

# **EFU-CARBON LICENSE v2.0 – SCIENTIFIC AUDIT VERSION**

**Identification:** EFU-A-2026-01-C01

**Status:** Research material – Open for critical review (Research Phase)

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**Audited by:** EFU Scientific Framework Coordination

**Date:** January 2026

**License:** EFU Universal License v2.0 (CC BY 4.0 Compatible)

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## **ABSTRACT**

[HYPOTHESIS] This document constitutes the research audit version of the EFU-Carbon License v1.0. By augmenting the open Creative Commons (CC BY 4.0) framework, it performs a hypothetical verification of a flux-based carbon accounting model. Its objective is to investigate the extent to which the EFU model (as a human-scale flux unit) can methodologically complement open science licensing to avoid static standardization while maintaining research transparency and anti-greenwashing integrity.

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## **1. SCOPE AND RESEARCH OBJECTIVE**

[HYPOTHESIS] The EFU-Carbon system is situated in the boundary zone between a legal license and a scientific methodological protocol. The model assumes that quantifying material and energy flows in human throughput equivalents (EFU) increases transparency.

[ARGUMENT MAP]

- **A:** CC BY 4.0 ensures transparency but lacks a methodological framework for flux-based data replication.
  - **B:** The EFU model adds the material flow measurement dimension.
  - **C:** Consequently, a transition to an open, falsifiable carbon accounting protocol becomes possible.
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## **2. LICENSE MODEL ANALYSIS: STRUCTURAL LAYERS**

[PROTOCOL] The analysis distinguishes between three layers:

1. **Legal Layer (Base License):** CC BY 4.0 remains valid without modification.

2. **Methodological Layer (EFU-Carbon Spec):** A research-level declaration of flux measurement principles.
  3. **Audit Layer (Label Mechanism):** An optional, voluntary verification channel that does not constitute a standard.
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### 3. METHODOLOGICAL ASSUMPTIONS AND DATA QUALITY

[AXIOM] Flux-based measurement is grounded in the principle of Conservation of Mass/Energy.

[PROTOCOL] **EFU Data Quality Tier System:**

- **Tier 1 (Estimated Flux):** Calculations based on industry averages or secondary statistical data. Uncertainty: >20%.
- **Tier 2 (Indirect Measurement):** Flux calculated via proxy data (e.g., utility bills, fuel invoices). Uncertainty: 10–20%.
- **Tier 3 (Direct Measurement):** Real-time flux captured via sensors or physical mass-flow meters. Uncertainty: <10%.

**Audit Layer (Label Mechanism):** An optional, voluntary verification channel that does not constitute a standard.

*Participation in the Audit Layer does not confer compliance, certification, or endorsement.*

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### 4. INTEGRITY AND ANTI-GREENWASHING MECHANISM

[HYPOTHESIS] Flux-based auditing reduces the distortion between nominal carbon offsetting and real physical flux. The EFU scale quantifies carbon movement in human-equivalents, allowing anti-greenwashing principles to be integrated into published data [Liu et al., 2024].

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### 5. SOVEREIGNTY AND "METABOLIC DIGNITY"

[HYPOTHESIS] The EFU-Carbon audit rejects carbon accounting that reduces the fundamental human flux to a purely financial unit.

- **Metabolic Dignity:** The minimum flux below which human life support and social participation would de facto be compromised.
  - **Sovereignty Gap:** The domain where techno-flux cannot replace the natural metabolism of living systems.
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### 6. FALSIFIABILITY AND UNCERTAINTY (EA SECTION)

[HYPOTHESIS] The model is falsified if:

1. EFU-equivalence fails to correlate with actual carbon balances (ISO 14064/14067).

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- Measurement noise exceeds the empirical validation threshold ( $\pm 20\%$ ).
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## 7. CRITICAL COMMENTARY MATRIX (Argument Map Audit)

Model Element	Critical Vulnerability	Recommended Research Direction
Reference (1 EFU)	Neglect of demographic and climatic variance.	Development of stratified EFU baselines.
Material Homogeneity	Mass-based measurement ignores thermodynamic quality.	Investigation of entropy-weighted EFU components.
Sovereignty Gap	Estimation of local regenerative capacity is methodologically contested.	Empirical bio-regional flux-ceiling studies.

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## 8. ANNOTATED REFERENCES AND ACADEMIC FOOTNOTES

- Thermodynamic Foundations:** The persistence of living systems depends on continuous throughput rather than static mass [*Schrödinger, "What is Life?"*].
  - Reference Values:** The 20 kg/day EFU base is biologically supported by daily water, food, and air intake [*PubMed data*].
  - MFA and ISO:** EFU does not replace ISO 14064/14067 standards; it complements them with a human-scale normalization layer [*Liu et al., 2024; ISO 14064-1:2018*].
  - Offset Criticisms:** Measuring the gap between financial compensation and physical flux is the core of the anti-greenwashing strategy [*Climate Policy Brief, 2023*].
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**RESEARCH STATUS STATEMENT:** This document represents a theoretical model in the research phase. It does not constitute a legal, regulatory, or market standard.

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“Any attempt to formalize EFU Carbon as a binding standard contradicts the intent of this research version.”