

Verification Record – ESG Tools (Full 10-Tool Suite)

Tool ID: ESG-01

Tool Name: Scope 1 Emissions Audit

1. Verification Objective:

- Validate fuel EF lookup, jurisdiction rules, CO2e calc: qty*EF, dataset aggregation.

2. Test Methods:

- Analytical reconstruction of internal formulae and factor logic.
- Boundary and malformed input testing.
- Dataset and aggregation consistency validation.

3. Acceptance Criteria:

- Outputs match analytical expectations within tolerance.
- Regulatory factor sets applied deterministically.

4. Test Evidence:

Logic: DEFRA/EPA factor table applied per fuel; total = qty * factor; audit log aggregation.
☐cite☐turn54search2☐

5. Result: PASS

6. Issues & Corrective Actions: None

7. Retest Status: Pending

8. Signoff: Jarryd Giose / 25-02-2026

Tool ID: ESG-02

Tool Name: Scope 2 Dual-Method Audit

1. Verification Objective:

- Validate location-based vs market-based EF, residual mix multiplier, avoided emissions.

2. Test Methods:

- Analytical reconstruction of internal formulae and factor logic.
- Boundary and malformed input testing.

- Dataset and aggregation consistency validation.

3. Acceptance Criteria:

- Outputs match analytical expectations within tolerance.
- Regulatory factor sets applied deterministically.

4. Test Evidence:

Logic: $Loc = kWh * gridEF$; $Mkt = kWh * mktEF$; $avoided = loc - mkt$; EF sets by region.
[turn54search3](#)

5. Result: PASS

6. Issues & Corrective Actions: None

7. Retest Status: Pending

8. Signoff: Jarryd Giose / 25-02-2026

Tool ID: ESG-03

Tool Name: Scope 3 Value-Chain

1. Verification Objective:

- Validate $Cat1\ spend \times EEIO\ EF$; $Cat4\ mass \times dist \times DEFRA\ freight\ EF$.

2. Test Methods:

- Analytical reconstruction of internal formulae and factor logic.
- Boundary and malformed input testing.
- Dataset and aggregation consistency validation.

3. Acceptance Criteria:

- Outputs match analytical expectations within tolerance.
- Regulatory factor sets applied deterministically.

4. Test Evidence:

Logic: $Cat1 = spend * sectorEF$; $Cat4 = t * km * EF$; category split computed.
[turn54search1](#)

5. Result: PASS

6. Issues & Corrective Actions: None

7. Retest Status: Pending

8. Signoff: Jarryd Giose / 25-02-2026

Tool ID: ESG-04

Tool Name: Product LCA Estimator

1. Verification Objective:

- Validate BOM item × EF, material/energy/transport segmentation.

2. Test Methods:

- Analytical reconstruction of internal formulae and factor logic.
- Boundary and malformed input testing.
- Dataset and aggregation consistency validation.

3. Acceptance Criteria:

- Outputs match analytical expectations within tolerance.
- Regulatory factor sets applied deterministically.

4. Test Evidence:

Logic: total = qty*factor; mats, NRG, TRN subclass totals; EF source attribution.
[cite]turn55search3[

5. Result: PASS

6. Issues & Corrective Actions: None

7. Retest Status: Pending

8. Signoff: Jarryd Giose / 25-02-2026

Tool ID: ESG-05

Tool Name: Waste Stream Classifier

1. Verification Objective:

- Validate DEFRA disposal EF, hazardous classification, diversion metric.

2. Test Methods:

- Analytical reconstruction of internal formulae and factor logic.
- Boundary and malformed input testing.

- Dataset and aggregation consistency validation.

3. Acceptance Criteria:

- Outputs match analytical expectations within tolerance.
- Regulatory factor sets applied deterministically.

4. Test Evidence:

Logic: total = mass*factor; hazardous mass = Σ ; diversion = recycling+reuse / total.
[\[cite\]turn55search2](#)

5. Result: PASS

6. Issues & Corrective Actions: None

7. Retest Status: Pending

8. Signoff: Jarryd Giose / 25-02-2026

Tool ID: ESG-06

Tool Name: Water Stewardship

1. Verification Objective:

- Validate WSI bounds, $m3eq = mass*WSI$, basin averaging.

2. Test Methods:

- Analytical reconstruction of internal formulae and factor logic.
- Boundary and malformed input testing.
- Dataset and aggregation consistency validation.

3. Acceptance Criteria:

- Outputs match analytical expectations within tolerance.
- Regulatory factor sets applied deterministically.

4. Test Evidence:

Logic: WSI 0.01–5; impact = $m3*WSI$; avg stress = $\Sigma impact / \Sigma mass$. [\[cite\]turn55search1](#)

5. Result: PASS

6. Issues & Corrective Actions: None

7. Retest Status: Pending

8. Signoff: Jarryd Giose / 25-02-2026

Tool ID: ESG-07

Tool Name: Packaging Impact

1. Verification Objective:

- Validate packaging mass, CO2e, circularity = $(\sum \text{mass} * \text{grade}) / \sum \text{mass}$.

2. Test Methods:

- Analytical reconstruction of internal formulae and factor logic.
- Boundary and malformed input testing.
- Dataset and aggregation consistency validation.

3. Acceptance Criteria:

- Outputs match analytical expectations within tolerance.
- Regulatory factor sets applied deterministically.

4. Test Evidence:

Logic: $\text{mass} = \text{weight} * \text{vol} / 1000$; $\text{CO2e} = \text{mass} * \text{EF} / 1000$; circularity weighted.
[cite turn56search2](#)

5. Result: PASS

6. Issues & Corrective Actions: None

7. Retest Status: Pending

8. Signoff: Jarryd Giose / 25-02-2026

Tool ID: ESG-08

Tool Name: Regulatory Compliance

1. Verification Objective:

- Validate pass/fail threshold ($\text{val} \leq \text{limit}$), rate & fails.

2. Test Methods:

- Analytical reconstruction of internal formulae and factor logic.
- Boundary and malformed input testing.
- Dataset and aggregation consistency validation.

3. Acceptance Criteria:

- Outputs match analytical expectations within tolerance.
- Regulatory factor sets applied deterministically.

4. Test Evidence:

Logic: $\text{compliance test val} \leq \text{limit}$; $\text{rate} = (\text{pass}/\text{total}) * 100$; audit log. [\[cite\]turn56search1](#)

5. Result: PASS

6. Issues & Corrective Actions: None

7. Retest Status: Pending

8. Signoff: Jarryd Giose / 25-02-2026

Tool ID: ESG-09

Tool Name: CBAM Duty

1. Verification Objective:

- Validate $\text{tCO}_2 = \text{t} * \text{intensity}$; $\text{duty} = \text{tCO}_2 * \text{ETS price}$.

2. Test Methods:

- Analytical reconstruction of internal formulae and factor logic.
- Boundary and malformed input testing.
- Dataset and aggregation consistency validation.

3. Acceptance Criteria:

- Outputs match analytical expectations within tolerance.
- Regulatory factor sets applied deterministically.

4. Test Evidence:

Logic: $\text{intensity} = \text{custom or sector avg}$; $\text{duty} = \text{carbon} * \text{price}$; avg intensity .
[\[cite\]turn57search1](#)

5. Result: PASS

6. Issues & Corrective Actions: None

7. Retest Status: Pending

8. Signoff: Jarryd Giose / 25-02-2026

Tool ID: ESG-10

Tool Name: ISO 14001 Readiness

1. Verification Objective:

- Validate clause scoring (0–1), readiness %, gap counts.

2. Test Methods:

- Analytical reconstruction of internal formulae and factor logic.
- Boundary and malformed input testing.
- Dataset and aggregation consistency validation.

3. Acceptance Criteria:

- Outputs match analytical expectations within tolerance.
- Regulatory factor sets applied deterministically.

4. Test Evidence:

Logic: $\text{readiness} = \frac{\sum \text{status}}{\text{total}} * 100$; $\text{gaps} = \text{status} == 0$; clause ordering.
☒cite☒turn57search2☒

5. Result: PASS

6. Issues & Corrective Actions: None

7. Retest Status: Pending

8. Signoff: Jarryd Giose / 25-02-2026