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A Discussion on Token Economy

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Two Predominant Models

1. The limited quantity deflationary model:

A fixed total supply and less and less money issued over time.

Also known as hard-capped assets.

Bitcoin, Avalanche, BNB

2. The balanced inflation model:

A model with an unlimited amount of token issuance.

Some mechanisms are put in place to limit inflation,

or even to create a deflationary system.

Ethereum, Solana(?), Doge, Polkadot

In both models, the price is determined by supply and demand.

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ETH TOKEN ECONOMY

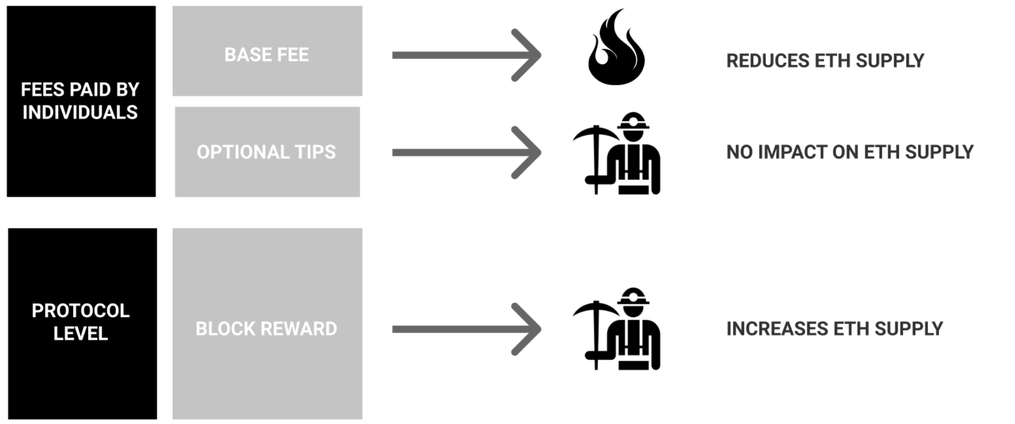
(After the Merge)

1. 💰 **Issuance of new tokens:**
   - Similar to block rewards that miners received before the merge
   - Depends on the number of ETH staked in the ecosystem
   - As more tokens get staked, token issuance increases but the overall return to the individuals decreases (validator interest).

2. 💵 **Tipping Rewards:**
   - Priority fee or tipping portion of the rewards

3. 🔥 **Base Fee (EIP-1559):**
   - Base fee is dynamic depending on the congestion in the network.

     The base fee is **burned** and so reduces the total supply of Ethereum.



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Why Infinite Supply?

1. Use Case

- Some cryptocurrencies are not just a store-of-value coin like Bitcoin, meaning their value don’t need to be finite.
  - e.g: New services are created on Ethereum every day. ETH can be used to pay gas fees, transactional fees and interact with the services.
  - e.g-2: Stable coins are generally infinite supply (such as USDC pegged on US dollar). It is circulated on demand and cannot be mined.

2. Consumer Behavior

- Fixed supply **disincentivizes people from spending**, meaning that digital assets are speculative investments that people hoard.
- “Deflationary Death Spiral”
- Stable issuance rate may prevent the excessive concentration of wealth in the hands of a few actors/validators.

3. Miner / Validator Rewards

- Rewards are eventually disappear altogether when supplies are exhausted.
- Transactions will still need to be validated on the blockchain. This could mean consumers end up paying **higher fees** in order to ensure their transactions are processed quickly.
- Not a big concern - Bitcoin mining will continue until 2140.

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Putting it Together

Ultra Sound: How can ETH circulating supply decrease?

The ETH supply decreases whenever more ETH is destroyed via fee burn than ETH is created via issuance.

- Staking rewards ~1,600 ETH/day (issued by beacon chain)
- After The Merge, execution layer (PoW) issuance is zero and only the ~1,600 ETH per day has remained, **dropping total new ETH issuance by ~90%**
- 🔥 **The burn:** At an average gas price of at least 16 gwei, approximately **1,600 ETH** is burned every day, which effectively brings net ETH inflation to zero or less post-merge.

Issuance & Inflation	
Inflation Rate	0.54%
Daily Issuance Rate	0.0106%
Yearly Issuance Rate	3.88%
Stock-to-Flow	184.48
Y+10 Projected Supply	123,061,693
Y+10 Issuance Percentage	94.74%
Y2050 Projected Supply	135,135,634
Y2050 Issuance Percentage	86.27%

https://messari.io/asset/ethereum/metrics/supply

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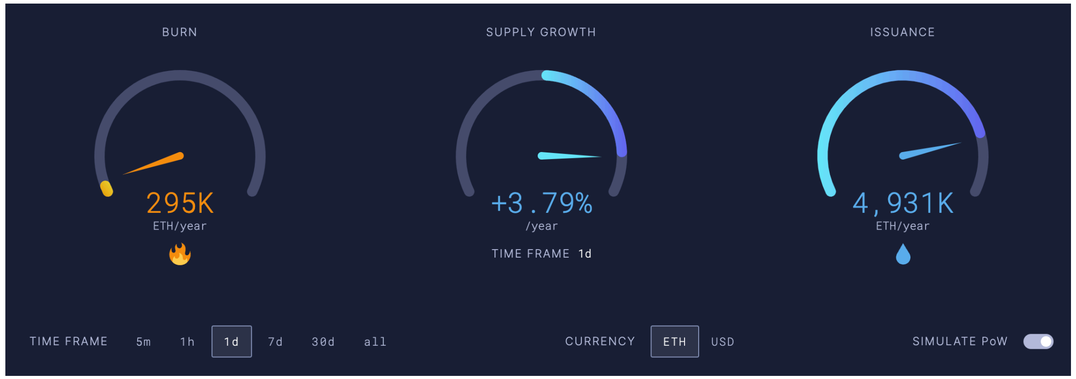
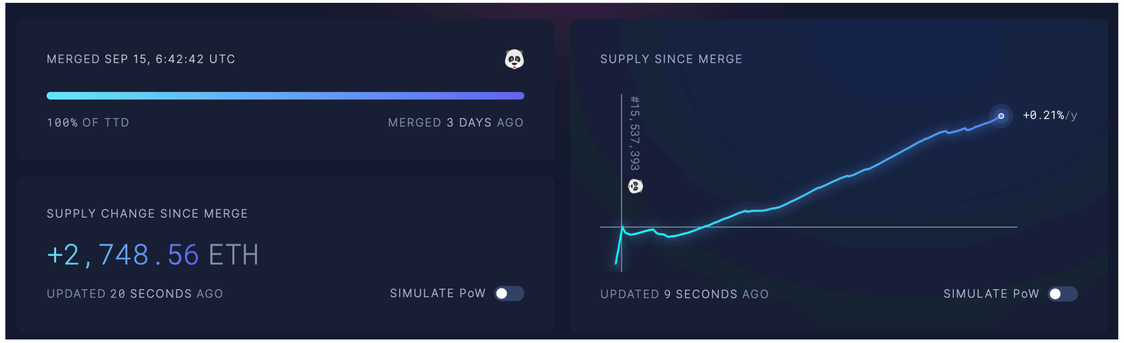
ETH Supply & Inflation



Pre-Merge



Post-Merge

https://ultrasound.money/

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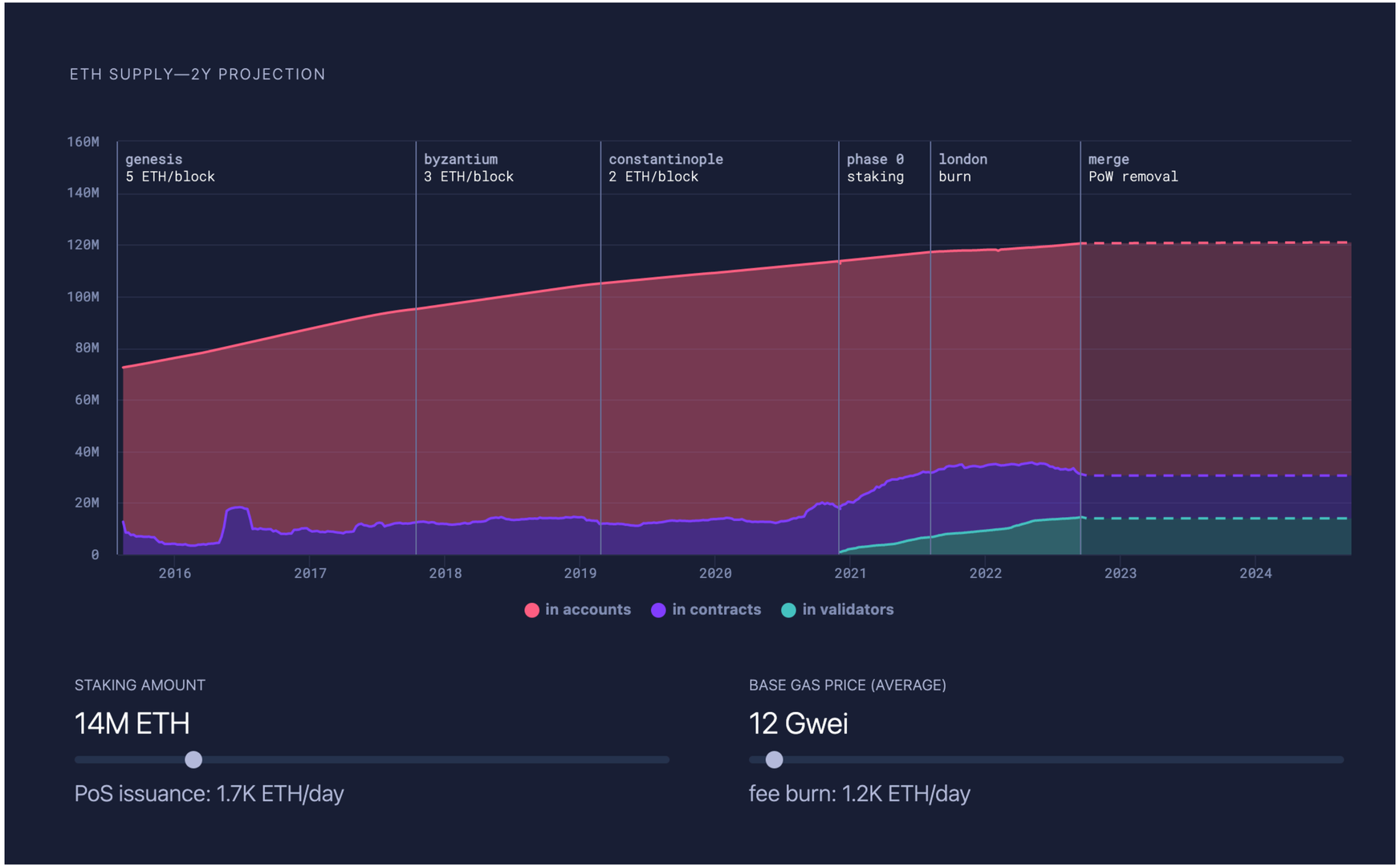
ETH Supply: 2 Year Projection



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ETH STAKING FORMULAS

Calculations for issuance rate

$$\text{Adjusted quotient} = \frac{\sqrt{\text{Network stake}}}{\text{Base reward quotient}}$$

The square root comes from an economic analysis of discouragement attacks, available here.

$$\text{Base reward} = \text{Base rewards per epoch} \times \frac{\text{Deposit}}{\text{Adjusted quotient}}$$

The base rewards per epoch is set to 5

$$\text{Issuance per epoch} = \text{Number of validators} \times \text{Base reward}$$

$$\text{Issuance per year} = \text{Epochs per year} \times \text{Issuance per epoch}$$

$$\text{Issuance rate} = \frac{\text{Issuance per year}}{\text{ETH in circulation}}$$

Calculations for validator interest

$$\text{Adjusted quotient} = \frac{\sqrt{\text{Network stake}}}{\text{Base reward quotient}}$$

The square root comes from an economic analysis of discouragement attacks, available here.

$$\text{Base reward} = \text{Base rewards per epoch} \times \frac{\text{Deposit}}{\text{Adjusted quotient}}$$

$$\text{Interest per year} = \frac{\text{Epochs per year} \times \text{Base reward}}{\text{Deposit}}$$

Total Network Stake	Validator Interest	Issuance Rate
1,000,000	18.08%	0.15%
2,000,000	12.78%	0.21%
3,000,000	10.44%	0.26%
4,000,000	9.04%	0.30%
5,000,000	8.08%	0.34%
6,000,000	7.38%	0.37%
7,000,000	6.83%	0.40%
8,000,000	6.39%	0.43%
9,000,000	6.03%	0.45%
10,000,000	5.72%	0.48%
20,000,000	4.04%	0.67%
30,000,000	3.30%	0.83%
40,000,000	2.86%	0.95%
50,000,000	2.56%	1.07%
60,000,000	2.33%	1.17%
70,000,000	2.16%	1.26%
80,000,000	2.02%	1.35%
90,000,000	1.91%	1.43%
100,000,000	1.81%	1.51%

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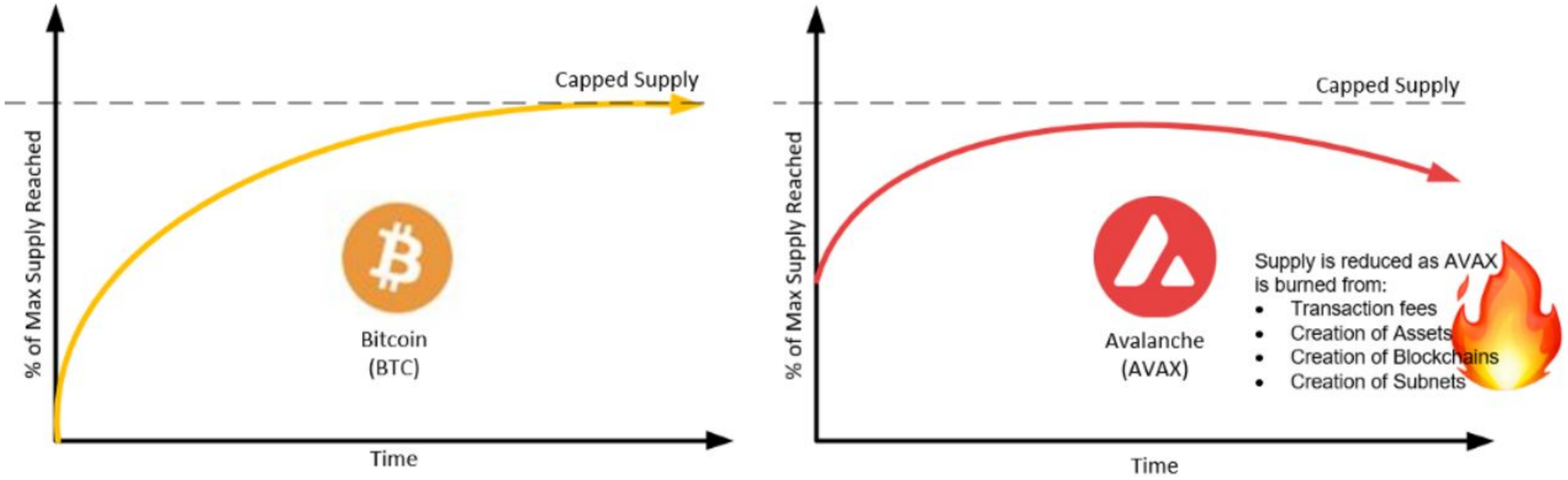
AVAX TOKEN ECONOMY OVERVIEW

- The staking rewards are proportional to that validator's **total stake** and the **length of the staking period**.
- A node that participates actively in consensus process earns right to mint $AVAX by special *minting transactions.*
- Avalanche is leaderless, there is no "rich-get-richer" compounding effects (proof-of-uptime and proof-of-responsiveness).
- $AVAX is a **capped-supply token**, with a maximum cap of 720 million tokens.
- While capped, $AVAX is still **governable**. The rate at which the maximum cap is reached is subject to governance.
- Fees are not paid to any specific validator. Instead, they are **burned**, thus increasing scarcity of the $AVAX.



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AVAX GOVERNANCE

- Δ : Staking amount, denominated in `$AVAX`. This value defines the minimal stake required to be placed as bond before participating in the system. The default value on genesis will be 2,000 `$AVAX`.
- δ_{min} : The minimal amount of time required for a node to stake into the system. The default value on genesis will be 2 weeks.
- δ_{max} : The maximal amount of time a node can stake. The default value on genesis will be 52 weeks.
- γ, λ : The two key parameters in governing the minting rate function.
- $\mathcal{F}$: the fee structure, which is a set of governable fees parameters that specify costs to various transactions.

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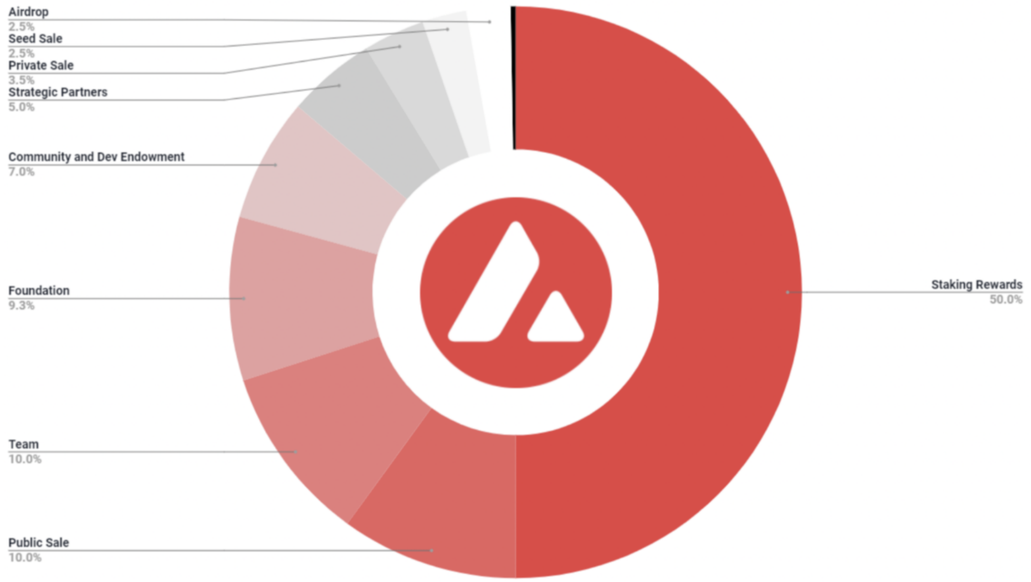
AVAX TOKEN DISTRIBUTION

- Capped-supply of 720,000,000 (720M) tokens
- The genesis block issued 360M $AVAX tokens.

Genesis allocation

SALE	BOUNTIES	TEAM	ECOSYSTEM	TOTAL SUPPLY
114.91M AVAX	20.02M AVAX	72.00M AVAX	153.07M AVAX	360.00M AVAX

		PRICE PER ASSET	VESTING PERIOD	AMOUNT
Seed sale	Completed in February of 2019. The implied fully-diluted mainnet valuation of this sale was $120M. These assets were sold to help initiate the development of the Avalanche codebase.	0.33 USD	1 YEAR	18.0M AVAX
Private sale	Completed in May of 2020. The implied fully-diluted mainnet valuation of this sale was $180M. These assets were sold to distribute AVAX and build staking infrastructure.	0.50 USD	1 YEAR	24.9M AVAX
Public sale option A1	Allocated for the public sale.	0.50 USD	1 YEAR	7.2M AVAX
Public sale option A2	Allocated for the public sale.	0.50 USD	1.5 YEARS	60.0M AVAX
Public sale option B	Allocated for the public sale.	0.85 USD	(none)	4.8M AVAX



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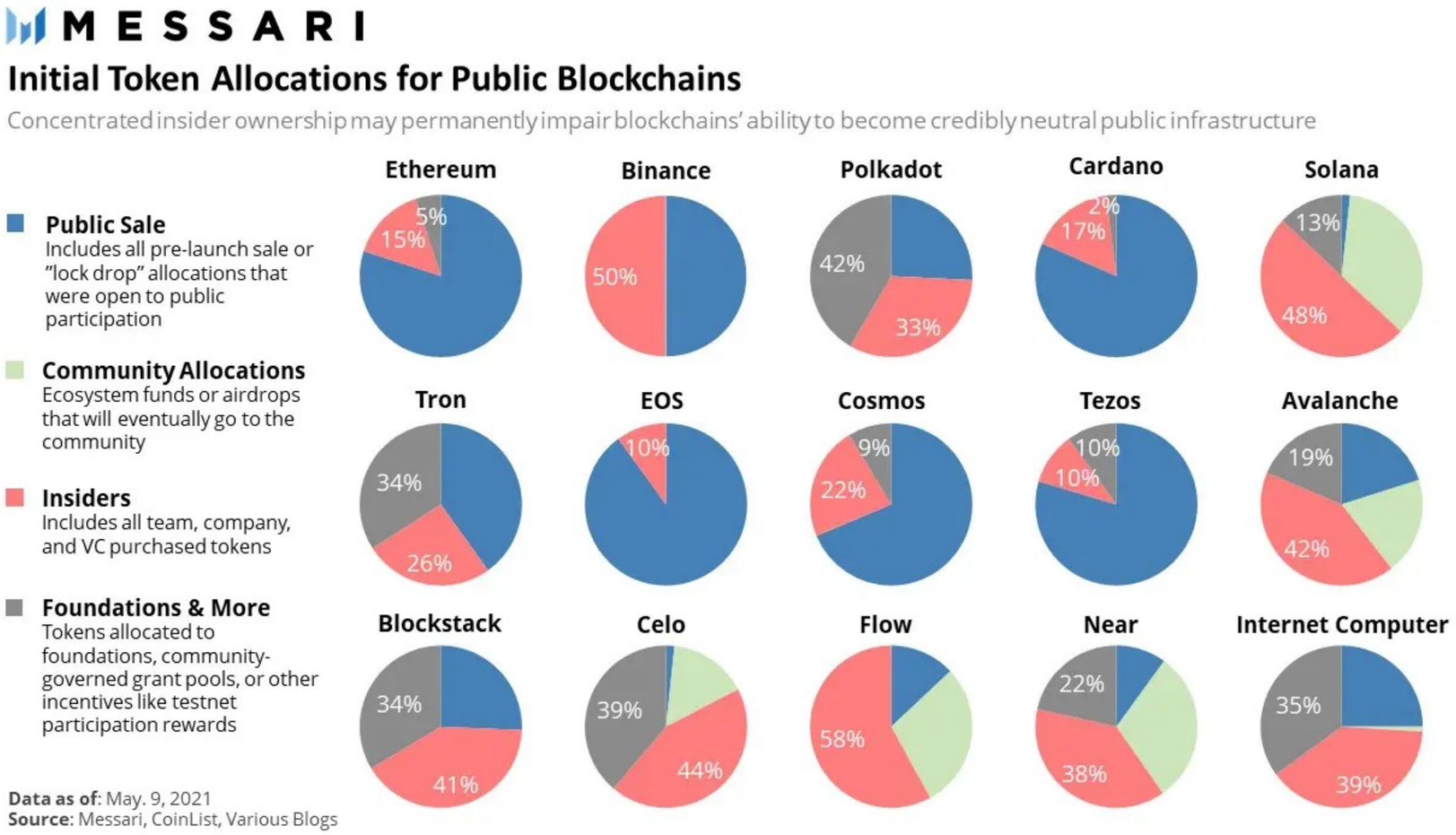
INITIAL TOKEN ALLOCATION

OF OTHER BLOCKCHAINS



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AVAX MINTING MECHANISM

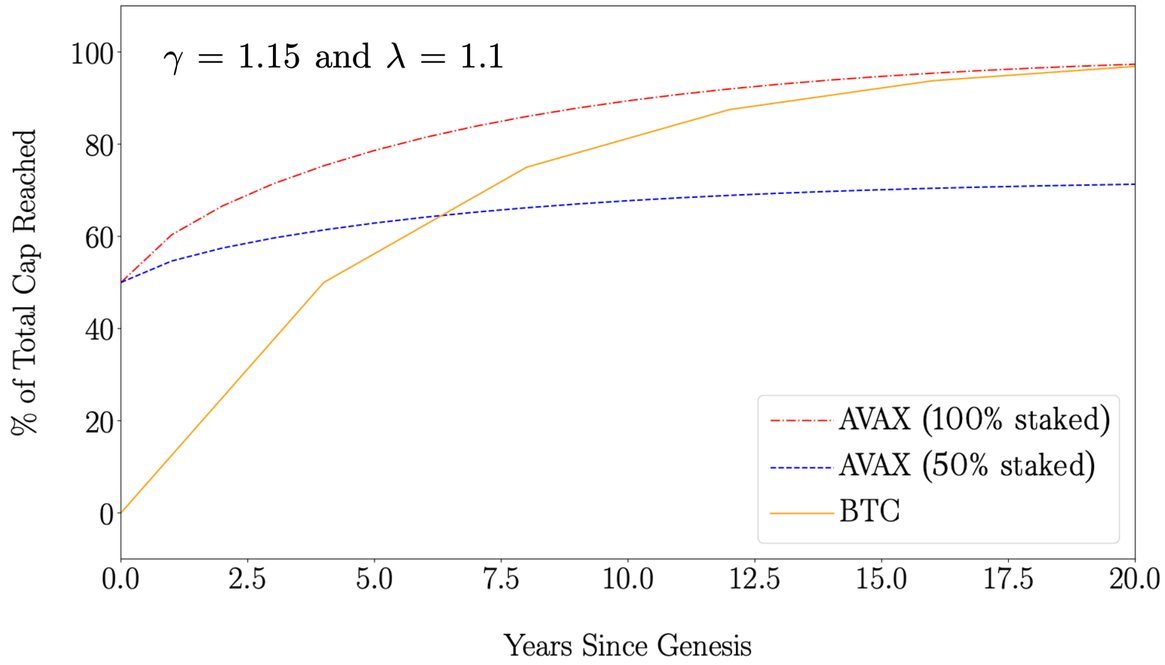
The rest of the 360M tokens will be issued as **staking rewards** and minted according to:

$$R_j = R_l + \sum_{\forall u} \rho(u.s_{amount}, u.s_{time}) \times (c_j / L) \times \left(\sum_{i=0}^{j} \frac{1}{\left(\gamma + \frac{1}{1+i^{\lambda}}\right)^{i}} \right) \quad (1)$$

where,

$$L = \left(\sum_{i=0}^{\infty} \frac{1}{\left(\gamma + \frac{1}{1+i^{\lambda}}\right)^{i}} \right) \quad (2)$$

$$\rho(u.s_{amount}, u.s_{time}) = (0.002 \times u.s_{time} + 0.896) \times \frac{u.s_{amount}}{R_j} \quad (3)$$



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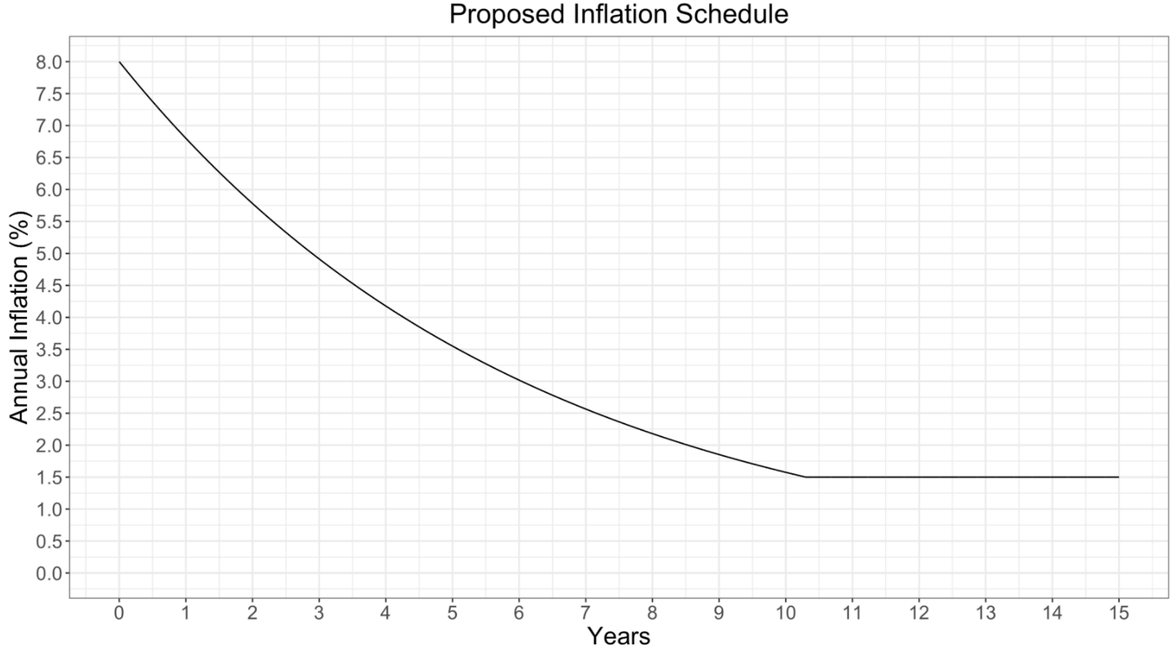
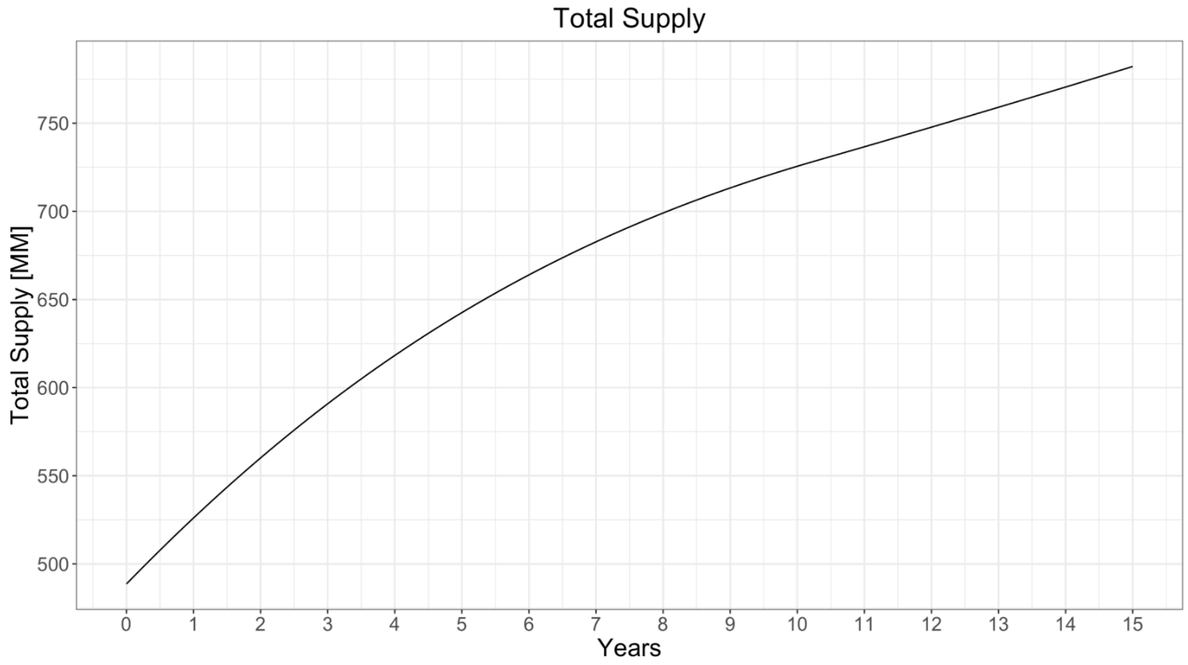
SOLANA TOKEN ECONOMY OVERVIEW

- Currently 354,115,809 SOL in circulation with a total supply of 511,616,946 **without an established maximum supply.**
- Stakers will receive fixed amount of inflation rewards (from the protocol) based on the number of tokens staked.
- Only portion of the transaction fees are burnt (initially 50%). Remaining part is sent to ‘Leader’
- Solana launched with an inflation rate of around 8%, which is expected to decline by 15% each year, a downward trend that will decrease until the rate reaches 1.5% annually, where it will remain.





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CRITICISM ON SOLANA TOKENOMICS

1. **Uncertainty around SOL Supply**

   - In November 2021, Solana's team initially stated that SOL's circulating supply was just 8.2 million tokens but that they had, without notifying the community, loaned an additional 13 million tokens to a market maker.

2. **Centralization of Solana**

   - Roughly half of the token supply is owned by venture capitalist firms and other insiders. Only a fractional amount went to the public.

3. **Solana's staking system**

   - SOL rewards are proportional to the number of tokens staked. For that reason, stakers and validators seek to hoard tokens under fewer validators to win more blocks instead of spreading tokens and propagating the network.
   - Small validators receive small rewards relative to the fees paid for a server and voting costs.

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SOAR CHAIN TOKEN ECONOMY KEY PARAMETERS

- What is the current token supply as well as total supply?

  1.7B $SOAR: Motivation is theoretically, each automative vehicle can own 1 $SOAR

- Does the token have an inflationary or deflationary model?

  Deflationary - but the parameters should be governable

- Events that cause supply change (token issuance or token burn)

  💰 **Full-Node Block Rewards:** Protocol level token issuance to nodes participating actively in consensus process.

  💰 **Validator Challenger Service Rewards:** Protocol level rewards for cluster of validators which run challenge service

  🔄 **Challengee rewards are paid by the validators according to application layer logic** - has no effect on the supply!

  🔥 **Burn Mechanism:** Portion of transaction fees, slashing for dishonest nodes & validators, dynamic base fee based on network usage

- Which parameters are subject to governance?

  Emission rate (protocol level issuance), min/max staking amount, min/max staking period, burn rate, …

- What is the real-world use case?

  Connected vehicles, autonomy, safety & emergency, fleet management, smart cities and more

- Who owns the majority of coins? Is it well spread out or concentrated?

  Seed Sale, private sale, public sale, foundation(bounties & incentive programs), development community, staking rewards, strategic partners, team

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FUTURE WORK

- Formulating the Soar Chain token economy mechanism.
- Simulation environment based on estimated parameters (Preferably with API support).
- Future projections of total supply and inflation/deflation based on different parameters and governance scenarios.