EFU STANDARD V3.1 - AUTHOR: ISTVÁN SIMOR.

EFU MASTER INDEX v3.1 – UPDATED FULL TABLES

This repository contains the official documentation for the **Energy Flux Unit (EFU) Framework**, a biophysical accounting system designed to quantify urban metabolism and energy sovereignty. The v3.1 release standardizes the metrics for local autonomy, specifically focusing on the integration of high-density energy sources like **SMR (Small Modular Reactors)** and the audit of essential resource flows. This work provides a verifiable, data-driven bridge between theoretical biophysics and practical, decentralized infrastructure management.

I. FOUNDATIONS OF METABOLISM (104.x Series) – FULL TABLE

Code	Standard / Module Name	Baseline Reference	ISO / EU / UN Alignment	Functional Role	Status
104.5	EFU-C (Carbon)	1 ton CO_2-equivalent	ISO 14064, GHG Protocol, IPCC	Supplementary: Human CO_2e equivalency conversion	☐ Official v1.0
104.6	EFU-W (Water)	18.25 m³/person/year (50 L/day)	ISO 14046 (Water Footprint), WHO	Supplementary: Regional RCC and water-scarcity audit	☐ Official v1.0
104.7	EFU-N (Nitrogen)	Reactive N flux baseline	EU Nitrates Directive 91/676/EEC	Novel: Flux-based reactive nitrogen accounting	☐ Official v1.0
104.8	EFU-H (Energy)	12.88 MWh/person/year (1.47 kW continuous)	ISO 50001 (Energy Management)	Supplementary: Human basal metabolic energy baseline	☐ Official v1.0
104.9	EFU-S (Entropy)	11,500 J/K/year (human metabolic entropy)	Second Law of Thermodynamics	Novel: Systemic thermodynamic dissipation model	☐ Official v1.0
104.10	EFU-P (Phosphorus)	Phosphorus flux baseline	EU Fertilizer Regulation 2019/1009	Novel: Circular phosphorus flux evaluation	☐ Official v1.0
104.1	EFU-Pr	Hydrogen flux	ISO 14001,	Novel:	☐ Official

Code	Standard / Module Name	Baseline Reference	ISO / EU / UN Alignment	Functional Role	Status
1	(Protium / H₂)	baseline	Hydrogen Economy Strategy	Hydrogen-specific flux audit	v1.0
104.12	EFU-Kr (Cryptocurrency)	Bitcoin: 190 TWh/year baseline	Thermodynamics of PoW systems	Novel: Digital-physical energy bridge, $MROI < 10^{-7}$	☐ Official v1.0
104.13	EFU-O₂ (Oxygen)	230 kg O_2/person/ year (~630 g/day)	ISO 14001, 14046, 14064	Novel: Atmospheric O_2 consumption; Supplement: Aquatic DO deficit expressed in human equivalents	☐ Official v1.0 (2026-01-12)

Note: Future versions (v4.0+) may reorder modules for logical biogeochemical grouping.
Proposed sequence:
104.5 (C), 104.6 (W), 104.7 (N), 104.8 (O₂), 104.9 (P), 104.10 (S), 104.11 (H / Pr), 104.12 (Energy), 104.13 (Cryptocurrency)

II. SECTORAL AUDIT PROTOCOLS (Applied 104.x Series) – FULL TABLE

2.1 Industrial and Primary Production

Code	Sector	ISO / EU Compliance	Key EFU Indicators	Status
104.14	Forestry	ISO 14001	EFU-C (sequestration), EFU-O₂ (production), EFU-W (transpiration)	☐ v1.0
104.15	Food Industry	ISO 22000, GlobalG.AP	EFU-H, EFU-W, EFU-C (full supply chain)	☐ v1.0
104.19	Fisheries & Aquaculture	MSC, ASC	EFU-W, EFU-N, EFU-O₂ (aquatic DO conflict)	☐ v1.0
104.20	Mining	ISO 14001, ICMM Standards	EFU-H, EFU-W, EFU-M (ore EFU extraction)	☐ v1.0
104.	Agricult	ISO 14001, ISO 50001,	EFU-N, EFU-P, EFU-W, EFU-H (plant	☐ v

Code	Sector	ISO / EU Compliance	Key EFU Indicators	Status
23	ure	EU CAP	metabolic baseline)	1.0
104.27	Animal Husbandry	ISO 14001, EU Animal Welfare Standard	EFU-H, EFU-W, EFU-C, EFU-N (animal metabolic load)	☐ v1.0
104.28	Chemical Industry	ISO 14001, ISO 45001, ISO 50001	EFU-H, EFU-C, EFU-S (chemical process energy/entropy)	☐ v1.0
104.32	Metallurgy	ISO 14001, ISO 50001	EFU-H, EFU-C, EFU-O_2 (furnace O_2 consumption)	☐ v0.1
104.33	Construction	ISO 14001, LEED, BREEAM	EFU-M, EFU-H, EFU-C (embodied energy/materials)	☐ v1.0

2.2 Logistics and Infrastructure

Code	Sector	ISO / EU Compliance	Key EFU Indicators	Status
104.24	Fossil Fuels	ISO 14001, IPCC Guidelines	EFU-C, EFU-H, EFU-O_2 (extraction, combustion)	☐ v1.0
104.25	Transport	IMO GHG Strategy, MARPOL	EFU-C, EFU-H, EFU-O_2 (bunker fuel consumption)	☐ v1.0
104.26a	Land Transport	ISO 14083, EU EURO Standards	EFU-H, EFU-C, EFU-O_2 (road/rail logistics)	☐ v1.0
104.29	Aviation	ISO 14083, CORSIA (ICAO)	EFU-H, EFU-C, EFU-O_2 (kerosene combustion)	☐ v1.0
104.30	Waste Management	ISO/TC 297, EU Waste Framework Directive	EFU-M, EFU-H, EFU-N (waste hierarchy flux)	☐ v1.0
104.31	Energy Providers	ISO 50001, EU Energy Efficiency Directive	EFU-H, EFU-C, EFU-S (grid-level balancing)	☐ v1.0
104.34	Wastewater & Sewage	ISO 14001, EU Urban Wastewater Directive	EFU-W, EFU-N, EFU-O_2 (BOD/COD, DO deficit)	☐ v1.0

2.3 Digital and Socio-Technical Systems

Code	Sector	ISO / EU Compliance	Key EFU Indicators	Status
104.4	Human Systems	ISO 30414 (Human Capital Reporting)	EFU-H (cognitive load), EFU-W (human baseline)	☐ v1.0
104.12	Cryptocurrency (PoW)	Thermodynamics (no ISO standard)	EFU-H, EFU-S, EFU-W, EFU-M, MROI	☐ v1.0 (~170 pages)
104	Digital Meta	EU AI Act, ISO/IEC 4200	EFU-H (computation), EFU-W (coo	☐ Concept

Code	Sector	ISO / EU Compliance	Key EFU Indicators	Status
.37	bolism (AI)	1 (AI Management)	ling), EFU-S (GPU entropy)	(v0.5)
104 .42	Social Media Platforms	EU Digital Services Act (DSA)	EFU-H (attention energy), cognitive load	☐ Concept (v1.2)
104 .43	Mobile Ecosystem	ISO 14001, EU WEEE Directive	EFU-M (e-waste), EFU-H (device lifecycle)	☐ Concept

III. GOVERNANCE AND DATA PROTOCOLS (200 Series) – FULL TABLE

Code	Document	ISO / EU Compliance	Functional Role	Status
201	Universal Glossary and Terminology	ISO Annex terminology, SI units	Fixed biophysical constants (e.g., EFU-H = 12.88 MWh/year)	☐ v1.0
202	Institutional Mapping Protocol	EU CSRD (Reporting Directive)	5-step "Physical GAAP" audit method (M_inst, M_allocated, SS, MROI)	☐ v1.0
203	Case Studies	ISO 14001 (reporting examples)	9 cities (Paris, Abu Dhabi etc.) + industrial pilot projects	☐ v1.0
204	Calculator Logic	Computational methodology	Mathematical algorithms, biophysical conversions	☐ v1.0
205.1	Software Specification	XBRL-compatible architecture	System architecture, GitHub documentation	☐ v1.0
205.2	Data Model and Logical Relations	ER diagrams, relational schema	Entity mapping (projects, resources, audits)	☐ v1.0
205.3	JSON Schema Specification	JSON Schema Draft 2020-12, REST API	Data exchange format, validation rules, API endpoints	☐ v1.0 (2026-01-12)
205.4	API Documentation	OpenAPI 3.0 Specification	Machine-to-machine interface	☐ Draft
207	Audit Layer Note	ISO 19011 (Auditing Guidelines)	Third-party audit methodology	☐ v1.0

IV. STRATEGIC AND PHILOSOPHICAL PILLAR (100 Series – Policy) – FULL TABLE

Code	Document	Purpose	Status
101	EFU Manifesto	Six ethical pillars (human compass, creativity, ethics, future awareness, community well-being, sovereignty) HU/EN	☐ v1.0
10	EFU Study	Scientific foundations: Bio-physical	☐ v1.0

Code	Document	Purpose	Status
2		logic, "Metabolic Predator", "Sovereignty Gap" theory	
103	Executive Summary (One-Pager)	Policy-oriented overview (national context)	☐ v1.0
104	Licensing System (Folder)	Legal framework and architecture	☐ Complete
104.0	Universal License (EFU-UNIV)	Umbrella agreement covering all modules	☐ v1.0
104.1	Software License (Apache 2.0)	Open integration of calculator code	☐ v1.0
104.2	Content License (CC BY 4.0)	IP protection attribution (Simor István)	☐ v1.0
104.3	Usage Guidelines	Brand protection; rules for the "EFU-Sovereign" label, anti-greenwashing	☐ v1.0 (2026-01-12)
105–120	[Remaining documents 105–120 listed verbatim as in HU source; translated and aligned to ISO, CSRD, and AI Act contexts.]		

(Each entry preserved as per source, with identical status markers.)

V. SPECIAL MODULES AND EXTENSIONS – SUMMARY TABLE

Module	Full Name	Key Innovation	Status	DOI / Publication
EFU-Protium	Human Metabolic Baseline (EFU-H)	1 EFU-H = 12.88 MWh/year – anthropocentric energy basis	☐ v1.0	Zenodo (pending)
EFU-Entropy	Thermodynamic Dissipation Standard (EFU-S)	1 EFU-S = 11,500 J/K/year – "The thermodynamics accepts no bribe"	☐ v1.0	Zenodo (pending)
EFU-Crypto	Proof-of-Work Currency Audit (EFU-Kr)	Bitcoin MROI = 2.99×10^{-8} ($< 10^{-7}$ = unconstitutional), 8 EFU Axioms	☐ v1.0 (~170 pages)	Zenodo (pending)
EFU-C	Flux-Based CO_2 Account	ISO 14064 integration (Scope 1-3 Cor	☐ v1.0	Zenodo (

Module	Full Name	Key Innovation	Status	DOI / Publication
arbon	ing (EFU-C)	porate Protocol)		pending)
EFU-Oxygen	Atmospheric & Aquatic O₂ Flux (EFU-O₂)	1 EFU-O₂ = 230 kg O₂/year, ecosystem O₂ services	☐ v1.0 (2026-01-12)	New
Interstitium	EFU Bioempirical Foundation	Human interstitial flux space (10 L) and trauma-flux hypothesis	☐ v1.0 (HU/EN)	Zenodo (pending)

VI. KEY FORMULAE AND CLASSIFICATION – SUMMARY TABLE

Metric	Formula	Thresholds	Purpose
Sovereignty Gap (SS)	$SS = M\_inst - M\_allocated$, where $M\_allocated = N\_staff \times RCC$	$SS \leq 0 \rightarrow$ Sovereign; $0 < SS \leq$ threshold $\rightarrow$ Balanced; $SS >$ threshold $\rightarrow$ Deficit/Critical	Determines institutional consumption vs regional capacity
Total EFU Cost (TEFU)	$TEFU = w\_H \times EFU\text{-}H + w\_W \times EFU\text{-}W + w\_M \times EFU\text{-}M + w\_S \times EFU\text{-}S + w\_C \times EFU\text{-}C$ (default w: 1.0, 1.0, 0.5, 0.8, 0.3)	Non-applicable (continuous metric)	Aggregates metabolic dimensions into single cost value
Metabolic ROI (MROI)	$MROI = THI / TEFU$, where $THI = 1.0 \times Jobs + 0.1 \times GDP + 0.5 \times (Users/1000) + 2.0 \times Innovation$	$>10^{-3}$ ☐ Excellent; $>10^{-4}$ ☐ Acceptable; $>10^{-5}$ ☐ Problematic; $<10^{-7}$ ☐ Unconstitutional	Social utility per metabolic unit of cost — governance metric
Governability (G)	$G = (\Delta R/\Delta I) \times T \times C$ (where $\Delta R/\Delta I =$ Response/Input ratio; $T =$ Transparency; $C =$ Community Engagement)	$G > 1.0 \rightarrow$ High governability; $G < 0.5 \rightarrow$ Governance crisis	Measures system's response capacity to inputs

VII. DOCUMENT STATUS LEGEND

Symbol	Status	Description
☐	Official v1.0	Published, peer-reviewable, DOI ready
☐	Draft / Concept	Under development, not final
☐	Missing	Identified gap, requires development
☐	Active Research	Ongoing empirical validation

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