

1. Project Implementation Period and Technical Lifetime

The project implementation period runs from 2027 to 2031. Allowing for procurement, construction, and fleet delivery, the Bus Priority Corridor (BPC) and its associated electric bus fleet are expected to become operational in 2029, and the GHG analysis period begins at that point.

The GHG analysis and crediting period is set at 20 years (2029–2048). This reflects several considerations:

- Differing technology lifespans within the project: the economic life of the electric buses is assumed to be approximately 12 years, and the Intelligent Transport Systems (ITS) supporting the corridor will likely require software and hardware refreshes on a broadly similar timescale. The civil engineering infrastructure created by the project — the dedicated bus lanes, stations, and associated road works — has a substantially longer design life, typical of urban road infrastructure. Per GCF guidance, the funded activity lifetime is taken as the longest mitigation lifetime among the technologies being implemented, which for this project is the civil infrastructure, assessed at 20 years.
- This infrastructure is also the component most directly responsible for the project's sustained emission reduction: the dedicated lanes and improved service reliability that drive modal shift persist independent of any single bus generation. The bus fleet itself is expected to be maintained and renewed through ordinary public-transport asset management over the period, consistent with standard CBS fleet planning practice, rather than the crediting period being constrained to a single fleet's service life.
- Comparable World Bank-financed BRT investments have used similar horizons: the Bank's Metro Manila BRT Line 1 project, for example, was publicly described by the Bank as avoiding GHG emissions on a 20-year accounting basis.

The means of verification is set out in Section 3 of this document.

2. GHG Mitigation Methodology

Two separate analyses are presented. The first estimates the emission reduction from passenger mode shift onto the Bus Priority Corridor (BPC), applying the Clean Development Mechanism (CDM) AM0031 for Bus Rapid Transit projects (version 8.0) together with CDM TOOL18: Baseline emissions for modal shift measures in urban passenger transport. The second estimates the emission reduction from fleet electrification alone, applying CDM AMS-III.C: Emission reductions by electric and hybrid vehicles (version 16.0). The relevant formulae for both are documented in the accompanying Excel spreadsheet.

Justification for Methodology Selection (AM0031/TOOL18)

AM0031

The project's emission reductions are expected primarily from modal shift to bus, driven by an 18.9 km dedicated Bus Priority Corridor (BPC) along Thimphu's main road corridor and concurrent fleet expansion, with 50 project-financed electric buses operating the corridor. This matches AM0031's applicability conditions:

- The project constructs and operates new bus priority lanes on which buses operate exclusively (more than half of the corridor is a bus-only lane);
- City buses in the project system use both conventional (diesel) and zero-emission (electric) fuel types, covered by AM0031's fuel-type provisions;
- The baseline scenario is the continuation of current motorised transport — cars, taxis, minibuses, and diesel buses — consistent with AM0031's applicability conditions;
- Additionality is established per AM0031's three-step process (below).

AM0031 vs ACM0016: ACM0016 restricts its applicability to "BRT systems without feeder route," directing systems with feeder lines plus trunk routes to AM0031 instead. The project-financed Bus Priority system will have feeder routes, as defined by AM0031 ("bus routes which have intersections with trunk routes and which 'feed' passengers to the trunk routes ... with less passenger demand and which operate under mixed traffic conditions"), as various bus routes intersect

the BPC corridor at one or more points and would functionally feed it passengers once operational. The project accordingly falls within AM0031's applicability rather than ACM0016's, and AM0031 is applied throughout.

Additionality (AM0031 §5.2). Bhutan graduated from Least Developed Country (LDC) status on 13 December 2023; automatic additionality under AM0031 therefore does not apply. Additionality is instead established through the three-step process:

AM0031 Step	Assessment	Outcome
Step 1 – Country-level (§5.2.1)	Are there fewer than 3 cities with operational BRT/MRTS systems in Bhutan? Currently, no city in Bhutan has an operational BRT system.	PASS → per AM0031 §26, proceed directly to Step 3. Step 2 (city-level assessment) is not required.
Step 3 – System-level, Performance Analysis (§5.2.3, Option b)	Does the project BRT system demonstrate forecast emissions per passenger-km (EFpkm) ≤ 50 gCO ₂ /pkm? Using the project ridership (Py) and emission-factor methodology set out below, forecast PE per passenger-km is 0 gCO ₂ /pkm – well below the 50 gCO ₂ /pkm threshold.	PASS → Project is additional.

TOOL18 (Option 2)

TOOL18 is the CDM-endorsed methodology for calculating baseline emissions from modal shift in urban passenger transport, referenced by AM0031. Option 2 (§5.4 of TOOL18) calculates baseline emissions from the passenger-km carried by the project system (PKMbus) and the share of those passengers previously using each baseline mode (SDi), together with the emission factor per passenger-km of each displaced mode (EFpkm,i). It is applied directly:

- Project ridership (Py) is estimated from BPC bus service parameters: 50 project buses × 50-seat capacity × 60% average occupancy × 5 daily round trips × the 18.9 km route, adjusted for passenger turnover along the route (route length ÷ average trip length) – held constant across the analysis period pending observed data from post-launch passenger surveys (Section 3).
- Baseline mode-shift shares (SDi) are assumed as 15% car, 15% taxi, 10% minibuss, 3% non-motorised transport (NMT), and 57% remaining conventional (diesel) bus – in line with global BRT evidence that a majority of new BRT ridership typically comes from existing bus/paratransit services rather than private vehicles, while also reflecting the higher baseline share of car/taxi use in Thimphu relative to other cities.
- Car and taxi shift shares are further disaggregated by fuel type – 61.5% gasoline / 13.5% diesel / 25% electric – based on modeling of average EV share over the analysis period, assuming EVs reach ~50% of new car sales by 2035, rather than previous survey-measured private-vehicle fleet composition (82% gasoline / 18% diesel / ~0.3% electric), which would understate the EV share expected to prevail over the crediting period.
- Project emissions (PE) are zero, reflecting Bhutan's zero-emissions electric grid. Formally, PE is calculated based the 50 project buses' grid electricity consumption: 1.616 kWh/km (reflecting Thimphu's hilly terrain), 68,985 km/year per bus (5 daily round trips × 2 × the 18.9 km route × 365 days), multiplied by Bhutan's grid emission factor (0 kgCO₂/kWh – Bhutan's grid is 100% hydropower), consistent with the CDM tool for calculating project emissions from electricity consumption.
- The technology improvement factor (IR), set to the CDM default value (0.99/year), is applied to baseline emissions.

Project Boundary and Scope

The project boundary is scoped to the 50 dedicated, project-financed BPC buses. Thimphu's City Bus Service (CBS) operates a wider network of approximately 61 additional buses that will continue running on subsidiary routes, many of which will intersect with the BPC and thus effectively serve as feeders. Reliable route-level operating data for this wider network (e.g., occupancy, frequency, route lengths) is not available at this stage of project preparation and cannot be reliably estimated without it. Given the absence of adequate operating data for the wider CBS network, project ridership (Py) and project emissions (PE) are provisionally scoped to the 50 project-financed buses.

This scoping is conservative in one respect and an acknowledged limitation in another. It is conservative in that it excludes any emission-reduction benefit from CBS passengers who might shift onto the BPC via a connecting trip on another route, crediting the project only for ridership captured directly on its own 50 buses. It is a limitation in that, strictly, some existing CBS routes will function as feeders to the corridor, and passengers shifting from those routes specifically onto the BPC are not separately identified in this analysis. However, shift from feeder routes to the BPC is not expected to be significant given that these routes serve different areas; most of the shift from conventional bus to BPC is expected to be from current users of routes along the main corridor. As more granular data on route-level ridership and fleet operations becomes available during project implementation, this boundary will be revisited.

Data Used in the GHG Calculations (AM0031/TOOL18)

The following datasets and parameters underpin the calculations. All data sources are documented in the Excel model (Inputs and calculation tabs).

Parameter	Source	Spreadsheet location
Project ridership (Py)	Estimated from BPC bus fleet, capacity, occupancy, and schedule parameters	Project emission BRT tab
Baseline mode-shift shares (SDi)	Assumptions in line with global BRT benchmark evidence and local traffic survey data	baseline BRT tab
Specific fuel consumption (SFCi,n)	Local field survey	Parameters_BRT tab
Net calorific value (NCVn)	Bhutan LEDS for Surface Transport	Parameters_BRT tab
CO ₂ emission factors (EFco2,n)	Local survey and published defaults	Parameters_BRT tab
Grid electricity emission factor (EFCO2,elec)	100% hydropower grid	Parameters_BRT tab
Grid transmission and distribution losses	Bhutan Power Corporation, Power Data Book 2024	Parameters_BRT tab
Electric bus energy consumption (SEC)	Global evidence on typical efficiency for a 9m bus; higher-end value selected reflecting Thimphu's hilly topography	Project emission BRT tab
Vehicle occupancy (OCi)	Field survey	Parameters_BRT tab
EV fuel-type share of car/taxi shift	Assumption (average EV share over period if 50% of new car sales are EV by 2035)	baseline BRT tab

Note on active mobility: A modest baseline NMT (walk/cycle) shift share (3%) is included, reflecting that NMT in Thimphu is generally used for shorter trips and that the project's interventions (e.g., Norzin Lam pedestrianization, sidewalk improvement) are expected to positively influence NMT share. Sensitivity to this assumption (tested up to 20%) is reported in the Scenario Analysis tab of the accompanying spreadsheet.

Step-by-Step Calculation Logic (AM0031/TOOL18)

Step 1: Emission factor per vehicle-km (EFkm) – TOOL18 Eq. 1

For each vehicle mode and fuel type, the emission factor per vehicle-km is calculated as:

$$EF_{km,i,n} = SFC_{i,n} \times NCV_n \times p_n \times EFCO_{2,n} \times 10^3 \text{ (gCO}_2\text{/km)}$$

For electric buses, where SEC is the specific electricity consumption in kWh/km:

$$EF_{km,bus,elec} = SEC \text{ [kWh/km]} \times EFCO_{2,elec} \text{ [kgCO}_2\text{/kWh]} \text{ (kgCO}_2\text{/km)}$$

These values are calculated once in the Parameters tab and referenced throughout the annual calculation tabs.

Step 2: Baseline emissions (BE) – TOOL18 Eq. 5 (Option 2)

TOOL18 Option 2 (§5.4, Eq. 5) expresses baseline emissions as a function of the passenger-km carried by the project system and the share of those passengers previously using each baseline mode:

$$BE = PKM_{bus} \times \sum_i [EF_{pkm,i} \times SD_i] \times 10^{-6}, \text{ where } EF_{pkm,i} = EF_{km,i} / OC_i$$

PKM_{bus} (total annual passenger-km on the BPC) is calculated as project ridership (Py) multiplied by the average trip length on the corridor. SD_i is the share of Py previously using baseline mode i (car, taxi, minibus, NMT, or the existing diesel bus fleet), and EF_{pkm,i} is the corresponding baseline emission factor per passenger-km for that mode and fuel type (Step 1).

BE therefore captures the emissions that would have been generated by BPC passengers' previous trips, across their previous modes, weighted by each mode's share of ridership and its emission intensity. Because SD_i includes a share attributed to the existing diesel bus fleet, BE also captures the benefit of passengers shifting from lower-frequency conventional bus services to the improved BPC service, in addition to the benefit of shift from private vehicles.

Step 3: Project emissions (PE) – AM0031

Project emissions (PE) are limited to the electricity consumption of the 50 electric buses operating the BPC:

$$PE = N_{bus} \times d_{bus} \times SEC \times EFCO_{2,elec} \times (1 + TDL) \times 10^{-3} \text{ (tCO}_2\text{e)}$$

where N_{bus} is the number of project buses (50), d_{bus} is the annual distance travelled per bus, SEC is the specific electricity consumption of the e-bus fleet (kWh/km), EFCO_{2,elec} is Bhutan's grid emission factor, and TDL is the grid's transmission and distribution loss factor, consistent with the CDM tool for calculating project emissions from electricity consumption. Because all project buses are electric, and a grid emissions factor of 0 is used, **PE = 0**.

Sub-step	Action	Spreadsheet location
Step 3a	Estimate project ridership (Py) from BPC bus capacity, occupancy, schedule, and route length	Project emission BRT tab
Step 3b	Apply baseline mode shares (SD _i) and per-passenger-km emission factors (EF _{pkm,i}) to Py and average trip length → BE	baseline BRT tab
Step 3c	Calculate e-bus fleet electricity consumption and apply the grid emission factor, including transmission and distribution losses → PE	Project emission BRT tab
Step 3d	Subtract: BE – PE → annual gross emission reduction (before leakage)	ER_BRT tab

Step 4: Leakage Assessment – AM0031 §5.5

Potential leakage sources are assessed per AM0031 §5.5:

- LEUP,y – Upstream emissions of gaseous fuels: not applicable; the project and baseline fleets do not use gaseous fuels.
- LELF,Z,y – Load factor (remaining conventional CBS buses): expected to increase as BPC and fleet expansion improve service quality and drive a modal shift to the bus system as a whole; no decline expected. A positive leakage

term would only arise if load factors fell by more than 10 percentage points relative to baseline (AM0031 §53/58 trigger). Ex-ante: LELF,Z = 0. Monitored at Years 1 and 3 of BPC operation.

- LELF,T,y — Load factor (taxi): monitored on the same basis and schedule; ex-ante assumed zero, subject to the same 10-percentage-point trigger. Monitored at Years 1 and 3 of BPC operation
- LECONG,y — Reduced congestion (rebound effect and change in vehicle speed): Applicable as project reduces road space for general vehicles (conversion of existing mixed-traffic lanes into dedicated bus lanes). Based on traffic demand modeling conducted for the project, tentatively expected to be negative (reduced emissions from speed/congestion improvements), therefore assessed as zero ex-ante; monitored in Years 1 and 3 of BPC operation.

Ex-ante, total leakage is assumed to be zero, consistent with a conservative approach; all leakage sources are subject to monitoring and update per Section 3.

Results (AM0031/TOOL18)

Analysis	Scope	Period	Total ER (tCO ₂ e)
AM0031/TOOL18 passenger mode-shift (default assumptions)	50 project buses	2029–2048	69,519
— sensitivity range (40 combinations: grid EF, occupancy, mode-shift shares)	50 project buses	2029–2048	36,164 – 92,986

Across all combinations tested — varying the grid emission factor, average bus occupancy, and modal-shift shares within plausible ranges — the estimated emission reduction remains positive throughout. Full detail is provided in the accompanying spreadsheet.

AMS-III.C: Technology-Switch Analysis

Justification for Methodology Selection (AMS-III.C)

CDM AMS-III.C (Emission reductions by electric and hybrid vehicles, version 16.0) is applied to isolate the emission-reduction effect of fleet electrification alone — the 50 project e-buses compared against a like-for-like diesel counterfactual — independent of any change in ridership. This methodology applies to project activities introducing electric vehicles that displace fossil-fuel vehicles providing the same transport service, which matches the project's replacement of the corridor's bus service with an electric fleet.

Comparability (§11): project and baseline vehicles must belong to the same category (bus) and have comparable passenger/load capacity and power rating, with a variation of no more than 20%. Since the project buses are 9m-class vehicles, the baseline vehicle for this analysis is a hypothetical 9m-class diesel bus, not Thimphu's existing conventional bus fleet, which includes smaller vehicles and is instead used as the baseline for the separate AM0031/TOOL18 mode-shift analysis above.

Additionality: demonstrated under Option 2 (§22) — market penetration of electric buses in Bhutan's bus fleet is well below the 2.5% threshold applied to the relevant vehicle category.

Data Used (AMS-III.C)

Parameter	Source	Spreadsheet location
Annual distance travelled by project buses (DDi,y)	Project bus service parameters (same as AM0031 analysis)	AMS-IIIC Input & Methodology tab
Specific fuel consumption, baseline diesel bus (SFCi)	Published literature on 9m-class diesel bus fuel consumption under hilly-terrain operating conditions (AMS-III.C §39, Option 5 — existing statistics), since no comparable vehicle currently operates in Thimphu's fleet to sample directly	AMS-IIIC Input & Methodology tab

Net calorific value and CO ₂ emission factor of diesel	Bhutan LEDS for Surface Transport (2023)	AMS-IIIC Input & Methodology tab
Grid electricity emission factor (EFelect)	100% hydropower grid	AMS-IIIC Input & Methodology tab
Grid transmission and distribution losses (TDLy)	Bhutan Power Corporation, Power Data Book 2024	AMS-IIIC Input & Methodology tab
Electric bus specific electricity consumption (SEC)	Same as AM0031 analysis (1.616 kWh/km)	AMS-IIIC Input & Methodology tab

Step-by-Step Calculation Logic (AMS-III.C)

Baseline emissions (§28, Approach 1): $BE_y = \sum EF_{BL,km,i} \times DD_{i,y} \times N_{i,y} \times 10^{-6}$, using the annual distance driven by the project buses and the emission factor of the hypothetical baseline (diesel) bus.

Baseline emission factor (§31): $EF_{BL,km,i} = SFC_i \times NCV_{BL,i} \times EF_{BL,i} \times IRT$, where the technology improvement factor (IR) is set to the CDM default value (0.99/year).

Project emissions (§43): $EP_{PJ,km,i,y} = SEC_{PJ,km,i,y} \times EFelect,y / (1 - TDLy) \times 10^{-3}$, using the project buses' actual electricity consumption and Bhutan's grid emission factor. The fossil-fuel term of this equation is zero (since the project fleet is fully electric), as is the electric term (since the grid EF is zero).

Leakage: not required under this methodology (§44).

Emission reductions (§45): $ER_y = BE_y - PE_y - LE_y$, summed over the 2029–2048 analysis period.

Results (AMS-III.C)

Analysis	Scope	Period	Total ER (tCO ₂ e)
AMS-III.C fleet electrification (default assumptions)	50 project buses vs. 50 comparable diesel buses	2029–2048	64,179

How the Two Analyses Relate

The AM0031/TOOL18 and AMS-III.C analyses are two separate, independently valid estimates of different effects, each using the baseline vehicle appropriate to the question it answers. The AM0031/TOOL18 analysis uses Thimphu's actual, existing conventional bus fleet as the baseline for mode-shift purposes, since that is what BPC passengers' previous trips genuinely displaced. The AMS-III.C analysis uses a same-size (9m-class) hypothetical diesel bus as its baseline, consistent with AMS-III.C's comparability requirement (§11(b)) described above.

Alignment with GCF Guidelines (Decision B.33/12, November 2024)

The GHG analysis is designed to be consistent with GCF's guidance on establishing mitigation impact potential:

- **Conservatism:** local vehicle survey data used for emission factors in the AM0031/TOOL18 analysis, and published literature for the hypothetical baseline vehicle in the AMS-III.C analysis; well-to-wheel emissions (potentially significant for petrol and diesel in Bhutan's context) excluded; project ridership (Py) is held constant across the 20-year analysis period rather than assumed to grow with expected population and travel-demand increases, a conservative simplification.
- **Recognised methodology:** CDM AM0031 v8.0, TOOL18, and AMS-III.C v16.0 applied directly, per GCF B.33/12.
- **Monitoring and verification:** passenger surveys will monitor and verify modal shift (SDi), load factors, and vehicle speeds, with results updated accordingly (Section 3).
- **NDC alignment:** Bhutan's NDC commits to reducing transport emissions; this project directly contributes to the conditional transport electrification targets.
- **Transparency:** all data sources, assumptions, and formula links are documented in this note and the accompanying spreadsheet. The calculation chain is fully reproducible from the Parameters and underlying calculation tabs.

3. Monitoring, Reporting and Verification (MRV)

Overview

The following table sets out the operational monitoring plan for GCF Core Indicator 1 (GHG emissions avoided), following AM0031 and TOOL18. Monitoring distinguishes three tiers: (A) annual operational data from CBS records; (B/C) periodic field surveys in Years 1 and 3 of BPC operation, funded from the M&E budget; and (D) fixed ex-ante parameters, updated only when published source data changes.

Year 3 of BPC operation (2031) serves as the final monitoring round, coinciding with project close.¹

Operational Monitoring Table

Parameter	AM0031 ref.	Data source & collection	Frequency	Used in
A. Annual operational data (from CBS records)				
Annual distance driven — project e-bus fleet (km/year)	§5.4.2 (Alt B); §6.2	CBS dispatch records / odometer / GPS logs; collected by CBS, cross-checked by PMU M&E Officer	Annual	PE (Alternative B)
Electricity consumption — electric buses (kWh/year)	§5.4.2; TOOL05; §6.2	Charging station meters; CBS / Bhutan Power Corporation	Annual	PE (electric buses)
Number of remaining conventional CBS buses in operation	§6.2	CBS fleet registry; collected by CBS, cross-checked by PMU M&E Officer	Annual	LELF,Z denominator
B. Periodic field surveys — ridership and passenger surveys				
Annual ridership — PKMbus (total passenger-km on BPC)	§5.3(b); §6.3	CBS smartcard/ticketing data (total boardings × average trip distance); trip-distance component confirmed in survey years	Annual from CBS data; trip distance verified in survey years	BE = PKMbus × $\sum [SD_i \times EF_{pkm,i}] / 1,000$
SDi (modal shift fractions): share of BPC passengers from each previous mode	§5.3; §6.3.2; App. 4–5	Passenger intercept surveys; third-party contractor	Year 1 and Year 3 of BPC operation	SDi compared to ex-ante values; one-directional update if observed SDi implies lower baseline

¹ Because project funds cannot be disbursed after 2031 (project Year 3), it is necessary to conduct the passenger and leakage surveys in Year 1 and Year 3 of BPC operation, rather than Year 1 and Year 4 as recommended in AM0031.

Average trip distance by previous mode (km)	§6.3.2; App. 5	Passenger surveys — same instrument as modal shift fractions (O/D questions)	Year 1 and Year 3 of BPC operation	Baseline BE recalibration
C. Leakage monitoring — periodic field surveys (same rounds as Group B)				
Bus load factor — occupancy relative to capacity, remaining conventional CBS buses	§5.5.1; §6.4.1; App. 1–2	Visual boarding/alighting survey on remaining CBS buses; third-party contractor	Year 1 and Year 3 of BPC operation	LELF,Z check — leakage triggered only if load factor declines >10 percentage points vs baseline
Taxi occupancy — average passengers per taxi, excluding driver	§5.5.1; §6.4.1; App. 3	Roadside visual survey at taxi ranks and waiting areas; third-party contractor	Year 1 and Year 3 of BPC operation	LELF,T check — leakage triggered only if occupancy declines >10 percentage points vs baseline
Traffic speed and vehicle counts on affected roads	§5.5.2; §6.3.2	Roadside measurement and manual traffic counts; third-party contractor	Pre-BPC baseline, Year 1, and Year 3 of BPC operation	LECONG calculation (rebound and vehicle-speed effects)
D. Fixed parameters — set ex-ante, updated only if published source revised				
Fuel emission factors (EF _{CO2,n}) and net calorific values (NCV _n) — diesel, petrol	§5.3; §5.4.2; TOOL18	Bhutan LEDS for Surface Transport	Fixed — updated only if Bhutan LEDS or national inventory formally revised	EF _{km} for all vehicle modes
Vehicle-specific fuel consumption (SFC _{i,n}) by mode and fuel type	§5.3; §6.3.1	Local field survey data (pre-project baseline)	Fixed at ex-ante values; updated in survey years only if lower baseline implied	Baseline EF _{km} for all modes
Grid electricity emission factor (EFCO _{2,elec} , kgCO ₂ /kWh)	TOOL05; §5.4.2	Bhutan Power Corporation official publications; Bhutan LEDS	Fixed — updated if official figures revised; otherwise value	PE (electric buses)

Data Flow

Annual (non-survey years): CBS/operator records (fuel, distance, electricity, fleet) → PMU M&E Officer (compiles annual monitoring spreadsheet; calculates draft ER using the AM0031/TOOL18 formula; cross-checks data quality) → World Bank (QA/QC) → GCF Annual Performance Report.

Survey years (Year 1 of BPC operation, 2029; Year 3 of BPC operation, 2031): CBS/operator records plus field survey data → Third-party contractor (conducts passenger intercept surveys and leakage surveys; processes ridership and modal-shift data; updates SDi; recalibrates baseline if applicable; calculates full ER; prepares monitoring report) → PMU M&E Officer (reviews and approves) → World Bank (QA/QC) → APR / evaluation reports.

A pre-BPC baseline field survey (project Year 1, approximately 2027) establishes baseline occupancy and speed values used in the leakage calculations (Step 4), consistent with AM0031's requirement for a baseline measurement taken in the most recent calendar year prior to the start of commercial operation or prior to CDM-PDD submission, whichever is earlier.

The ex-ante modal shift fractions (SDi) used in this analysis will be compared against observed values from the Year 1 and Year 3 passenger intercept surveys. AM0031's one-directional update rule applies:

- If observed SDi values imply lower baseline emissions than the ex-ante estimate: baseline is revised downward and cumulative ER is restated using the lower figure.
- If observed SDi values imply higher baseline emissions: ex-ante values are retained; ER is not revised upward.

Core Indicator 1 Verification

Core Indicator 1 is calculated annually and verified at key reporting points:

- **Annual (each year from 2029):** PMU M&E Officer calculates annual ER from CBS operational data using the AM0031/TOOL18 formula. Cumulative ER to date is also calculated.
- **Mid-Term Review (2029, Year 1 of BPC operation):** Independent evaluator reviews annual ER calculations, CBS source data, and Year 1 survey results (modal shift, leakage). Baseline recalibration — if triggered — is confirmed. Verified cumulative ER is reported as the Core Indicator 1 mid-term value.
- **Final Evaluation (2031, project close, Year 3 of BPC operation):** Third-party contractor conducts the final survey round and prepares the final ER calculation. Verified total ER is reported as the Core Indicator 1 end-of-project value. Data is used to re-calculate lifetime ER projections.