

# L29: Token Economics Fundamentals

## Module D: Tokenomics

Blockchain & Cryptocurrency

December 2025

- Describe different token types (utility, governance, security) and their purposes
- Analyze value accrual mechanisms in token economies
- Evaluate token supply models and their implications
- Apply tokenomics principles to real-world projects

# The Problem: How do we create sustainable token economies?

## The Challenge

Designing a token that aligns incentives across users, developers, investors, and validators without collapsing into a speculative bubble or death spiral. Most token economies fail because they prioritize short-term hype over long-term sustainability.

## Why It Matters

- Over 95% of ICO-era tokens failed due to poor economic design
- Terra/Luna collapsed (\$40B) from flawed algorithmic stablecoin tokenomics
- Inflationary token spirals destroy user trust and protocol viability

## What We Need

- Economic alignment of actors
- Sound monetary policy (supply schedules, emission rates)
- Real utility beyond speculation (value capture mechanisms)

## The Cryptoeconomics Question

*How do we design incentives so participants act in the protocol's best interest while pursuing their own gains?*

*Today's lesson: How Token Economics addresses this challenge*

# What is Tokenomics?

**Definition:** The study of the economic systems governing the creation, distribution, and management of tokens in blockchain ecosystems.

## Key Components:

- Token design and purpose
- Supply and distribution mechanics
- Incentive structures
- Value capture mechanisms
- Governance and utility

**Why It Matters:** Tokenomics determines the long-term sustainability and success of crypto projects.

## 1. Utility Tokens

- Access to platform services
- Payment for network fees
- Examples: BNB, LINK, FIL

## 2. Security Tokens

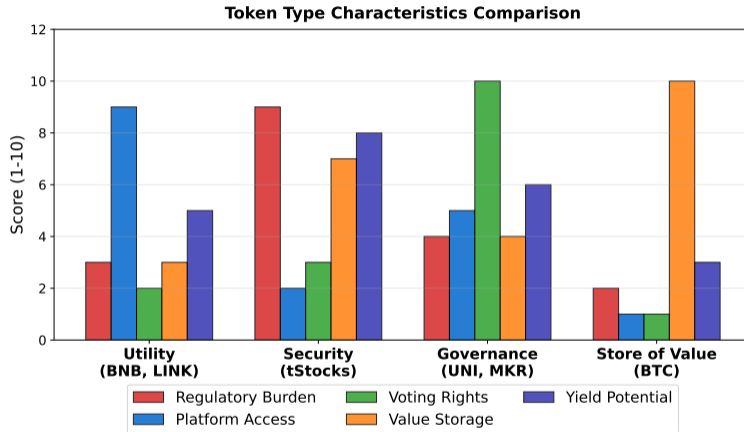
- Represent ownership/dividends
- Subject to securities laws
- Examples: tokenized stocks, bonds

## 3. Governance Tokens

- Voting rights on protocol changes
- DAO participation
- Examples: UNI, AAVE, MKR

## 4. Store of Value Tokens

- Digital gold analogy
- Limited supply
- Example: BTC



*Security tokens have highest regulatory burden; governance tokens offer strongest voting rights*

**Purpose:** Access to products/services

**Characteristics:**

- Not designed as investments
- Required for platform interaction
- Value linked to usage
- May offer fee discounts

**Example: Binance Coin (BNB)**

- Trading fee discounts on exchange
- Gas fees on BNB Chain
- Token sale participation (Launchpad)
- Quarterly burns based on volume

**Definition:** Investment contracts subject to securities regulations

**Howey Test Criteria:**

- 1 Investment of money
- 2 In a common enterprise
- 3 Expectation of profits
- 4 From efforts of others

**Implications:**

- Must comply with SEC (US)
- Require registration/exemption
- Investor protections apply
- Often limited to accredited investors

**Examples:** Tokenized stocks, bonds, real estate

**Purpose:** Decentralized decision-making

**Voting Rights:**

- Protocol parameter changes
- Treasury allocation
- Fee structure modifications
- Smart contract upgrades

**Example: Uniswap (UNI)**

- Protocol fee governance
- Treasury management (\$B+ assets)
- Grant program decisions
- 1 UNI = 1 vote (delegatable)

## How do tokens capture value from protocol success?

### 1 Fee Distribution

- Protocol fees shared with token holders
- Example: GMX distributes 30% of trading fees

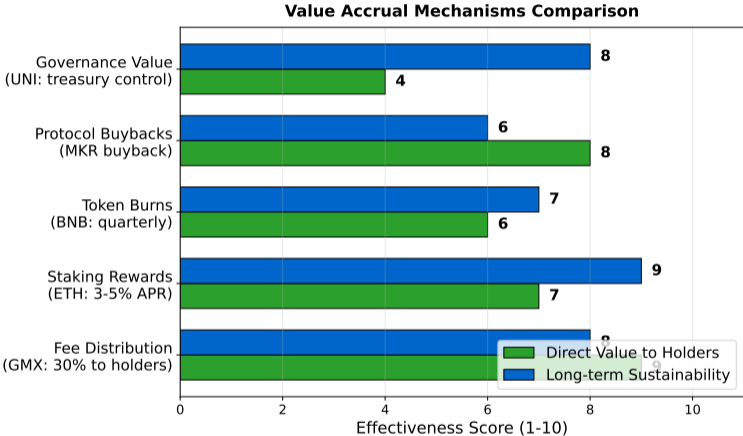
### 2 Staking Rewards

- Lock tokens to earn yield
- Example: Ethereum validators earn ETH rewards

### 3 Token Burns

- Reduce circulating supply
- Example: BNB quarterly burns, ETH EIP-1559

# Value Accrual Mechanisms Comparison



*Fee distribution provides direct value; staking rewards offer best sustainability*

## Characteristics:

- Predetermined max supply
- No new tokens after cap
- Deflationary if burned

## Advantages:

- Scarcity drives value
- Predictable monetary policy
- Inflation protection

## Bitcoin Example:

- Max: 21 million BTC
- Current: 19.5M (2024)
- Halving every 4 years
- Final BTC: year 2140

## Inflationary:

- New tokens continuously created
- Rate may be fixed or decreasing
- Incentivizes participation

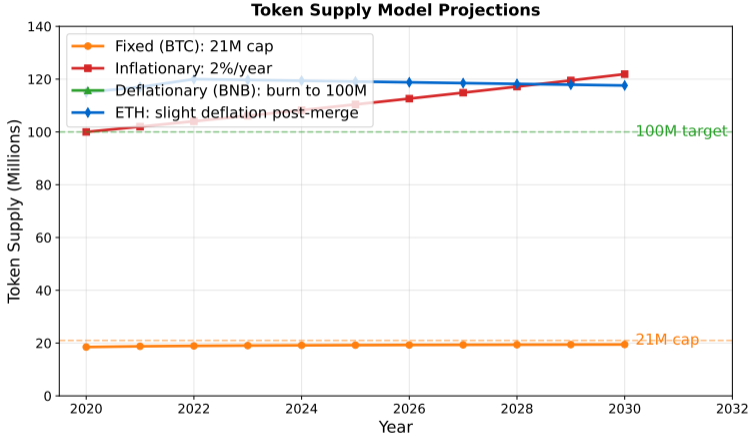
## Deflationary:

- Supply decreases over time
- Tokens removed via burns
- Creates scarcity pressure

## BNB Burn Mechanism:

- Auto-Burn: based on gas fees
- Target: 100M (from 200M)
- Current: 144M (Dec 2024)

# Supply Model Projections



BTC approaches 21M cap; BNB burns toward 100M; ETH slightly deflationary post-merge

## How tokens enter circulation over time:

### 1. Linear Emission

- Constant rate of new tokens
- Predictable but perpetual inflation

### 2. Decreasing Emission

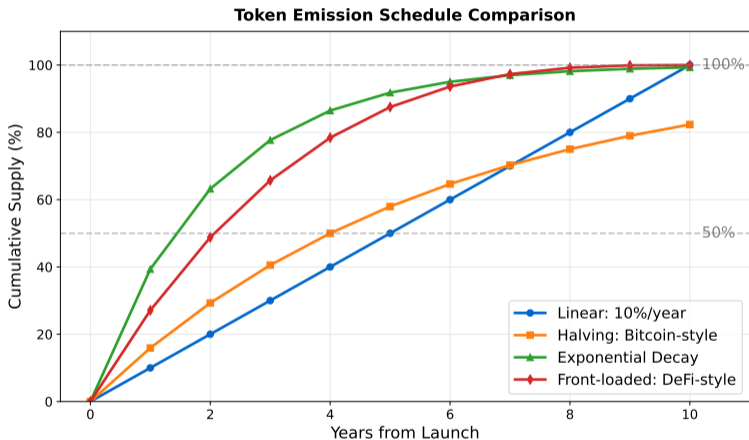
- Halving events (Bitcoin model)
- Gradually reducing inflation

### 3. Exponential Decay

- Rapid initial distribution
- Asymptotically approaches max supply

### 4. Algorithmic Adjustment

- Based on network metrics
- Example: Ethereum's variable issuance



*DeFi protocols often use front-loaded emission; Bitcoin uses halving model*

# Token Velocity Problem

**Problem:** High token velocity (frequent buying/selling) can suppress token price.

**Equation of Exchange:**

$$MV = PQ$$

where:

- $M$  = Money supply (token supply)
- $V$  = Velocity (transaction frequency)
- $P$  = Price level
- $Q$  = Quantity of goods/services

**Solutions:**

- Staking mechanisms (reduce velocity)
- Vesting periods
- Utility that requires holding (governance, fee discounts)

## Token Sinks (Removal)

- Transaction fee burns
- Protocol penalties (slashing)
- Staking locks
- Governance participation locks

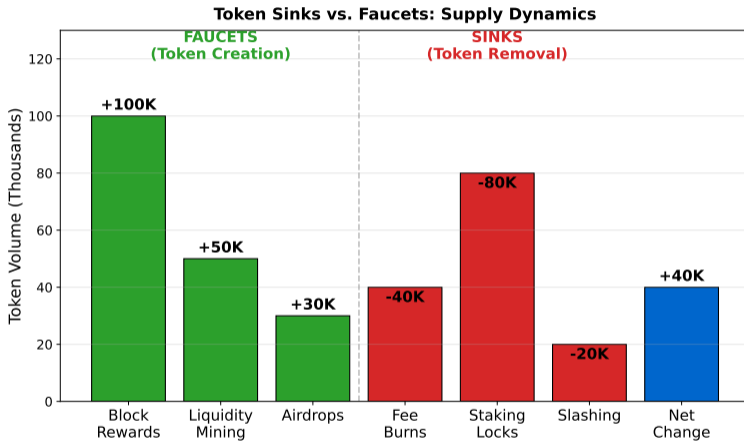
**Effect:** Reduce circulating supply, increase scarcity.

## Token Faucets (Creation)

- Block rewards
- Liquidity mining rewards
- Airdrops
- Developer grants

**Effect:** Increase supply, incentivize participation.

**Balance:** Healthy tokenomics requires equilibrium between sinks and faucets.



*Healthy tokenomics balances faucets (creation) with sinks (removal)*

## Pre-EIP-1559:

(Before Aug 2021)

- 4.5% inflation
- All fees to miners
- Unpredictable fees

## Post-EIP-1559:

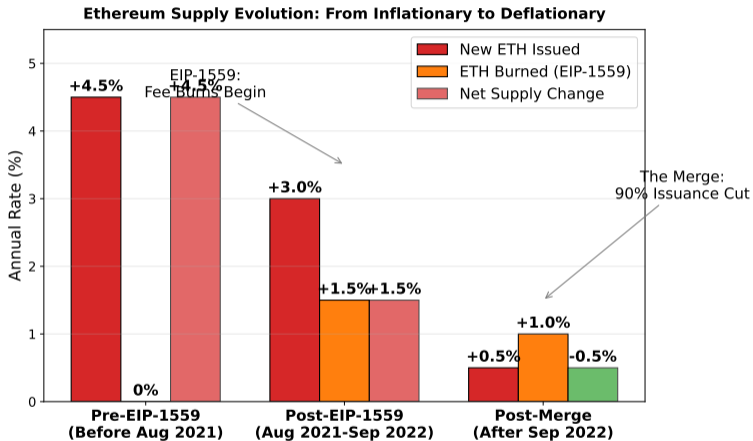
- Base fee burned
- Tips to miners
- Predictable fees

## Post-Merge:

(Sept 2022)

- Issuance -90%
- Net deflationary
- 3-5% staking APR

# ETH Supply Evolution



*EIP-1559 introduced burns; The Merge cut issuance 90%, achieving net deflation*

## Good Tokenomics

- Clear value accrual
- Sustainable incentives
- Low initial team/VC allocation
- Long vesting periods
- Transparent distribution
- Real utility beyond speculation

## Red Flags:

- Excessive token supply to insiders ( $\geq 30\%$ )
- Unsustainable yield promises ( $\geq 100\%$  APY)

## Bad Tokenomics

- No clear value capture
- Ponzi-like dynamics
- High team/insider allocation
- Short/no vesting
- Opaque distribution
- Pure speculation

## 1 **Circulating vs Total Supply**

Large gap = future dilution

## 2 **Token Distribution**

Top holder concentration, team %

## 3 **Inflation Rate**

Current and projected annual

## 4 **Value Accrual**

Fee sharing, burns, staking

## 5 **Unlock Schedule**

When do vested tokens circulate?

**Key:** Evaluate all metrics together for complete picture

## The Original Problem

*How do we create sustainable token economies that don't collapse?*

## How Token Economics Solves It

- **Supply schedules:** Fixed (BTC), inflationary (ETH pre-merge), or deflationary (BNB burns) – predictable monetary policy
- **Value accrual:** Fee distribution, staking rewards, token burns create organic demand
- **Velocity control:** Staking locks and governance utility reduce sell pressure

## Remaining Limitations

- **Speculation dominates utility:** Even well-designed tokens suffer from price volatility unrelated to fundamentals
- **Behavioral unpredictability:** Token velocity, holder psychology, and market cycles are hard to model

## Open Questions

- What makes a token economy sustainable long-term? (No token has survived multiple market cycles with stable demand)
- Risk: Incentive misalignment if team allocations are excessive or vesting too short

*Token Economics provides frameworks but no guarantees – success depends on execution and market conditions*

## Key Takeaways:

- Token type determines purpose and regulatory treatment
- Value accrual mechanisms connect token price to protocol success
- Supply models (fixed, inflationary, deflationary) have trade-offs
- Good tokenomics aligns incentives across all stakeholders
- Token velocity must be managed to maintain value
- Transparent distribution and vesting are crucial

**Next Lecture:** Distribution and Vesting - How tokens are allocated and released over time.

- ① How does Bitcoin's fixed supply model compare to Ethereum's flexible issuance?
- ② What are the trade-offs between utility tokens and governance tokens?
- ③ How can a protocol reduce token velocity without harming liquidity?
- ④ Why might high team/VC allocations be problematic?
- ⑤ What role do token burns play in value accrual?

## Quiz Questions (1–5)

**Q1. Which of the following best defines tokenomics?**

- A) The price of a cryptocurrency
- B) The study of economic systems governing token creation and management
- C) Mining difficulty algorithms
- D) Exchange trading volumes

**Answer: B** – Tokenomics encompasses token design, distribution, incentives, and value capture.

**Q2. What is the primary characteristic of a utility token?**

- A) Represents ownership in a company
- B) Grants access to platform services
- C) Provides voting rights only
- D) Functions as digital gold

**Answer: B** – Utility tokens are required for platform interaction and service access.

**Q3. According to the Howey Test, which criterion does NOT determine if a token is a security?**

- A) Investment of money
- B) Common enterprise
- C) Token name includes “coin”
- D) Expectation of profits from others' efforts

**Answer: C** – The Howey Test has 4 criteria; token naming is not one of them.

**Q4. What is the maximum supply of Bitcoin?**

- A) 18.5 million
- B) 21 million
- C) 100 million
- D) Unlimited

**Answer: B** – Bitcoin has a predetermined cap of 21 million BTC.

**Q5. Which token provides an example of governance functionality?**

- A) BTC
- B) USDT
- C) UNI
- D) WBTC

**Answer: C** – Uniswap (UNI) allows holders to vote on protocol changes.

## Quiz Questions (6–10)

**Q6. What is the purpose of EIP-1559 in Ethereum's tokenomics?**

- A) Increase block size
- B) Burn base fees to reduce supply
- C) Eliminate all transaction fees
- D) Double staking rewards

**Answer: B** – EIP-1559 burns the base fee, creating a deflationary mechanism.

**Q7. Which value accrual mechanism directly distributes protocol revenue to token holders?**

- A) Token burns
- B) Fee distribution
- C) Halving events
- D) Airdrops

**Answer: B** – Fee distribution shares protocol fees with token holders (e.g., GMX).

**Q8. In the equation of exchange ( $MV = PQ$ ), high token velocity ( $V$ ) typically:**

- A) Increases token price
- B) Suppresses token price
- C) Has no effect on price
- D) Doubles the money supply

**Answer: B** – High velocity means tokens change hands quickly, suppressing price.

**Q9. What is BNB's target supply after all burns are complete?**

- A) 50 million
- B) 100 million
- C) 144 million
- D) 200 million

**Answer: B** – BNB aims to burn from 200M initial supply down to 100M.

**Q10. Which of these is a “token sink” (removes tokens from circulation)?**

- A) Block rewards
- B) Liquidity mining
- C) Staking locks
- D) Airdrops

**Answer: C** – Token sinks reduce circulating supply; staking locks achieve this.

## Quiz Questions (11–15)

**Q11. What happened to ETH issuance after The Merge in September 2022?**

- A) Increased by 90%
- B) Stayed the same
- C) Reduced by 90%
- D) Stopped completely

**Answer: C** – The Merge cut issuance from 4.5% to 0.5% annually.

**Q12. Which emission schedule model does Bitcoin use?**

- A) Linear emission
- B) Exponential decay
- C) Halving events (decreasing emission)
- D) Algorithmic adjustment

**Answer: C** – Bitcoin halves block rewards every 210,000 blocks (4 years).

**Q13. What is a major red flag in tokenomics design?**

- A) Long vesting periods
- B) Transparent distribution
- C) Team/insider allocation exceeding 30%
- D) Fee sharing mechanism

**Answer: C** – Excessive insider allocation risks dumping and misaligned incentives.

**Q14. Which strategy can reduce token velocity?**

- A) Encouraging frequent trading
- B) Staking mechanisms with lock-up periods
- C) Removing governance rights
- D) Increasing transaction fees to 50%

**Answer: B** – Staking locks tokens, reducing velocity and sell pressure.

**Q15. What does a large difference between circulating supply and total supply indicate?**

- A) Strong tokenomics
- B) Future dilution risk
- C) Deflationary pressure
- D) High demand

**Answer: B** – Unvested tokens entering circulation can dilute existing holders.

## Quiz Questions (16–20)

**Q16. Which token is an example of a “store of value” token?**

- A) LINK B) UNI C) BTC D) BNB

**Answer: C** – Bitcoin is designed as digital gold with limited supply.

**Q17. What is the primary function of governance tokens?**

- A) Pay network fees B) Enable decentralized voting on protocol changes  
C) Generate passive income D) Facilitate cross-chain transfers

**Answer: B** – Governance tokens allow holders to vote on protocol decisions.

**Q18. In a deflationary token model, what happens to circulating supply over time?**

- A) Increases steadily B) Remains constant  
C) Decreases through burns D) Doubles every 4 years

**Answer: C** – Deflationary models reduce supply via token burns.

**Q19. What percentage of trading fees does GMX distribute to token holders?**

- A) 10% B) 20% C) 30% D) 50%

**Answer: C** – GMX distributes 30% of trading fees as value accrual.

**Q20. Which year is Bitcoin's final BTC estimated to be mined?**

- A) 2040 B) 2100 C) 2140 D) 2200

**Answer: C** – Bitcoin's final coin is projected to be mined around 2140.