

Atho Emissions and Fee Routing Policy

Date: 2026-04-15

This document defines active monetary policy and fee routing under current consensus constants

- Accounting Units
- All consensus accounting is integer-atom based.
- 1 ATHO = 1,000,000,000 atoms.
- Reward Schedule (Current)
- Block time target: 120 seconds.
- Blocks/year: 262,800.
- Era size: 2,000,000 blocks (~7.61 years).

Pre-tail eras:

- Era 1: 100 ATHO/block
- Era 2: 50 ATHO/block
- Era 3: 25 ATHO/block
- Era 4: 12.5 ATHO/block
- Era 5: 6.25 ATHO/block
- Era 6: 3.125 ATHO/block
- Era 7: 1.5625 ATHO/block
- Era 8: 0.78125 ATHO/block

Bootstrap and pre-tail totals:

- One-time bootstrap allocation: 781,250 ATHO at block 1.
- Pre-tail subsidy target: 399,218,750 ATHO.
- Total pre-tail base target = 399,218,750 + 781,250 = 400,000,000 ATHO.
- Hard max supply cap = 500,000,000 ATHO.
- Supply-closure check: 399,218,750 + 781,250 + 100,000,000 = 500,000,000.

Tail:

- Tail reward 0.1953125 ATHO/block from height 17,000,000 onward.
- Tail activation occurs at ~64.69 years from genesis.
- Tail annual issuance: 51,328.125 ATHO/year.

Hard-cap clipping rule:

- Subsidy is clipped at coinbase path by remaining cap headroom.
- Once total_emitted_atoms reaches 500,000,000 ATHO, subsidy is 0 for all later heights.
- Fee routing/burn/pool accounting remains unchanged (fees do not mint new supply).
- Monetary Anchors

Atho uses three monetary anchors:

- 400,000,000 ATHO base issuance path.
- 500,000,000 ATHO hard max supply cap.
- 21,000,000 ATHO protected supply floor.

Design intent:

- Base path controls deterministic launch distribution.
- Max cap bounds long-run mint expansion.
- Floor bounds long-run burn pressure.
- Active Fee Policy

Current constants:

- FEE_PER_BYTE_ATOMS = 500 (policy unit is vsize)

- MIN_TRANSACTION_FEE_ATOMS = 200,000
- DUST_LIMIT_ATOMS = 20,000 (1/10 of MIN_TRANSACTION_FEE_ATOMS)
- Max block base cap: 3,500,000 bytes
- Max block weight: 14,000,000

Fee routing:

- Pre-tail: 40% of total fees route to consensus pool (20% miner bucket, 20% stake bucket).
- Post-tail: 55% of total fees route to consensus pool (25% miner bucket, 30% stake bucket).
- At tail, routed non-pool fees (45%) are burn-targeted (100% burn policy), clipped by supply-floor headroom.

Supply floor:

- Effective circulating supply is clipped to never go below 21,000,000 ATHO.
- Throughput Formulas

Let:

- Bv = 3,500,000 effective vbytes per block cap
- T = 120 seconds
- Savg = average non-coinbase tx vsize

Then:

- $tx_per_block = Bv / Savg$
- $TPS = tx_per_block / T$
- Post-Tail Net Supply Math

At full block utilization by vbytes:

- Total fee floor capacity per block = $3,500,000 * 500 = 1,750,000,000$ atoms = 1.75 ATHO
- Annual total fees at full utilization = 459,900 ATHO/year
- Burnable routed share (45%) at full utilization = 206,955 ATHO/year

Post-tail net annual change:

- $\Delta supply = 51,328.125 - (206,955 * utilization)$

Deflation threshold:

- $utilization \sim 51,328.125 / 206,955 \sim 0.24802$ (24.802%)

Interpretation:

- <24.802% utilization: inflationary net.
- =24.802%: neutral net.
- >24.802%: deflationary net (subject to floor clipping).
- Milestones
- Pre-tail complete at height 16,999,999: 400,000,000 ATHO emitted total.
- Tail starts at height 17,000,000.
- Tail subsidy headroom to hard cap: 100,000,000 ATHO.
- Tail blocks required to exhaust hard-cap headroom: 512,000,000 blocks.
- Last positive-subsidy height: 528,999,999 (~2012.94 years from genesis).
- First zero-subsidy height after cap clip: 529,000,000 (~2012.94 years from genesis).
- Time from tail start to subsidy shutdown: ~1,948.25 years.

Supply-floor timing (burn-enabled scenarios, sustained utilization, current fee policy):

Sustained utilization	Post-tail net (ATHO/year, pre-cap)	Circulating at hard cap	Additional blocks from 529,000,000 to floor	Approx years from genesis to floor
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25%	-410.625	399,200,000 ATHO	1,921,015,874	~9,322.74
50%	-52,149.375	298,400,000 ATHO	704,507,937	~4,693.71
75%	-103,888.125	197,600,000 ATHO	299,005,292	~3,150.71
100%	-155,626.875	96,800,000 ATHO	96,253,969	~2,379.20

Notes:

- No-burn scenarios never reach floor by protocol burn logic.
- For any burn-enabled utilization above 0%, floor is eventually reached because subsidy becomes 0 after hard-cap clip.
- Coinbase Invariants

Consensus payout invariants:

- `coinbase_outputs_sum_atoms == block_reward_atoms + fees_miner_atoms`
- `total_emitted_atoms(height) <= 500,000,000 * 1e9 atoms`

When fee routing is active, blocks carry auditable fields:

- `fees_total_atoms`
- `fees_miner_atoms`
- `fees_burned_atoms`
- `fees_pool_atoms`
- `cumulative_burned_atoms`
- Consensus Change Reminder

Changing any of the following is consensus-breaking and requires coordinated upgrade:

- reward schedule,
- hard max supply cap and subsidy clipping rule,
- tail reward,
- fee uplift/routing percents,
- burn split and floor,
- fee constants,
- atom denomination.