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Transition Risk Analysis Support Toolkit – Element 6

Quantifying greenhouse gas emissions from investments

The Green House

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1. Introduction

Investors, including asset managers and pension fund managers, are increasingly being required understand the climate risks of their investment portfolios, and take into account emissions and other information linked to climate change responses in their investment decision making. To do so, it is necessary to collate information on greenhouse gas (GHG) emissions from companies in which they invest, which can be used to provide an overall perspective on the emissions impact or emissions intensity of investments. This information also helps to identify "hotspots" in an investment portfolio where the greatest contribution to emissions arise, and hence companies and/or sectors which are most vulnerable to carbon taxes, border tax adjustments and other transition risks.

Availability of GHG emissions information varies significantly between companies, sectors and jurisdictions. Information may also be presented to varying levels of aggregation, potentially making interpretation of emissions data challenging. As such, there is value in understanding where such information can be obtained, and potential approaches to filling data gaps where information is not readily available. This document, along with an accompanying spreadsheet tool, has been prepared to provide guidance on how this may be done for asset managers and owners, with a focus specifically on South Africa.

The document has been prepared as part of a Toolkit to support the asset management and retirement fund industries in improving their climate-related financial disclosures and incorporating climate considerations into investment decisions. For an overview of the toolkit and a description of its other components please see *Introduction to the Transition Risk Analysis Support Toolkit* available from here. The Toolkit has been developed under a broader South Africa UK Partnering for Accelerated Climate Transitions (South Africa-UK PACT)[1] funded project on Climate Related Financial Disclosures. This document, the accompanying spreadsheet, all the Toolkit elements and other outputs from this project are available online[2].

[1] UK Partnering for Accelerated Climate Transitions. For more information see https://www.ukpact.co.uk/country-programme/south-africa

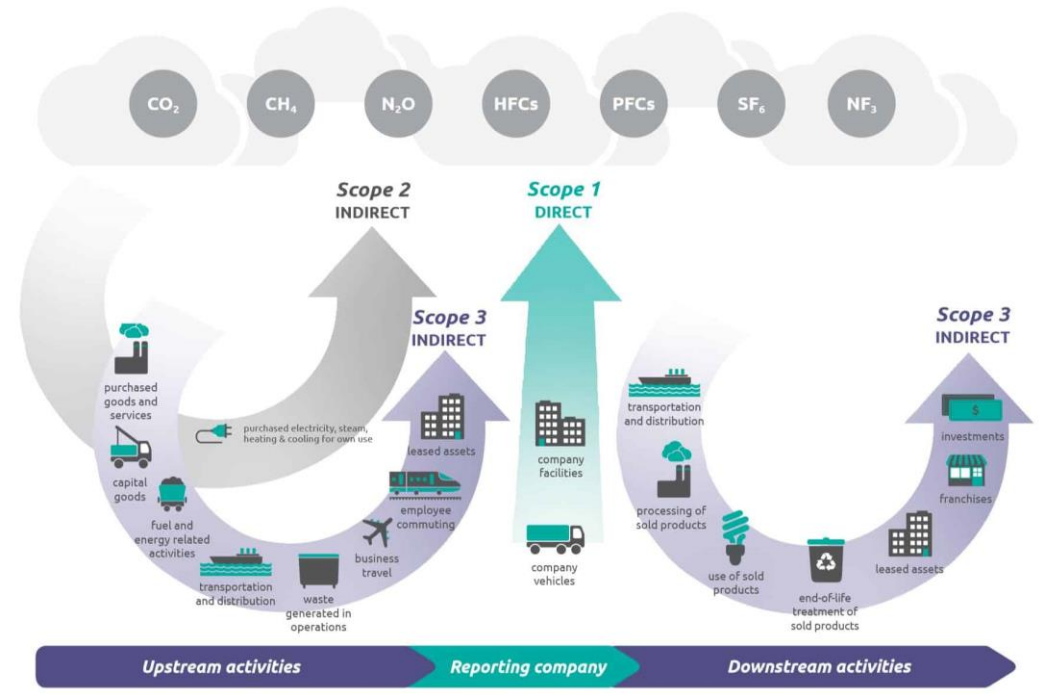
[2] http://www.dnaeconomics.com/pages/sa_climate_disclosure/

2. The GHG Protocol

The most widely used framework to guide the quantification of GHG emissions is the GHG Protocol.[3] The Protocol broadly classifies emissions from an organisation into scope 1, scope 2 and scope 3 emissions, as shown in the box overleaf. According to this classification, where an asset manager or owner has investment holdings in another company, it accounts for the Scope 1 and 2 emissions from that company as part of its own scope 3 emissions. It may also report scope 3 emissions from companies in which it has investment holdings, depending on the reporting framework being used.

The Greenhouse Gas Protocol (www.ghgprotocol.org) defines three scopes of emissions:

- **Scope 1:** Direct emissions from company owned operations, vehicles, buildings etc.
- **Scope 2:** Emissions from purchased electricity and heat
- **Scope 3:** Emissions associated with upstream and downstream activities of the organization's activities. In the context of this paper, this includes investments held by the organization.



Source: GHG Protocol

[3] http://www.ghgprotocol.org

More information on types of greenhouse gas emissions and the units in which emissions are expressed is provided in the box below.

Types of greenhouse gases, CO_2 equivalents and Global Warming Potentials

Activities may give rise to a variety of different greenhouse gas emissions. Carbon dioxide (CO_2) is produced in the highest volumes globally, followed by methane (CH_4) and nitrous oxide (N_2O). There are also a number of other gases that contribute to global warming. However, a tonne of CO_2 does not have the same impact as a tonne of CH_4, for example. To express the difference in contribution of each of the gases, a conversion factor known as the Global Warming Potential (GWP) is used. The GWP allows for conversion of a tonne of an individual emission into the equivalent warming potential of a tonne CO_2, with the emissions then being expressed in carbon dioxide equivalents (CO_2e), the common unit for reporting emissions. GWPs are published by the IPCC and are updated frequently.

In using this guideline and emissions reporting, care should thus be taken to ensure values being combined have the same units. For example, tonnes of CO_2 or tonnes CO_2e cannot be added to tonnes CH_4 without applying the relevant GWP.

The GHG Protocol has issued a guidance document specifically for accounting for GHG emissions from investments[4], distinguishing between four different types of investments:

- Equity investments
- Debt investments
- Project finance
- Managed investments and client services.

The guidelines also identify which emissions are required to be reported, and which are optional. While emissions from managed investments and client services, the focus of this guidance document, fall into the "optional" category in terms of the Protocol, they are increasingly being required to be reported in terms of other reporting frameworks, including that developed by the Task Force on Climate-related Financial Disclosure (TCFD).

Other reporting frameworks are emerging which also provide guidelines for emissions reporting from investments. The Partnership for Carbon Accounting Financials (PCAF) has developed a reporting standard[5] which derives its principles from, and builds upon, the GHG Protocol. It includes five additional principles to those included in the Protocol (see the Figure below),

[4] https://ghgprotocol.org/sites/default/files/standards_supporting/Chapter15.pdf
[5] https://carbonaccountingfinancials.com/files/downloads/PCAF-Global-GHG-Standard.pdf

additional requirements for reporting, and notably a phased in requirement, by sector, for reporting of the scope 3 emissions from investments as shown in Table 2 (under the Protocol these were not required). The inclusion/exclusion of scope 3 emissions should be clearly reported.

Table 1: GHG Protocol and PCAF Reporting Principles

GHG Protocol principles for scope 3 inventories	Additional PCAF requirements
Completeness Account for and report on all GHG emission sources and activities within the inventory boundary. Disclose and justify any specific exclusions. **Consistency** Use consistent methodologies to allow for meaningful performance tracking of emissions over time. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series. **Relevance** Ensure the GHG inventory appropriately reflects the GHG emissions of the company and serves the decision-making needs of users — both internal and external to the company **Accuracy** Ensure that the quantification of GHG emissions is systematically neither over nor under actual emissions, as far as can be judged, and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable confidence as to the integrity of the reported information. Transparency Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used.	**Recognition** Financial institutions shall account for all financed emissions under Scope 3 category 15 (Investment) emissions, as defined by the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard. Any exclusions shall be disclosed and justified. **Measurement** Financial institutions shall measure and report their financed emissions for each asset class by "following the money" and using the PCAF methodologies. As a minimum, absolute emissions shall be measured, however avoided and removed emissions can also be measured if data is available and methodologies allow. **Attribution** The financial institution's share of emissions shall be proportional to the site of its exposure to the borrower's or investee's total (company or project) value. **Data quality** Financial institutions shall use the highest quality data available for each asset class and improve the quality of the data over time. **Disclosure** Public disclosure of the results of PCAF assessments is crucial for external stakeholders and financial institutions using the methodology to have a clear, comparable view of how the investments of financial institutions contribute to the Paris climate goals.

Table 2: Phase in of Scope 3 emissions reporting under the PCAF

Phase-in period	Sectors
From 2021	At least energy (oil and gas) and mining
From 2024	At least transportation, construction, buildings, materials and industrial activities
From 2024	At least transportation, construction, buildings, materials and industrial activities

In terms of which emissions are reported by an investor as Scope 1 and 2, and which are reported as Scope 3, the GHG Protocol allows for use of an **equity-share approach,** where emissions from equity investments are included by the reporting company in their own scope 1 and scope 2

emissions, or a **control approach** under which only those equity investments that are under the company's financial or operational control are included in scope 1 and scope 2, and the remainder in scope 3. The PCAF guidelines, however, require the use of a control approach.

3. Sources of information on GHG emissions from investments

The GHG Protocol identifies two approaches that can be used to obtain emissions data on equity investments, which are also applicable to managed investments and client services:

- **Investment-specific method,** which involves collecting scope 1 and scope 2 emissions for the investee company, and allocating the emissions based upon the share of investment.
- **Average-data method,** which involves using revenue data combined with Environmentally-Extended Input-Output (EEIO) data (discussed further below) to estimate the scope 1 and scope 2 emissions from the investee company, and allocating emissions based upon share of investment.

Of these, the investment-specific method is more accurate than the average-data method. A further approach not identified in the Protocol, which is likely to be even less accurate, is that of using **similar company data**. It is proposed in this current document that this approach may be considered for use where no other data exists.

A decision tree for selecting which approach to take is given in Figure 1. Different approaches could be used for estimating emissions for different companies in a portfolio, depending on data availability.

Depending on the number of companies or assets in a portfolio, and the purposes of the analysis, the GHG Protocol suggests that a threshold can be set below which emissions are excluded from the analysis, such as where the portfolio has an equity share in the company of <1% of its total value. However, applying such a cut-off runs the risk of underestimating the portfolio's emissions particularly where the portfolio holds small holdings in a number of companies, where companies invested in have very high market capitalizations, or where companies in the portfolio are very high emitters. As such, coverage should be as wide as possible.

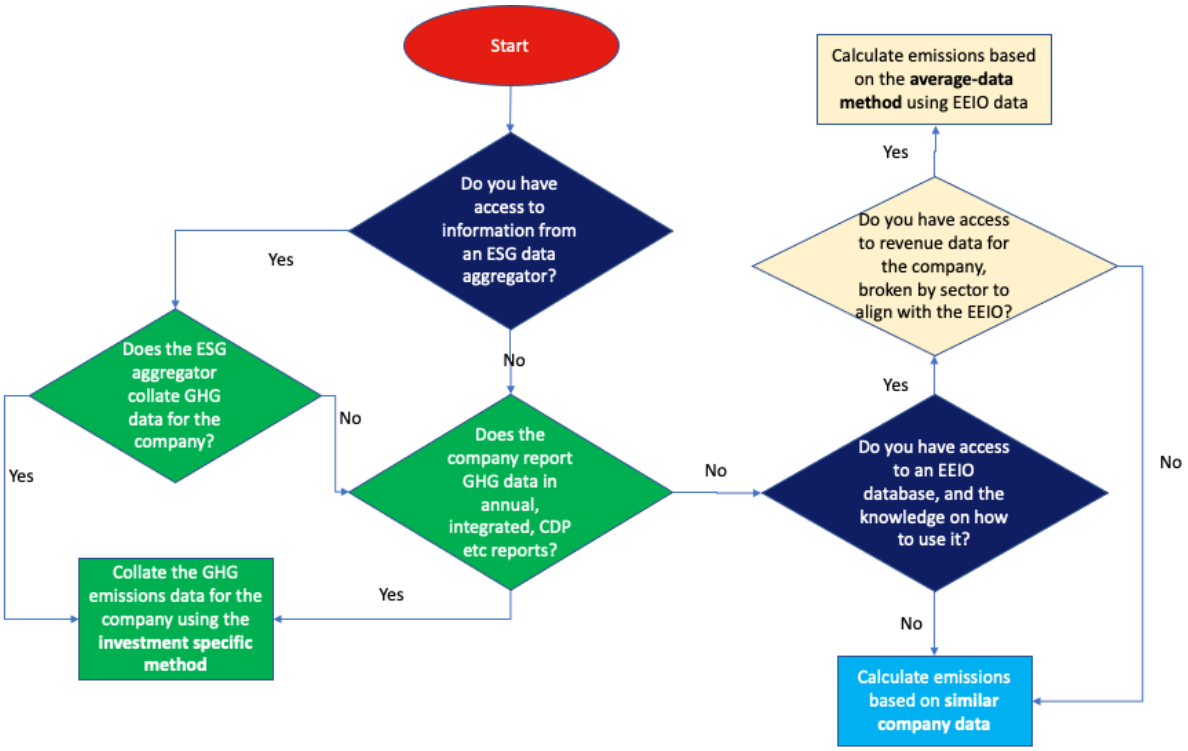


Figure 1: Decision tree for selecting approach to collating company emissions data

4. Investment-specific method

Investment-specific method

Two potential sources of investment specific emissions information are identified[6]:

- **Annual reports:** Companies, and particularly listed companies, are coming under increasing pressure to report GHG emissions information, including scope 1, scope 2 and scope 3 emissions. This information is typically presented in annual, integrated, environmental, social and governance (ESG), CDP[7] and/or TCFD[8] reports. Reports are typically available on company websites. Climate disclosure fact sheets[9] developed by this project list the GHG

[6] Note that the GHG Protocol only refers to the first option, that of accessing annual reports, but the second option, using data from ESG data aggregators, is considered to be equally applicable for this purpose, given the high-quality data that is collected by these services.
[7] https://www.cdp.org/
[8] Task Force on Climate-Related Financial Disclosure, https://www.fsb-tcfd.org/
[9] Available at www.dnaeconomics.com/pages/jse_climate_disclosure_fact_sheets/

emissions data, and where to obtain this information, for 54 of the largest companies listed on the JSE.

- **Data aggregation services:** A large number of subscription-based services is available which aggregate company level data for thousands of companies across the world on various ESG issues, including GHG emissions. Examples of data aggregators that collate GHG emissions data include:
    - https://www.trucost.com
    - https://www.mcsi.com
    - https://www.sustainalytics.com

Emissions allocated to an investor are calculated as follows:

$$GHG\ emissions_{x,y} = (Scope\ 1_{x,y} + Scope\ 2_{x,y}) * holding_{x,y}$$

where:

GHG emissions$_{x,y}$	GHG emissions for company x in year y (tonnes CO_2e)
Scope 1$_{x,y}$	Total scope 1 emissions from company x in year y, collated from either annual reports or data aggregators (tonnes CO_2e)
Scope 2$_{x,y}$	Total scope 2 emissions from company x in year y, collated from either annual reports or data aggregators (tonnes CO_2e)
holding$_{x,y}$	Average percentage holding in company x in year y

Example: Investment-specific method

A Steel Manufacturer (ASM) reports Scope 1 emissions of 7 Mt CO_2e and a further 4 Mt CO_2e of Scope 2 emissions in 2020. In that year, an investment company held 5% of ASM's shares. The contribution of ASM to the investment company's Scope 3 emissions is given by:

GHG emissions $_{ASM, 2020}$ = (7+4)*5%

= 0.55 Mt CO_2e

Average-data method

5. Average-data method

In the average-data method, Environmentally-Extended Input-Output (EEIO) data is used to estimate scope 1 and scope 2 emissions associated with equity investments. EEIO is a method of exploring the linkages between economic consumption activities and environmental impacts, including emissions of GHGs. An EEIO data set provides a measure of the emissions intensity associated with an economic metric for sub-sectors of the economy, typically revenue. To use this data, therefore, the revenue of the company for which GHG emissions information is required is multiplied by the appropriate sectoral EEIO emission factor to get its total emissions. Where a company spans multiple sectors, the share of revenue from different sectors is multiplied by the relevant sectoral EEIO emission factors. The proportional share of equity is then used to allocate the estimated scope 1 and scope 2 emissions to the investee company.

Estimation of emissions using EEIO databases is less accurate than using the investment-specific method, due to the fact that the databases use average emission factors and that they are typically not updated each year. Furthermore, all companies operating in a sector will have the same emission intensities and so identifying better and worse performers in an investment portfolio is not possible. Finally, EEIO database information may include scope 3 emissions, which may be difficult to separate from scope 1 and 2 emissions. In this case, the full scope 1, 2 and 3 emissions will need to be included, and this boundary disclosed.

A selection of EEIO databases include data for South Africa. The Exiobase database[10] is available at no cost, and has monetary based (as opposed to output based) data for up to the year 2015.

Emissions are given as follows:

$$GHG\ emissions_{x,y} = \sum_{z} (revenue_{x,y,z} * EF_z) * holding_y$$

where:

GHG emissions$_{x,y}$	GHG emissions for company x in year y (tonnes CO_2e)
revenue$_{x,y,z}$	revenue of company x in year y in sector z (e.g. $)
EF_z	Emission factor of sector z, in the latest year for which data is available from the EEIO database (e.g tonnes CO_2e/$ revenue)

[10] https://www.exiobase.eu

$holding_y$ Average percentage holding in the company in year y

Example: Average data method

A diverse holding company (ADHC) has activities spanning three sectors, with the allocation of revenue to the sectors shown in the following table. Also shown in the table are the emission factors for each of the sectors, obtained from an EEIO database.

Sector	Sectoral revenue ($)	Emission factor (kg CO_2e/$ revenue)
Food and beverage	2,000,000	0.4
Banking	7,000,000	0.3
Mining	5,000,000	2

In that year, an investment company held an average of 9% of their total shares. The contribution of ADHC to the investment company's total Scope 3 emissions is given by:

$GHG\ emissions_{ADHC,\ 2020}$ = (2,000,000*0.4 + 7,000,000*0.3 + 5,000,000*2) * 9%

= 1.161 Mt CO_2e

Similar company data method

6. Similar company data method

The third option proposed here[11], which could be used as a least accurate fall-back method when the other two methods are not available, is to find emissions data for similar companies and use that data to estimate emissions for the company of interest. Similar companies may be defined as those operating in a similar sector, producing similar products or conducting similar activities, and ideally those operating in similar jurisdictions. Ideally, if information from more than one similar company is available, then an average intensity factor can be used. This will provide a more accurate figure than using a single company's emissions.

To take into account differences in scale or size, total emissions from the similar company are divided by an appropriate normalisation factor, such as turnover, sales, production or number of

[11] As stated previously, this option is not included in the GHG Protocol guideline, but is proposed by the authors of this current document.

employees, to give an emissions intensity. This intensity is then multiplied by the same factor for the company of interest.

Expressed mathematically, intensity is calculated as:

$$EI_{\ similar\ companies} = average(\frac{emissions}{NF})$$

where:

$EI_{\ similar\ companies}$	Emissions intensity for one or more similar companies to the company of interest
emissions	GHG emissions from each company for which emissions data is available, in the most recent year for which data is available (tonnes CO_2e)
NF	Normalisation factor for that company in the year for which emissions information is available (e.g turnover, sales, production or number of employees). The same NF must be used for all companies in the calculation.

GHG emissions for the company of interest are then given by:

$$GHG\ emissions_{x,y} = EI_{\ similar\ companies} * NF_{x,y} * holding_{x,y}$$

where:

$GHG\ emissions_{x,y}$	GHG emissions for company x in year y (tonnes CO_2e)
$EI_{\ similar\ companies}$	As defined above
$NF_{x,y}$	Normalisation factor for company x in year y, which is the same factor and units as was used in the calculation of $EI_{\ similar\ companies}$
$holding_{x,y}$	Average percentage holding in company x in year y

Example: Similar company method

A Furniture Retailer (AFR) employs 5,000 people. A review of the literature finds three companies that are similar to AFR, in terms of their target market, location and size, as shown in the following table.

Company	Number of employees	GHG emissions (tonnes CO_2e)
Company A	8,000	18,000 (Scope 1) 26,000 (Scope 2) 34,000 (Total)
Company B	1,500	2,000 (Scope 1) 3,000 (Scope 2) 5,000 (Total)
Company C	6,000	14,000 (Scope 1) 21,000 (Scope 2) 34,000 (Total)

The emissions intensity is then given by:

$$\text{EI}_{\text{similar companies}} = \text{average}\left(\frac{34{,}000}{8{,}000}, \frac{5{,}000}{1{,}500}, \frac{34{,}000}{6{,}000}\right)$$

= 4.417 tonnes CO_2e/employee

If an investment company held an average of 12% of AFR's total shares in that year, the contribution of AFR to the investment company's total Scope 3 emissions is given by:

$\text{GHG emissions}_{\text{AFR, 2020}}$ = (4.417*5,000) * 12%

= 2,650 t CO_2e

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