The Plus Project: Project level carbon tracking

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Plus Project partners: Unitedaid, PSI, iNSP, University of Copenhagen, Fobang Institutes, Centre de Recherche Entomologique de Cotonou (CREC), Manhica Health Research Center (CISM), Tropical Disease Research Centre Zambia, FINISTECH, NHRTI Zambia, University of Ghana, University of Kinshasa, University of Southern Florida

1. Report foreword

Advances in global health rely on researchers working together across countries and continents. However, climate change threatens to disrupt the very conditions in which research is conducted and interpreted. Its health impacts are profound, making it a priority for researchers and policymakers to reduce their own environmental footprint. Yet international collaboration - essential for global health research - often depends on frequent travel for meetings, site visits, and dissemination activities at local, national, and global levels. These activities can generate substantial carbon emissions.

At the outset of the Plus Project, a large multi-country evaluation of a malaria control strategy, the project team took deliberate steps to minimise travel-related emissions. This case study outlines the project's travel policy and the effect of this policy on the project's carbon footprint from international travel.

2. Plus Project summary

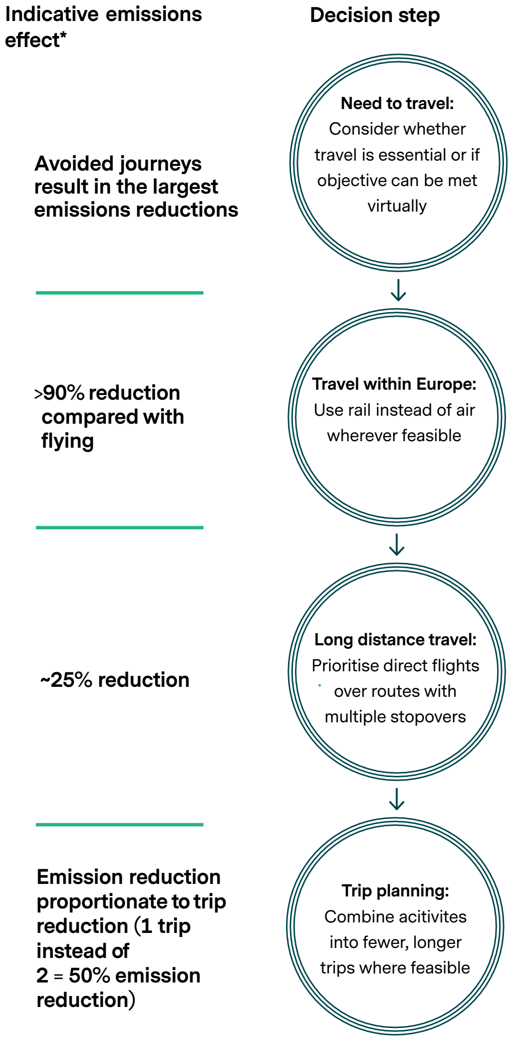
The Plus Project, funded by Unitaid with a budget of $34 million, aimed to co-design, pilot, and evaluate country-specific models of Perennial Malaria Chemoprevention (PMC), a WHO recommended strategy. The main study countries were Benin, Cameroon, Côte d'Ivoire, and Mozambique, with additional activities in the Democratic Republic of the Congo, Ghana, and Zambia. In the four primary countries, Population Services International (PSI) collaborated with Ministries of Health to design and implement PMC strategies. The London School of Hygiene & Tropical Medicine (LSHTM), working with a wide network of partners[1] developed and conducted a range of evaluations across all seven countries.

To manage and reduce emissions, the LSHTM team introduced a strict travel policy at the start of the project. This policy covered travel by LSHTM staff as well as partner travel for annual meetings, inter-institutional visits and conferences.

1. Partners: CISM, Mozambique, CREC, Benin, FINISTECH, Cameroon, INSP, Cote d'Ivoire, NHRTI, Zambia, University of Copenhagen, Denmark, University of Ghana, Ghana, University of Kinshasa, DRC, University of Southern Florida, USA

Photo credit: PSI Benin, Plus Project

Figure. 1: Summary of the principles underpinning the Plus Project travel policy



**Percentages are indicative and intended to support decision-making at the planning stage; not all effects were quantified in this study.*

3. Methods to estimate the effect of the travel policy

Calculating travel related carbon emissions (CO_2e)

Records of all journeys made were collected by the Plus Project administrative team, including passenger details, flight or rail origins, stop-overs, destination, dates and costs.

Data collection and scenario modelling

We calculated 3 carbon emissions scenarios for each journey:

- Actual route: CO_2e from the recorded route take
- Minimum CO_2e route: Hypothetical best practice route, following guidance shown in figure. 1
- Business-as-usual route: Hypothetical CO_2e calculated from cheapest ticket available within reasonable travel time

Detailed rationale for the selection of these scenarios is provided in Annex A.

Emissions calculations

Each leg was calculated separately using UK Department for Environment, Food and Rural Affairs (DEFRA) modespecific emissions factors per passenger kilometre, with year-based adjustments (see Annex B for full table) Emissions were calculated as:

$$CO_2e = \text{distance (km)} \times \text{emissions factor (kg } CO_2e\text{/km)}$$

- For the actual route, emissions values were taken directly from travel management company (TMC) reports
- For the minimum CO_2e and business-as-usual routes, flight distances were calculated using the Great Circle Map tool and rail distances were taken from published timetables where available
- All results included radiative forcing (RF) multipliers
- Journey records were standardised and checked for accuracy before analysis (Annex C)

Table 1: Details of CO_2e calculations

Actual route	As booked and travelled CO_2e values are taken from monthly reports produced by LSHTM's contracted travel management companies (TMCs) which record detailed information of all flights taken.
Minimum CO_2e route	The lowest-emission feasible option, applying the following rules: • Train travel substituted for flights where journey time is under 8 hours • Direct economy flights only • Where direct flights were unavailable, train travel to European hubs before onward direct flights
Business-as-usual route	A cost-driven scenario reflecting common academic travel practices: • Cheapest economy-class flight recommended by Google Flights within a selected one-week window • Within recommended flights, the cheapest non-direct flight is selected • If all recommended flights are direct, a direct flight can be assumed

4. Results: What was the effect of the travel policy on carbon emissions?

Travel-related carbon emissions

- Across the project, total travel-related emissions amounted to 167,776 kg CO_2e
- On average, each journey generated 1,459 kg CO_2e, though emissions varied widely depending on the mode and distance of travel
- The lowest emitting journey (return rail travel between London and Paris) produced just 3 kg CO_2e, while the highest emitting trip, involving long-haul flights from Tampa to London and onward to Yaoundé, generated 3,687 kg CO_2e

Scenario comparison

To assess the effectiveness of the travel policy, actual emissions were compared with two counterfactual scenarios:

- Best case scenario (minimum emissions): 153,361 kg CO_2e
- Worst case scenario (business-as-usual): 219,743 kg CO_2e
- Actual emissions: 167,776 kg CO_2e

This indicates that the project avoided 51,967 kg CO_2e, representing a 24% reduction compared with a business-as-usual approach. A further 14,415 kg CO_2e (9%) could have been saved if all journeys had followed the lowest emission options.

↓ **24%** 52 tonnes ≈ Annual energy consumption of 15 UK households

Key insights

Several important lessons emerged from the analysis:

- **Route optimisation was critical.** By prioritising more direct routes and avoiding high-emission journeys with multiple stopovers, the project achieved substantial savings —equivalent to 52 tonnes CO_2e, or a 24% reduction compared with the worst-case scenario.
- **Most feasible low-carbon options were adopted.** Only 22% of potential emissions savings remained unrealised, suggesting that the travel policy was largely effective in capturing available reductions.
- **Short-haul flights present the greatest opportunity for further reduction.** Around 24% of flight legs involved travel between the UK and European hubs, indicating strong potential for substitution with rail travel on these routes.
- **Business class travel significantly increases emissions. Where feasible, it should be avoided.** In many cases, it is environmentally preferable for travellers to allow additional recovery time after economy-class flights rather than choosing higher-emission seating for convenience.
- **Long-haul travel offers fewer alternatives.** Limited practical substitutes constrain additional reductions in this area. However, further emissions cuts could be achieved by reducing the number of trips overall.
- **Although not formally quantified in this analysis, there is anecdotal evidence that the travel restrictions associated with the COVID-19 pandemic also led to fewer journeys being taken.** Some trips were cancelled entirely or replaced with lower-carbon alternatives—including rail travel within Europe (e.g., to Copenhagen, Geneva, and Paris) and increased use of virtual meetings in place of in-person visits.

5. Challenges

Methodological challenges

- Variability in "business-as-usual" estimates: The business-as-usual scenario was modelled using Google Flights to approximate cost-driven travel choices. However, routes and prices fluctuate frequently due to changing availability and demand, introducing uncertainty into this baseline comparison
- Reliance on hypothetical modelling: Both the minimum-emissions and business-as-usual scenarios are based on modelled rather than observed travel behaviour. While this enables consistent comparisons across journeys, it may not fully reflect real-world booking constraints or traveller preferences at the time decisions were made

Policy and implementation challenges

- Complexity of lower-carbon journeys: Rail alternatives and other lower-emission options often involve longer journey times, multiple transfers, and a greater risk of disruption. These factors can limit their practicality and uptake, particularly for time-sensitive journeys

Administrative and visa barriers:

- Travel via European rail or combined train–flight routes can introduce additional visa or administrative requirements. This can disproportionately affect international staff and reduce the feasibility of lower-emission travel options

Photo credit: Malika Kounkourou

6. Lessons learned

This work, undertaken jointly by the Plus Project and the LSHTM Sustainability Team, aimed to develop a replicable approach for tracking and reducing project-level carbon emissions. The Excel-based tool developed (Annex E) provides a practical template that can be adapted by other projects seeking to achieve similar reductions. Key lessons include:

Establish shared priorities early

At the outset, agree a clear decision-making framework for travel, involving both travellers and booking staff. This may include a travel hierarchy (e.g. rail over air where feasible) or agreed cost thresholds for selecting lower-emission routes. Early alignment ensures that those responsible for booking feel empowered to prioritise sustainability.

Leadership is critical

Principal Investigators and senior staff play a key role in setting expectations. Visible commitment to low-carbon travel — through both advocacy and personal practice—helps embed these principles across the team.

Start early and embed tracking process

Emissions tracking should begin at project inception. Assign clear responsibility within the team, allocate time for data management, and integrate carbon tracking into routine project processes (e.g. as a standing agenda item in meetings). This ensures consistent monitoring without creating undue administrative burden.

Capture decisions not to travel

Decisions to cancel, combine, or replace trips often yield the greatest emissions savings but are frequently undocumented. Maintaining a register of such decisions would strengthen future analyses and provide a more complete picture of emissions reductions.

Validate external data sources

While TMC data can streamline reporting, it should be periodically verified. In particular, emissions calculations should be checked when DEFRA carbon factors are updated (typically annually) to ensure accuracy and avoid the need for retrospective corrections.

With thanks to the whole Plus Project team

Photo credit: Malika Kounkourou

Annexes

Annex A: Scenario

This annex explains the rationale for the three scenarios used in the analysis. The goal was to design scenarios that are standardised, transparent and repeatable, ensuring both comparability within this dataset and reproducibility in future research.

Actual route

- Provides the "real-world" benchmark for assessing alternative options
- Essential for evaluating the gap between practice and potential
- Anchors the analysis in verifiable data rather than assumptions

Minimum CO_2e route

- Provides a transparent "best-case" counterfactual, answering the question: "What emissions could have been avoided if if sustainability was the primary travel consideration?"
- Rules reflect evidence-based thresholds (e.g. 8-hour train limit is commonly used in academic travel policies)
- Emphasises feasibility as options modelled were technically achievable, not hypothetical (e.g. no routed assumed non-existent)

Business As Usual (BAU) route

- Provides a credible counterfactual to test the extent of emissions avoided by more deliberate travel choices
- Reflects real-world booking behaviour under cost and budget constraints
- Highlights the trade-offs between financial and environmental priorities

Standardisation and Repeatability

The choice of these three scenarios was motivated by the need for results that are not only internally consistent but also externally reproducible. Specifically:

- **Comparability:** All journeys were assessed under the same decision rules, ensuring like-for-like comparisons
- **Transparency:** The rules are clearly defined and documented
- **Repeatability:** Future projects can replicate the modelling using the same publicly available tools (Google Flights, rail timetables, Great Circle Map) and DEFRA emissions factors
- **Scalability:** The approach is adaptable and can be applied to larger datasets or across different projects without modification

Annex B: Emissions factors used

All emissions factors were sourced from the UK Government/DEFRA Greenhouse Gas Conversion Factors for Company Reporting. Factors are expressed per passenger kilometre and include radiative forcing multipliers for aviation. The appropriate factor for each journey was applied according to its year of travel (2022-2025). All emissions factors given are gCO_2e/km.

Mode of Transport	2022	2023	2024	2025	Notes
Short-haul flight	151	182.87	182.87	125.76	<3,700km
Long-haul flight	147.87	147.87	200.11	117.04	>3,700km
Rail (electric)	4.46	4.46	4.46	4.459	
Rail (diesel)	35.49	35.463	35.46	35.463	

Annex C: Data cleaning and validation

- All journey records were standardised (removal of commas, consistent formatting). For example:
- Minimum CO_2e and BAU routes were formatted as a breakdown of travel legs by mode and distance, e.g:
  - Train (electric): 342
  - Short-haul flight: 1200
  - Long-haul flight: 4200
- Distances parsed from multi-line and comma-separated entries
- Monthly TMC reports used to cross-check and replace booking confirmation values where discrepancies existed
- Journeys with incomplete data were resolved through traveller follow-up, where possible

Annex D: Outputs and metrics

The following table summarises the key outputs calculated for each journey. These metrics enables comparison between the actual routes taken, the lowest-carbon feasible routes and the cost-driven BAU scenarios.

Metric (kg)	Description	Aggregate Result
Min CO_2e	Emissions for the lowest carbon alternative	153,361
BAU CO_2e	Route emissions for the costdriven BAU	219,743
Actual CO_2e	Route emissions for the route actually taken	167,776
CO_2e savings made	Difference between BAU and actual routes	51,967
Further CO_2e savings possible	Difference between actual and minimum routes	14,415

Annex E: Spreadsheet

For a copy of the Excel Spreadsheet Template please email sustainability@lshtm.ac.uk.