

Ethereum's Shanghai Upgrade: by the charts



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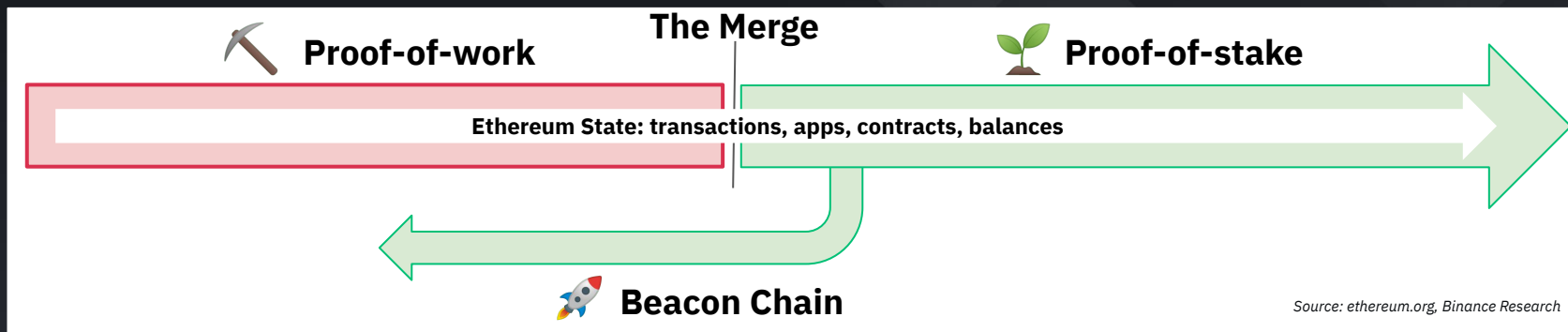
What is the Shanghai Upgrade?

EIP-4895 is the key upgrade of Shanghai...

... and will enable withdrawals of staked ETH

A brief history lesson

- The first step in Ethereum's switch from a Proof of Work ("PoW") consensus mechanism to Proof of Stake ("PoS") involved the launch of the Beacon Chain, a PoS chain that ran alongside PoW Ethereum from its launch in Dec 2020 until "The Merge" in Sept 2021.

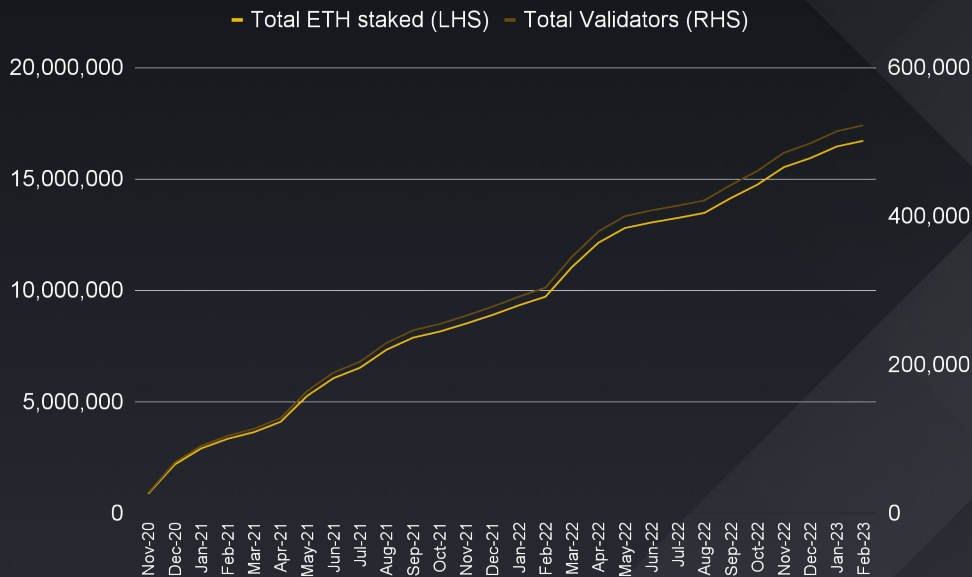


- The Beacon Chain introduced staking to Ethereum. However, it remained a one-way street i.e. validators could deposit ETH to the Beacon Chain, but not withdraw it. **EIP-4895, which is the headline improvement within the Shanghai Upgrade, will finally allow validators to withdraw their ETH and any accrued staking rewards.**

So, how much ETH has been staked?

Over 16.5M ETH has been staked via 520K+ validators

Total staked ETH & total validators have been on a steady rise



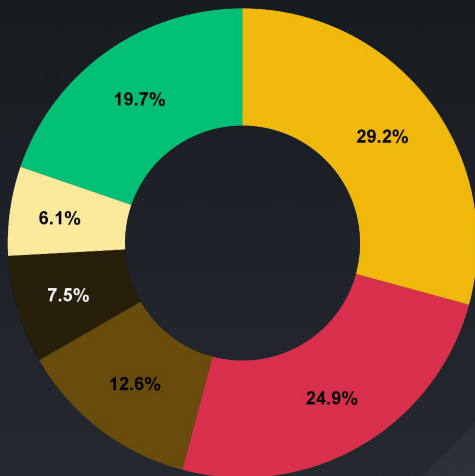
- Since the launch of the Beacon Chain in late 2020, **over 16.5M ETH (worth over US\$25B as of Feb-23) has been staked.**
- Approximately **520K validators** have also spun up to facilitate this staking. Remember it takes 32 ETH to initially set up a validator.
- We should note that while there are over 520K unique consensus validators in Ethereum PoS, **operators of these nodes can host and maintain multiple validators.** Even solo-stakers are able to operate multiple validators. Thus, this number does not represent the number of unique validating entities - we look further at this in the next page.

Where is it staked?

Liquid staking provider, Lido, leads the pack

Staked ETH Breakdown

● Lido ● Solo Stakers / Unidentified ● Coinbase ● Kraken ● Binance
● Other Staking Providers



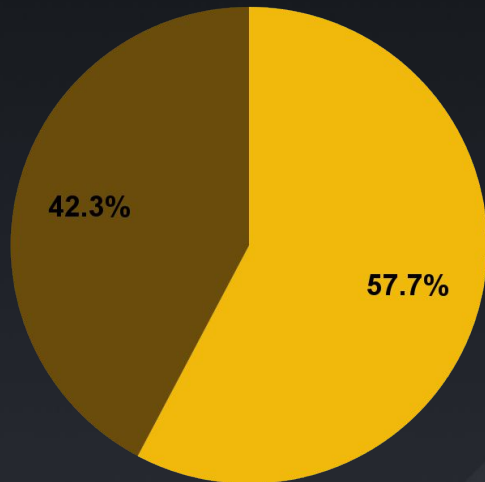
- **Lido is the largest player in the market, accounting for nearly 5B staked ETH and 29.2% of the market.** Lido is a liquid staking provider and provides the stETH token to users to represent staked ETH on its platform. stETH has largely traded in-line with ETH over the last few months and provides users with liquidity (for DeFi etc.) for their staked ETH.
- The top exchanges in the staking market are **Coinbase, Kraken and Binance, accounting for over 4B ETH and ~26% of the market.** Within this group, Coinbase and Binance provide users with liquidity via their cbETH and bETH derivatives.
- Nearly **25% of the market is also held by solo / unidentified stakers.** These might be individuals running nodes from their homes or smaller groups who are running private staking pools, for example.

Zooming in on liquid staking...

A potential barrier against sell pressure?

Over 57% of staked ETH is already liquid

● Liquid Staking ● "Illiquid" Staking



- When we think we about liquid staking, not only are we considering the pure-play providers like Lido and Rocket Pool, but also the ETH staked by some of the major exchanges including Binance and Coinbase. For **Lido and Rocket Pool**, users receive **stETH** and **rETH**, while **Binance and Coinbase** provide users with **BETH** and **cbETH**. All of these tokens, while subtly differing in some of their mechanics, are **tokenized representations of staked ETH** and have **traded close/or at 1:1 for a long time**.
- The point being that **57% of ETH stakers have been able to access liquidity, with both their principal and rewards, for many months** already. In some ways, we can almost not worry about this group of users as they have no real reason to sell off after the Shanghai Upgrade.

What about the others?

Who are the “illiquid” stakers?

Mostly illiquid

1 Solo stakers

- Requires at least 32 ETH and a dedicated setup with a 24/7 Internet connection
- Completely trustless and user maintains complete control of the keys

2 “SaaS” stakers

- Requires at least 32 ETH
- Third-party node operators will handle your validator
- Requires some trust in the provider. Can limit this by keeping hold of your withdrawal keys.

Mostly liquid e.g. Lido, Binance, Coinbase etc.

3 Pooled stakers

- No minimum ETH requirement
- Pooling is not native to Ethereum, so is handled by third-parties e.g. Lido
- You are likely to get a liquid token that should track ETH e.g. stETH

4 CEX stakers

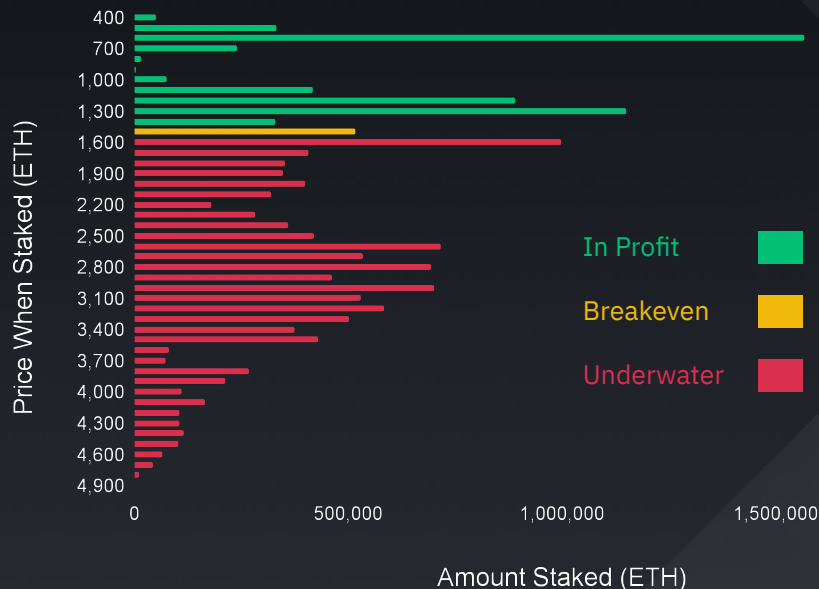
- No minimum ETH requirement
- Ideal for users not comfortable in holding their own keys
- You are likely to get a liquid token that should track ETH e.g. BETH

- So the question is, **are the “illiquid” stakers** i.e. those that have not received a liquid staking derivative and thus been unable to access liquidity for their staked ETH, **likely to sell their ETH as soon as it is unlocked?**
 - Of course, this is not a simple question to answer and one we will also consider on the next page. But thinking holistically, **who are the people running ETH validators at home?** One could call many of these group, “ETH-maxis”...you tell me, **is this group rushing to sell ETH at US\$1,600?**

When did this ETH get staked?

How many stakers are in profit?

Only 31% of ETH stakers are in profit



- The **majority of ETH stakers are underwater and have little financial incentive to sell** at the current ETH price (at least on a purely mathematical basis).
- We note a sizeable amount of ETH (around 2M) was staked at prices in the US\$400 - 700 range - this represents the earliest stakers in Dec 2020 - a group that is likely illiquid given that liquid staking was far less known at the time.
- While this is a considerable chunk of staked ETH and is currently at profit, given these were the earliest stakers in the market, we can imagine these are some of the strongest Ethereum believers.

How will the withdrawal process work?

A queue system designed to keep price volatility in check

There are two types of withdrawals

- **Partial withdrawals:** referring to withdrawing any earned staking rewards in excess of the initial 32 ETH staked on the Beacon Chain. The user will continue to be a validator.
 - The first step of withdrawals would be to set up a “withdrawal credential”. This is a one-time process and will allow **partial withdrawals to happen automatically**. These will happen in a **round-robin format, averaging 1 sweep per week**.
 - Total ETH staking rewards amount to ~1.03M ETH or US\$1.6B of max sell-pressure at current prices (US\$1,560). Given these will be **spread out over days (or even weeks)** and also considering ETH’s daily volume close to US\$8-10B, these partial withdrawals are unlikely to substantially affect the price of ETH.
- **Full withdrawals:** referring to the withdrawal of the entire balance i.e. 32 ETH principle and any rewards. The user will no longer be a validator on the Beacon Chain after this unlock.
 - Full exits are **rate limited** by the protocol and at the current level of active validators (~520K), would allow 7 validators to exit per epoch. Given an epoch is every 6.4 minutes, that allows a **maximum of 1,575 validators to exit per day**.
 - **32 ETH x 1,575 validators = 50,400 ETH** of max sell pressure. At a price of US\$1,560, this would represent **~US\$80M** of max sell-pressure per day.

Opportunities

Ethereum's Monetary Policy

Staking rewards are inversely correlated to no. of validators

ETH staking APR increases as the number the number of validators drop

Ethereum
Validator
Rewards



Consensus
Rewards



Execution
Rewards

a) Proposer rewards
b) Attester rewards
c) Sync Committee rewards

a) Tips / priority fees
b) Maximal Extractable Value ("MEV")

1

Consensus Rewards are rewarded for consensus-related tasks and **inversely proportional to the amount of ETH staked** i.e. the more ETH staked, the lower the per validator consensus rewards.

2

Execution Rewards are **directly proportional to the number of transactions on the network** i.e. they are for rewards for transaction execution. The higher the demand for Ethereum's blockspace, the higher the tip / MEV opportunities will be.

3

Ultimately, this means that if the **number of validators drops** i.e. they withdraw their ETH, **Consensus Rewards will increase to attract other validators.**






Current ETH Staking Returns

	Yearly APR
Consensus Rewards	4.1%
Tips	2.2%
MEV estimate	1.0%
Total	7.3%

How does ETH staking look vs other assets?

We could argue that many have been waiting for Shanghai

ETH staking ratio is materially lower than its competitors

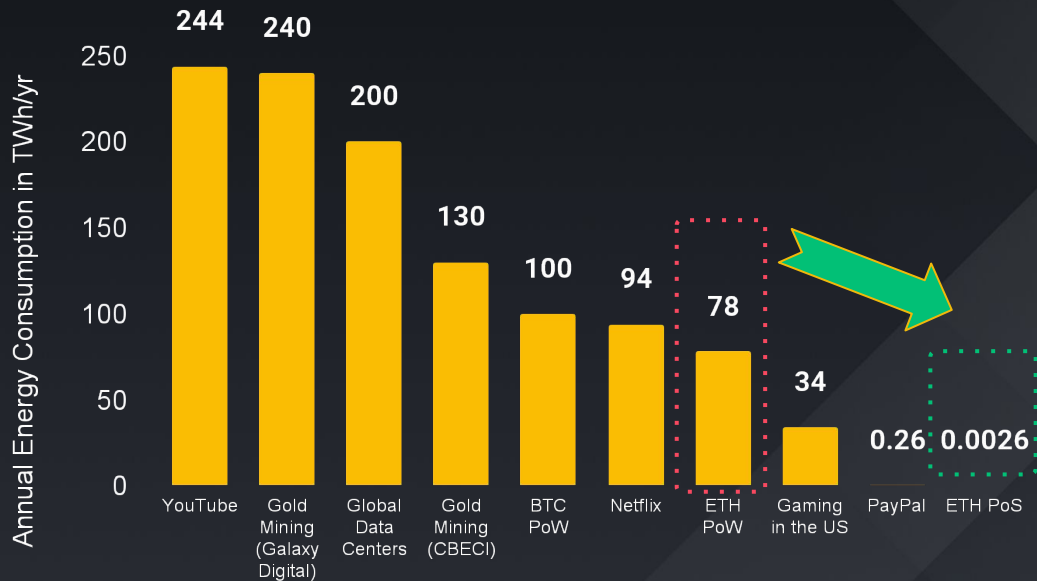
	Price (US\$)	Market Cap (US\$B)	Staking Ratio
	1,671.5	204.7	14.3%
	331.4	52.3	97.5%
	0.39	13.8	71.8%
	23.7	8.9	69.8%
	20.5	6.5	63.7%

- It could be argued that many groups of individuals had been waiting for Shanghai to stake their ETH, as withdrawals will remove the **liquidity risk** and uncertainty of an previously undefined lock-up period.
- While smart contract risk and other security risks may remain, it is key to many users (whether investors, institutions or individuals) to be able to see withdrawals successfully take place before attempting to stake.
- A wave of new participants who had previously been watching from the sidelines can **potentially add a level of buying pressure to ETH**, especially if institutional capital can be enticed.

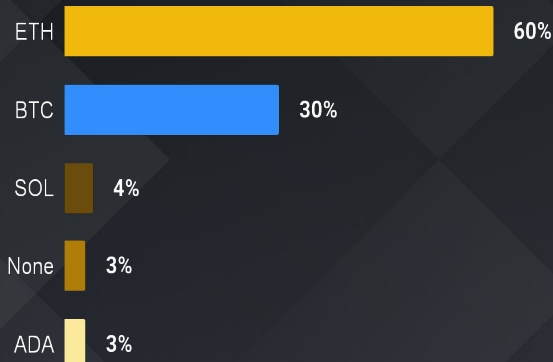
What about institutional buying pressure?

The ESG narrative could be a key value proposition

Estimates show that Ethereum's energy consumption dropped
~99% after The Merge



Which digital asset do you believe has the most compelling growth outlook?

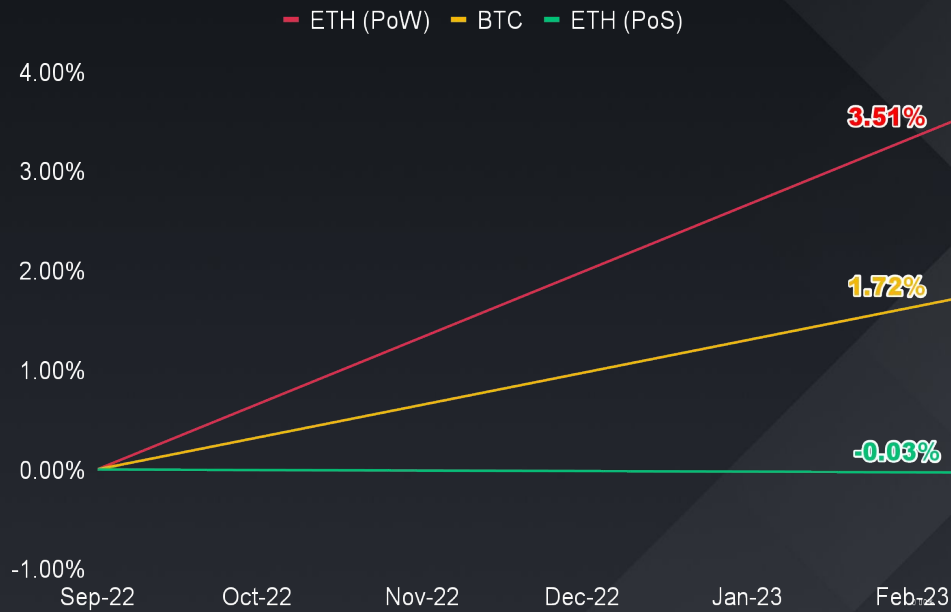


CoinShares' latest quarterly fund manager survey shows a record 60% of respondents expressing belief in **ETH**

What about ETH supply?

Did someone say ultra-sound...?

ETH has become a deflationary asset post-Merge



- One of the most significant effects of The Merge was in relation to daily ETH issuance.
- Due to the transition from PoW to PoS, there was no longer any need to pay expensive mining rewards to incentivize miners to provide network security.
- In combination with [EIP-1559](#), which implemented a **fee burn** mechanism into Ethereum's monetary policy, **ETH supply growth has been reduced from over 3.5% per year to -0.03%**. In fact, ETH has been deflationary since Jan of this year.
- This deflationary nature, in addition to a few other properties of ETH as an asset, has led to the **memecoin** of "ETH = ultra-sound money"

Risks

Macro environment remains shaky

GDP challenges and higher inflation continue to persist

IMF projections predict a challenging year ahead

	2022	2023 (Projected)	Historical Average
GDP Growth	3.4%	2.9%	3.8%*
Inflation	8.8%	6.6%	3.5%**

- The challenging macro environment has reflected itself in financial markets, which saw consistent repricing through 2022 and continue to remain in a precarious place.
- With crypto continuing to trade in correlation with the broader market, the macro environment is an undoubtable short-term risk for ETH and the broader crypto ecosystem.

The **balance of risks remains tilted to the downside**, but adverse risks have moderated since the October 2022 WEO. On the upside, a stronger boost from pent-up demand in numerous economies or a faster fall in inflation are plausible. On the downside, **severe health outcomes in China** could hold back the recovery, **Russia's war in Ukraine** could escalate, and **tighter global financing costs** could worsen debt distress. **Financial markets could also suddenly reprice** in response to adverse inflation news, while further **geopolitical fragmentation** could hamper economic progress.

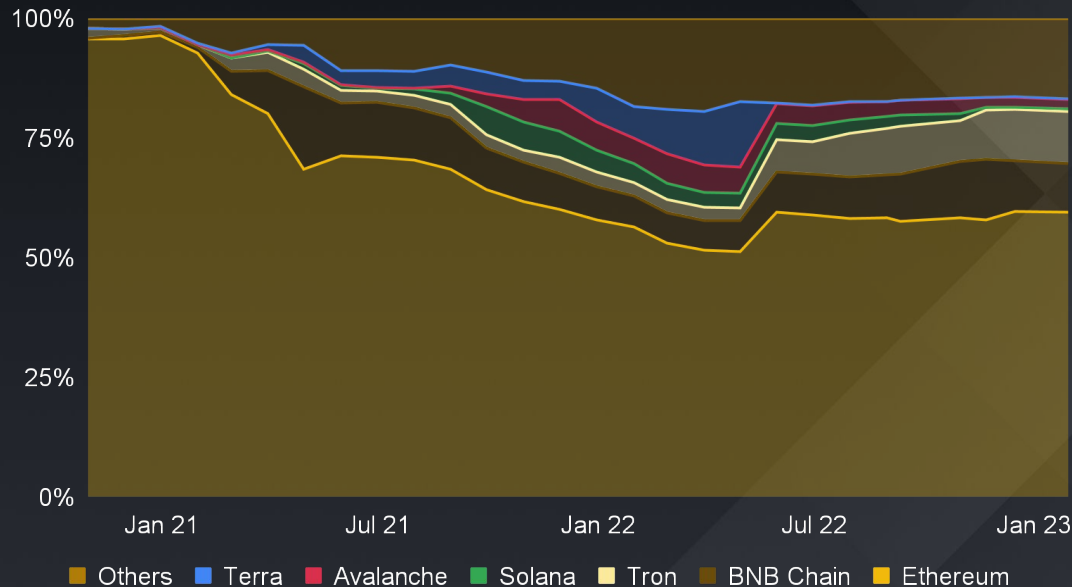
IMF World Economic Outlook **2023**



Alt-L1 dominance continues to rise... (1 of 2)

Alternative DeFi ecosystems continue to claw at Ethereum

Ethereum DeFi dominance has been trending down since late 2020








- Since November 2020, **Ethereum's DeFi market dominance is down from ~96% to ~60%.**
- In this same time period, **BNB Chain is up from 0.1% to 10.2%**, while **Tron from 2.1% to 10.4%**. Avalanche and Solana have also demonstrated growth, while Ethereum scaling solutions, **Polygon, Arbitrum and Optimism, also command top-10 positions in terms of DeFi TVL.**
- While we continue to see DeFi innovation in competing L1s, particularly BNB Chain, we also have new **DeFi-specific chains emerging i.e. Canto and Sei.** Ethereum's position within the DeFi space is definitely something worth monitoring closely.

Alt-L1 dominance continues to rise... (2 of 2)

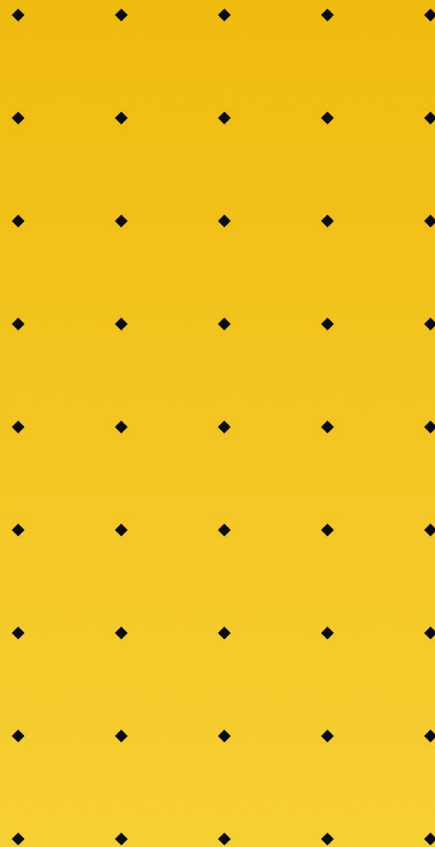
The nascent NFT market remains for the taking

While Ethereum NFTs continue to dominate, Solana and Polygon are very much also in the race

	All-Time Sales (US\$B)	2022 Sales (US\$B)	Last 30 days Sales (US\$M)
	35.9	17.9	859.2
	4.2	0.3	2.9
	3.7	1.8	114.3
	1.2	0.3	7.8
	0.8	0.4	14.1

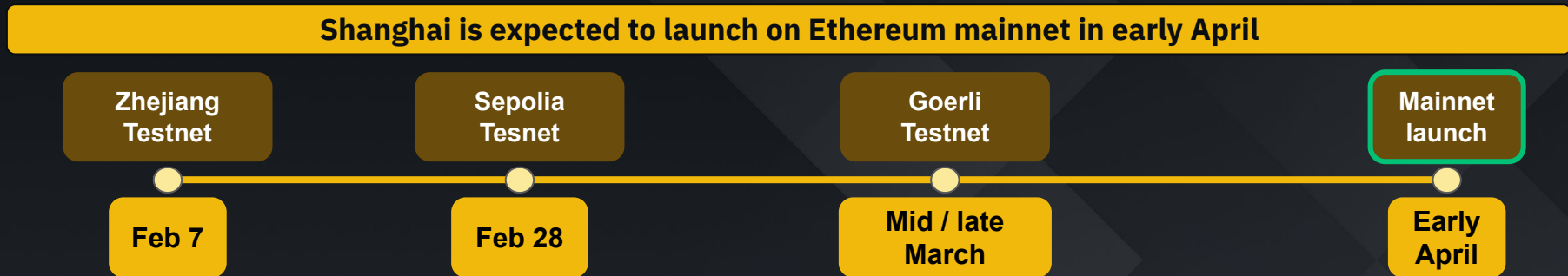
- In terms of NFTs, Ethereum continues to be the blockchain of choice for most premium collections. Ronin also has a rich legacy within the ecosystem given the popularity of Axie Infinity.
- Solana and Polygon have emerged as two of the more viable competitors for Ethereum in the longer term. **Polygon has been successful in attracting Web2 giants to NFTs** e.g. Reddit, Starbucks etc.
- **Solana**, on the other hand, has its own vibrant community and is **often a more affordable place for newer users / artists** to experience NFTs.

What to look out for?



What is next?

From Zhejiang to Sepolia



- The **Zhejiang Testnet** was the **first testnet launch** of the Shanghai Upgrade on a public Ethereum testnet. The activation was **successful** and did not encounter any issues.
- The **Sepolia Testnet** is the **next step** and a blog post announcing this upgrade is expected to be released on the Ethereum website around Feb 20th.
- The **Goerli Testnet** will be the **final test** launch before a **Mainnet launch in early April**.
- Alongside the testing for Shanghai, developers are also preparing for **EIP-4844 (now named the Deneb Upgrade)**, which will be the next in line. **Deneb will enable Proto-Danksharding**.

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About the author



Shivam Sharma

Shivam is currently working for Binance as Macro Researcher. Prior to joining Binance, he worked as an Investment Banking Associate / Analyst at Bank of America on the Debt Capital Markets desk, specializing in European Financial Institutions.

Shivam holds a BSc Economics degree from the London School of Economics & Political Science ("LSE") and has been involved in the cryptocurrency space since 2017.



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