A framework for assessing the carbon footprint of teacher professional development programmes

About this document

This document details a process framework for calculating the carbon footprint of education programmes. It outlines the four key phases that can be expected to be followed. It is intended to serve as an illustrative guide for those interested and involved in reporting the environmental impact of education programming.

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Abbreviations and acronyms

CO2e	Carbon dioxide equivalent (emissions)
GHG	Greenhouse Gas
HCC	Humanitarian Carbon Calculator
LMIC	Low- and Middle-Income Country
STELIR	Secondary Teachers English Language Improvement Rwanda
TPD	Teacher Professional Development

Figures

Key definitions

Carbon dioxide equivalent (CO2e)	This measurement is commonly used to express a carbon footprint consisting of several greenhouse gases using a single number; the idea is to express the impact of each different greenhouse gas in terms of the amount of CO2 that would lead to the same warming (EcoAct, 2022).
Emission factors	An emission factor is a coefficient that quantifies the rate at which a given activity or process releases greenhouse gases (expressed as carbon equivalent emissions) into the atmosphere (Climatiq, 2024). For example, according to the HCC an average horsepower diesel car has an emission factor of 0.25, expressed in kgCO2 e/km. This means that each km distance travelled in this vehicle type produces 0.25kg of carbon equivalent emissions.
Emission scopes	Greenhouse gas emissions are classified into three scope categories: **Scope 1** are the emissions an individual or organisation directly controls, such as burning fuel in vehicles or factories. **Scope 2** emissions are released when generating the electricity, steam, or heat that an individual or organisation buys, but not from their own activities. **Scope 3** are the emissions released up and down a value chain, such as when individuals or organisations buy, use and dispose of products from suppliers. (Our Carbon, n.d.)

Overview

The framework included in this report is a step-by-step guide outlining a methodological approach that could be taken to assess the carbon footprint of teacher professional development (TPD), or other education programmes, implemented in LMICs.

The framework is intended for use in contexts where the user has access to primary data related to programme activities and their associated energy usage and costs. It is also designed around utilising online, free-to-access secondary data (such as emission factors) for calculating the carbon footprint of programme activities. As such, this framework aims to enable individuals who are not experts in carbon accounting to generate a reasonable estimate of a programme's carbon footprint on behalf of an organisation.

The document draws on an example case study, a carbon footprint assessment of the Secondary Teachers English Language Improvement Rwanda (STELIR) programme, which utilised this methodological approach. A full case study report accompanies this framework guide.

Two accompanying spreadsheets (an activity mapping matrix and calculations spreadsheet) are also provided. These are indicative examples of the kind of output that could be developed using this framework. However, the exact nature and detail of each output will vary significantly based on the nature of the programme, its implementation, and data availability.

It is important to note that a more granular examination of the methodological approach, in particular carbon footprint calculations and formulas, is not included due to the complexity and contextual nature of the calculations meaning replication is a challenge. For example, calculating the carbon footprint of each data point relies on different emission factors, data requirements and formulas, all of which will vary significantly depending on the context. However it is hoped this framework, in outlining the wider methodological process undertaken, has replicability and use beyond this case study. The framework is split into four key phases (see *Figure 1* on page 6):

Phase 1 - Scoping and reviewing documentation
Phase 2 - Data gathering
Phase 3 - Identifying calculation tools
Phase 4 - Calculating emissions

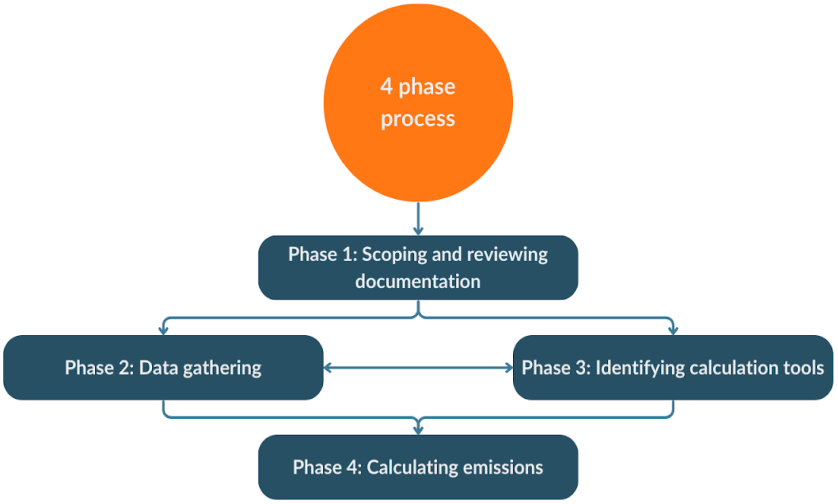

Figure 1: The four phase process proposed by this framework.

Phase 1: Scoping and reviewing documentation

At the outset, it is important to ensure that the person conducting the emissions assessment (hereafter referred to as 'the assessor') has a deep understanding of the programme. Where the assessor does not already possess this knowledge, or only elements of it, they should begin by having scoping discussions with relevant stakeholders - most likely with experienced programme staff. They should also conduct a detailed review of programme and organisational documents. During these activities, the assessor should ensure that they can answer the following questions about the project, which will serve as a basis for calculations later on:

1) What is the purpose of the programme?

2) What is the timeframe for the programme?

3) What is the budget and scale of the programme?

4) Who is involved in the programme?

5) What are the key programme activities?

The exact scale and nature of the scoping phase will depend heavily on the assessor's pre-existing familiarity with the programme. If the process is being completed internally, by staff who already have a detailed understanding of the programme, this first phase may be less relevant. Either way, those who will be handling the data and running the calculations must have a strong appreciation of the nature of the programme that is being assessed.

Phase 2: Data gathering

The second phase entails targeted data collection based on the information gathered during the first phase. This data gathering involves answering more specific questions about both the programme and its data, which are needed to calculate the emissions generated by each project activity. While this will vary depending on the programme and the nature of the information provided during phase 1, it is helpful to think about the following sub-questions (shown in *Figure 2*) associated with the initial questions suggested in phase 1:

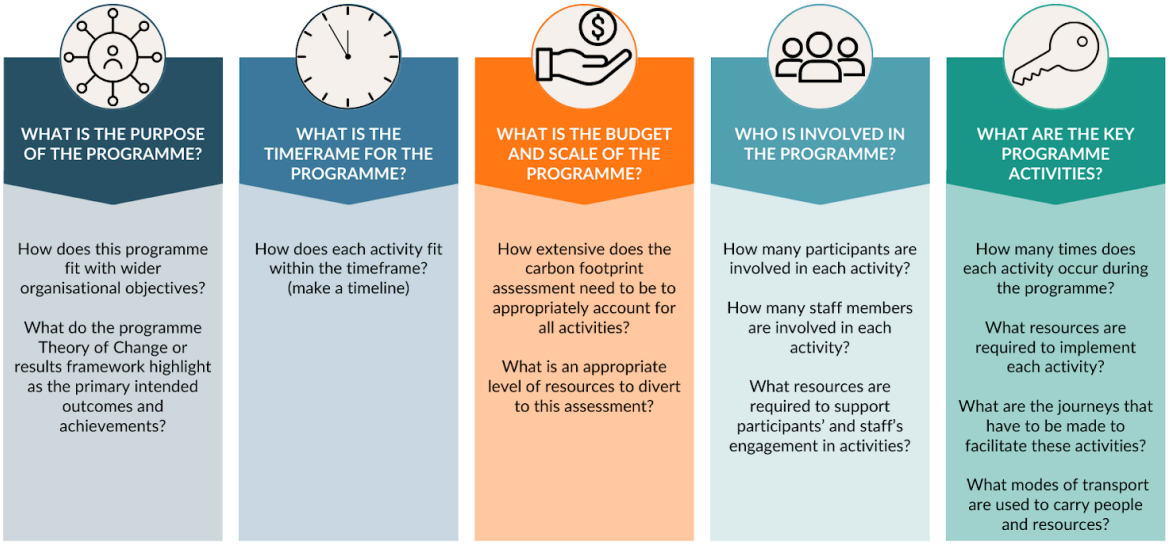

Figure 2: Sub-questions to consider when gathering information about the programme to be utilised within the carbon footprint assessment.

It is also important at this point to decide on the data parameters for the carbon footprint assessment. In the case of the STELIR assessment, only activities and resources that were undertaken and procured exclusively for the programme itself were counted, meaning that any pre-existing resources or activities that would have taken place even if the programme were not running (e.g. the meals that teachers consumed in their own homes while undertaking online training) were not counted. Please refer to the STELIR case study report for a more detailed exploration of this issue.

To check that all relevant data is being considered, it is also worth asking:

Are there any other activities that take place in order for the programme to function?

Is data available for these activities?

It is likely that the assessor will not be able to find data for every activity identified. In this case, it may be necessary to use estimates and

proxies; this is discussed in phase 4 below, and also in the STELIR case study report.

During the process of data gathering, the assessor should begin organising the data to be more readily converted into carbon equivalent emissions. An activity mapping process can help to centralise and re-categorise data so that it is ready to be used in later stages. Each programme activity should be mapped to an emission category (e.g. transportation, energy usage) that is aligned with existing tools and databases (see phase 3), to increase the likelihood of finding relevant emission factors and producing replicable and comparable results.

The activity mapping matrix for STELIR (see *Figure 3* below) provides an illustrative example of this process, though the exact nature of activity mapping will depend on the contextual parameters of the carbon footprint assessment. In STELIR, where emphasis was placed on calculating the relative carbon footprint of online and face-to-face components, activities were laid out chronologically and allocated to clear separate stages (*Figure 4*).

Recurrence	Primary resource	Key Data Points and Description	Relevant impact categories
One-time	Participant numbers	3,619 participants across 8 districts	n/a
	Transportation	**Invigilator travel to district:** One invigilator per district travels out to the TTC from Kigali (via 4x4) each weekend of testing (4 weekends total per year). In year one this totals 32 return journeys. These journeys also carry equipment.	Transportation
		Invigilator travel to TTC: Each invigilator per district travels to the TTC from the hotel (via 4x4) on Saturday and Sunday. This is a total (per district) journey length of 4-30km per day (so 8 - 60km per weekend, and 32 - 240 km total across all testing weekends). These journeys also carry equipment.	Transportation
		Participant travel: Participants make one return journey to their district TTC to complete testing. In year 1 this is 3,619 return journeys. Journeys are split 79% rural, 12% peri-urban, 9% urban.	Transportation
	Accommodation	**In district:** Each invigilator is provided with 3 nights accommodation at a nearby hotel (24 nights per testing weekend across all districts, 96 nights total across all 4 testing weekends)	Energy Usage, Water Usage, Infrastructural related emissions
	Resource Usage	**Daily TTC usage:** 2 days in each TTC per testing weekend, meaning 8 days total per district at a rate of RWF 25,000 per day.	Energy Usage, Water Usage, Waste
		Daily tablet use: Each individual test lasts for 3 hours, meaning a total number of 10857 hours of tablet energy use across the 3,619 participants.	Energy Usage
	Additional services / systems	**MTN mobile money**: transaction fee is RWF 60 per transaction. Participating teachers are reimbursed for their transport costs using STELIR pre-calculated rates for every district and sector in Rwanda (average RWF 20,000).	Energy Usage, Upstream services

Figure 3: Screenshot of the activity mapping matrix, explaining how the individual data points for delivering the activity 'Aptis testing 2023' were mapped.

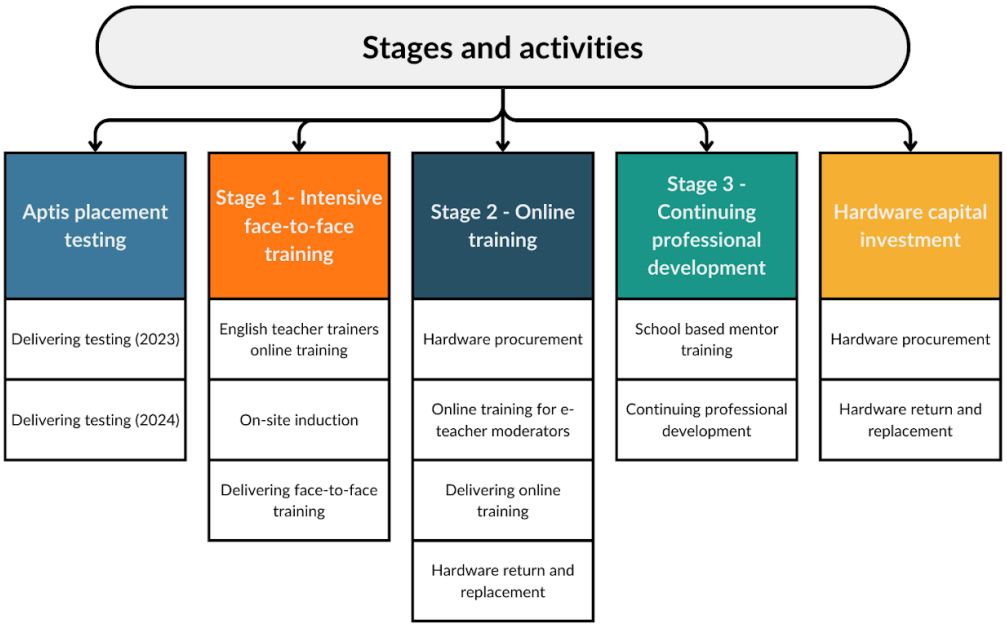

Figure 4: The stages and activities used to map data points in the STELIR case study.

Phase 3: Identifying calculation tools

The third phase, which can be done alongside phase 2, encompasses the assessor reviewing and testing different online tools relevant to carbon footprint calculations, to determine whether they could be used. The extent to which each tool is reviewed, and their determined relevance, will depend on the requirements of the assessment for each study. For example, if the programme entails a significant volume of international aviation travel, a deeper review of tools that assess air travel emissions will be necessary.

In STELIR, three tools were chosen for deeper review based on the fact that they were open access, were designed to follow the GHG Protocol, produce results in terms of carbon dioxide equivalent (CO2e), and were developed to enable individuals or organisations to calculate their emissions with a view to making evidence-based plans for reducing their emissions. The three tools chosen for deeper review were:

The Humanitarian Carbon Calculator (HCC)

Carbon Footprint

Our Carbon

When testing each tool, the assessor should ask the following questions (see the STELIR case study for an example of how this was done):

1. **What types of emissions and activities are covered? (e.g., Scope 1, 2, 3)**
   (a) Does the tool contain the same categories and activities as my programme?

2. **Who is the tool's target user? (e.g., individuals, whole organisations)**
3. **In what format is the tool accessed, and how easy is it to input data?**
   (a) Does the tool require data in different units to what I have available?
4. **Can the tool account for emissions across the whole length of the programme?**
   (a) Can the tool only measure one-time activities, or can it measure continuous or repeated activities?
5. **Is the tool free to access?**
6. **What support is available for using the tool? (e.g., manuals, video tutorials)**
7. **Does the tool use emissions factors that have been generated using the same context as my data?**
8. **How much detail is provided when results are presented?**

If none of the tools are a perfect fit for the programme being assessed, as was the case with the STELIR case study, they can still constitute a valuable starting point for calculations. The HCC, in particular, explicitly states which emissions factors are used to calculate the emissions of each activity. Providing that they are relevant enough to the specific programme activity being calculated, these can be lifted from the tool and used separately. Other useful sources that provide emissions factors, and which were used for the STELIR case study, are:

The UK Government's conversion factors 2023

Climatiq Data Explorer

Finally, reviewing available tools and emission factors may feed back into phase 2; they may contain categories and activities applicable to the programme being assessed that have been overlooked during the data-gathering phase. It is therefore helpful to bear this in mind when reviewing the tools to catch any additional data points.

Phase 4: Calculating emissions

The final phase entails the process of calculating the carbon equivalent emissions for each programme activity. To calculate the emissions, the assessor should follow four sequential steps listed below:

Step 1 - Reorient data into individual data points
Step 2 - Derive appropriate emission factors or conversions
Step 3 - Formulate proxies and estimates (if necessary)
Step 4 - Run calculations

Step 1 - Reorient data into individual data points

As the first step in this process, the assessor should reorient the mapped data into discrete data points, which can accurately and reliably be converted by an emission factor or equivalent conversion. It is therefore recommended that the assessor ensures that data is arranged by emissions category (e.g. transportation, energy use), ideally in a way that aligns with the categorisation of emissions

within the tools or emission factor sources being used.

An example of how this was done for STELIR is provided in *Figure 5* (on page 11), which uses the example of invigilator transportation in a 4x4 vehicle, to deliver the activity of "Aptis testing (2023)".

The calculation spreadsheet provides a full example of the process that was undertaken during STELIR. Activities were transferred from the activity mapping matrix into a calculations spreadsheet, structured by emissions category tabs that were mapped to each activity during phase 2. Relevant columns were then added to input the required data.

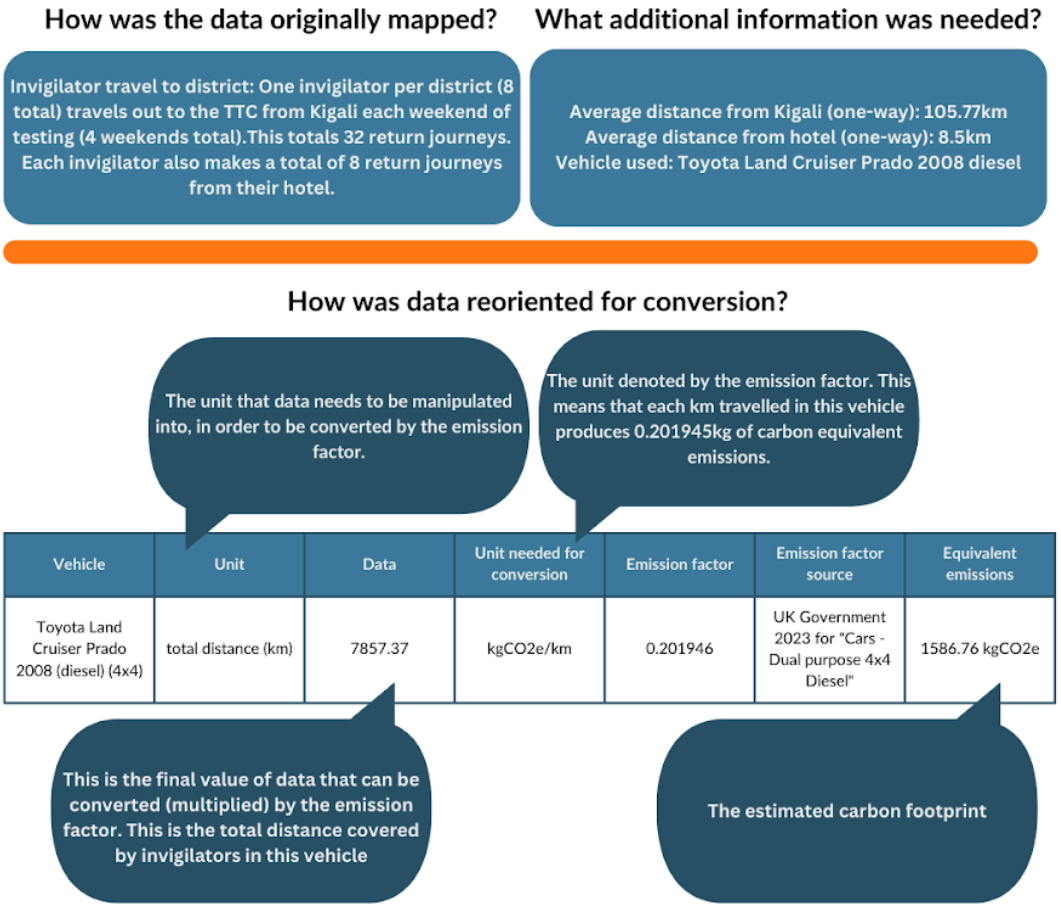

Figure 5: The transportation emissions calculation for invigilator travel using a 4x4 vehicle required to deliver Aptis testing in 2023, this can also be seen in the calculation spreadsheet.

Step 2 - Derive appropriate emission factors or conversions

Before starting calculations, an appropriate emission factor or conversion needs to be derived for each data point. In some instances, programme data will need to be converted into a different unit to align with the data requirement of the chosen emission factor (see *Figure 5* above as an example). The databases and tools outlined in phase 3 should serve as the primary reference point to obtain these conversions.

Step 3 - Formulate proxies and estimates (if necessary)

If direct conversions are not available, or exact programme data cannot be provided, for example, not knowing the individual weight of each item, then proxies and estimates should be obtained using online searches for data from parallel contexts. This may entail additional data collection to generate reasonable estimates or 'proxies' that could be used to simplify the calculation process. For example, STELIR participants live in diverse locations and therefore travel varying distances using various modes of transport. The British Council team therefore developed 'typical' journeys for different types of participants. An 'average' typical journey was then developed for each participant from rural, peri-urban and urban areas, and the research team was provided with an estimated percentage of total participants from each of these locales to use in the final calculations.

It is also worth noting that, prior to running the calculations, decisions will need to be made about whether all data points merit inclusion in the final analysis. If there are data points with emission factors 0.00, or a lack of means to reasonably estimate values using proxies or alternative data sources, then it may be necessary to remove them.

Step 4 - Run calculations

Once all this data is in place, the final step is to complete the calculations. Data being converted into the format aligned with each emission factor means that a simple multiplication of the two ("Data" x "Emission factor" columns as shown in *Figure 5* above) will provide a kilogram per carbon dioxide equivalent (kgCO2e) emission figure for each data point.

Take the example in *Figure 5* above, which shows the emissions generated by invigilators' journeys to and from the test centres, and to and from hotels, to deliver Aptis testing in 2023. Here the total distance travelled was calculated using the total number of one-way journeys to both the test centres and the hotels, multiplied their respective average distances for a one-way journey. This total figure was then multiplied by the emissions factor identified as most closely reflecting the activity - in this case, the UK Government emissions factor for "Cars - Dual purpose 4x4 Diesel". This produced a final emissions value in kgCO2e. Finally, the emissions values for each data point were added together to produce a final figure for emissions generated across the programme

Conclusion

The above framework is an attempt to guide non-experts through a low-intensity process that will result in a reasonable estimate of their programme's carbon footprint. It is important to view the framework as an indicative guide rather than a rigid set of instructions due to the variation in programme structures and differing organisational priorities when it comes to measuring carbon emissions. However, it is hoped that the framework constitutes an accessible way of generating estimates that can be used in organisational decision-making. The framework could also be used as part of monitoring and evaluation, with the process being repeated multiple times over the course of a programme so that implementers can compare emissions generated during different phases, assess the impact of different programme decisions on their carbon footprint, and use the results to make changes to current and future programming.

While the framework has been designed for use by education organisations working in LMICs, it may have wider applicability and the research team invites other organisations to also consider using it in their contexts, especially those for whom investing in high-intensity environmental impact assessments is not a possibility. Whoever the user, it is hoped that the framework presents a pathway for those who are not carbon accounting specialists to begin to engage more seriously with environmental issues, and to integrate environmental impact evidence into programme decision-making without the need to redirect substantial funds away from core activities.