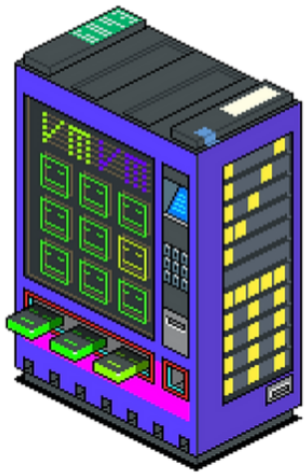
Arbitrum DAO
Report on Inflation as Staking Reward Source



VENDING MACHINE

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1 Introduction

1.1 Context

Vending Machine has been tasked with focusing on the inflation reward source for the ARB staking group (led by Entropy) over the past two weeks. We have not been officially engaged by the DAO and have no exposure to ARB in the company treasury. This document explores a potential framework for parameterizing inflation as a staking reward source, based on the Tally Proposal.

1.2 Assumptions

For Arbitrum, whose staking currently serves only governance with future utility as a possibility, it's essential to ask: what should be the true purpose and impact of staking the ARB token? Without a mature staking system aligned with network utility, rewards could disproportionately dilute token value while failing to attract committed, utility-focused users.

The assumption taken by Vending Machine in advocating for inflation as a reward source is that staking utility will move to become crypto-economic security in a PoS system.

2 Target Staking Ratio

The framework for Arbitrum's target staking ratio builds on historical governance participation data, analyzed using information from Tally.

2.1 Historical Data (from Tally)

The table below summarizes data gathered from Tally for proposals on Arbitrum, excluding OLD and CANCELLED proposals.

Table 1: Governance Proposal Participation Rates

Proposal Type	**Quorum Threshold**	**Number of Proposals**	**Min Participation Rate**	**Mean Participation Rate**	**Max Participation Rate**
Constitutional	5%	18	0.43%	4.35%	7.41%
Non-constitutional	3%	40	0.46%	4.87%	8.89%

2.2 Framework

To consistently meet the quorum for all proposal types, we establish a target staking ratio based on the constitutional quorum requirement of 5%, using a safety factor M, determined by historical participation rates, to account for potential fluctuations or delegate non-participation.

The formula is:

$$\text{Target Staking Ratio} = M \cdot \frac{\text{No. of staked tokens}}{\text{Total Circulating Supply}} = M \cdot \frac{5\% \cdot \text{Votable Tokens}}{\text{Total Circulating Supply}}$$

With M set to 5, this ratio is designed to exceed minimum requirements comfortably, aiming for a staking ratio of 25%.

2.3 Considerations and Rationale

Research on DAO governance indicates that a 10-20% participation rate is generally considered healthy, though reaching the upper end is challenging due to voter fatigue.

However, since Arbitrum's staking token (stARB) will be delegated, the system is less susceptible to voter fatigue, allowing the use of a higher target ratio.

By setting a target staking ratio at 25%, Arbitrum aims to ensure a quorum for all governance proposals with an adequate buffer, thereby stabilizing governance efficacy while fostering stakeholder confidence in decision-making processes.

3 Target Staking APR

3.1 Comparable PoS Networks

A preliminary analysis of staking rewards and inflation rates on comparable PoS networks provides insight into optimal inflation rate settings and target staking Annual Percentage Rates (APRs) for Arbitrum.

Figure 1: Plots showing average staking APR and inflation rate Year-To-Date for PoS networks

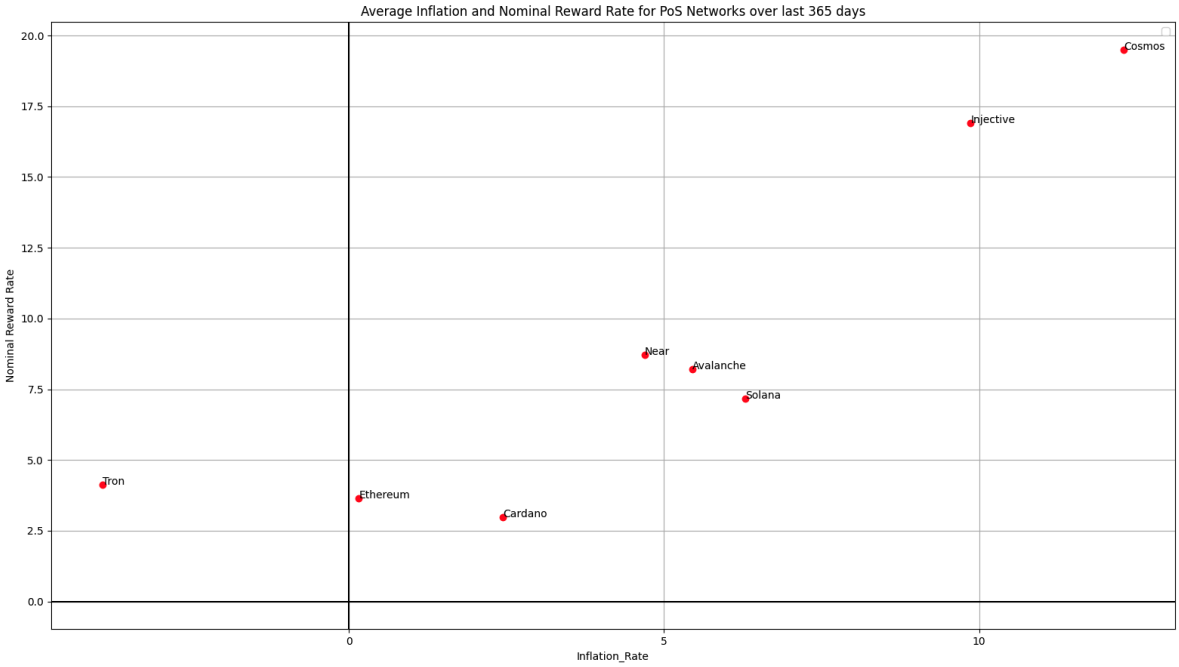

Table 2: Comparable PoS Network Staking APR and Inflation Rates

Network	**Inflation Rate**	**Staking APR**
Solana	6.29	7.16
Cardano	2.44	2.98
Near	4.69	8.72
Avalanche	5.45	8.22
Cosmos	12.30	19.50
Injective	9.86	16.91
Tron	-3.91	4.13
Ethereum	0.16	3.64
Average	4.66	8.91

The average staking APR of 8.91% from comparable PoS networks can serve as a useful guideline for targeting Arbitrum's staking APR. Given the variability in inflation and reward rates among these networks, setting a target staking APR close to the market average can help maintain competitiveness while supporting sustainable growth within the network.

A lower inflation rate close to Ethereum's 0.16% could be ideal, but a figure up to 2-3% (in line with Cardano) may allow for a balance of competitive APR and network integrity.

4 Inflation as a Reward Source

4.1 Overview

Inflation of circulating supply is one of the ways many PoS networks reward stakers. Stakers receive additional tokens minted on a per-block or epochal basis; if less than 100% of circulating supply is staked, the resultant APR for stakers will be higher than the inflation rate.

4.2 Advantages

- **No dependency on ARB price:** Inflationary rewards are denominated in ARB tokens, removing the need to adjust for ARB price fluctuations to estimate projected staker yields.
- **Immediate Accessibility:** Rewards become available without dependence on a tangible revenue source, enabling immediate incentives for stakers.
- **Decoupling from Revenue Size Constraints:** This approach avoids linking token value to a specific revenue magnitude, freeing token rewards from absolute revenue caps and token price speculation.
- **Industry Norm Acceptance:** Token rewards as an incentive mechanism have broad industry acceptance, adding legitimacy to their use.

4.3 Disadvantages

- **Inflationary Impact on Token Value:** Token issuance-based rewards introduce inflationary pressures that can erode token price over time.
- **Sustainability Challenges without Revenue Growth:** Inflation-based staking rewards are unsustainable without corresponding growth in token value or network revenue.
- **Dilution of Non-Staker Holdings:** Inflationary issuance dilutes the holdings of non-stakers, a critique highlighted by Cobie in the case of Apecoin.

4.4 Additional Considerations

- **Inflation Cap and Governance Requirements:** The current inflation rate is capped at 2% of circulating supply, providing a controlled limit. Any increase beyond this threshold would require a constitutional vote.

4.5 Recommendation

An initial recommendation is 2% inflation on circulating supply as staking rewards if inflation is used as the sole reward source. This provides 8% staking APR at a 25% target staking ratio, slightly below the target APR based on PoS networks' data.

5 Yield Projection

To achieve the specified staking ratio and target APR, a comprehensive modeling framework has been developed, calculating in USD terms:

- **Required Staking Reward Value:** Reward amount needed to meet target staking APR for a given staking ratio.
- **Reward Value from Inflation:** Value of rewards generated through inflation within the set cap.
- **Reward Value Shortfall:** Gap between inflation-based rewards and total required rewards to achieve target APR.

The model performs calculations across four timeframes:

- October 31, 2024 (current supply)
- October 31, 2025 (1-year projection)
- October 31, 2026 (2-year projection)
- April 30, 2027 (2.5-year projection)

6 Further Thoughts on Staking Utility

Staking's original intent—to provide network security or facilitate essential services—has often shifted to mere inflationary rewards, which can even resemble traditional Ponzi schemes by incentivising holders without real utility.

To prevent these pitfalls, the working group for Arbitrum should prioritise a long-term framework for staking, emphasising network objectives like direct utility, sustainability, and fair, impactful rewards. By clearly defining these objectives in detail, Arbitrum DAO can construct a model where staking contributes measurable value—whether through direct crypto-economic security, required fee token, token collateral or revenue-sharing mechanisms—offering an investment that grows alongside genuine ecosystem utility rather than less defined, governance dominated systems. This clarity would also improve benchmarks like the target staking ratio and APR, aligning rewards more accurately with required token functionality and value retention.

Defining these parameters early will help prevent Arbitrum staking from falling into the trap of inflationary mechanisms that undermine token value, a lesson that several DAOs (including ApeCoin) have highlighted.

7 Disclaimer

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