MAG

Mines Advisory Group

INDEPENDENT VERIFICATION STATEMENT

ISO 14064-3 Limited Assurance Report

carbonVerification™

CONTENTS

1. VERIFICATION OPINION

Carbon Verification Limited has undertaken a limited assurance engagement to verify the greenhouse gas (GHG) inventory of **Mines Advisory Group (MAG)** for the reporting period **1 January 2024 to 31 December 2024**.

Based on the procedures we have performed and the evidence we have obtained, **nothing has come to our attention that causes us to believe** that MAG's GHG inventory for the year ended 31 December 2024:

- **is not** materially correct and **is not** a fair representation of GHG data and information;
- **has not** been prepared in accordance the requirements of:
    - ISO 14064-1:2018 - Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals
    - The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (2004, amended 2015)
    - The Humanitarian Carbon Calculator (HCC+) methodology

22,313.20 tonnes CO_2 equivalent (tCO_2e)

comprising:

- **Scope 1 (Direct emissions):** 7,341.60 tCO_2e
- **Scope 2 (Indirect emissions from purchased electricity):** 1,063.74 tCO_2e
- **Scope 3 (Other indirect emissions):** 13,907.86 tCO_2e

This opinion is subject to the inherent limitations of the GHG quantification methodology, the acknowledged scope exclusions documented in Section 3, and the observations regarding emission factor appropriateness documented in Section 7.

2. RESPECTIVE RESPONSIBILITIES

2.1 MAG's Responsibility

MAG's management is responsible for:

- Preparing the GHG inventory in accordance with ISO 14064-1:2018 and the GHG Protocol Corporate Standard
- Establishing and maintaining appropriate systems and processes for collecting, aggregating, and reporting GHG data
- Ensuring the completeness and accuracy of the data and information provided for verification
- Defining the organizational and operational boundaries in accordance with the GHG Protocol
- Selecting and applying appropriate emission factors and calculation methodologies
- Maintaining adequate documentation to support the reported emissions

2.2 Verifier's Responsibility

Our responsibility is to:

- Plan and perform the verification engagement to obtain limited assurance about whether the GHG inventory is free from material misstatement
- Express an independent conclusion based on the evidence obtained
- Report in accordance with the requirements of ISO 14064-3:2019
- Maintain independence, objectivity, and professional competence
- Apply professional judgment throughout the verification process

Our verification does not constitute:

- Reasonable (high-level) assurance
- A comprehensive audit of all organizational systems and controls
- An assessment of the effectiveness of emissions reduction measures
- Verification of forward-looking statements or projections

3. INVENTORY SCOPE AND BOUNDARY

3.1 Organizational Boundary

Approach: Operational control

Coverage: 41 operational entities organized into 7 Super Reporting Entities (SREs):

- Asia Pacific
- Middle East
- Eastern Europe
- East & Southern Africa
- West Africa
- Latin America
- Coordination Offices (UK HQ and regional coordination functions)

Operational Control Definition: MAG includes all operations where it has full authority to implement policies, practices, and operational decisions, including staffing, procurement, and asset management.

3.2 Operational Boundary - Included Emission Sources

Scope 1 - Direct Emissions (7,341.60 tCO_2e):

- Mobile combustion from vehicles, motorcycles, trucks, excavation equipment
- Stationary combustion from diesel generators and fixed fuel-consuming assets
- Fugitive emissions from refrigerants (Iraq programme only: 5.64 tCO_2e)

Scope 2 - Indirect Emissions from Energy (1,063.74 tCO_2e):

- Purchased electricity (location-based method)

Scope 3 - Other Indirect Emissions (13,907.86 tCO_2e):

- Category 3.1: Purchased goods and services (5,578.72 tCO_2e)
- Category 3.2: Capital goods (2,810.55 tCO_2e)
- Category 3.3: Fuel and energy-related activities (2,259.05 tCO_2e)
- Category 3.4: Upstream transportation and distribution (78.42 tCO_2e)
- Category 3.5: Waste generated in operations (179.27 tCO_2e)
- Category 3.6: Business travel (3,001.85 tCO_2e)

3.3 Acknowledged Scope Exclusions

The following emission sources were **not comprehensively quantified** in the 2024 baseline and are **excluded from the verification scope**:

- Fugitive emissions from refrigerants (except Iraq: 5.64 tCO_2e)
- Process emissions from explosive ordnance disposal and destruction
- Employee commuting (pilot data collected but excluded from totals)
- Comprehensive waste disposal data (partial reporting only - 179.27 tCO_2e)
- Capital goods beyond high-emission categories (vehicles, ICT, generators)
- Upstream transportation (except supplier-reported data)
- Biogenic CO_2 and land use, land-use change and forestry (LULUCF)
- Scope 3 Categories 3.8-3.15 (downstream activities)
- Ukraine Year 1 electricity: Tier 3 estimation due to conflict-zone data constraints (metered from 2025)

These exclusions are **transparently disclosed** in MAG's Carbon Baseline Report 2024 (Section 3.5) and reflect data availability and system maturity constraints typical of first-cycle humanitarian sector inventories. The excluded sources are not believed to be material to MAG's emissions profile based on sector benchmarking and organizational activities.

3.4 Reporting Period

Base Year: 2024 (first organizational baseline)
Reporting Period: 1 January 2024 to 31 December 2024 (12 months)
Reporting Frequency: Biennial comprehensive inventory (planned); annual Scope 1, 2, 3.6 tracking

4. VERIFICATION CRITERIA AND STANDARDS

The verification was conducted against the following criteria:

4.1 GHG Quantification and Reporting Standards

- **ISO 14064-1:2018** - Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals
- **GHG Protocol Corporate Accounting and Reporting Standard** (2004, amended 2015)
- **GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard** (2011)

4.2 Verification Standard

- **ISO 14064-3:2019** - Specification with guidance for the verification and validation of greenhouse gas statements

4.3 Sector-Specific Methodology

- **Humanitarian Carbon Calculator (HCC+)** - Sector-specific Excel-based calculation tool developed under the Climate and Environment Charter for Humanitarian Organisations

4.4 Emission Factor Sources

- **DEFRA 2021** - UK Government GHG Conversion Factors for Company Reporting (spend-based factors, GBP-denominated)
- **HCC+ Embedded Factors** - Activity-based factors sourced from:
    - ADEME (Agence de l'Environnement et de la Maîtrise de l'Énergie)
    - DEFRA/BEIS (Department for Energy Security and Net Zero, UK)
    - ICAO Carbon Emissions Calculator (International Civil Aviation Organization)
    - IEA (International Energy Agency) - electricity grid factors

4.5 GHG Protocol Principles

The verification assessed compliance with the five principles of GHG accounting:

- **Relevance:** Appropriate reflection of MAG's emissions profile
- **Completeness:** All material sources within defined boundary included
- **Consistency:** Methodologies applied consistently across entities and over time
- **Transparency:** Disclosure of methodologies, assumptions, and limitations
- **Accuracy:** Reduction of bias and uncertainties as far as practicable

5. LEVEL OF ASSURANCE AND MATERIALITY

5.1 Level of Assurance

This verification provides **limited assurance** in accordance with ISO 14064-3:2019.

Limited assurance engagements involve:

- Less extensive procedures than reasonable assurance engagements
- Evidence gathering sufficient to conclude that reported emissions are plausible
- Negative form opinion: "Nothing has come to our attention..."

Limited assurance provides a moderate level of confidence but is not a guarantee that all material misstatements have been detected.

5.2 Materiality Threshold

Quantitative Materiality: Individual or aggregate misstatements ≥ **5% of total reported emissions**

- 5% of 22,313.20 tCO_2e = **1,116 tCO_2e**

Qualitative Materiality: Errors or omissions that would:

- Affect the identification of emission hotspots
- Materially impact regional or category-level allocation
- Influence stakeholder understanding or decision-making
- Affect year-on-year trend comparability

6. VERIFICATION METHODOLOGY AND PROCEDURES

6.1 Verification Planning

The verification was conducted in accordance with ISO 14064-3:2019 and included:

- Review of MAG's organizational structure, operational boundary, and GHG management systems
- Assessment of data collection processes, templates, and quality control procedures
- Strategic analysis to identify areas of high risk and materiality
- Development of a risk-based sampling strategy

6.2 Document Review

We reviewed the following documentation:

- MAG Carbon Baseline Report 2024 (published 1 November 2025)
- HCC+ calculation tool (Excel workbook) with all entity-level inputs and aggregated outputs
- Emission factor database and source documentation (DEFRA 2021, HCC+ embedded factors)
- Entity-level data collection templates and submission records
- Source evidence including:
    - Fuel consumption logs, receipts, and reconciliations
    - Electricity bills and meter readings
    - Travel booking system records and flight itineraries
    - Procurement records, invoices, and specifications (vehicles, ICT, generators)
    - Financial ledgers for spend-based category validation
- Data quality spot-check records

6.3 Data Sampling and Testing

We applied a risk-based sampling strategy covering:

Geographic Coverage:

- Representative samples from all 7 Super Reporting Entities
- Focus on highest-emitting entities (Asia Pacific, Middle East)

Category Coverage:

- All material emission categories (>5% of total emissions)
- Emphasis on Scope 1 (fuel), Scope 3.1 (procurement), Scope 3.6 (travel)

Data Quality Tiers:

- Tier 1 (activity-based), Tier 2 (spend-based), and Tier 3 (estimated) inputs
- Mix of metered data, supplier records, and financial proxies

Sample Size:

Extensive sampling was conducted on the top three material categories, exceeding the requirements of Limited assurance.

- **Scope 1 fuel**: 67.4% of total litres consumed (by value)
- **Scope 2 electricity**: 64.9% of total kWh/expenditure
- **Scope 3.6 travel**: 100% of flight records
- **Scope 3.1 procurement**: 100% of spend by value

6.4 Verification Procedures Performed

A. Recalculation and Mathematical Accuracy:

- Independent recalculation of 100% of line-level emissions using source activity data and emission factors
- Verification of aggregation accuracy from entity level to global totals
- Validation of unit conversions (eg $kgCO_2e$ to tCO_2E, etc)
- Confirmation of HCC+ tool formula accuracy

B. Data Traceability:

- Tracing of activity data from HCC+ tool back to source records (eg. fuel logs)
- Validation of spend-based entries to financial ledgers
- Cross-referencing of travel records to booking confirmations

C. Emission Factor Verification:

- Confirmation of emission factor sources and vintages
- Assessment of appropriate factor selection for activity types
- Verification of DEFRA 2021 GBP factor integration into HCC+ tool
- Testing of emission factor currency (2022 HCC+ vs. 2024 DEFRA)
- Assessment of geographic appropriateness (UK blended vs. 100% mineral fuels)

D. Boundary and Completeness:

- Review of operational control assessment for included entities
- Verification that material emission sources within scope are captured
- Assessment of exclusions against materiality criteria
- Validation of partner/subcontractor exclusion rationale

E. Methodology Consistency:

- Verification of consistent application of hybrid methodology (Tier 1/2/3) across entities
- Assessment of fuel allocation approach (mobile vs. stationary)
- Review of electricity calculation method (mix of metered and cost-based)
- Validation of GWP values (100-year IPCC AR5)

F. Interviews and Confirmations:

- Discussions with MAG Global Climate and Environment Advisor (inventory preparer)

6.5 Limitations of the Verification

This verification was subject to the following limitations:

- We relied on the accuracy and completeness of data provided by MAG; we did not independently verify source documents beyond the sampled items
- We did not conduct site visits to field operations due to access and security constraints
- We did not verify the appropriateness of excluded emission sources (as pre-agreed in scope)
- We did not assess the effectiveness of emissions reduction measures or future projections
- We did not verify supplier-reported emissions data for upstream transportation (limited to confirming appropriate disclosure)
- Limited assurance provides moderate confidence but does not detect all possible misstatements

7. VERIFICATION FINDINGS

7.1 Material Misstatements Identified

None.

No material misstatements (≥1,116 tCO_2e or ≥5% of total emissions) were identified during the verification process.

7.2 Calculation Accuracy

Procedure: Independent recalculation of 100% of line-level emissions using the same activity data and emission factors applied in the original inventory.

Finding:

- Recalculated total emissions: **22,313.20 tCO_2e** ✓
- Variance from reported inventory: **Nil**

Minor rounding variances (<1 tCO_2e) observed at individual entity level due to intermediate calculation rounding within the HCC+ tool. These differences net to <0.01% at the global level and are not considered material.

Conclusion: ✅ All calculations are mathematically accurate. The HCC+ tool has been correctly applied and aggregation is accurate.

7.3 Emission Factor Appropriateness - Immaterial Findings

Immaterial findings were identified regarding emission factor selection. None of the findings constitute a material misstatement, but are documented for transparency and to inform future inventory improvements.

7.3.1: Scope 3 Spend Emission Factor Currency (Temporal Lag)

Description:

MAG applied emission factors from the following sources:

- **DEFRA 2021** GBP conversion factors for spend-based calculations

We recalculated emissions for the largest category, Scope 3.1: Purchased goods and services, using **DEFRA 2022 Spend factors updated for inflation (2023-24)** to assess the impact of temporal lag:

Quantification:

Category	**Original** (2021/2022 factors)	**Recalculated** (2024 inflation adjusted factors)	**Variance**
Purchased goods and services	5,578.72 tCO_2e	5,318.14 tCO_2e	260.58 tCO_2e (4.67% ↓)
Impact on total inventory	**22,313.20 tCO_2e**	**22,052.62 tCO_2e**	**260.58 tCO_2e (1.17% ↓)**

Materiality Assessment:

- Variance: 260 tCO_2e = **0.23 × materiality threshold**
- **Immaterial** (well below 5% threshold)

Direction: The use of 2021/2022 factors results in a **4.67% overstatement** of emissions relative to 2024 emission intensities.

Interpretation:

This variance reflects normal temporal lag in emission factor updates:

- Emission intensities have decreased 2021-2024 due to grid decarbonization, supply chain efficiency improvements, and aviation fleet modernization
- The HCC+ tool's embedded factors are periodically updated by the tool developers; MAG correctly applied the factors available in the tool version used
- The tool does not take into account inflation for spend based factors resulting in over statement of emissions
- Using older factors that produce slightly higher emissions represents a **conservative approach** (preferable to understatement)

Conclusion: ✅ **No material misstatement.** The temporal lag represents a tool design characteristic, not an error in application. The conservative bias (overstatement) is appropriate for a baseline year.

7.3.2: Fuel Emission Factor Geographic Appropriateness

Description:

The HCC+ tool applies **UK average forecourt fuel emission factors** (2022) which incorporate mandated biofuel blends:

- UK diesel: ~7% FAME biodiesel blend (B7)
- UK petrol: ~10% bioethanol blend (E10)

However, MAG's fuel consumption occurs primarily in **non-UK operational contexts** (Cambodia, Vietnam, Laos, Iraq, Syria, Ukraine, Angola, Zimbabwe, South Sudan, Colombia) where fuel is typically **100% mineral petroleum products** without biofuel blending.

Biofuel blends have lower net CO_2 emissions per litre due to biogenic carbon offset. Therefore, using UK blended fuel factors for 100% mineral fuel **understates emissions**.

Example:

- UK average diesel (with biodiesel): 2.55784 kgCO_2e/litre (DESNZ 2022)
- 100% mineral diesel: 2.66155 kgCO_2e/litre (DESNZ 2024)
- **Difference: 4.05% higher for mineral diesel**

Recalculation:

We recalculated Scope 1 fuel emissions for Petrol and Diesel using **DEFRA 2024 emission factors for 100% mineral fuels** based on geographic assessment of likely fuel specifications:

Fuel Category	**Litres**	**Original** (HCC+ UK blended biofuels)	**Recalculated** (100% mineral)	**Variance**
Diesel	2,261,931	5,785.69 tCO_2e	6,020.24 tCO_2e	234.55 tCO_2e (4.05% ↑)
Petrol	481,894	1,041.78 tCO_2e	1,134.24 tCO_2e	92.46 tCO_2e (8.88% ↑)
Total Diesel & Petrol	**2,743,825**	**6,827.47 tCO_2e**	**7,154.49 tCO_2e**	**327.02 tCO_2e (4.79% ↑)**
Total Scope 1		**7,341.60 tCO_2e**	**7,668.62 tCO_2e**	**327.02 tCO_2e (4.45% ↑)**
Impact on total inventory		**22,313.20 tCO_2e**	**22,640.22 tCO_2e**	**327.02 tCO_2e (1.47% ↑)**

Materiality Assessment:

- Variance: 327.02 tCO_2e = **0.29 × materiality threshold**
- **Immaterial** (well below 5% threshold)

Direction: The use of UK blended fuel factors results in a **4.45% understatement** of Scope 1 emissions (or 1.47% of total inventory).

Interpretation:

This variance reflects a tool design limitation:

- The HCC+ tool is designed for broad humanitarian sector use with standardized (European) fuel specifications
- MAG correctly applied the tool as designed
- Obtaining verified fuel specifications for every procurement location across 41 entities in humanitarian contexts is challenging
- The tool prioritizes consistency and comparability over perfect geographic precision

Conclusion: ✅ **No material misstatement.** The geographic standardization represents an acceptable methodological trade-off. The minor understatement (1.47% of total) does not affect the credibility of the baseline.

7.3.3: Emission Factor Currency (Scope 3.6 Business Travel – Flights)

Description:

MAG calculated flight emissions using the Humanitarian Carbon Calculator (HCC, April 2025 version). Our verification review identified that the tool's embedded emission factors are not contemporaneous with the 2024 reporting period:

Flight Category	Emission Factor Vintage
Medium Haul	2018
Short Haul	2021
Long Haul	2021

Additionally, the HCC tool uses a "Medium Haul" flight classification that is no longer aligned with current UK Government (DESNZ/DEFRA) reporting conventions.

We recalculated flight emissions using DESNZ/DEFRA 2024 emission factors. During this process, several data quality issues were identified in the travel agent source data, including understated flight distances and incorrectly applied emission factors. These errors have been corrected in the recalculation.

Quantification:

Calculation Basis	**tCO_2e**
Original (HCC Tool, 2018/2021 factors)	2,175.21
Recalculated (2024 factors, data errors corrected)	2,184.73
Variance	**9.51 (0.44% ↑)**

Materiality Assessment:

- Variance: 9.51 tCO_2e = 0.01 × materiality threshold
- Immaterial (well below 5% threshold)

Direction: The use of 2018/2021 factors results in a 0.44% understatement of emissions relative to 2024 emission intensities.

Interpretation:

This variance reflects both temporal lag in emission factors and minor source data errors:

- The net effect of correcting source data errors (understated distances, incorrectly applied factors) outweighs the impact of emission factor vintage differences
- The HCC tool is widely used within the humanitarian sector and the Organisation correctly applied the methodology available in the tool version used
- The "Medium Haul" classification, while no longer standard practice in UK reporting, does not result in material misstatement for the current period

Conclusion: ✅ No material misstatement. The minor understatement (0.44%) is immaterial and does not affect the credibility of the baseline.

Observation for Future Reporting:

To maintain compliance with ISO 14064-1 principles of Accuracy and Relevance, the Organisation should transition to the current UK Government GHG Conversion Factors methodology for the 2025 reporting period. This requires re-mapping flight data from Short/Medium/Long to the standard classifications:

Category	Definition
Domestic	UK to UK
Short-haul International	< 3,700 km
Long-haul International	≥ 3,700 km

7.3.4: Emission Factor Currency (Scope 2 – Purchased Electricity)

Description:

The Organisation calculated Scope 2 purchased electricity emissions using the HCC+ tool, which applies EcoAct emission factors with a 2022 vintage. Verification review compared these factors against the Ember Global Electricity Database (sourced from IEA) using the latest available factors..

The Organisation operates across 26 countries, with electricity consumption concentrated in regions where grid emission intensities vary significantly due to differing generation mixes (hydro, geothermal, fossil fuel dependency).

We recalculated Scope 2 emissions using Ember 2024 emission factors (or most recent available year where 2024 data was unavailable) to assess the impact of temporal lag.

Quantification:

Calculation Basis	**tCO_2e**
Original (HCC+ Tool, 2022 factors)	1,063.74
Recalculated (2024 factors)	1,064.68
Variance	**0.93 (0.09% ↑)**

Country-Level Analysis:

While the aggregate variance is negligible, country-level variances were identified due to changes in national grid emission intensities between 2022 and 2024:

Variance Range	**Number of Countries**	**Direction**
< ±5%	18	Mixed
5–20%	5	Mixed
> 20%	3	Mixed

The largest country-level variance equates to approximately 2.5% of total Scope 2 emissions, which remains within the 5% materiality threshold.

Materiality Assessment:

- Aggregate variance: 0.93 tCO_2e = 0.01 × materiality threshold
- Maximum country-level impact: ~2.5% of Scope 2 emissions
- Immaterial (well below 5% threshold at both aggregate and country level)

Direction: The use of 2022 factors results in a 0.09% understatement of emissions relative to 2024 emission intensities at the aggregate level. This marginal understatement is not material.

Interpretation:

The minimal aggregate variance reflects movements in country-level grid intensities:

- Some countries have decarbonised their grids since 2022 (e.g., increased renewable penetration in Kenya, Vietnam, United Kingdom), resulting in lower 2024 factors
- Other countries have seen increased grid intensity due to drought impacts on hydropower or increased fossil fuel reliance (e.g., Cambodia, Ecuador)
- The Organisation's electricity consumption profile is distributed across countries with both increasing and decreasing intensities, resulting in near-complete offset at the aggregate level
- The HCC+ tool applies factors from a reputable source (EcoAct) and the Organisation correctly applied the methodology available in the tool version used

Conclusion: ✅ No material misstatement. The 2022 emission factors produce results within 0.1% of 2024 recalculation at the aggregate level. Country-level variances are within materiality thresholds.

Observation for Future Reporting:

While the 2022 factors do not result in material misstatement for the 2024 reporting period, grid emission intensities are subject to ongoing change as countries transition their electricity generation mixes. To maintain compliance with ISO 14064-1 principles of **Accuracy** and **Relevance**, the Organisation should:

1. Update to 2024/2025 vintage emission factors for the next reporting cycle
2. Monitor countries with high variance (>20%) for continued divergence
3. Consider adopting IEA or Ember factors directly, which are updated annually
4. Improve data quality to reduce secondary data and estimates

Combined Effect of Emission Factor Findings

The four emission factor findings partially offset each other:

Finding	Description	Direction	Magnitude
7.3.1	Factor currency – Spend-based (2021 → 2024)	Overstatement	260.58 tCO_2e
7.3.2	Fuel composition (UK blended → 100% mineral)	Understatement	327.02 tCO_2e
7.3.3	Factor currency – Flights (2018/2021 → 2024)	Understatement	9.51 tCO_2e
7.3.4	Factor currency – Electricity (2022 → 2024)	Understatement	0.93 tCO_2e
	Total Overstatement		**260.58 tCO_2e**
	Total Understatement		**337.46 tCO_2e**
	Net Combined Effect	**Understatement**	**76.88 tCO_2e (0.34%)**

Combined Materiality Assessment:

- Net variance: 76.88 tCO_2e = 0.07 × materiality threshold
- Immaterial (well below 5% threshold)

Overall Assessment: The inventory contains a minor net understatement of 0.34%, which is negligible for decision-making purposes. The offsetting nature of the findings demonstrates that while individual methodological choices introduce variance in different directions, the aggregate effect on the reported total is minimal.

The net effect does not materially impact:

- Emission hotspot identification
- Regional allocation
- Category distribution
- Strategic emissions reduction planning
- Baseline year integrity

7.4 Data Quality Assessment

We assessed data quality using the tiered approach documented in Section 9.2 of MAG's Carbon Baseline Report:

Category	Confidence Level	Data Tier	Assessment
Scope 1 (Fuel)	Medium-High	Tier 1 & 3	✅ Activity data from logs/receipts; some estimation in small offices. **Appropriate.**
Scope 2 (Electricity)	Medium	Tier 1 & 3	✅ Mix of metered data, secondary data and cost-based estimates. Assumptions consistently applied. **Acceptable for first-cycle inventory.** *(See 7.4.1 for special circumstances in Ukraine)*
Scope 3.6 (Travel)	High	Tier 1	✅ Standardized data from booking systems. **High confidence.**
Scope 3.2 (Capital Goods)	Medium	Tier 1 & 2	✅ Item-level procurement data with standard embodied carbon factors. **Appropriate.**

Category	Confidence Level	Data Tier	Assessment
Scope 3.1 (Procurement)	Low-Medium	Tier 2	✅ Spend-based with inherent uncertainty; typical for first-cycle inventory. **Acceptable.**
Scope 3.5 (Waste)	Low	Tier 1 & 2	⚠️ Limited and inconsistent data. **Transparently disclosed as incomplete.**
Scope 3.4 (Transport)	Medium	Tier 3	✅ Supplier-reported; limited transparency but appropriately caveated. **Acceptable.**

Overall Assessment: Data quality is **appropriate for a first-cycle humanitarian inventory** and consistent with sector norms. Material categories (fuel, travel, electricity, procurement) have adequate data quality. Low-confidence categories (waste, commuting) are transparently disclosed as incomplete and are not material.

7.4.1 Ukraine Programme - Electricity Estimation (Special Circumstances)

Context:

During 2024, MAG established operations in Ukraine in response to the ongoing armed conflict. The initial operational phase (Year 1) occurred under exceptional security constraints, with staff safety and humanitarian service delivery necessarily taking precedence over routine environmental data collection systems.

Methodology Applied:

Rather than excluding electricity consumption from the Ukraine programme entirely, MAG applied an estimation methodology to ensure completeness:

1. **Sample Measurement:** Electricity consumption was measured in one operational building for one month
2. **Temporal Scaling:** The one-month consumption was extrapolated to estimate full-year consumption for that building
3. **Geographic Scaling:** The resulting annual estimate was then applied as a proxy for all other Ukraine buildings

Data Quality Assessment:

This estimation approach results in **Tier 3** data quality with acknowledged high uncertainty due to:

- Limited sample period (one month may not capture seasonal variation)
- Limited sample size (one building may not represent diverse building types/uses)
- Lack of metered validation data
- Inability to account for conflict-related disruptions to grid supply or operational patterns

Verification Assessment:

✅ **Acceptable under the circumstances.** While data quality is clearly low, the verification team notes:

1. **Reasonable effort under extreme constraints:** MAG demonstrated commitment to inventory completeness despite operating in an active conflict zone where data collection infrastructure is not yet established

2. **Materiality:** Ukraine electricity represents a very small fraction of MAG's global footprint, therefore uncertainty in this figure does not materially impact total emissions or strategic conclusions

3. **Temporary measure:** MAG has since implemented robust metered electricity tracking systems; this estimation methodology was applied only for the initial operational period (Year 1)

4. **Conservative approach:** Including an estimate (with uncertainty) is preferable to omitting Ukraine electricity entirely, which would understate the organizational footprint

Forward Treatment:

From 2025 onwards, Ukraine electricity consumption is captured through **metered data** (Tier 1) via the implemented tracking system. The 2026 inventory will reflect significantly improved data quality for this programme.

Conclusion: This estimation does not constitute a material misstatement. MAG's approach balances the competing demands of inventory completeness, operational feasibility in conflict-affected settings, and transparent acknowledgment of data limitations. The verification team commends MAG's effort to account for emissions during an exceptionally challenging operational context.

7.5 Methodological Consistency

We confirmed consistent application of the following methodological choices across all entities:

✅ **Organizational boundary:** Operational control approach consistently applied; partner emissions appropriately excluded

✅ **Fuel allocation:** Where mobile/stationary breakdown unavailable, consistently allocated to mobile combustion

✅ **Electricity method:** Mix of metered and cost-based consistently documented and calculated

✅ **GWP values:** 100-year IPCC AR5 consistently applied

✅ **Emission factor sources:** HCC+ embedded factors and DEFRA 2021 GBP factors consistently applied across portfolio

Conclusion: ✅ Methodology has been consistently applied. No inconsistencies that would affect comparability or trend analysis were identified.

7.6 Completeness

We assessed completeness against the defined scope:

- ✅ **All 41 operational entities included**
- ✅ **All material emission sources within scope captured**
- ✅ **Exclusions transparently disclosed and justified**
- ✅ **No evidence of material omissions within included categories**

Observation: While certain categories are incomplete (waste, commuting, refrigerants), these are transparently disclosed in Section 3.5 of the Carbon Baseline Report and are not believed to be material based on:

- Sector benchmarking (waste/commuting typically <5% of humanitarian inventories)
- Organizational profile (limited refrigerant-dependent activities; majority field-based staff with minimal commuting)

Conclusion: ✅ The inventory is **complete within the defined scope** and exclusions are appropriate and transparent.

7.7 GHG Protocol Principles Compliance

Principle	Assessment	Evidence
Relevance	✅ Compliant	Boundary and scope appropriately reflect MAG's operations and stakeholder needs
Completeness	✅ Compliant	All material sources within boundary captured; exclusions justified and disclosed
Consistency	✅ Compliant	Methodologies consistently applied; provides foundation for future trend analysis
Transparency	✅ Compliant	Comprehensive disclosure of methods, assumptions, data quality, and limitations
Accuracy	✅ Compliant	Data quality appropriate for materiality; bias and uncertainties minimized within constraints

Conclusion: ✅ The inventory demonstrates **strong compliance** with GHG Protocol principles.

8. OBSERVATIONS AND RECOMMENDATIONS

While no material misstatements were identified, we offer the following observations and recommendations to enhance the accuracy, completeness, and utility of future inventory cycles.

8.1 Emission Factor Updates

Observation: The use of 2021 DEFRA factors and 2022 HCC+ embedded factors results in a ~2% overstatement relative to 2024 emission intensities. While immaterial, this temporal lag will accumulate over future inventory cycles.

Recommendation: For the **2026 inventory**, adopt **reporting-year emission factors**:

Priority 1 - Spend-Based Factors:

- Update from DEFRA 2021 to DEFRA 2022 factors (or most recent available)
- Update factors in-line with inflation
- This is straightforward to implement within HCC+ tool

Priority 2 - HCC+ Tool Updates:

- Check for HCC+ tool updates that incorporate more current emission factors
- If updated tool version available, adopt for 2026 cycle
- Document tool version and factor vintage in methodology disclosure

Justification:

- GHG Protocol recommends "the most recent emission factors available at the time of reporting"
- Enhances year-on-year comparability and accuracy
- Aligns with emerging sector practice

Baseline Treatment:

- No recalculation of 2024 baseline required (variance immaterial)
- Document methodological refinement in 2026 report to aid trend interpretation

8.2 Geographic Appropriateness of Fuel Factors

Observation: The HCC+ tool's use of UK average forecourt fuel factors (incorporating biofuel blends) results in a 4.45% understatement of Scope 1 emissions for MAG's predominantly non-UK operations where fuel is 100% mineral petroleum.

Recommendation: For the **2026 inventory**, implement **region-appropriate fuel emission factors**:

Segmented Approach (Preferred):

1. **For UK/EU operations:**
    - Continue using HCC+ UK average forecourt factors (B7 diesel / E10 petrol)
2. **For non-UK operations:**
    - Apply DEFRA 100% mineral fuel factors:
        - 100% mineral diesel: 2.66155 kgCO_2e/litre (DESNZ 2024)
        - 100% mineral petrol: 2.35372 kgCO_2e/litre (DESNZ 2024)
3. **For countries with known biofuel mandates:**
    - Research country-specific factors where available (e.g., Brazil, Colombia, USA)
    - Document blend percentage and source

Implementation Steps:

1. Enhance fuel log templates to capture fuel specification:
    - Add field: "Fuel specification: ☐ Mineral ☐ Biodiesel blend ☐ Unknown"
    - Where unknown, default to 100% mineral (conservative)
2. Create regional fuel factor lookup table for consistency
3. Override HCC+ default fuel factors in tool for non-UK entities
4. Document assumptions in calculation notes

Alternative (Acceptable):

- Apply 100% mineral factors globally as conservative approach
- Simpler to implement; slight overstatement in UK/EU acceptable

Justification:

- Improves accuracy of largest emission category (Scope 1 = 33% of total)
- Aligns factors with actual fuel specifications
- Maintains conservatism (where specification unknown, assume mineral)

Baseline Treatment:

- No recalculation of 2024 baseline required (variance immaterial)
- Document methodological refinement in 2026 report

8.3 Expand Activity-Based Data Collection

Observation:

Several categories rely heavily on spend-based estimation (Tier 2), which carries higher uncertainty:

- Scope 3.1: Purchased goods and services (confidence: Low-Medium)
- Scope 3.5: Waste (confidence: Low; partially reported)
- Scope 3.7: Employee commuting (currently excluded)

Recommendation:

Priority 1 - Waste Data (2026):

- Standardize waste reporting templates with clear units (kg or tonnes)
- Collect waste composition data where feasible (% recyclable, landfill, incinerated)
- Even if coverage remains partial, improve consistency of reporting

Priority 2 - Procurement Detail (2026-2027):

- For high-spend categories, engage suppliers for product-level emission data
- Transition from generic spend-based factors to supplier-specific Environmental Product Declarations (EPDs) where available
- Pilot supplier engagement in 1-2 regions before global rollout

Priority 3 - Commuting (2026+):

- Revisit commuting data collection with improved survey design
- Target countries with large office-based populations
- Consider sample-based approach rather than universal survey

Justification:

- Improves data quality and reduces uncertainty
- Supports more targeted emissions reduction measures
- Aligns with GHG Protocol Corporate Value Chain (Scope 3) Standard guidance

8.4 Integrate Emissions Data into Operational Systems

Observation:

The 2024 inventory was prepared through a dedicated project exercise. Sustaining and improving data quality over time will require embedding emissions tracking into routine operational systems.

Recommendation:

Phase 1 (2025-2026):

- Integrate fuel and electricity tracking into existing asset management / logistics systems
- Add emissions fields to procurement approval workflows
- Train logistics and procurement staff on data collection requirements

Phase 2 (2027-2028):

- Develop visual QA dashboards for real-time emissions monitoring
- Link emissions data to financial management systems
- Embed carbon considerations into programme design and proposal development

Justification:

- Reduces manual data collection burden
- Improves data completeness and timeliness
- Enables operational decision-making (not just annual reporting)
- Supports MAG's goal to move "from standalone biennial reporting toward real-time operational use of emissions data" (Section 3.6)

8.5 Develop Output-Based Emissions Metrics

Observation:

MAG piloted output-based emissions metrics in Vietnam:

- 32.66 tCO_2e per km^2 of land released
- 0.118 tCO_2e per explosive ordnance item found and destroyed

These metrics provide valuable insight into the emissions efficiency of humanitarian outcomes but are not yet scaled across operations.

Recommendation:

Expand output-based metrics to additional countries in 2026 inventory:

- Pilot in 2-3 additional high-emitting programmes (e.g., Cambodia, Iraq)
- Standardize output definitions (km^2 released, EO items destroyed)
- Explore additional output metrics where relevant (e.g., training participants, beneficiaries reached)

Use cases:

- Inform programme design decisions (e.g., technology choices, operational approaches)
- Enable benchmarking across programmes and over time
- Demonstrate emissions efficiency improvements alongside humanitarian outcomes

Justification:

- Links emissions to humanitarian impact (not just operational activity)
- Aligns with sector movement toward impact-adjusted carbon accounting
- Supports evidence-based emissions reduction planning

8.6 Plan for Third-Party Assurance Readiness

Observation:

MAG has indicated intent to seek independent third-party assurance for future inventories. The 2024 baseline provides a strong foundation, but certain enhancements would facilitate future assurance engagements.

Recommendation:

Enhance documentation and controls for 2026 inventory:

1. **Data Management:**
    - Centralized evidence repository with clear naming conventions
    - Audit trail linking source records to HCC+ tool inputs
    - Clearly state units on all source document
    - Version control for calculation files/source spreadsheets
2. **Quality Assurance:**
    - Formalize internal QA protocols (spot checks, peer review)
    - Document QA findings and resolutions
    - Implement data validation rules in HCC+ tool
3. **Roles and Responsibilities:**
    - Define data collection, review, and approval authorities at entity-level
    - Document training provided to data collectors
    - Maintain records of entity-level data submissions and follow-ups
4. **Methodological Documentation:**
    - Expand disclosure of estimation methods and assumptions
    - Document decision rationale for methodological choices
    - Maintain change log for any methodology refinements

Justification:

- Reduces cost and time for future assurance engagements
- Demonstrates maturity of GHG management systems
- Aligns with ISO 14064-1 requirements for uncertainty management and quality assurance

8.7 Consider Refrigerant Tracking System

Observation:

Fugitive emissions from refrigerants were excluded from the 2024 baseline (except Iraq: 5.64 tCO_2e) due to lack of standardized tracking systems. While potentially immaterial, refrigerants have high Global Warming Potentials (GWPs of 1,300-3,900 for common HFCs) and even small leaks can be significant.

Recommendation:

Implement basic refrigerant tracking for 2026 inventory:

1. **Asset Register:**
    - Inventory all refrigeration/AC equipment
    - Record refrigerant type and charge quantity
2. **Maintenance Logs:**
    - Track refrigerant top-ups for static HVAC etc. (indicates leakage)
    - Track top-ups for mobile refrigeration (eg. Air Con in 4x4s which operate in hot climates and rugged terrain)
    - Record disposal of equipment and refrigerant recovery
3. **Calculation:**
    - Apply IPCC default leak rates (e.g., 15-30% per year for poorly maintained systems)
    - Or use measured top-up quantities as proxy for leakage

Prioritization:

- Focus initially on large office AC systems and cold storage facilities
- Defer small portable AC units if administrative burden high

Justification:

- Completes Scope 1 coverage
- Refrigerants are increasingly regulated (Kigali Amendment to Montreal Protocol)
- Demonstrates comprehensive approach to GHG management

9. CARBONSAVER OPPORTUNITIES

Purpose

This section presents a comprehensive assessment of carbon reduction opportunities for MAG International, a humanitarian organisation committed to reducing its environmental impact while maintaining operational effectiveness in challenging environments.

Scope

The assessment covers the four major emission source categories:

- Business travel, with particular focus on international flights
- Fleet operations, specifically diesel and gasoline consumption in 4x4 vehicles
- Scope 3 purchased goods and services
- Stationary combustion from generators

Key Principles

The recommendations in this report are guided by the following principles:

Asset Optimisation: Recognising budget constraints typical of charitable organisations, recommendations prioritise sweating existing assets and maximising efficiency before capital replacement.

Operational Pragmatism: All recommendations aim to account for the operational realities of humanitarian work, including remote locations, security requirements, and unreliable infrastructure.

Measurable Progress: Each recommendation is designed to deliver quantifiable emission reductions that can be verified under ISO 14064-3 standards.

Summary of Opportunities

Emission Source	Priority Focus	Implementation Horizon
Business Travel	Policy and behavioural change	Immediate to 12 months
Fleet Operations	Operational efficiency	Immediate to 24 months
Scope 3 Purchases	Supplier engagement	6 to 36 months
Stationary Combustion	Load optimisation and hybrid trials	Immediate to 36 months

Methodology

These recommendations have been prepared in accordance with the CarbonSAVER methodology, which is aligned with ISO 14064-3 verification requirements and the Greenhouse Gas Protocol Corporate Standard. The recommendations follow a structured hierarchy:

Step 1. Avoid

Eliminate emission sources where operationally feasible without compromising humanitarian objectives.

Step 2. Reduce

Minimise emissions from necessary activities through efficiency improvements, behavioural change, and technology optimisation.

Step 3. Replace

Substitute high-carbon activities or equipment with lower-carbon alternatives where economically viable.

Step 4. Offset

Address residual emissions through verified carbon offset programmes and BYCM Beyond Value Chain Mitigation as a last resort.

Intensity-Based Targets

Given the nature of humanitarian operations, where activity levels may fluctuate based on response requirements, we recommend intensity-based rather than absolute targets. This approach allows for meaningful emission reductions while accommodating operational variability.

Recommended intensity metrics include:

- tCO_2e per full-time equivalent staff member
- tCO_2e per £1 million programme expenditure
- Litres fuel per 100km (fleet)
- $kgCO_2e$ per kWh generated (generators)
- tCO_2e per km^2 of land released
- $kgCO_2e$ per explosive ordnance item found and destroyed

9.1 Business Travel

International flights typically represent a significant proportion of organisational carbon footprints for humanitarian organisations due to the geographically dispersed nature of operations.

9.1.1 Avoidance and Reduction

Travel Hierarchy Policy

Establish a formal travel decision hierarchy embedded in organisational policy:

- **Virtual-first:** Default to video conferencing for all meetings and training where physical presence is not essential
- **Surface transport:** Where travel is necessary, prioritise rail or road over air where journey times, terrain and security considerations permit
- **Flights as last resort:** Air travel only when other options are impractical or where mission-critical requirements exist
- **Prioritize Local Personnel and Regional Centers:** Reduce the high carbon impact of long-haul flights by prioritizing the upskilling of in-country personnel. Enable local staff to provide services and support typically flown in, and explore establishing regional centers of excellence.

Carbon Budget Allocation

Implement departmental or programme-level carbon budgets for travel:

- Allocate annual flight carbon budgets based on baseline data and reduction targets
- Require pre-approval for travel that exceeds budget thresholds
- Enable budget trading between departments where operational needs vary

Trip Consolidation

Maximise the value of each flight by combining activities:

- Cluster site visits, training sessions, and stakeholder meetings into single itineraries
- Coordinate travel across teams to reduce duplicate journeys to the same region
- Schedule regional conferences to coincide with essential travel

Annual Reduction Targets

Set year-on-year flight reduction targets of 10-15% from baseline, with adjustments permitted for significant changes in programme scope.

9.1.2 Efficiency and Procurement

Booking Standards

- Default to economy class for all flights (lower per-passenger emission allocation)
- Favour direct routes over connections where practical (take-off and landing represent significant fuel consumption)
- Preference airlines with newer, more fuel-efficient fleets and verified Sustainable Aviation Fuel (SAF) programmes

Climate Impact Accounting

Apply a radiative forcing multiplier of 1.9x to flight emissions to account for non-CO2 climate effects (contrails, NOx emissions at altitude). This provides a more accurate representation of true climate impact.

9.1.3 Monitoring and Accountability

Centralised Booking

Route all travel through a centralised booking system that captures:

- Origin and destination
- Class of travel
- Airline and aircraft type
- Calculated emissions (with radiative forcing)

Reporting

- Quarterly emissions reporting by team and project
- Annual trend analysis and target progress review

Internal Carbon Pricing

To drive behavioral change and prioritize lower-carbon options, we recommend applying an internal shadow cost of £100/tCO_2e to all travel budgets.

This figure is strategically positioned between the 2025 government benchmarks:

- **> £44/tCO_2e (Market Floor):** Exceeds the 2025 forecast for UK ETS traded carbon credits, ensuring the internal signal is stronger than basic compliance costs.
- **< £273/tCO_2e (Net Zero Ceiling):** Remains below the UK Government's full policy appraisal value (the theoretical cost of reaching Net Zero), balancing ambition with operational financial feasibility.

Financial Impact: Applying this shadow price to the 2024 footprint equates to a theoretical carbon cost of £217,500 for business travel emissions alone. This "paper cost" should be visible in budget requests to discourage high-carbon itineraries.

Here is a drafted section on Beyond Value Chain Mitigation (BVCM) tailored to your report's style. It incorporates the £7/tonne price point for a balanced portfolio and references the key industry endorsements.

Voluntary Beyond Value Chain Mitigation (BVCM)

In addition to internal reductions, we strongly recommend implementing a strategy for **Beyond Value Chain Mitigation (BVCM)**. This involves funding climate action outside of the organisation's immediate value chain—a practice now explicitly endorsed by the **Science Based Targets initiative (SBTi)** and the **UK Climate Change Committee (CCC)** as a critical component of global net zero integrity.

Rather than relying on a single project type, we recommend a **balanced portfolio** approach. This spreads investment across verified high-quality projects—such as nature-based avoidance (e.g., forest conservation), community-based energy efficiency (e.g., clean cookstoves), and carbon reductions, etc.

Financial & Strategic Implication: A high-integrity portfolio can be secured for an average price of **~£7.00 per tonne**.

- **Mitigation of Unavoidable Impact:** This allows the organisation to mitigate the environmental effects of **essential business travel where there are currently no realistic low-carbon alternatives**.
- **Responsibility over Labels:** Rather than seeking marketing labels like "Carbon Neutral," this approach demonstrates immediate responsibility for the emissions inherent in delivering humanitarian services, ensuring that necessary flights fund equivalent climate action elsewhere while internal decarbonisation progresses.

9.2 Fleet Operations

The organisation operates a fleet of 4x4 vehicles (primarily Toyota Land Cruisers, Ford Rangers, etc.) running on diesel and gasoline. Electric vehicle alternatives are not currently practical given operational contexts (remote locations, charging infrastructure limitations, security requirements). The focus is therefore on maximising efficiency of existing assets.

9.2.1 Operational Efficiency

Driver Behaviour Programme

Driver behaviour is one of the most significant variables in fuel consumption, with potential savings of 10-25%:

- Eco-driving training for all fleet operators covering smooth acceleration, optimal cruising speeds, and anticipatory braking
- Minimisation of idling time, particularly during security waits and loading/unloading
- Regular refresher training and performance feedback

Telematics and Route Optimisation

- GPS and telematics installation to monitor driving patterns, idling time, and route efficiency
- Identification of inefficient routes and unnecessary diversions
- Real-time feedback systems where connectivity permits

Journey Consolidation

- Coordinate movements across teams to reduce total vehicle-kilometres
- Batch deliveries and site visits where security conditions allow
- Shared vehicle booking systems to maximise utilisation

Preventative Maintenance

Maintain vehicles at optimal efficiency through:

- Regular tyre pressure checks (under-inflation increases fuel consumption by 3-5%)
- Timely air filter replacement
- Engine tuning to manufacturer specifications
- Scheduled servicing aligned with manufacturer recommendations

9.2.2 Fuel Management

Consumption Monitoring

- Per-vehicle fuel consumption logging with anomaly detection
- Investigation of vehicles with consumption significantly above fleet average
- Monthly fuel efficiency reporting

Intensity Targets

Establish fleet-wide intensity targets:

- Litres per 100km by vehicle category
- Litres per mission / disposal activity
- Annual improvement targets of 3-5%

Alternative Fuels

Where supply chains permit:

- Investigate biodiesel blends (B20) for compatible vehicles
- Pilot HVO (Hydrotreated Vegetable Oil) as drop-in diesel replacement
- Assess availability and quality assurance in operational contexts

9.2.3 Fleet Rationalisation

Right-Sizing

- Identify underutilised vehicles for reallocation or disposal
- Assess hire versus own economics for infrequently used vehicles
- Centralised vehicle pooling with booking system

Future Procurement

While EV replacement is not currently viable:

- Monitor hybrid 4x4 options for future procurement cycles
- Include fuel efficiency as a key weighted criterion in vehicle procurement
- Maintain watching brief on infrastructure developments in operational areas

9.3 Scope 3 Purchases

Purchased goods and services and capital goods represent 38% of the carbon footprint (8,389.27 tCO_2e). While direct control is often limited, significant influence can be exercised through procurement practices and supplier engagement.

9.3.1 Supplier Engagement Programme

Supplier Classification

Tier suppliers by spend and estimated carbon intensity:

- Tier 1: Top 20 suppliers by spend - active engagement programme
- Tier 2: Suppliers 21-50 - annual data request
- Tier 3: Remaining suppliers - general communications

Data Collection

For Tier 1 suppliers:

- Request carbon footprint data and verification status
- Request disclosure of reduction targets and progress
- Annual supplier sustainability survey

Procurement Integration

- Include carbon criteria in tender evaluation (recommended 5-10% weighting)
- Supplier code of conduct with climate expectations
- Preference for suppliers with verified carbon management programmes

9.3.2 Carbon Footprint Education

Many suppliers, particularly smaller organisations and those in developing economies, may lack carbon management capability. Building supplier capacity is essential for long-term Scope 3 reductions.

Educational Resources

- Simple guidance document: What is a carbon footprint and why it matters
- Quick wins guide: Low-cost emission reduction opportunities
- Sector-specific case studies demonstrating practical actions

Capacity Building

- Webinars or workshops for key suppliers, particularly SMEs
- One-to-one support for strategic suppliers
- Peer learning networks where appropriate

9.3.3 Simple Tools

Provide suppliers with accessible tools to measure and manage emissions:

- Spreadsheet-based carbon calculator for basic Scope 1 and 2 emissions
- Standardised reporting template aligned to GHG Protocol
- Annual supplier carbon survey with benchmarking feedback
- CarbonSAVER online tools for self-assessment where appropriate

9.3.4 Intensity Reduction Targets

Organisational Target

Set a Scope 3 procurement intensity target, such as:

- $kgCO_2e$ per £1 spend (2024 Actual = 0.342)
- 20% intensity reduction over 5 years
- Critical to adjust for inflation

Category Tracking

- Track intensity trends by procurement category
- Identify high-intensity categories for focused intervention
- Annual progress reporting

Recognition Programme

- Public recognition of supplier progress
- Case study publication
- Preferred supplier status for high performers

9.4 Stationary Combustion

Generator operations represent a significant emission source for organisations operating in areas with unreliable electrical grids. The focus is on maximising energy efficiency from existing generator assets while trialling renewable alternatives.

9.4.1 Fuel Use and Tracking

Metering and Monitoring

- Meter-level fuel consumption logging per generator
- Electricity output metering to calculate generation efficiency
- Calculation and tracking: litres consumed, kWh generated, specific fuel consumption (L/kWh)

Anomaly Detection

- Identify high-consumption outliers for investigation
- Benchmark performance across sites
- Regular reporting of fuel efficiency metrics

9.4.2 Energy Efficiency

Generator Sizing Audit

Oversized generators running at low load are significantly less efficient:

- Audit generator capacity against typical load profiles
- Identify opportunities to right-size or redistribute generators
- Optimal loading is typically 50-80% of rated capacity

Technical Efficiency

- Power factor correction where applicable (typically for larger installations)
- Regular servicing to maintain combustion efficiency
- Fuel quality assurance to prevent efficiency losses from contaminated fuel

9.4.3 Load Optimisation

Demand Profiling

- Develop load profiles to understand demand patterns across 24-hour cycles

- Identify peak and baseload periods
- Understand seasonal and operational variations

Generator Management

- Consolidate loads onto fewer, appropriately-sized generators during low-demand periods
- Sequencing and cascading for sites with multiple generators
- Automatic shutdown during extended low-load periods where operationally safe

Demand-Side Management

- Shift non-critical loads to optimal generation windows
- Timer controls for non-essential equipment
- Staff awareness programme on energy conservation

9.4.4 Sweating Existing Assets

Before investing in new equipment, maximise efficiency of existing infrastructure:

Load Reduction

- LED lighting retrofit (typically 50-70% reduction in lighting energy)
- Energy-efficient appliances for replacement purchases
- IT equipment power management
- Mobile device charging
- Unauthorised use

Passive Measures

- Insulation improvements to reduce HVAC loads
- Natural ventilation and passive cooling where climate permits
- Solar shading and reflective roofing

9.4.5 Solar-Battery Hybrid Trials

Solar PV with battery storage can significantly reduce generator run-hours and fuel consumption. A phased pilot approach is recommended:

Pilot Site Selection

- Select sites with good solar resource and stable security
- Target daytime baseload displacement first (offices, communications)
- Start with smaller systems to build operational experience

Monitoring and Business Case

- Detailed monitoring of fuel savings and system performance
- Calculate payback period and return on investment
- Document lessons learned for replication, eg. panel cleaning schedules are often overlooked,etc.

Funding Approach

- Explore donor and grant funding for capital costs
- Consider energy-as-a-service models where available
- Phased rollout based on pilot success

9.4.6 Reporting and Targets

Intensity Metrics

- Primary: Litres diesel per kWh generated
- Secondary: kgCO2e per kWh
- Site-level benchmarking and league tables

Targets

- Annual efficiency improvement targets (recommended 3-5%)
- Site accountability for performance
- Integration with organisational carbon targets

9.5 Implementation Roadmap

Overview

Implementation is structured in three phases, prioritising quick wins and low-cost measures before progressing to capital investments.

Phase 1: Foundation (Months 1-6)

Establish monitoring systems and implement policy changes with immediate effect.

Business Travel

- Implement travel hierarchy policy and approval process
- Establish centralised booking with carbon capture
- Set baseline and Year 1 reduction targets
- Consider BVCM to offset unavoidable flight emissions

Fleet

- Launch driver eco-training programme
- Implement fuel consumption monitoring
- Establish preventative maintenance schedules

Scope 3

- Classify suppliers by tier
- Issue initial data request to Tier 1 suppliers
- Draft supplier code of conduct

Generators

- Install fuel and electricity metering
- Conduct generator sizing audit
- Implement basic load management

Phase 2: Optimisation (Months 7-18)

Embed efficiency measures and begin supplier engagement programmes.

Business Travel

- Implement departmental carbon budgets
- Introduce internal carbon pricing shadow cost
- Quarterly reporting cycle established

Fleet

- Deploy telematics and route optimisation
- Fleet rationalisation review
- Alternative fuel pilot (where feasible)

Scope 3

- Launch supplier education programme
- Deploy supplier carbon tools
- Integrate carbon criteria into procurement

Generators

- LED lighting retrofit programme
- Demand-side management implementation
- Solar-battery pilot site selection and design

Phase 3: Investment (Months 19-36)

Capital investments based on proven business cases from earlier phases.

Business Travel

- Review and adjust targets based on Year 1-2 performance
- Refine policies based on lessons learned

Fleet

- Procurement cycle with efficiency criteria
- HVO or biofuel rollout (subject to supply chain)

Scope 3

- Supplier recognition programme
- Expand engagement to Tier 2 suppliers
- Set medium-term intensity targets inline with climate science

Generators

- Solar-battery pilot implementation
- Evaluation and replication planning
- Grant applications for expanded rollout

Governance

Successful implementation requires appropriate governance structures:

- Senior leadership accountability (Executive or Board level)
- Dedicated programme coordination resource
- Cross-functional working group with representation from Operations, Procurement, Finance, and Country offices
- Quarterly progress reporting to leadership
- Annual third-party verification under ISO 14064-3

10. STATEMENT OF INDEPENDENCE AND COMPETENCE

10.1 Independence

Carbon Verification Limited confirms that:

- We have no financial interest in Mines Advisory Group beyond the fees for this verification engagement
- We have not been involved in the preparation of MAG's GHG inventory or the selection of emission factors
- We maintain appropriate independence in accordance with ISO 14064-3 and professional verification standards
- No conflicts of interest exist that would compromise our objectivity

10.2 Competence

- **Lead Verifier:** Glenn Wilkinson, Technical Director (18+ years carbon verification experience)
- Technical expertise in ISO 14064-1/3, GHG Protocol, Third party carbon accounting tools eg. HCC+ methodology
- Experience conducting limited and reasonable assurance engagements for international Organisations

10.3 Impartiality

This verification was conducted with impartiality, objectivity, and professional skepticism. Our opinion is based solely on the evidence obtained through the verification procedures and is not influenced by any external pressures or considerations.

11. AUTHORIZATION

This verification statement has been reviewed and approved by:

Name: Glenn Wilkinson
Position: Technical Director
Organisation: Carbon Verification Limited

Date: 7th January 2026

Company Stamp & Signature:

12. DISTRIBUTION

This verification statement is addressed to:

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Intended Users:

- MAG Management and Board of Trustees
- Institutional donors and funding partners
- External stakeholders and the public (via published Carbon Baseline Report)

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13. KEY DEFINITIONS

Limited Assurance: A level of assurance engagement that provides moderate confidence through negative form opinion ("nothing has come to our attention..."). Procedures are less extensive than reasonable assurance but sufficient to conclude reported emissions are plausible.

Materiality: The threshold above which misstatements are considered significant enough to affect stakeholder decisions or inventory credibility. Set at 5% of total emissions (1,116 tCO_2e) for this engagement.

Operational Control: An organizational boundary approach where the reporting entity includes 100% of emissions from operations over which it has full authority to implement policies and operational practices.

Scope 1/2/3 Emissions: GHG Protocol classification of direct emissions (Scope 1), indirect emissions from purchased energy (Scope 2), and all other indirect value chain emissions (Scope 3).

tCO_2e (Tonnes CO_2 Equivalent): Standard metric expressing greenhouse gas emissions by converting all GHGs to the equivalent warming impact of carbon dioxide using Global Warming Potential (GWP) values.

END OF VERIFICATION STATEMENT

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Carbon Verification Limited has prepared this verification statement in alignment with ISO 14064-3:2019. It reflects our professional opinion, which is grounded in the evidence gathered during the verification process detailed within this document. The statement must be published in its entirety, without any omissions.

carbonVerification™

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