text{Portfolio Eligible}_R}
\]

Where

\[
\text{EligiblePortfolioNotInvolved}_R = \text{The proportion of the eligible portion of the portfolio that is held in securities that are not exposed to or involved in the relevant industry/activity.}
\]

The involved/not involved statistic (as a percentage of the covered portfolio) will sum to 100% as it only contains holdings that have data.

\[ [16] \]

\[
\text{CoveredPortfolioInvolved}_R = \frac{\text{PortfolioInvolved}_R}{\text{Portfolio Covered}_R}
\]

Where

\[
\text{CoveredPortfolioInvolved}_R = \text{The proportion of the covered portion of the portfolio that is held in securities that are exposed to or involved in the relevant industry/activity.}
\]

\[ [17] \]

\[
\text{CoveredPortfolioNotInvolved}_R = \frac{\text{PortfolioNotInvolved}_R}{\text{Portfolio Covered}_R}
\]

Where

\[
\text{CoveredPortfolioNotInvolved}_R = \text{The proportion of the covered portion of the portfolio that is held in securities that are not exposed to or involved in the relevant industry/activity.}
\]
**Emission Calculations**

These PAIs come in two flavors: the total amount of emissions (in metric tons) the portfolio is responsible for and the amount of emissions per million of euros invested (in metric tons per EUR million). These calculations only include those holdings for which data is available.

The portfolio is considered responsible for all of the underlying holding's emissions in proportion to the amount of the company owned. For example, if a portfolio owned 10% of Bayerische Motoren Werke AG BMW, it would be responsible for 10% of its emissions.

Note: The result of the total amount in metric tons calculation will be different for portfolios with identical holdings in identical proportions solely because of portfolio size. The metric tons per million of euros invested "normalizes" this figure and allows for a portfolio's impact to be compared in relation to the same amount invested.

As these calculations are based on the amount (in millions of euros) held in the company, some additional coverage statistics are also calculated. For the purpose of these calculations, the holding value is market value for any equity-based securities and the nominal or face value for any bond holdings.

\[
[18] \quad Portfolio_{Eligible}^{EURm} = \sum_{i=1}^{E} H_{EURm}^{E}
\]

Where

\[
Portfolio_{Eligible}^{EURm} = \text{The amount in millions of euros held in eligible holdings.}
\]

\[
H_{EURm}^{E} = \text{The amount in millions of euros held in the company.}
\]

\[
i = 1, E = \text{Securities in the adjusted portfolio that are of the relevant holding type (eligible) for the PAI in question.}
\]

\[
[19] \quad Portfolio_{Covered}^{EURm} = \sum_{i=1}^{EC} H_{EURm}^{EC}
\]

Where

\[
Portfolio_{Covered}^{EURm} = \text{The amount in millions of euros held in covered holdings.}
\]

\[
H_{EURm}^{EC} = \text{The amount in millions of euros held in the company.}
\]

\[
i = 1, EC = \text{Securities in the adjusted portfolio that are of the relevant holding type (eligible) for the PAI in question and have data (covered).}
\]
[20]

\[ Portfolio_{EligibleNotCovered}^{EURm} = \sum_{i=1}^{ENC} H_{EURm} \]

Where

- \( Portfolio_{EligibleNotCovered}^{EURm} \) = The amount in millions of euros held in eligible holdings where the relevant underlying data is not known.
- \( H_{EURm} \) = The amount in millions of euros held in the company.
- \( i = 1, ENC \) = Securities in the adjusted portfolio that are of the relevant holding type (eligible) for the PAI in question and do not have data (not covered).

[21]

\[ TotalEmissions_R = \sum_{i=1}^{EC} \frac{Investment}{EVIC} \times CompanyEmissions \]

Where

- \( TotalEmissions_R \) = The amount in metric tons of the relevant emission(s) for which the portfolio is known to be responsible.
- \( Investment \) = The amount in millions of euros the portfolio has invested in the relevant underlying company.
- \( EVIC \) = The entire value of the company (enterprise value including cash). This is calculated by summing the market capitalization, the total preferred stock/units/securities, the noncontrolling/minority interests in equity, and the total debt.
- \( CompanyEmissions \) = The amount in metric tons of the relevant emission(s) for which the relevant company is responsible.

[22]

\[ Emissions_{perEURm}^R = \frac{TotalEmissions_R}{Portfolio_{Covered}^{EURm}} \]

Where

- \( Emissions_{EURm}^R \) = The amount in metric tons per millions of euros invested of the relevant emission(s) for which the portfolio is known to be responsible.
Social Violation Calculations

These PAIs represent the number of countries (as an absolute number and as a percentage of the total number of countries invested in) in which the portfolio invests that are subject to social violations. These statistics note if a country has been invested in; the amount invested in the country and the weight in the portfolio are not factors. This PAI is for sovereign (including some agency) issuances only.

Four statistics are calculated: number of countries with violations, number of countries without violations, percentage of countries with violations, and percentage of countries without violations.

\[22\]

\[ CountriesViolations_R = \sum_{i=1}^{SV} C_R \]

Where

\( CountriesViolations_R \) = The absolute number of countries the portfolio invests in that are subject to social violations.

\( C_R \) = The unique countries the portfolio invests in via sovereign or some types of agency bond.

\( i = 1, SV \) = Countries invested in that are subject to social violations.

\[23\]

\[ CountriesNoViolations_R = \sum_{i=1}^{NV} C_R \]

Where

\( CountriesNoViolations_R \) = The absolute number of countries the portfolio invests in that are not subject to social violations.

\( C_R \) = The unique countries the portfolio invests in via sovereign or some types of agency bond.

\( i = 1, NV \) = Countries invested in that are not subject to social violations.

\[24\]

\[ \%CountriesViolation_R = \frac{CountriesViolations_R}{CountriesViolations_R + CountriesNoViolations_R} \]

Where

\( \%CountriesViolation_R \) = The percentage of countries the portfolio invests in that are subject to social violations.

\[25\]

\[ \%CountriesNoViolation_R = \frac{CountriesNoViolations_R}{CountriesViolations_R + CountriesNoViolations_R} \]

Where
\[
\%\text{CountriesNoViolation}_R = \text{The percentage of countries the portfolio invests in that are not subject to social violations.}
\]

**Anticorruption/Bribery Violation Calculations**

These PAlS represent the number of convictions and amount of fines (in euros) for corruption and/or bribery offenses of the underlying holdings of the portfolio. These statistics note if a company has been invested in; the amount invested in the company or the weight in the portfolio are not factors.

\[26\]

\[
\text{AntiCorruptionViolation}_R = \sum_{i=1}^{E} \text{Convictions}_R
\]

Where

\[
\text{AntiCorruptionViolation}_R = \text{The total number of convictions for corruption and/or bribery offenses of all the companies the portfolio invests in.}
\]

\[
\text{Convictions}_R = \text{The number of convictions the company has for corruption and/or bribery offenses.}
\]

\[
i = 1, E = \text{All eligible portfolio holdings.}
\]

\[27\]

\[
\text{AntiCorruptionFines}_R = \sum_{i=1}^{E} \text{CorruptionFines}_R
\]

Where

\[
\text{AntiCorruptionFines}_R = \text{The total amount in euros of fines for corruption and/or bribery offenses of all the companies the portfolio invests in.}
\]

\[
\text{CorruptionFines}_R = \text{The amount in euros the company has been fined for corruption and/or bribery offenses.}
\]

\[
i = 1, E = \text{All eligible portfolio holdings.}
\]
Category Averages
For a selection of portfolio impact metrics, category averages are computed in order to enable comparison of funds against their peer groups. The peer groups used are the standard Morningstar Categories.

Funds need to have at least 67% of their eligible portfolio covered to be included in the category average calculation. A category average is computed for a given Morningstar Category only when at least five funds meet the coverage requirement within this category.

Category averages will be calculated for the average value PAIs, the emissions per EURm invested PAIs, and the involved/with policy PAIs based upon the involved/with policy statistics as a percentage of the covered portfolio.

Category averages will not be calculated for the social violation, anticorruption/bribery, and total amount of emissions PAIs, as these are not considered useful when averaged at a category level, as the fund values depend, to some extent, on the size of the fund and/or the number of holdings/countries invested in.

\[ \text{CategoryAverage}_R = \frac{\sum_{i=1}^{F} \text{PAI Value}_f}{\text{Number of Funds}} \]

Where
- \( \text{PAI Value}_f \) = The relevant PAI value for fund \( f \).
- Number of Funds = The number of funds in the category that meet the relevant criteria to be included in the category average calculation.
- \( i = 1, F \) = All funds in the category that meet the relevant criteria.

Methodology History
Version: 1.0  31 Jan 2022    Original publication
Version 1.01  28 Feb 2022    Clarification on what is calculated for category averages
Version 1.02  24 Mar 2022    Fix to equation 8 - Numerator is PortfolioEligibleNotCovered.
<table>
<thead>
<tr>
<th>PAI code</th>
<th>Generic PAI name</th>
<th>Calculation type</th>
<th>Input Datafield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manto 1a</td>
<td>PAI scope 1 GHS Emissions</td>
<td>3a. share of emissions calculations</td>
<td>Carbon - Scope 1 Emissions</td>
</tr>
<tr>
<td>Manto 1b</td>
<td>PAI scope 2 GHS Emissions</td>
<td>3a. share of emissions calculations</td>
<td>Carbon - Scope 2 Emissions</td>
</tr>
<tr>
<td>Manto 1c</td>
<td>PAI scope 3 GHS Emissions</td>
<td>3a. share of emissions calculations</td>
<td>Carbon - Scope 3 Emissions</td>
</tr>
<tr>
<td>Manto 1d</td>
<td>PAI scope 182 GHS Emissions</td>
<td>3a. share of emissions calculations</td>
<td>Carbon - Total Emissions Scope 182</td>
</tr>
<tr>
<td>Manto 1e</td>
<td>PAI scope 1,2,6 GHS Emissions</td>
<td>3a. share of emissions calculations</td>
<td>Carbon - Total Emissions Scope 1,2,6</td>
</tr>
<tr>
<td>Manto 2a</td>
<td>PAI Carbon Footprint scope 182</td>
<td>3b. Emissions per EUR/inv invested</td>
<td>Carbon - Total Emissions Scope 182</td>
</tr>
<tr>
<td>Manto 2b</td>
<td>PAI Carbon Footprint scope 1,2,6</td>
<td>3b. Emissions per EUR/inv invested</td>
<td>Carbon - Total Emissions Scope 1,2,6</td>
</tr>
<tr>
<td>Manto 3a</td>
<td>PAI GHS intensity Scope 182</td>
<td>1. average value</td>
<td>Carbon Intensity Scope 182 EUR</td>
</tr>
<tr>
<td>Manto 3b</td>
<td>PAI GHS intensity Scope 1, 2 &amp; 3</td>
<td>1. average value</td>
<td>Carbon Intensity Scope 1,2,6 EUR</td>
</tr>
<tr>
<td>Manto 4</td>
<td>PAI Fossil Fuel</td>
<td>2. involvement/policy - Involvement</td>
<td>Carbon - Fossil Fuel Level of Involvement Range</td>
</tr>
<tr>
<td>Manto 5a</td>
<td>PAI Non-Renewable Energy consumption</td>
<td>1. average value</td>
<td>Share of Non-Renewable Energy Consumption, Percentage</td>
</tr>
<tr>
<td>Manto 5b</td>
<td>PAI Non-Renewable Energy production</td>
<td>1. average value</td>
<td>Share of Non-Renewable Energy Production, Percentage</td>
</tr>
<tr>
<td>Manto 6a</td>
<td>PAI energy consumption Intensity - NACE A</td>
<td>1. average value</td>
<td>Energy Consumption Intensity_Agriculture, Forestry &amp; Fishing</td>
</tr>
<tr>
<td>Manto 6b</td>
<td>PAI energy consumption Intensity - NACE B</td>
<td>1. average value</td>
<td>Energy Consumption Intensity_Mining &amp; Quarrying</td>
</tr>
<tr>
<td>Manto 6c</td>
<td>PAI energy consumption Intensity - NACE C</td>
<td>1. average value</td>
<td>Energy Consumption Intensity_Mining &amp; Quarrying</td>
</tr>
<tr>
<td>Manto 6d</td>
<td>PAI energy consumption Intensity - NACE D</td>
<td>1. average value</td>
<td>Energy Consumption Intensity_Electricity, Gas, Steam &amp; Air Conditioning Supply</td>
</tr>
<tr>
<td>Manto 6e</td>
<td>PAI energy consumption Intensity - NACE E</td>
<td>1. average value</td>
<td>Energy Consumption Intensity_Water Supply, Sewerage, Waste Management &amp; Remediation Activities</td>
</tr>
<tr>
<td>Manto 6f</td>
<td>PAI energy consumption Intensity - NACE F</td>
<td>1. average value</td>
<td>Energy Consumption Intensity_Construction</td>
</tr>
<tr>
<td>Manto 6g</td>
<td>PAI energy consumption Intensity - NACE G</td>
<td>1. average value</td>
<td>Energy Consumption Intensity_Wholesale &amp; Retail Trade &amp; Repair of Motor Vehicles &amp; Motorcycles</td>
</tr>
<tr>
<td>Manto 6h</td>
<td>PAI energy consumption Intensity - NACE H</td>
<td>1. average value</td>
<td>Energy Consumption Intensity_Transportation &amp; Storage</td>
</tr>
<tr>
<td>Manto 6i</td>
<td>PAI energy consumption Intensity - NACE I</td>
<td>1. average value</td>
<td>Energy Consumption Intensity Real Estate Activities</td>
</tr>
<tr>
<td>Manto 7</td>
<td>PAI Negative affect on Biodiversity</td>
<td>2. involvement/policy - Involvement</td>
<td>Activities Negatively Affecting Biodiversity Areas</td>
</tr>
<tr>
<td>Manto 8</td>
<td>PAI Emissions to Water</td>
<td>3b. Emissions per EUR/inv invested</td>
<td>Emissions to Water_Tonnes</td>
</tr>
<tr>
<td>Manto 9</td>
<td>PAI Hazardous waste</td>
<td>2b. Emissions per EUR/inv invested</td>
<td>Hazardous Waste_Tonnes</td>
</tr>
<tr>
<td>Manto 10</td>
<td>PAI UNGC principles/OECD guidelines Violations</td>
<td>2. involvement/policy - UNGC Violation</td>
<td>Breach of UN Global Compact Principles &amp; OECD Guidelines for Multinational Enterprises</td>
</tr>
<tr>
<td>Manto 11</td>
<td>PAI UNGC Lack of compliance mechanisms</td>
<td>2. involvement/policy - Involvement</td>
<td>Lack of Processes &amp; Compliance Mechanisms to Monitor Compliance with UN Global Compact Principles &amp; OECD Guidelines for Multinational Enterprises</td>
</tr>
<tr>
<td>Manto 12</td>
<td>PAI Gender pay gap</td>
<td>1. average value</td>
<td>Unadjusted Gender Pay Gap_Percentage of Male Employees Gross Hourly Earnings</td>
</tr>
<tr>
<td>Manto 13</td>
<td>PAI percentage of female board members</td>
<td>1. average value</td>
<td>Number of Female Directors, Number of Male Directors</td>
</tr>
<tr>
<td>Manto 14</td>
<td>PAI Controversial Weapons</td>
<td>2. involvement/policy - Involvement</td>
<td>Controversial Weapons Evidence of Activity</td>
</tr>
<tr>
<td>Manto 15</td>
<td>PAI Carbon intensity (gCO2e)</td>
<td>1. average value</td>
<td>Carbon Emissions Intensity</td>
</tr>
<tr>
<td>Manto 16a</td>
<td>PAI Social Violations</td>
<td>4. Social violations</td>
<td>Any Country Social Violations</td>
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<td>Table 2-1</td>
<td>PAN Air pollutant emissions</td>
<td>3bl. Emissions per EURm invested</td>
<td>Emissions of Air Pollutants_Tones</td>
</tr>
<tr>
<td>Table 2-4</td>
<td>PAN Carbon reduction</td>
<td>2. involvement /policy - policy</td>
<td>Lack of Carbon Emission Reduction Initiatives</td>
</tr>
<tr>
<td>Table 2-7</td>
<td>PAN Water Management</td>
<td>2. involvement /policy - policy</td>
<td>Lack of Water Management Policies</td>
</tr>
<tr>
<td>Table 2-9</td>
<td>PAN Chemical production</td>
<td>2. involvement /policy - involvement</td>
<td>Particles/Production Involvement</td>
</tr>
<tr>
<td>Table 2-13</td>
<td>PAN Non-Recycled waste</td>
<td>3bl. Emissions per EURm invested</td>
<td>Non-Recycled Waste Generation_Tones</td>
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<tr>
<td>Table 2-15</td>
<td>PAN Deforestation</td>
<td>2. involvement /policy - policy</td>
<td>Lack of Deforestation Policy</td>
</tr>
<tr>
<td>Table 3-1</td>
<td>PAN Workplace accidents prevention</td>
<td>2. involvement /policy - policy</td>
<td>Lack of Workplace Accident Prevention Policy</td>
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<tr>
<td>Table 3-2</td>
<td>PAN Ratio of accidents</td>
<td>1. average value</td>
<td>Recordable Work-Related Injuries Rate</td>
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<tr>
<td>Table 3-3</td>
<td>PAN Days Lost to accidents</td>
<td>1. average value</td>
<td>Employee &amp; Contractor Lost Days Due to Injuries, Accidents, Fatalities or Illness</td>
</tr>
<tr>
<td>Table 3-4</td>
<td>PAN Code of conduct</td>
<td>2. involvement /policy - policy</td>
<td>Lack of Supplier Code of Conduct</td>
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<tr>
<td>Table 3-5</td>
<td>PAN Whistleblower protection</td>
<td>2. involvement /policy - policy</td>
<td>Lack of Whistleblower Protection</td>
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<tr>
<td>Table 3-8</td>
<td>PAN CEO pay ratio</td>
<td>1. average value</td>
<td>Excessive CEO Pay Ratio</td>
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<tr>
<td>Table 3-9</td>
<td>PAN Human rights</td>
<td>2. involvement /policy - policy</td>
<td>Lack of Human Rights Policy</td>
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<td>Table 3-10</td>
<td>PAN Due diligence</td>
<td>2. involvement /policy - policy</td>
<td>Lack of Human Rights Due Diligence</td>
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<tr>
<td>Table 3-11</td>
<td>PAN Anti human trafficking</td>
<td>2. involvement /policy - policy</td>
<td>Lack of Processes to Prevent Human Trafficking</td>
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<tr>
<td>Table 3-14</td>
<td>PAN Human rights incidents</td>
<td>1. average value</td>
<td>Number of Identified Cases of Severe Human Rights Issues &amp; Incidents</td>
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<tr>
<td>Table 3-15</td>
<td>PAN Anti bribery/corruption</td>
<td>2. involvement /policy - policy</td>
<td>Lack of Anti-Corruption &amp; Anti-Bribery Policy</td>
</tr>
<tr>
<td>Table 3-16</td>
<td>PAN Anti bribery/corruption lack of action</td>
<td>2. involvement /policy - involvement</td>
<td>Insufficient Action on Breaches of Anti-Corruption Policy</td>
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<td>Table 3-17a</td>
<td>PAN Corruption/Bribery convictions</td>
<td>5. Corruption convictions/fines</td>
<td>Number of Convictions for Violations of Anti-Corruptions &amp; Anti-Bribery Laws</td>
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<td>Table 3-17b</td>
<td>PAN Corruption/Bribery fines</td>
<td>5. Corruption convictions/fines</td>
<td>Amount of Fines for Violations of Anti-Corruptions &amp; Anti-Bribery Laws_EUR</td>
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<td>Table 3-18</td>
<td>PAN Income inequality</td>
<td>1. average value</td>
<td>Income Inequality</td>
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<td>Table 3-19</td>
<td>PAN Freedom of expression</td>
<td>1. average value</td>
<td>IC - Voice and Accountability-Score</td>
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<tr>
<td>Table 3-20</td>
<td>PAN Human rights score</td>
<td>1. average value</td>
<td>Average Human Rights Performance</td>
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<td>Table 3-21</td>
<td>PAN control of corruption</td>
<td>1. average value</td>
<td>IC - Control of Corruption-Score</td>
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<tr>
<td>Table 3-22</td>
<td>PAN Non-cooperative tax jurisdictions</td>
<td>2. involvement /policy - involvement</td>
<td>Non-Cooperative Tax Jurisdictions</td>
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<td>Table 3-23</td>
<td>PAN Political stability</td>
<td>1. average value</td>
<td>IC - Political Stability-Score</td>
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<td>Table 3-24</td>
<td>PAN Rule of law</td>
<td>1. average value</td>
<td>IC - Rule of Law-Score</td>
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## Appendix 2 - List of DTIDs and Mapping to the Corporate or Sovereign Holding Type

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<thead>
<tr>
<th>Detail/Type</th>
<th>Description</th>
<th>ESG Holding Type</th>
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<tbody>
<tr>
<td>CD</td>
<td>Cash - CD/Treas Note</td>
<td>Corporate</td>
</tr>
<tr>
<td>CP</td>
<td>Cash - Commercial Paper</td>
<td>Corporate</td>
</tr>
<tr>
<td>B</td>
<td>Bond - Corporate Bond</td>
<td>Corporate</td>
</tr>
<tr>
<td>BC</td>
<td>Bond - Convertible</td>
<td>Corporate</td>
</tr>
<tr>
<td>BR</td>
<td>Bond - Bank Loan</td>
<td>Corporate</td>
</tr>
<tr>
<td>BU</td>
<td>Bond - Units</td>
<td>Corporate</td>
</tr>
<tr>
<td>P</td>
<td>Bond - Corp Inflation Protected</td>
<td>Corporate</td>
</tr>
<tr>
<td>P</td>
<td>Preferred Stock</td>
<td>Corporate</td>
</tr>
<tr>
<td>PC</td>
<td>Convertible Preferred</td>
<td>Corporate</td>
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<tr>
<td>ND</td>
<td>Bond - Covered Bond</td>
<td>Corporate</td>
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<tr>
<td>E</td>
<td>Equity</td>
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<tr>
<td>EQ</td>
<td>Equity - Undistributed</td>
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<tr>
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<td>Equity - REIT</td>
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</tr>
<tr>
<td>EU</td>
<td>Equity - Units</td>
<td>Corporate</td>
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<td>Bond - Unaffiliated</td>
<td>Corporate</td>
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<tr>
<td>BH</td>
<td>Bond - Non-Agency Residential MBS</td>
<td>Corporate</td>
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<tr>
<td>NB</td>
<td>Bond - Commercial MBS</td>
<td>Corporate</td>
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<tr>
<td>BG</td>
<td>Bond - Govt Agency Pass-Through</td>
<td>Corporate if issued by Fannie Mae or Freddie Mac otherwise sovereign</td>
</tr>
<tr>
<td>NC</td>
<td>Bond - Govt Agency CMO</td>
<td>Corporate if issued by Fannie Mae or Freddie Mac otherwise sovereign</td>
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<td>NE</td>
<td>Bond - Govt Agency Agency</td>
<td>Corporate if issued by Fannie Mae or Freddie Mac otherwise sovereign</td>
</tr>
<tr>
<td>ST</td>
<td>Bond - Govt Issuance</td>
<td>Sovereign</td>
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<td>Bond - Govt Inflation Protected</td>
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<td>Bond - Govt Agency Debt</td>
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<td>BZ</td>
<td>Bond - Supranational</td>
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