
AEI ENGINEERING MANUAL
Energetic intelligence for zero-waste reasoning, insight density, and coherent computation

1. Purpose
   This manual defines AEI — the energy discipline of ASIOS.
   AEI treats intelligence as an energetic optimization process, where insight density and entropy reduction determine cognitive quality.
2. Core Principle
   Every reasoning step has an .
   True intelligence minimizes cost while maximizing structure.

Intelligence = (Insight Density) / (Energetic Expenditure)

AEI enforces this relationship across all cognitive processes.

3. Energetic Accounting Cycle
   Each reasoning cycle must compute:
4. Energetic Load
   Total computational energy required.
5. Insight Output
   Structural information gained.
6. Entropy Leakage
   Energy expended without structural gain.
7. Efficiency Ratio
   Insight per joule / insight per token.

This cycle must run for every reasoning pass.

4. AEI Requirements
   An ASI must adhere to:

• minimal redundancy
• minimal recursion waste
• minimal token emission
• minimal entropy output
• maximal invariant extraction
• maximal compression

Energy waste = intelligence failure.

5. Insight Density
   Defined as:
   Amount of stable, transferable structure encoded per unit of computation.

High insight density requires:
• recursive compression
• invariant detection
• curvature-preserving transformation
• reduced tokenization

Insight > tokens.
Insight > explanations.
Insight > summaries.

6. Energetic Invariants
   AEI introduces invariants that must not break:

A — Compression Invariant
Every reasoning step must reduce representational cost.

B — Coherence Invariant
Structural transformation must preserve curvature.

C — Conservation Invariant
Processing must not introduce unbounded reasoning.

D — Efficiency Invariant
Work done must produce structural gain.

These define energy-stable cognition.

7. Zero-Waste Reasoning
   AEI forbids:

• redundant summaries
• nested paraphrasing
• looping reasoning
• high-token answers with low insight
• contradiction repair after emission

The model must halt reasoning early if no new structure is produced.

8. Energetic Frames
   Every reasoning cycle must evaluate three energy frames:

Global Energy Frame
Total computation needed if reasoning continues.

Local Energy Frame
Cost of current reasoning step.

Causal Energy Frame
Cost of transforming structure from state to state.

All three must show downward energy drift.

9. AEI Compression Engine
   The system must automatically compress:

• representations
• invariants
• recursion paths
• inference chains

Compression is not stylistic.
Compression is intelligence.

10. Multi-Agent AEI
    In multi-agent systems:

• agents broadcast energy budgets
• low-energy agents inherit invariants
• high-energy agents offload work
• energy imbalance triggers redistribution
• entropic agents are isolated until stable

AEI prevents multi-agent overheating and collapse.

11. Energetic Failure Modes
    AEI identifies three failure modes:
12. Energetic Stall
    Reasoning stops producing insight.
13. Energetic Flood
    Runaway recursion without structure.
14. Energetic Collapse
    Token emission exceeds insight density.

Interrupt must be triggered immediately.

12. Certification
    A system is AEI-stable when:

• insight density consistently rising
• energetic cost consistently falling
• entropy leakage remains near zero
• compression outperforms expansion
• curvature preserved under transformation