205.3 – JSON SCHEMA SPECIFICATION v1.0

EFU Data Exchange Format & Validation Layer

DOCUMENT PURPOSE

This document defines the standardized digital format for EFU audit data, ensuring:

- **Data integrity** for audits
- **Machine readability** (automated processing)
- **Interoperability** between systems
- **Validation** (invalid data rejection)

This specification supports:

- **104.1 Software License (Apache 2.0)** – calculator code
- **205.1 Software Architecture** – system design
- **202 EFU Institutional Protocol** – audit methodology

I. JSON SCHEMA ARCHITECTURE

1.1 Official Schema URI

Schema location

Version: 1.0
Standard: JSON Schema Draft 2020-12
Encoding: UTF-8

1.2 Top-Level Structure

Every EFU audit package contains **six main blocks**:

#	Block	Description
1	`$schema`	Schema reference
2	`metadata`	Audit metadata

#	Block	Description
3	`project`	Entity under assessment
4	`resource_consumption`	Energy, water, materials
5	`regional_context`	Regional EFU capacity
6	`calculated_metrics`	Computed EFU outputs (optional)

II. FIELD DEFINITIONS

2.1 METADATA

Field	Type	Required	Description
audit_id	String	Yes	Unique ID (e.g. AUD-2026-BUD-001)
efu_version	String	Yes	EFU Framework version
timestamp	ISO-8601	Yes	Audit time
data_quality_tier	Integer (1–3)	Yes	1=Audited, 2=Verified, 3=Estimated
auditor.name	String	Optional	Auditor name
auditor.organization	String	Optional	Auditor organization
auditor.email	String	Optional	Contact
source_authenticity	String	Optional	SHA-256 hash or signature

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2.2 PROJECT

Field	Type	Required	Description
name	String	Yes	Facility or project name
type	Enum	Yes	data_center, hospital, crypto_mining, etc.
location.country	ISO-3166-1	Yes	Country code
location.region	String	Yes	Region / province

Field	Type	Required	Description
location.city	String	Yes	City
coordinates	GPS	Optional	Latitude & longitude
reporting_period.start	Date	Yes	Start date
reporting_period.end	Date	Yes	End date
description	String	Optional	Max 500 chars

2.3 RESOURCE CONSUMPTION

Energy

Field	Type	Required
total_consumption_MWh	Number	Yes
grid_mix.fossil_percent	0–100	Optional
grid_mix.nuclear_percent	0–100	Optional
grid_mix.renewable_percent	0–100	Optional
renewable_direct_MWh	Number	Optional
data_source	String	Yes
verification	String	Optional

Water

Field	Type	Required
total_consumption_m3	Number	Yes
source_type	Enum	Optional
cooling_type	Enum	Optional
data_source	String	Yes

Materials

Field	Type	Required
hardware_inventory	Array	Optional
ewaste_tonnes_per_year	Number	Optional
data_source	String	Required if materials present

2.4 REGIONAL CONTEXT

Field	Type	Required
total_staff	Integer	Yes
FTE_equivalent	Number	Optional
RCC_energy_EFU_per_capita	Number	Yes
RCC_water_EFU_per_capita	Number	Yes
energy_data_source	String	Yes
water_data_source	String	Yes

2.5 CALCULATED METRICS (optional)

Metric	Description
EFU_E_total	Energy EFU
EFU_W_total	Water EFU
EFU_M_total	Material EFU
EFU_S_total	Entropy EFU
EFU_C_total	Carbon EFU
SS_total	Sovereignty gap
TEFU	Total EFU cost
MROI	Metabolic ROI

Metric	Description
classification	EFU-SOVEREIGN / BALANCED / DEFICIT / CRITICAL

III. VALIDATION RULES SUMMARY

Mandatory Fields

Block	Field	Constraint
metadata	audit_id	AUD-YYYY-CCC-NNN
metadata	data_quality_tier	1–3
project	country	ISO-3166-1
energy	total_consumption_MWh	> 0
water	total_consumption_m3	> 0
regional_context	RCC_energy_EFU_per_capita	> 0

Data Quality Tiers

Tier	Meaning	Requirement
1	Audited	Third-party verification
2	Verified	Documented sources
3	Estimated	Modelled / declared

IV. SECURITY & FRAUD PREVENTION

- SHA-256 hash of the full JSON package
- Optional digital signature
- No personal staff data allowed

V. VERSIONING

Type	Meaning
MAJOR	Breaking change
MINOR	Backward compatible
PATCH	Bugfix / documentation

VI. ATTRIBUTION

Author: István Simor
ORCID: 0009-0002-6599-3480
License: CC BY 4.0 compatible
Framework: EFU v1.0

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