ISCF FREE EDUCATIONAL PUBLICATIONS | EXPANDED PROFESSIONAL SERIES 01 / 2026

ADVANCED PROFESSIONAL MANUAL TO GREENHOUSE GAS ACCOUNTING

From activity data to a traceable and verifiable greenhouse gas inventory

Inventory boundaries · Calculation methods · Emission factors · Data quality · Uncertainty · Verification

01	**Technical reference** GHG Protocol · ISO 14064-1:2018 · ISO 14064-3:2019 · ISO 14067:2018
02	**Reporting applications** Organisational inventories · Scopes 1/2/3 · IFRS S2 · Relevant CBAM requirements
03	**Fully worked illustration** Hypothetical industrial inventory, evidence register, QA/QC tests and reporting checklist

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01 / METHODOLOGY

Technical framework and inventory deliverables

A greenhouse gas (GHG) inventory is not merely a single emissions figure. A defensible statement specifies **what was measured, why, how, using which evidence and within what boundaries**. Methodological choices must be set before calculating the results.

Assignment objective	Principal accounting reference	Expected controlled output
Organisation-wide inventory	GHG Protocol Corporate Standard; ISO 14064-1	Annual inventory defined by entity, sources, boundaries and reporting period
Purchased electricity	GHG Protocol Scope 2 Guidance	Location-based and market-based results where applicable
Value-chain inventory	GHG Protocol Scope 3 Standard	Assessment of the 15 Scope 3 categories, estimation methods and data limitations
Product carbon footprint	ISO 14067 and suitable life-cycle assessment principles	$kgCO_2e$ per functional or declared unit within defined life-cycle boundaries
Validation/verification	ISO 14064-3 and relevant programme rules	A verifiable GHG statement, not an unsupported self-declaration

02 / PRINCIPLES

Five principles to demonstrate

1. Relevance and completeness

Include material sources, operations, entities and gases; explain exclusions and their justification.

2. Consistency and comparability

Apply a consistent policy between years; disclose changes to factors, base year and structural boundaries.

3. Accuracy and uncertainty

Use supported activity data and suitable factors; document missing data, uncertainty and consistent units.

4. Transparency and traceability

Identify the owner, source, version, aggregation logic, calculation and edit history for every input.

Fifth principle — impartiality

Separate data preparation, internal review, management approval and external verification where practicable. Any verification claim must identify its criteria, scope and output.

Technical distinction

ISO 14064-1:2018 organises direct and indirect emissions into its own reporting categories. These do not correspond word-for-word to the GHG Protocol's Scope 1/2/3 labels. Prepare an explicit crosswalk instead of changing terminology automatically.

03 / BOUNDARIES

Define inventory boundaries before calculation

Specify the reporting year, legal entities and site register. Select the organisational consolidation approach—**operational control, financial control or equity share**—consistent with the applicable framework. Then define activities, emission sources, leased assets, shared services and rules for including or excluding facilities.

Boundary decision	Reviewer question	Effect on reported inventory
Entities and sites	Are the factory, logistics depot and offices included?	Determines included sources and activity populations
Control/equity approach	Who controls operations or owns the relevant equity?	Determines consolidation of entity emissions
Base year	Which historical year is representative and has adequate records?	Enables meaningful performance tracking and recalculation
Shared infrastructure	How is shared steam or power apportioned?	Requires an evidenced and reproducible allocation basis
GHGs and GWP	Which gases and 100-year GWP values were adopted?	Determines consistent conversion to CO_2e

04 / GHG PROTOCOL SCOPES

Emission-source map

Scope 1 — Direct emissions

- Fuel combustion in controlled boilers, furnaces and vehicles.
- Process emissions from calcination, reduction and chemical reactions.
- Fugitive refrigerant and industrial-gas losses, as applicable.

Scope 2 — Acquired energy

- Purchased and consumed electricity.
- Purchased steam, heating and cooling, when relevant.
- Applicable location-based and market-based approaches, factors and contractual instruments.

Scope 3 — Value chain

Other indirect emissions from purchased goods, capital goods, transport, waste, travel, use of sold products, investments and related activities are organised into 15 GHG Protocol categories. Assess applicability, overlaps, exclusions and evidence gaps before quantification.

Base-year comparability

Adopt a documented policy and materiality threshold for recalculation following acquisitions, disposals, significant method changes or material errors. Higher absolute emissions do not automatically imply poorer efficiency when output volumes or boundaries have changed.

05 / QUANTIFICATION

Core equations and unit discipline

Source-by-source calculation maximises traceability. For each source, retain activity measurements, the selected factor, the factor source and version, the included gases and all unit conversions.

E (tCO_2e) = Activity data × Emission factor × GWP ÷ 1,000 (when units require)

If the emission factor already has units of **$kgCO_2e$ per activity unit**, its CO_2-equivalent conversion is embedded and GWP must **not** be applied again. If the factor is in kilograms of an individual gas, apply the specified GWP100. Double application of GWP is a material error.

Source type	Illustrative calculation expression	Result unit
Fuel combustion	Fuel quantity × NCV × gas-specific EF × GWP	tCO_2e
Fuel with composite factor	Litres of fuel × $kgCO_2e$/litre ÷ 1,000	tCO_2e
Grid electricity	kWh × $kgCO_2e$/kWh ÷ 1,000	tCO_2e
Refrigerant leakage	kg of leaked refrigerant × GWP100 ÷ 1,000	tCO_2e
Carbon mass balance	Net oxidised carbon × (44/12)	tCO_2
Freight transport	Tonne-km × $kgCO_2e$/tonne-km ÷ 1,000	tCO_2e

06 / TECHNICAL TESTS

Technical checks for every equation

- **Activity:** reconcile the invoice, meter, inventory movement or laboratory record; test the date and unit.
- **Emission factor:** inspect country, year, fuel and technology, and whether the value reports CO_2 only or CO_2e.
- **Boundaries:** exclude out-of-period activities and repeated sources.
- **Conversion:** distinguish Nm^3/m^3, tonnes/kg, NCV/GCV, CH_4 and N_2O, and keep unit transformations explicit.
- **Change control:** preserve original files; record the reason, owner and approver of a correction.

Biogenic CO_2

Under the GHG Protocol, CO_2 from biomass combustion is reported separately from fossil Scope 1 CO_2 totals as required by the accounting framework; relevant CH_4 and N_2O emissions must still be addressed.

07 / DATA CONTROLS

Source register and emission-factor selection

Many material errors arise before arithmetic: a source is misclassified, activity data are unreliable or a factor is inappropriate. Maintain a source register that enables another qualified reviewer to reproduce the reported result.

Register field	Minimum record	Quality-control test
Source ID / site	Unique ID, operating unit, responsible person	No duplicates or ownerless sources
Activity and period	Quantity, unit, start and end date	Cross-check meters/invoices and missing months
EF and reference	Value, gases, unit, issue, country and year	Technological and temporal suitability
GWP reference	Selected gas values and reporting version	Consistent basis across the inventory
Calculation and evidence	Workbook cell, version and proof link	Reperformance from source to result
Review/approval	Preparer, reviewer, date and review comments	Segregation of duties and closure

08 / RELIABILITY

Hierarchy of activity-data reliability

Priority 1 Traceable primary measurements: calibrated meters, scales, accredited laboratory results and validated supplier-specific data.

Priority 2 Secondary factors that are geographically, temporally and technologically representative, with disclosed limitations.

Priority 3 Proxies and estimation models, supported by sensitivity analysis, a gap record and an improvement plan.

09 / FACTOR SELECTION

Practical emission-factor selection rules

- Check system boundaries: direct combustion, upstream emissions, full life cycle or a multi-gas composite.
- For electricity, use the appropriate grid, reporting year, accounting approach and contractual instruments where relevant.
- Do not silently mix $kgCO_2$/litre with $kgCO_2e$/litre: their included gases differ.
- Review annual changes in factors; an inventory movement may come from a changed factor rather than different consumption.
- Retain a dated source citation or captured record for every material factor and GWP.

Evidence-chain rule

Reported result → formula → activity/factor inputs → source register → original document → responsible data owner. Digital traceability supports readiness for verification; it is not itself an independent verification opinion.

10 / CASE STUDY

Worked illustration: hypothetical industrial facility

Assume a facility produces **10,000 tonnes** of product during one year. Every activity quantity and factor below is **invented for training**, not an official factor for Egypt or any other location. Do not reuse them in compliance reporting or a verified statement.

Emission source / scope	Illustrative activity	Illustrative factor	tCO_2e
Diesel — Scope 1	50,000 litres	2.68 $kgCO_2e/L$	134.0
Natural gas — Scope 1	200,000 Nm^3	2.00 $kgCO_2e/Nm^3$	400.0
Refrigerant loss — Scope 1	8 kg	GWP100 = 1,000	8.0
Purchased electricity — Scope 2	1,200,000 kWh	0.42 $kgCO_2e/kWh$	504.0
Outbound freight — Partial Scope 3	800,000 tonne-km	0.09 $kgCO_2e$/tonne-km	72.0

Scope 1 = 134 + 400 + 8 = 542 tCO_2e

Scope 2 = 1,200,000 × 0.42 ÷ 1,000 = 504 tCO_2e

Illustrated sources = 542 + 504 + 72 = 1,118 tCO_2e

Illustrated sources

1,118

tCO_2e / training only

Illustrated intensity

0.1118

tCO_2e per tonne of product

11 / REVIEW FINDINGS

Recalculation and interpretation

- Reconcile Scope 1 separately from Scope 2; the 72 tCO_2e shown is **one selected Scope 3 source**, not a complete value-chain inventory.
- Electricity accounts for 504 ÷ 1,118 ≈ **45.1%** of the **illustrated subset only**, not the facility's full footprint.
- A market-based electricity result may differ from a location-based one, depending on eligible evidence and selected factors.
- Interpret emissions intensity with production volume, allocation approach and product mix; facilities with different boundaries cannot be compared uncritically.

Evidence limitation

The illustration excludes process emissions, a complete Scope 3 assessment and a full uncertainty budget. It must not be labelled the facility's definitive carbon footprint or used to substantiate a carbon-neutrality claim.

12 / VALUE CHAIN

Scope 3 is not a single residual category

The GHG Protocol groups Scope 3 into **15 upstream and downstream categories**. Start with applicability, likely magnitude and data availability; then select supplier data, activity-based factors or spend-based estimates, explaining the limitations of each approach.

Upstream categories 1–8	Downstream categories 9–15
1. Purchased goods and services	9. Downstream transportation and distribution
2. Capital goods	10. Processing of sold products
3. Fuel- and energy-related activities not in Scopes 1 or 2	11. Use of sold products
4. Upstream transportation and distribution	12. End-of-life treatment of sold products
5. Waste generated in operations	13. Downstream leased assets
6. Business travel	14. Franchises
7. Employee commuting	15. Investments
8. Upstream leased assets	—

13 / SCREENING

Materiality and estimation screening

Expected scale

Evaluate spend, tonnage, sold product use, logistics volume or financed portfolio size—even when supplier data are incomplete.

Data fitness

Consider supplier specificity, reporting year, geography, technology and possible duplication between categories.

Decision relevance

Assess purchasing choices, design, product life cycle, reputational and regulatory risks.

Data improvement

Begin with defensible estimates and progressively replace generic averages with more representative supplier or product information.

14 / DECARBONISATION

Emission-reduction priorities

- Identify hotspots using absolute emissions and operational materiality, not percentages alone.
- Compare efficiency, redesign, energy substitution and supplier alternatives with measurable KPIs.
- Distinguish physical reductions from offsets, credits and removals; do not double count benefits.
- Present the base year, recalculation rules and effects of structural, capacity or volume changes.

Disclosure boundary

Spend-based estimates may be necessary for screening, but are not always an adequate substitute for reliable activity or supplier data. Disclose which Scope 3 categories were included, excluded, estimated or improved.

15 / QA/QC

Quality assurance, quality control and evidence

Professional QA/QC tests **completeness, correctness, consistency and traceability**, not only spreadsheet arithmetic. Control design should target risks specific to each source and measurement process.

Control test	Practical implementation	Assurance purpose
Completeness	Every month × site × source; reconcile production and fuel	Avoid omission of periods or operating units
Reconciliation	Meters, invoices, opening and closing stocks	Detect data inconsistency and misstatements
Trend and range	Monthly intensity and prior-year changes	Investigate unusual values
Units and duplicates	Consistent conversions, locked source IDs	Prevent 1,000-fold errors or duplicate records
Traceability	Source ID → evidence → EF → formula → version	Permit independent recalculation
Governance	Preparer / reviewer / approver and change log	Document control and accountability

16 / UNCERTAINTY

Illustrative combined uncertainty

If activity-data and emission-factor uncertainties are **statistically independent**, with negligible correlation or systematic bias, their relative standard uncertainties may be combined by root-sum-of-squares. This is a teaching approximation, not a substitute for a project-specific uncertainty budget.

$$u_{combined} \approx \sqrt{(u_{activity}^2 + u_{factor}^2)} = \sqrt{(3\%^2 + 5\%^2)} = 5.83\%$$

For the illustrated electricity source, 504 × 5.83% ≈ **29.4 tCO_2e**. This describes only that source under those assumptions—not the total inventory margin of error. Boundary choices, data gaps and model bias can add other material uncertainty.

17 / AUDIT FILE

Evidence package for independent review

- Original activity register identifying meter, calibration, reading date, invoice or contract.
- Version-controlled factor and GWP library showing source, unit, region and period.
- Protected calculation files, clearly identified inputs, validation checks and fixed versions.
- Documented assumptions, justified exclusions, data-gap treatment and boundary decisions.
- Finding/correction log identifying ownership, dates, evidence and closure.

18 / REPORTING FRAMEWORKS

Verification and regulatory uses: alignment, not substitution

A common emissions database can support multiple reporting outputs, but **the reports themselves are not interchangeable**. Each programme establishes its own boundaries, allocation, factors, disclosure rules and level of independent assessment.

Reporting route	Unit / system boundary	Key distinction
ISO 14064-1 organisational inventory	tCO_2e per year and defined organisational boundaries	Direct/indirect categories, entities and gases
GHG Protocol Scopes 1–3	tCO_2e per year including relevant value-chain categories	Scope 2 methods, Scope 3 coverage and duplication
ISO 14067 product footprint	$kgCO_2e$ per defined unit and life-cycle boundary	Functional unit, system boundary and allocation
EU CBAM definitive regime	Embedded emissions for covered goods under EU rules	Production processes, precursors, allocation and verification
IFRS S2 climate disclosures	Emissions, climate risk/opportunity information	Connection to sustainability-related financial reporting

19 / VERIFICATION

Technical steps in an independent verification engagement

- **Criteria and scope:** identify the GHG statement, period, entity, intended use and assurance criteria.
- **Risk assessment:** identify sources and estimates most prone to error, fraud or duplication.
- **Evidence plan:** perform recalculation, document testing, controls tests, interviews and site visits as necessary.
- **Evaluation:** examine misstatements, deviations, alternative evidence and uncorrected findings.
- **Reporting:** issue the appropriate verification or assurance report, with stated criteria, scope, level and limitations.

20 / CBAM

CBAM definitive implementation in 2026

The definitive EU Carbon Border Adjustment Mechanism phase began on **1 January 2026**. Embedded-emissions determination is subject to **Regulation (EU) 2023/956** and applicable implementing rules, including **(EU) 2025/2547** for calculation and **(EU) 2025/2546** for verification principles. Check amended legislation and sector-specific rules before use: an organisational factor does not replace CBAM's treatment of precursors and allocation.

Professional distinction

ISO 14064-3 validation/verification of GHG information differs from sustainability assurance engagements under ISSA 5000. An organisation's accreditation or content licence is not an endorsement of its digital platform by an accreditation or standards body.

Purpose and methodological basis. The inventory file must separate raw activity records, transformed calculations, review evidence and final approval. Assign the source operator to measurements, the accounting analyst to factors and formulas, the quality reviewer to completeness and reconciliation, and management to final representation. Document control is fundamental to reproducibility, not an administrative add-on after year end.

Acceptance criterion

Acceptance: every tCO_2e total must trace to activity records, a specified factor and a reproducible calculation.

CONTROL PROCEDURES

Work programme and review procedures

- Record file ID, owner, effective date and revision
- Retain source records without overwriting originals
- Log formula changes, author and reason
- Link every result to supporting evidence
- Distinguish management approval from third-party verification

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-11-1	Record file ID, owner, effective date and revision	Document reference / owner / review date
WP-11-2	Retain source records without overwriting originals	Document reference / owner / review date
WP-11-3	Log formula changes, author and reason	Document reference / owner / review date
WP-11-4	Link every result to supporting evidence	Document reference / owner / review date
WP-11-5	Distinguish management approval from third-party verification	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. Implement an RACI matrix for each source, from capture to calculation, review, approval and external communication. Small facilities may combine roles, but compensating controls must prevent an unchecked single-person workflow. When an installation, process or supplier changes, update assignments so that no material source lacks an accountable owner.

Acceptance criterion

Acceptance: every significant source has time-stamped review evidence, and no material source has an unassigned owner.

CONTROL PROCEDURES

Work programme and review procedures

- Name the meter, invoice and monitoring-plan owners
- Assign calculation and factor-library custodians
- Appoint a reviewer separate from data entry
- Document authority over exclusions and changes
- Escalate overdue and missing records

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-12-1	Name the meter, invoice and monitoring-plan owners	Document reference / owner / review date
WP-12-2	Assign calculation and factor-library custodians	Document reference / owner / review date
WP-12-3	Appoint a reviewer separate from data entry	Document reference / owner / review date
WP-12-4	Document authority over exclusions and changes	Document reference / owner / review date
WP-12-5	Escalate overdue and missing records	Document reference / owner / review date

Review disposition

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Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. Prepare a map of entities, equity interests, operations, leased assets and common utilities before collecting emissions. Select equity-share, financial-control or operational-control consolidation in line with the reporting framework. Different approaches produce different inventory populations; do not automatically count every affiliate at 100 percent without examining control.

Acceptance criterion

Reviewer test: select a partly owned facility and independently recompute its consolidation treatment.

CONTROL PROCEDURES

Work programme and review procedures

- Register ownership, contracts and operating rights
- Specify the control criterion in a written policy
- Link each site to legal entity and source IDs
- Document leases and shared assets
- Keep exclusion decisions and rationales

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-13-1	Register ownership, contracts and operating rights	Document reference / owner / review date
WP-13-2	Specify the control criterion in a written policy	Document reference / owner / review date
WP-13-3	Link each site to legal entity and source IDs	Document reference / owner / review date
WP-13-4	Document leases and shared assets	Document reference / owner / review date
WP-13-5	Keep exclusion decisions and rationales	Document reference / owner / review date

Review disposition

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Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. GHG Protocol classifies emissions as Scope 1, Scope 2 and Scope 3. ISO 14064-1:2018 applies categories of direct and indirect emissions, including transport, products used and use of sold products. A crosswalk is required when reporting against both; simply relabelling one classification as the other is methodologically unsound.

Acceptance criterion

Expected output: an auditable classification crosswalk that preserves differences between the frameworks.

CONTROL PROCEDURES

Work programme and review procedures

- Use distinct GHG Protocol and ISO classification columns
- Document each ambiguous mapping decision
- Test purchased energy and outsourced transport
- Assess exclusions against the chosen criteria
- Check for cross-category duplication

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-14-1	Use distinct GHG Protocol and ISO classification columns	Document reference / owner / review date
WP-14-2	Document each ambiguous mapping decision	Document reference / owner / review date
WP-14-3	Test purchased energy and outsourced transport	Document reference / owner / review date
WP-14-4	Assess exclusions against the chosen criteria	Document reference / owner / review date
WP-14-5	Check for cross-category duplication	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. Use actual fuel-consumption records and reconcile purchases, stock movements and use. Combustion emissions can be calculated with a composite fuel factor or energy content and gas-specific factors. Confirm whether calorific value is net or gross, and whether volumes are standardized for pressure and temperature; unit confusion can create large systematic errors.

Acceptance criterion

Teaching example: 50,000 L × 2.68 kgCO_2e/L ÷ 1,000 = 134 tCO_2e; the factor is hypothetical.

CONTROL PROCEDURES

Work programme and review procedures

- Use fuel consumed, not purchases alone
- Record NCV and gas-specific factor origins
- Validate kg, L, Nm^3 and GJ conversions
- Include applicable CH_4 and N_2O sources
- Compare totals with process energy intensity

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-15-1	Use fuel consumed, not purchases alone	Document reference / owner / review date
WP-15-2	Record NCV and gas-specific factor origins	Document reference / owner / review date
WP-15-3	Validate kg, L, Nm^3 and GJ conversions	Document reference / owner / review date
WP-15-4	Include applicable CH_4 and N_2O sources	Document reference / owner / review date
WP-15-5	Compare totals with process energy intensity	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. For owned or controlled fleets, identify each vehicle, fuel type, activity and reporting boundary. Fuel-based and distance-based methods are alternatives where relevant, not additive calculations for the same source. Fuel-card records may represent purchases rather than consumption, and outsourced transport is usually evaluated as a value-chain activity rather than direct fleet emissions.

Acceptance criterion

Quality test: a journey must not be counted in both Scope 1 and outsourced Scope 3 without a justified boundary.

CONTROL PROCEDURES

Work programme and review procedures

- Map fuel transactions to individual vehicles
- Check period and actual consumption
- Prevent fuel and distance double-counting
- Determine ownership or operational control
- Compare fuel economy against expected ranges

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-16-1	Map fuel transactions to individual vehicles	Document reference / owner / review date
WP-16-2	Check period and actual consumption	Document reference / owner / review date
WP-16-3	Prevent fuel and distance double-counting	Document reference / owner / review date
WP-16-4	Determine ownership or operational control	Document reference / owner / review date
WP-16-5	Compare fuel economy against expected ranges	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. Cement emissions include CO_2 from carbonate decomposition in clinker manufacture, in addition to fuel and electricity emissions. A defensible process estimate requires appropriate clinker production, chemistry or material-balance data, with correction terms where relevant. Keep process emissions separate from energy emissions and document any assumptions concerning dust, kiln feeds and carbonate composition.

Acceptance criterion

Generic calcination factors must not be represented as site-verified values without assessing applicability.

CONTROL PROCEDURES

Work programme and review procedures

- Verify clinker output, not only cement tonnes
- Retain chemistry test reports and source
- Document method and kiln boundary
- Address dust/recycle streams where required
- Separate calcination from fuel combustion

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-17-1	Verify clinker output, not only cement tonnes	Document reference / owner / review date
WP-17-2	Retain chemistry test reports and source	Document reference / owner / review date
WP-17-3	Document method and kiln boundary	Document reference / owner / review date
WP-17-4	Address dust/recycle streams where required	Document reference / owner / review date
WP-17-5	Separate calcination from fuel combustion	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. Steelmaking emissions depend on process route: BF-BOF, EAF, DRI and hybrid systems differ in reductants, carbon inputs, process gases, scrap use and electricity requirements. Avoid reducing the assessment to purchased power. Trace carbon-bearing inputs and outputs, by-product gases, process transfers and precursors where relevant.

Acceptance criterion

Technical check: reconcile calculated carbon flows to documented plant carbon and material balances.

CONTROL PROCEDURES

Work programme and review procedures

- Identify production routes at line level
- Document carbon in fuels, reductants and additives
- Handle off-gases without double-counting
- Reconcile products, scrap and yield
- Test allocation across multiple products

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-18-1	Identify production routes at line level	Document reference / owner / review date
WP-18-2	Document carbon in fuels, reductants and additives	Document reference / owner / review date
WP-18-3	Handle off-gases without double-counting	Document reference / owner / review date
WP-18-4	Reconcile products, scrap and yield	Document reference / owner / review date
WP-18-5	Test allocation across multiple products	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. Fugitive emissions can be significant even at small released masses when substances have high GWP values. Prefer service logs documenting additions, recoveries, equipment servicing and cylinder movements. An inventory-balance method must include all relevant equipment and stocks; purchasing refrigerant is not identical to leakage.

Acceptance criterion

Example: 8 kg of a hypothetical gas with GWP100=1000 gives 8 tCO_2e; identify the actual gas first.

CONTROL PROCEDURES

Work programme and review procedures

- Record the exact gas identity and blend
- Quantify kg released or defensible inventory balance
- Select documented GWP100 from the criteria
- Keep leak repair, recovery and disposal logs
- Prevent equating purchases with emissions

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-19-1	Record the exact gas identity and blend	Document reference / owner / review date
WP-19-2	Quantify kg released or defensible inventory balance	Document reference / owner / review date
WP-19-3	Select documented GWP100 from the criteria	Document reference / owner / review date
WP-19-4	Keep leak repair, recovery and disposal logs	Document reference / owner / review date
WP-19-5	Prevent equating purchases with emissions	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. The location-based approach reflects average emissions intensity of the relevant grid under GHG Protocol Scope 2 Guidance. Choose a factor appropriate to geography, year, market and reporting boundary. Renewable procurement claims do not simply replace the location-based result, and electricity factors from unrelated grids should not be combined without an allocation rationale.

Acceptance criterion

Illustrative example: 1,200,000 kWh × 0.42 $kgCO_2e/kWh$ ÷ 1,000 = 504 tCO_2e.

CONTROL PROCEDURES

Work programme and review procedures

- Reconcile kWh to meters and bills
- Identify the relevant grid for every meter
- Version and date the grid factor
- Specify gases included in the factor
- Disclose the use of estimates and limitations

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-20-1	Reconcile kWh to meters and bills	Document reference / owner / review date
WP-20-2	Identify the relevant grid for every meter	Document reference / owner / review date
WP-20-3	Version and date the grid factor	Document reference / owner / review date
WP-20-4	Specify gases included in the factor	Document reference / owner / review date
WP-20-5	Disclose the use of estimates and limitations	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. Where appropriate contractual instruments exist, market-based Scope 2 reflects eligible energy attributes obtained by the reporting company. Review instrument quality criteria, market boundaries, generation and consumption periods, ownership, retirement, residual mix and double-claim risk. Where suitable instruments are unavailable, explain the fallback data hierarchy rather than invent a zero factor.

Acceptance criterion

Control rule: an unsupported “green electricity” claim is insufficient for a zero market-based factor.

CONTROL PROCEDURES

Work programme and review procedures

- Assess contractual instrument eligibility
- Match generation and consumption periods
- Test retirement and double-claim prevention
- Document relevant residual mix data
- Report both approaches where required

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-21-1	Assess contractual instrument eligibility	Document reference / owner / review date
WP-21-2	Match generation and consumption periods	Document reference / owner / review date
WP-21-3	Test retirement and double-claim prevention	Document reference / owner / review date
WP-21-4	Document relevant residual mix data	Document reference / owner / review date
WP-21-5	Report both approaches where required	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. Scope 3 should be screened across all fifteen upstream and downstream categories, assessing relevance, magnitude, data access and potential double-counting. Move from defensible initial estimates toward supplier- and product-specific data for hotspots. Each category needs a method statement; do not sum purchased-goods, freight and financial spend data blindly where activity boundaries overlap.

Acceptance criterion

Output: a category register marking applicable, non-applicable or excluded-with-reason, plus estimates and data confidence.

CONTROL PROCEDURES

Work programme and review procedures

- Screen all fifteen categories
- Evaluate relevance and data availability
- Specify supplier-specific, activity or spend methods
- Document overlaps and boundaries
- Prioritise hotspot data improvements

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-22-1	Screen all fifteen categories	Document reference / owner / review date
WP-22-2	Evaluate relevance and data availability	Document reference / owner / review date
WP-22-3	Specify supplier-specific, activity or spend methods	Document reference / owner / review date
WP-22-4	Document overlaps and boundaries	Document reference / owner / review date
WP-22-5	Prioritise hotspot data improvements	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. Purchased materials, precursors and capital goods can dominate upstream emissions. Prefer supplier- or product-specific factors with defined life-cycle boundaries and reporting periods, then use activity- or spend-based methods with transparent uncertainty. Monetary factors require currency, price-year and system-boundary checks; spend estimates are not automatically comparable across countries and years.

Acceptance criterion

Do not apply a single supplier factor to all suppliers without testing process and geographic representativeness.

CONTROL PROCEDURES

Work programme and review procedures

- Map supplied materials to product and quantity
- Assess cradle-to-gate and declared boundaries
- Check supplier data year and review status
- Control currency and price-year for spend factors
- Separate capital goods from operating purchases

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-23-1	Map supplied materials to product and quantity	Document reference / owner / review date
WP-23-2	Assess cradle-to-gate and declared boundaries	Document reference / owner / review date
WP-23-3	Check supplier data year and review status	Document reference / owner / review date
WP-23-4	Control currency and price-year for spend factors	Document reference / owner / review date
WP-23-5	Separate capital goods from operating purchases	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. Freight emissions may use fuel data, distance and load, or tonne-kilometres with appropriate mode-specific factors. Review multimodal legs, real routes, empty backhauls, load factors and contractual boundary. Prevent counting the same freight leg within a purchased-goods life-cycle factor and again as a separate transport activity without the required boundary treatment.

Acceptance criterion

Training case: 800,000 tonne-km × 0.09 kgCO_2e/tonne-km ÷ 1000 = 72 tCO_2e, using an imaginary factor.

CONTROL PROCEDURES

Work programme and review procedures

- Record mode, consignment and distance
- Determine actual or assumed payload
- Request fuel records where accessible
- Review returns and overlapping legs
- Retain waybills, invoices and routes

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-24-1	Record mode, consignment and distance	Document reference / owner / review date
WP-24-2	Determine actual or assumed payload	Document reference / owner / review date
WP-24-3	Request fuel records where accessible	Document reference / owner / review date
WP-24-4	Review returns and overlapping legs	Document reference / owner / review date
WP-24-5	Retain waybills, invoices and routes	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. A large factor database does not justify selecting whichever row matches an activity label. Every factor needs a unique identifier, authoritative source, unit, version date, geography, methodological boundary and included gases. Preserve historical factor selections for every reporting period. Do not redistribute protected factor libraries into other products without permission.

Acceptance criterion

Acceptance: each source-period uses exactly one justified factor selection that can be reconstructed later.

CONTROL PROCEDURES

Work programme and review procedures

- Assign a unique Factor ID
- Link to source, URL and version
- Require matching units and boundaries
- Block superseded factors absent approval
- Record exception approval and rationale

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-25-1	Assign a unique Factor ID	Document reference / owner / review date
WP-25-2	Link to source, URL and version	Document reference / owner / review date
WP-25-3	Require matching units and boundaries	Document reference / owner / review date
WP-25-4	Block superseded factors absent approval	Document reference / owner / review date
WP-25-5	Record exception approval and rationale	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. An emission factor may be expressed as kilograms of CO_2, CH_4, N_2O, or as pre-aggregated CO_2e. Misreading this field leads to duplicate GWP multiplication or omitted non-CO_2 gases. Document the required GWP100 assessment basis, gas name, unit and reporting-programme rule, and avoid mixing incompatible GWP sets within one inventory without a stated rationale.

Acceptance criterion

Simple test: a factor already in $kgCO_2e/kWh$ requires no additional gas-specific GWP multiplier.

CONTROL PROCEDURES

Work programme and review procedures

- Distinguish gas mass factors from CO_2e factors
- Version the chosen GWP100 source
- Identify refrigerant blends and components
- Apply each GWP conversion once
- Test gas-level subtotals before aggregation

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-26-1	Distinguish gas mass factors from CO_2e factors	Document reference / owner / review date
WP-26-2	Version the chosen GWP100 source	Document reference / owner / review date
WP-26-3	Identify refrigerant blends and components	Document reference / owner / review date
WP-26-4	Apply each GWP conversion once	Document reference / owner / review date
WP-26-5	Test gas-level subtotals before aggregation	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. Test activity-data completeness across all periods, unit accuracy, and reconciliation to original records. Assign data confidence according to direct metering, invoicing, engineering estimate or proxy. Flag meter outages, manual overrides, unexplained zero records and months with implausible activity relative to production.

Acceptance criterion

Red flag: an operating source reporting zero monthly activity requires documented explanation.

CONTROL PROCEDURES

Work programme and review procedures

- Reconcile all twelve months and shutdowns
- Inspect meter readings and calibration
- Match energy use to invoices
- Compare production and material throughput
- Log estimated substitutes and approvals

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-27-1	Reconcile all twelve months and shutdowns	Document reference / owner / review date
WP-27-2	Inspect meter readings and calibration	Document reference / owner / review date
WP-27-3	Match energy use to invoices	Document reference / owner / review date
WP-27-4	Compare production and material throughput	Document reference / owner / review date
WP-27-5	Log estimated substitutes and approvals	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. Missing records require a controlled hierarchy: recover actual measurements where possible, use corroborating internal evidence next, then documented engineering estimation or a proxy when justified. Log the missing period, reason, estimation method, sources and impact on the total. An estimated replacement does not become primary measured data merely because it is entered in the spreadsheet.

Acceptance criterion

Do not use a prior-year average for six months of missing fuel data when plant output materially changed without adjustment.

CONTROL PROCEDURES

Work programme and review procedures

- Record gap start and end dates
- Choose proxies related to actual activity
- Estimate sensitivity where material
- Approve the chosen methodology
- Disclose the estimation impact in reporting

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-28-1	Record gap start and end dates	Document reference / owner / review date
WP-28-2	Choose proxies related to actual activity	Document reference / owner / review date
WP-28-3	Estimate sensitivity where material	Document reference / owner / review date
WP-28-4	Approve the chosen methodology	Document reference / owner / review date
WP-28-5	Disclose the estimation impact in reporting	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. The fictional facility produces 10,000 tonnes of output annually. Activity data comprise 50,000 L diesel, 200,000 standard m³ natural gas, 8 kg of refrigerant loss, 1,200,000 kWh purchased electricity and 800,000 tonne-km outsourced freight. All numerical factors are teaching assumptions, not national, sectoral or UNFCCC values.

Acceptance criterion

Task: reproduce all subsequent results from source inputs using the same formulas as the Excel model.

CONTROL PROCEDURES

Work programme and review procedures

- Create a unique source register entry for each activity
- Retain the original input units
- Assign scopes before calculation
- Mark every hypothetical factor explicitly
- Separate calculation sheet from source records

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-29-1	Create a unique source register entry for each activity	Document reference / owner / review date
WP-29-2	Retain the original input units	Document reference / owner / review date
WP-29-3	Assign scopes before calculation	Document reference / owner / review date
WP-29-4	Mark every hypothetical factor explicitly	Document reference / owner / review date
WP-29-5	Separate calculation sheet from source records	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. Calculate diesel as 50,000 L × 2.68 $kgCO_2e/L$, gas as 200,000 standard m^3 × 2.00 $kgCO_2e/m^3$, and fugitive loss as 8 kg × hypothetical GWP100 1000. These yield 134, 400 and 8 tCO_2e respectively, for a teaching Scope 1 total of 542 tCO_2e. No factor comes from the UNFCCC workbook.

Acceptance criterion

Close-out test: Scope 1 must equal 542 tCO_2e, without reapplying GWP to CO_2e factors.

CONTROL PROCEDURES

Work programme and review procedures

- Separate combustion from refrigerant loss
- Verify factor units and GWP assumptions
- Convert kg to tonnes by dividing by 1,000
- Sum 134 + 400 + 8
- Retain formula-level audit references

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-30-1	Separate combustion from refrigerant loss	Document reference / owner / review date
WP-30-2	Verify factor units and GWP assumptions	Document reference / owner / review date
WP-30-3	Convert kg to tonnes by dividing by 1,000	Document reference / owner / review date
WP-30-4	Sum 134 + 400 + 8	Document reference / owner / review date
WP-30-5	Retain formula-level audit references	Document reference / owner / review date

Review disposition

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Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. Purchased power is calculated at 1,200,000 kWh × hypothetical 0.42 kgCO_2e/kWh = 504 tCO_2e. Outsourced freight uses 800,000 tonne-km × hypothetical 0.09 kgCO_2e/tonne-km = 72 tCO_2e from one selected Scope 3 activity. This does not represent the organisation's complete Scope 3 inventory, because other categories were not quantified.

Acceptance criterion

Expected: Scope 2 = 504 and selected Scope 3 = 72 tCO_2e, explicitly noting the incomplete value-chain scope.

CONTROL PROCEDURES

Work programme and review procedures

- Document illustrative electricity factor
- Confirm transport is outsourced rather than controlled
- Label selected Scope 3 rather than total Scope 3
- Use unambiguous kgCO_2e/activity units
- Reconcile outputs to independent Excel workbook

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-31-1	Document illustrative electricity factor	Document reference / owner / review date
WP-31-2	Confirm transport is outsourced rather than controlled	Document reference / owner / review date
WP-31-3	Label selected Scope 3 rather than total Scope 3	Document reference / owner / review date
WP-31-4	Use unambiguous kgCO_2e/activity units	Document reference / owner / review date
WP-31-5	Reconcile outputs to independent Excel workbook	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. Summing the illustrated sources gives 542 + 504 + 72 = 1,118 tCO_2e. Dividing by 10,000 tonnes of output gives 0.1118 tCO_2e per tonne of output for these selected inventory boundaries. This is an intensity indicator, not an ISO 14067 product carbon footprint, because a complete life-cycle boundary and functional unit analysis were not performed.

Acceptance criterion

Warning: increased production can reduce intensity while absolute emissions rise; disclose and interpret both indicators.

CONTROL PROCEDURES

Work programme and review procedures

- Aggregate by scope before calculating totals
- Label numerator, denominator and time basis
- Report absolute and intensity metrics together
- Explain omitted Scope 3 categories
- Display case-study boundaries beside results

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-32-1	Aggregate by scope before calculating totals	Document reference / owner / review date
WP-32-2	Label numerator, denominator and time basis	Document reference / owner / review date
WP-32-3	Report absolute and intensity metrics together	Document reference / owner / review date
WP-32-4	Explain omitted Scope 3 categories	Document reference / owner / review date
WP-32-5	Display case-study boundaries beside results	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. QA/QC should operate across the data cycle, not only as a final spreadsheet review. Tests cover completeness by month and site, reviewer independence, factor selection, dimensional checks, trend variance, independent recalculation and final-report reconciliation. Corrective actions must include cause, evidence, owner and completion status; a simple tick box is not a substitute for evidence.

Acceptance criterion

Acceptance: each material finding is either closed with evidence or openly reported as unresolved.

CONTROL PROCEDURES

Work programme and review procedures

- Check twelve-month coverage and facilities
- Investigate unexplained zero values
- Recalculate a risk-based source sample
- Log corrective actions, owners and closure
- Approve a controlled inventory-report version

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-33-1	Check twelve-month coverage and facilities	Document reference / owner / review date
WP-33-2	Investigate unexplained zero values	Document reference / owner / review date
WP-33-3	Recalculate a risk-based source sample	Document reference / owner / review date
WP-33-4	Log corrective actions, owners and closure	Document reference / owner / review date
WP-33-5	Approve a controlled inventory-report version	Document reference / owner / review date

Review disposition

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Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. Distinguish metering uncertainty, emission-factor uncertainty, methodological choices and incomplete activity data. Perform scenario sensitivity by varying material assumptions, or apply appropriate uncertainty propagation where distributions and correlations are known. Do not present a statistical confidence interval without explaining its basis, input distributions and any dependence among sources.

Acceptance criterion

Illustration: a 10% increase in the example electricity factor raises Scope 2 from 504 to 554.4 tCO_2e; this is sensitivity, not a confidence interval.

CONTROL PROCEDURES

Work programme and review procedures

- Identify the three most influential sources
- Estimate activity and factor ranges
- Recalculate low and high cases
- Separate uncertainty from clerical errors
- Report method, boundaries and limitations

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-34-1	Identify the three most influential sources	Document reference / owner / review date
WP-34-2	Estimate activity and factor ranges	Document reference / owner / review date
WP-34-3	Recalculate low and high cases	Document reference / owner / review date
WP-34-4	Separate uncertainty from clerical errors	Document reference / owner / review date
WP-34-5	Report method, boundaries and limitations	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. Verification begins with a defined GHG assertion, criteria, reporting period, intended use and engagement scope. A qualified verifier plans around material risks, evidence collection, sampling, recalculation and site-specific findings. The outcome depends on the agreed scope and assurance level. An internal review log, however detailed, does not constitute an independent verification statement.

Acceptance criterion

Use accreditation marks or “verified” claims only within an actual qualified verification engagement and its approved scope.

CONTROL PROCEDURES

Work programme and review procedures

- Specify assertion, boundary and verification criteria
- Retain original evidence and accounting decisions
- Assess engagement-level risks and materiality
- Document findings and closure evidence
- Protect independence from consulting conflicts

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-35-1	Specify assertion, boundary and verification criteria	Document reference / owner / review date
WP-35-2	Retain original evidence and accounting decisions	Document reference / owner / review date
WP-35-3	Assess engagement-level risks and materiality	Document reference / owner / review date
WP-35-4	Document findings and closure evidence	Document reference / owner / review date
WP-35-5	Protect independence from consulting conflicts	Document reference / owner / review date

Review disposition

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Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. A product footprint requires a functional or declared unit and an explicit life-cycle boundary. Define upstream and downstream processes, co-product allocation, site-specific and secondary datasets, system cut-offs, and cradle-to-gate versus cradle-to-grave coverage. A company-inventory intensity per tonne is not automatically a valid ISO 14067 product footprint, despite sharing the same-looking unit.

Acceptance criterion

Before comparing products, check equivalence of function, unit, boundaries, methodology and data or the comparison may mislead.

CONTROL PROCEDURES

Work programme and review procedures

- Define the product and functional unit
- Document included life-cycle stages
- Explain co-product allocations
- Distinguish primary from secondary datasets
- Apply relevant product rules and review criteria

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-36-1	Define the product and functional unit	Document reference / owner / review date
WP-36-2	Document included life-cycle stages	Document reference / owner / review date
WP-36-3	Explain co-product allocations	Document reference / owner / review date
WP-36-4	Distinguish primary from secondary datasets	Document reference / owner / review date
WP-36-5	Apply relevant product rules and review criteria	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. The EU CBAM definitive regime applies from 1 January 2026. Covered goods require embedded-emissions data under current EU legal acts, with product-specific boundaries, precursors, allocation, reporting and qualified verification requirements. A corporate Scope 1/2 total is not a ready-made CBAM factor per tonne, and a general inventory does not substitute for a regulated monitoring plan.

Acceptance criterion

Check the European Commission legislation portal before each report; 2026 updates affect defaults and verification detail.

CONTROL PROCEDURES

Work programme and review procedures

- Confirm product CN code and regulatory scope
- Use the latest implementing acts and updates
- Map processes, precursors and allocation
- Trace output and allocated emissions
- Prepare for programme-specific verification

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-37-1	Confirm product CN code and regulatory scope	Document reference / owner / review date
WP-37-2	Use the latest implementing acts and updates	Document reference / owner / review date
WP-37-3	Map processes, precursors and allocation	Document reference / owner / review date
WP-37-4	Trace output and allocated emissions	Document reference / owner / review date
WP-37-5	Prepare for programme-specific verification	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. Climate disclosure connects GHG metrics to governance, strategy, risk management and metrics/targets that affect an entity's prospects. IFRS S2 requires greenhouse gas information within its applicable provisions, subject to effective dates, transitions and the December 2025 amendments. General-purpose sustainability disclosure, CBAM reporting and professional certification are separate regimes.

Acceptance criterion

Institutional electronic-use licensing by IFRS Foundation does not imply the Foundation has endorsed or approved the digital platform.

CONTROL PROCEDURES

Work programme and review procedures

- Align GHG and reporting-entity boundaries
- Document comparative periods and accounting policies
- Map climate risks and relevant assumptions
- Retain evidence for material Scope 3 data
- Check applicable IFRS S2 amendments and reliefs

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-38-1	Align GHG and reporting-entity boundaries	Document reference / owner / review date
WP-38-2	Document comparative periods and accounting policies	Document reference / owner / review date
WP-38-3	Map climate risks and relevant assumptions	Document reference / owner / review date
WP-38-4	Retain evidence for material Scope 3 data	Document reference / owner / review date
WP-38-5	Check applicable IFRS S2 amendments and reliefs	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

Purpose and methodological basis. A GHG inventory report should state entity, purpose, period, boundary, criteria, activity and factor sources, uncertainties, results by scope, hotspots, exclusions and material changes. Distinguish management assertions, preparer analysis and any external verification. Release only a controlled final version after QA/QC, reconciliation and management sign-off.

Acceptance criterion

Publication gate: the PDF statement, Excel model and factor register reconcile to one controlled version and approval date.

CONTROL PROCEDURES

Work programme and review procedures

- Complete scope, boundary and criteria statement
- Present results and major emission sources
- Disclose estimates, gaps and uncertainties
- Document base-year adjustments and exclusions
- Sign off preparation, review and approval

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-39-1	Complete scope, boundary and criteria statement	Document reference / owner / review date
WP-39-2	Present results and major emission sources	Document reference / owner / review date
WP-39-3	Disclose estimates, gaps and uncertainties	Document reference / owner / review date
WP-39-4	Document base-year adjustments and exclusions	Document reference / owner / review date
WP-39-5	Sign off preparation, review and approval	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

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Purpose and methodological basis. This free technical publication provides original educational interpretation and does not reproduce the full standards or UNFCCC factor database. It is not a verification report, accreditation certificate or substitute for official rules. Each reporting entity is responsible for choosing relevant factors, maintaining evidence and checking current legal requirements at the reporting date.

Acceptance criterion

Publication notice: original authored content is attributed to the author and ISCF; non-commercial educational use requires source attribution and accurate representation.

CONTROL PROCEDURES

Work programme and review procedures

- ISO 14064-1, -3 and ISO 14067 — iso.org
- GHG Protocol Corporate, Scope 2 and Scope 3
- IFRS Foundation — IFRS S2 and 2025 amendments
- European Commission — CBAM legislation/guidance
- Complete accounting and review files before release

EVIDENCE FILE | WORKPAPER

Documented review matrix

Control ID	Test or action	Evidence to record
WP-40-1	ISO 14064-1, -3 and ISO 14067 — iso.org	Document reference / owner / review date
WP-40-2	GHG Protocol Corporate, Scope 2 and Scope 3	Document reference / owner / review date
WP-40-3	IFRS Foundation — IFRS S2 and 2025 amendments	Document reference / owner / review date
WP-40-4	European Commission — CBAM legislation/ guidance	Document reference / owner / review date
WP-40-5	Complete accounting and review files before release	Document reference / owner / review date

Review disposition

Mark each requirement as accepted, requiring corrective action or not applicable (with reasoning). A tick without an evidence file is not a completed audit procedure.

Workpaper identification

Facility: _____ | Reporting year: _____ | Source/process: _____ | Prepared by: _____ | Reviewed by: _____ | Date: _____

Reading basis: GHG Protocol / ISO 14064-1 and applicable activity-specific criteria. This original ISCF educational workpaper does not reproduce official standard text.

21 / SIGN-OFF

Professional close-out checklist before releasing an inventory

Close-out control	Evidence to retain
01. Purpose and reference	Reporting framework, intended users, documented scope
02. Organisational boundaries	Entity/site schedule and selected consolidation method
03. Operational boundaries	Scope / ISO category register, source list and exclusions
04. Base year	Comparative basis and recalculation policy
05. Gases and GWP	Gas register and documented GWP100 source/version
06. Activity data	Source register, periods, readings, documents and owners
07. Emission factors	Versioned library with references, geography and units
08. Calculations	Protected formulas, unit checks, totals tests and file versions
09. QA/QC and uncertainty	Missing data, sensitivity analyses and estimates
10. Disclosure/approval	Draft statement, explanatory notes, management sign-off and closure log

22 / REFERENCES

Principal technical references

- [1] GHG Protocol — Corporate Accounting and Reporting Standard: ghgprotocol.org/corporate-standard
- [2] GHG Protocol — Scope 2 Guidance: ghgprotocol.org/scope-2-guidance
- [3] GHG Protocol — Scope 3 Calculation Guidance: ghgprotocol.org/scope-3-calculation-guidance-2
- [4] ISO 14064-1:2018 — Organization-level GHG quantification and reporting: iso.org/standard/66453.html
- [5] ISO 14067:2018 — Carbon footprint of products: iso.org/standard/71206.html
- [6] IFRS Foundation — IFRS S2 Climate-related Disclosures: ifrs.org
- [7] European Commission — CBAM legislation and guidance: taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism/cbam-legislation-and-guidance_en

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