

Methods note · Everyday practice

A seat is not a journey: comparing transport on the same unit

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ABSTRACT

Transport comparisons can fail when vehicle-kilometres, passenger-kilometres, seating capacity, and complete journeys are treated as interchangeable. This methods note develops an event-travel comparison using the UK government's conversion-factor methodology and GHG Protocol product and policy-accounting standards. A fictional twelve-person case illustrates occupancy, detours, positioning, and the risk of rewarding unnecessary distance through a denominator. The analysis distinguishes factors that already contain occupancy assumptions, aligned operating boundaries, average allocation, and marginal consequences. Accessibility and a feasible return journey define the service rather than appearing as optional extras. No real emissions or modal savings are calculated. The resulting record supports comparison of complete, usable journeys while retaining uncertainty about vehicles, routes, factors, and displaced alternatives.

Keywords: transport units · occupancy · passenger-kilometres · journey boundaries

A source-based editorial text, not a report of original Still North research. Examples and imagery are illustrative.

Different denominators answer different questions

A car's emissions per vehicle-kilometre and a train's emissions per passenger-kilometre cannot be compared as though their units were identical. The first describes moving a vehicle; the second allocates activity across the people transported. Occupancy connects them, but only under a stated allocation rule. Even after aligning units, a modal average does not automatically describe a specific journey or the consequences of one person's choice.

This methods note develops a transport comparison for an event organiser deciding how a group can reach the same destination. It uses the UK government's 2025 conversion-factor methodology and the GHG Protocol's product and policy-accounting standards. It is a boundary-and-unit exercise, not a ranking of real operators. All passenger counts and distances in the worked case are fictional, and no real emissions or savings are calculated.

Start with the service: a specified group arriving at a particular place within an acceptable time window, with a feasible return journey and the access support they require. This is more useful than a kilometre in isolation. Routes, transfers, accessible boarding, luggage, and schedules can change which options genuinely deliver that service.

Occupancy is a measured relationship

For a vehicle travelling a uniform route with a constant number of occupants, dividing a vehicle-based factor by the relevant occupancy gives an allocated passenger-based factor. That arithmetic is straightforward. Its interpretation depends on whether the driver is a passenger receiving the service, whether all occupants travel the same distance, and whether the factor already includes an occupancy assumption.

For changing occupancy, use passenger-kilometres across route segments divided by vehicle-kilometres across the same boundary. A headcount at the busiest stop is not average occupancy. Neither is the simple mean of occupancy readings if the readings represent unequal distances. Empty positioning movements contribute vehicle-kilometres and emissions but no passenger-kilometres, so excluding them can flatter a dedicated service.

The 2025 UK methodology describes how bus factors draw on fuel consumption, activity, and occupancy data, and notes that individual services vary with local conditions and vehicles. Its published passenger factors already incorporate their stated assumptions. Dividing such a factor by a bus's seating capacity would apply occupancy twice and create a meaningless result.

A fictional twelve-person journey

Imagine twelve fictional participants travelling from the same departure point to an event. Six cars could each carry two people over a twenty-kilometre one-way route. That outward movement produces 120 vehicle-kilometres and 240 passenger-kilometres, assuming all twelve people are counted consistently as recipients of the service. The figures describe activity only. They do not provide a vehicle emission factor.

A dedicated minibus could carry the group but would travel twenty-six kilometres because of its pickup and access route. Its outward journey would produce twenty-six vehicle-kilometres and, if all twelve remain aboard throughout, 312 passenger-kilometres. Fewer vehicle-kilometres alone do not prove lower emissions: the minibus and cars may have different emissions per kilometre. Those factors remain unknown in this example.

There is also a denominator trap. Dividing the minibus's emissions by its longer passenger distance can

make the detour appear to improve its per-kilometre performance without improving the event service. For this decision, compare the whole journey required to deliver twelve arrivals, not an artificially equalised distance. Passenger-kilometres remain useful for documenting activity, but the destination and service requirement should not change between options.

Add the return and positioning movements. Where does the minibus start before collecting participants, and where does it go after dropping them off? Do the cars return empty during the day? Are accessible transfers required? A comparison restricted to the attractive loaded leg is incomplete. State which movements change because of the event and which belong to an existing service.

Align the emissions boundary

Direct exhaust emissions, energy-supply emissions, and complete life-cycle emissions are different boundaries. A battery-electric vehicle has no combustion exhaust at the vehicle, but that does not make its electricity, manufacture, or infrastructure impact zero. Conversely, adding manufacturing to one option while comparing it with exhaust-only emissions for another biases the result. List included stages beside each factor.

The GHG Protocol Product Standard explains life-cycle accounting and the additional specifications needed for comparisons. An organiser does not need to perform a full assessment of every vehicle to make a useful decision. They do need to avoid labelling a limited operating-emissions estimate as a complete footprint. A narrower, aligned boundary is better than a broader but inconsistent one.

Electricity location and year, fuel supply, vehicle type, route conditions, and factor vintage can all matter. The UK methodology distinguishes direct and upstream components and documents data limitations. Record the selected factor and any adjustments. A current-looking calculator interface does not demonstrate that its source data describe this route or that every option includes the same processes.

Average allocation is not marginal consequence

A scheduled train may operate whether a participant boards or not. That does not establish that the passenger's long-term effect is zero, because demand can influence capacity, scheduling, and investment. Nor does it mean that the full average allocation is the immediate physical emission caused by one extra passenger. These are different questions and should not be answered by switching interpretations mid-calculation.

For an organisational inventory, consistently applying an appropriate published passenger factor can be useful. For the consequence of chartering a minibus, the additional vehicle movements and their energy use may be more directly relevant. The GHG Protocol Policy and Action Standard frames effects through an explicit baseline and intervention scenario. It helps expose whether an analysis concerns reporting responsibility or a change caused by a decision.

Do not allocate emissions to empty seats as though unused capacity were another passenger. Capacity is

relevant to service planning, not a substitute for actual occupancy. Equally, a low-occupancy service can provide essential access or connect into a wider network. Its social value and its environmental performance should be assessed together without making one erase the other.

Use comparison units that preserve access

Per-person estimates can conceal important constraints. A wheelchair-accessible vehicle may need space that a seat-count metric treats as inefficiency. A carer's journey is part of enabling attendance, not an optional surplus that can be deleted to improve a ratio. Set the service requirement with affected participants and compare options that can actually fulfil it.

Time also belongs beside the calculation. A theoretically low-emission route that arrives after the event, requires an inaccessible transfer, or lacks a safe return is not available in practice. Changing the event time or venue may create a better comparison than asking individuals to overcome a timetable. Report these design alternatives rather than presenting only a choice among vehicle labels.

For group travel, maintain a transparent record: participants served, origins and destination, route distances, vehicle movements, occupancy treatment, factor boundaries, and material unknowns. Avoid collecting detailed personal itineraries where aggregate information suffices. Where distances or occupancy remain uncertain, show a reasonable range and identify whether that uncertainty could change the decision.

Limits and the decision that remains

This note does not supply route-specific emissions, model induced travel, or value congestion, air quality, safety, and access in a single score. Published factors are often averages assembled from data with different reference years. A dedicated service requires different information from a scheduled network. Those limits should constrain the claim, not be hidden behind extra decimal places.

The practical conclusion is to compare complete, feasible journeys on an aligned boundary, then explain the role of occupancy. Passenger-kilometres describe delivered movement; vehicle-kilometres describe vehicle activity; attendance describes the organiser's immediate service objective. Keeping those quantities distinct makes arithmetic easier to check and prevents a tidy transport table from answering a different question from the one people need resolved.

References

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