State of Crypto

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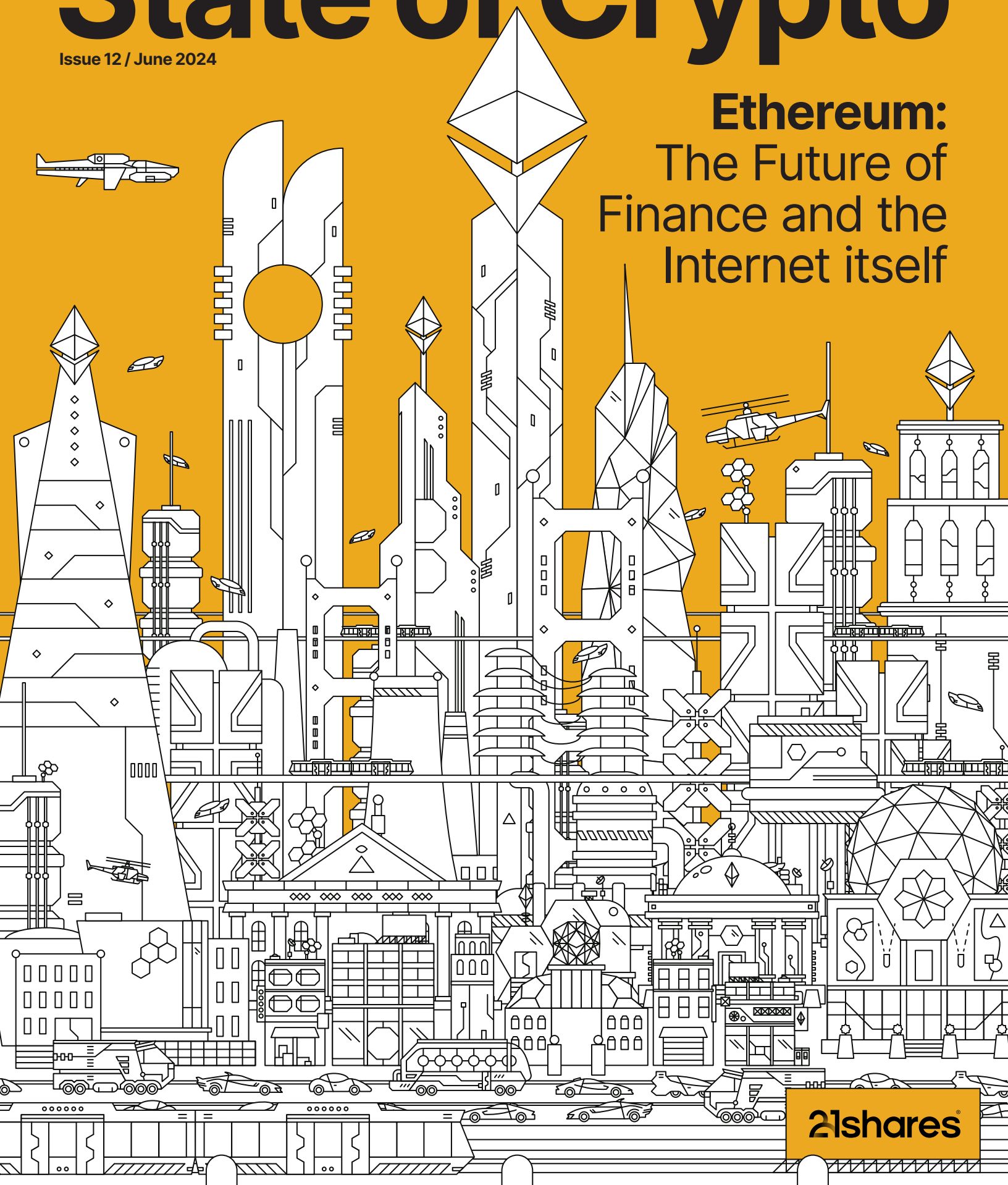
Ethereum: The Future of Finance and the Internet itself



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Introduction

Before Ethereum officially turns 10, we are thrilled to release our latest research report: a refreshing primer on the world's first decentralized global app store!

The digital landscape has undergone a seismic shift in recent years. Blockchain technology, once a niche concept relegated to enthusiasts, has emerged as a transformative force with the potential to reshape industries and redefine trust models. At the forefront of this revolution stands Ethereum, a decentralized platform that has taken blockchain technology beyond its initial use case of peer-to-peer payments.

This report will explore Ethereum in an urban context, to better explain the pillars of the network's burgeoning economy, and how they are encouraging thousands of developers around the world to contribute to its security and build use cases around it.

While this issue can act as a guide for those who are still getting to know Ethereum, we also dive deeper into the risks of brand new primitives on the network. We conclude this primer with our signature valuation methodologies and paint a picture of how to value Ethereum.

Finally, we hope that this piece guides and entices you to learn more about this revolutionary blockchain ecosystem.

"Once a niche concept relegated to enthusiasts, blockchain has emerged as a transformative force with the potential to reshape industries and redefine trust models."

Executive Summary

- **What is Ethereum?** Ethereum is a decentralized smart-contract platform that revolutionized the world of blockchain technology beyond its original use case, which was initially limited to peer-to-peer payments inspired by the Bitcoin model. In this section, we take you on a tour around the blockchain in an urban analogy to explain how blockchain empowered Ethereum into building a thriving ecosystem, spearheaded by its decentralized financial district.

- **What is Ether?** ETH, the native cryptoasset of the network, is the fuel that allows Ethereum to operate in the same way that we use oil to propel vehicles, heat buildings, and produce electricity in the physical world. Users must pay a "gas fee" or a transaction fee in ETH for every transaction they perform on the network.

- **What is a Smart Contract?** Smart contracts are like vending machines for legal agreements. They are self-executing programs on blockchains, and automate trustless transactions, removing the need for intermediaries. While the technology is still maturing, they offer significant advantages in efficiency and security. Their importance in the ecosystem is paramount as they facilitate the creation of innovative applications on Ethereum.

- **What is Gas?** In the digital world of Ethereum, gas is the essential fuel for transactions. Imagine it like a taxi fare - you pay a small amount of ETH to get your transaction processed by the network. This fee incentivizes validators to prioritize your transaction and keeps the network running smoothly. However, gas prices can fluctuate based on demand, sometimes surging during peak hours. While these fees are crucial for security, they can also be a hurdle for users, and that's where scaling solutions come in to relieve the incredible amount of stress on the Ethereum blockchain.

- **What is Proof-of-Stake/Staking?** Staking represents a more efficient consensus algorithm adopted by newer blockchains to determine the network's correct state. Validators participate by staking collateral, acting as insurance against potential dishonest behavior, which is deducted in case of violations. In return, validators are rewarded with the native token of the network, incentivizing ongoing support for network security. Conceptually, staking resembles a savings account, allowing users to participate and earn rewards based on their security contributions. This parallels the way users earn interest by depositing money in banks, fueling lending activities and sustaining the economy. In that sense, Ethereum's staking yield can be thought of as equivocal to an internet digital bond.

- **Liquid Staking/Re-Staking:** Liquid staking, introduced in 2021, tackled the inefficiencies of traditional staking. It allowed users to stake ETH and receive IOU tokens representing their principal and accrued yields. These tokens could be used as collateral in DeFi, enhancing liquidity and accessibility to staking markets without the need for personal infrastructure or meeting minimum balance requirements like the 32 ETH threshold. In contrast, Re-staking expands Ethereum's security to external networks, creating a trust marketplace. Smaller networks can now leverage Ethereum's security assurances, reducing costs and accelerating the establishment of their networks' security.

- **Risks:** Persistent inflationary pressures are a key risk for the crypto industry this year, delaying potential interest rate cuts and increasing pressure on risk-on assets like crypto. Additionally, the nonrestrictive growth of EigenLayer could transform Ethereum into a single point of failure while jeopardizing its security. Finally, competition from alternative smart contract platforms and the potential for institutions to advocate for regulated distributed ledger technology (DLT) platforms pose further risks to Ethereum's dominance.

- **Valuation:** Ethereum operates on a Proof-of-Stake system, where validators commit a portion of their capital—specifically, ETH—as a "stake" to earn recurring value from the network's activities. This positions Ethereum within the Capital Asset framework, allowing for the use of staking yield and transaction fees as proxies for future cash flows. The value of Ethereum can thus be estimated using the discounted cash flow method, which calculates the net present value of the annual flows to validators.

About Our Research

Since 2018, 21Shares has been providing access to crypto through simple and easy-to-use products — co-founded by Hany Rashwan and Ophelia Snyder.

The research team is a cross-functional department collaborating with the distribution, product, and engineering teams. Composed of professionals with substantial experience in the cryptoasset industry, our team places education at the core of our institutional-grade research as we stand by free and publicly accessible content and strongly believe information asymmetry contradicts the crypto ethos and philosophy. We provide data-driven, cutting-edge, unique insights into the crypto markets and macroeconomic factors likely to influence the state of this industry.

More than 10,000 investors are subscribed to our research notes and reports on a weekly basis, ranging from private banks, asset managers, professional traders, hedge funds, tier-1 media outlets, and regulators.

Adrian | Head of Research
Karim | Associate, Research
Leena | Associate, Research
Max | Associate, Research and Product

Ethereum: An Internet Economy

Ethereum is an open-source, decentralized smart-contract platform that revolutionized the world of blockchain technology beyond its use case which was initially limited to peer-to-peer payments, originally inspired by the Bitcoin model. However, Ethereum's success story lived to even inspire the pioneer crypto network eight years later — an epitome of the phrase, "the student became the master."

We can imagine Ethereum as a city booming with business activity. You can find thousands of companies in its famous financial district, offering exchange services like **Uniswap**, and its blueprint investment services that enable anyone to invest in the city's security, like **Lido** among many others. Ethereum's financial district has made it what it is today, but it has also paved the way for more business opportunities that go beyond the world of finance.

In November 2017, Ethereum had its first art gallery inaugurated. **CryptoKitties** took Ethereum by storm, auctioning fancy cat paintings. Each canvas is unique and therefore can't be swapped for another, it can however be resold, sometimes at a higher price. At the same time, galleries in Ethereum have a unique feature of automating royalty-sharing, ultimately benefiting the artists. These, as well as other terms in the city, are governed by self-executing **smart contracts**. CryptoKitties brought in $5 million in auctioned volume at its peak in December that year.

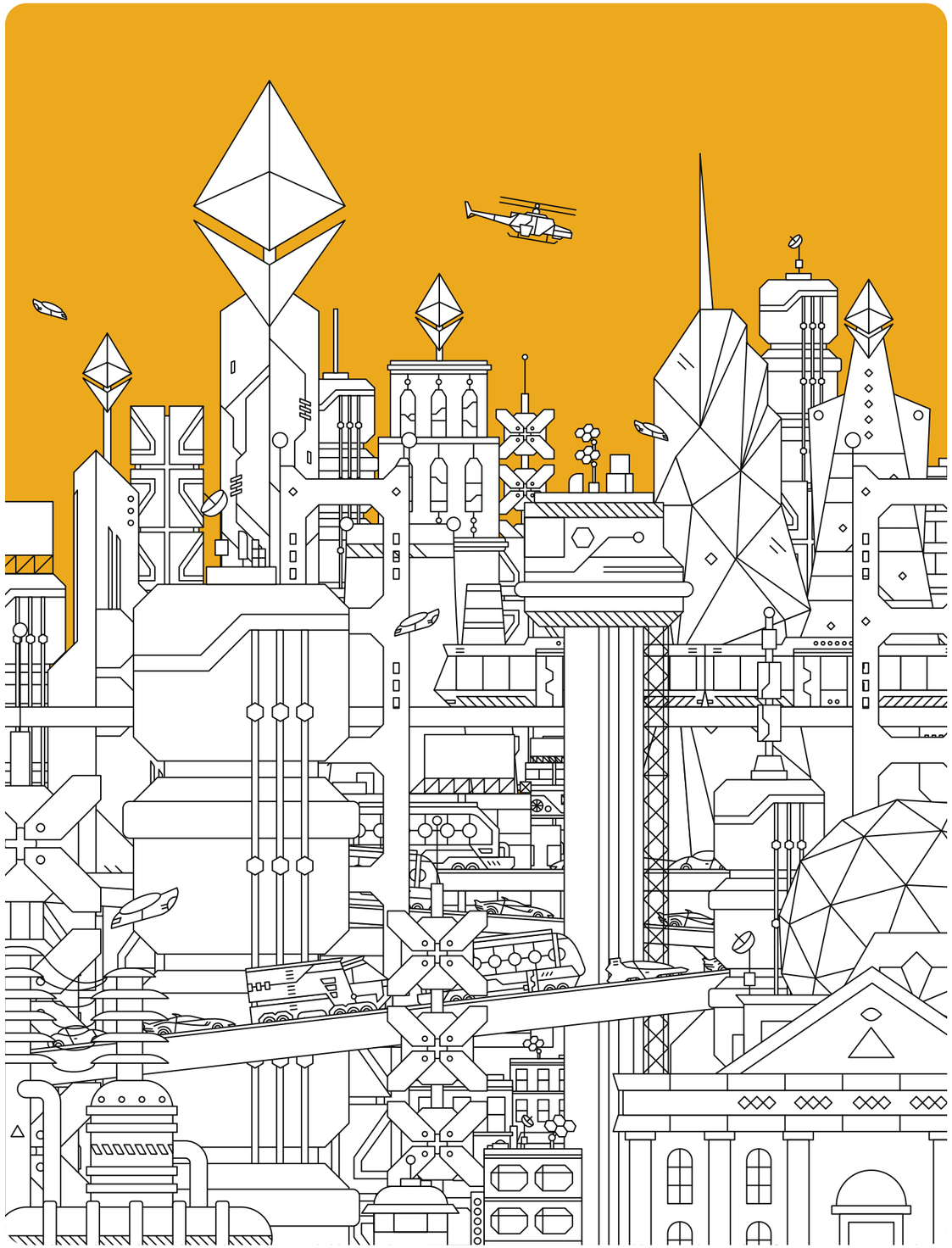
More communities began to move to Ethereum, influenced by that CryptoKitties moment of 2017, and they brought along their new business ideas catering to the needs of the native residents of Ethereum, who originally came here for a more **democratic**, **transparent**, **efficient**, and **safer** environment that they didn't find in other places like the older, centralized city of the Internet.

Even in a place like Ethereum one has to pay the **price of decentralized mobility**, and they pay it in a currency called **Gas**, or gwei, and it's a billionth of an ETH, the native currency of Ethereum. Because Ethereum is a decentralized economy, the streets are safeguarded by the grassroots of the city who are incentivized to offer their patrolling **validation** services by that gas paid by the dwellers.

Congestion burdened the city for weeks after the inauguration of CryptoKitties. Validators couldn't keep up with the traffic in the city that they had to increase the gas fees, creating an inconvenience that shaped Ethereum today. The city saw the rise of solutions offered by its builders who wanted to scale Ethereum to solve this congestion issue by developing **layer 2** tram networks.

More galleries took place later in 2021, making $17 billion that year. Nonetheless, CryptoKitties' underlying infrastructure was the real game-changer, non-fungible tokens were deployed onto many use cases in the Ethereum economy, championing **ownership** and identity **authentication**.

Before we end this urban analogy, it's important to note some statistics. The Ethereum economy stands at $450 billion by market cap since May 22nd this year, up by 102% since last year, however still 18% away from its all-time high back in November 2021. In April 2024, although a low season for Ethereum, there were 8 million people actively moving around doing business in Ethereum, paying over $37 million worth of ETH at that time in gas into its economy, secured by around a million validators. In contrast, at the peak of activity in November 2021 users paid an average of $217 million in gas fees.



So, What Really Is Ethereum?

Ethereum is a decentralized, open-source blockchain platform that enables developers to build and deploy smart contracts and decentralized applications (dApps). It represents the most significant innovation within the cryptoasset and blockchain industry since the creation of Bitcoin in 2009. Ethereum was co-founded in 2013 by Vitalik Buterin together with Gavin Wood, Charles Hoskinson, Anthony Di Iorio, and Joseph Lubin. The Ethereum mainnet went live on 2015 to become the second-largest cryptoasset by market cap. Unlike its big brother Bitcoin, Ethereum offers a distinct value proposition. While Bitcoin pioneered a decentralized peer-to-peer digital payment system, Ethereum introduced the concept of "**programmable money**" and **smart contracts**, revolutionizing blockchain technology.

Much like Bitcoin, Ethereum is a peer-to-peer network where transactions are recorded in a publicly available, decentralized ledger. What's different about Ethereum is that it launched out of Bitcoin's initial limitation as a simple settlement layer where people send and receive coins. From the start, Ethereum positioned itself as the infrastructure for building applications similar to websites or mobile applications like Robinhood, for example, on top of a fully a decentralized internet. In other words, a globally permissionless app store and a platform for Web 3 innovation.

The Go-To Settlement Layer for the Digital Economy

Since its launch, Ethereum has driven the evolution of the blockchain space with innovations, ranging from decentralized finance (DeFi), non-fungible tokens (NFTs), digital identity solutions, and the tokenization of real-world assets. Some of the most important innovations that have come out of DeFi include stablecoins, decentralized exchanges (DEXs), and lending & borrowing protocols. Stablecoins maintain price parity with a target asset, such as the U.S. dollar. DEXs, such as Uniswap, allow users to trade assets without the need for an intermediary, facilitating trillions of dollar volume since its inception. These and many other DeFi innovations reveal one of the core value propositions of Ethereum – the ability to act as a credibly neutral settlement layer where developers can automate away the need for centralized intermediaries and give power back to the individual.

Ethereum's use case grew exponentially beyond its own world of programmable money to serve a multitude of use cases, with **real-world asset (RWA) tokenization taking the front seat**. That is due to its fast finality, global access and 24/7 operation, leading to an 80%[1] cost reduction when it comes to bond issuance. Tokenization involves the conversion of real-world assets—ranging from real estate and securities to art and intellectual property, into digital assets, or tokens, that are recorded on a blockchain. Each token represents a fraction of ownership in the asset, allowing for increased liquidity, fractional ownership opportunities, and streamlined transactions within a secure and transparent decentralized ledger system.

Ethereum Stats and Figures

- **Lots of Active Users:** Ethereum is home to one of the stickiest user bases due to its deep liquidity and vibrant ecosystem, unlike other blockchains which enjoy a temporary surge in user activity on the back of incentivization programs, but fail to sustain over the long term. For instance, Ethereum maintains its position in the top three leading networks in terms of user activity, which is currently home to around 500K active daily users.
- **Dominance in DeFi:** Ethereum currently maintains a ~57% of the total value locked (TVL) across the entire DeFi ecosystem over the past two years, with the biggest contributor being the Liquid Staking Tokens (LSTs) sector and RWAs.
- **Energy Efficient:** Ethereum's energy consumption dropped significantly by 99.9% following the Merge upgrade switching from Proof-of-Work (PoW) to Proof-of-Stake (PoS).
- **Settlement Volume:** Ethereum is the only blockchain that was able to keep up with Visa's settlement capabilities as they processed $3.01 trillion worth of payments vs $3.04 trillion for the incumbent payment provider in Q1 of 2023.
- **Tokenization Dominance:** Ethereum accounts for over 80% of the total assets under management (AuM) across tokenization protocols such as US Treasuries, Private Credit, Equites, Money Markets, and Tokenized Commodities (Gold mainly).

What Is the Role of the Native Currency?

Ether (ETH), the native cryptoasset of the network, is the fuel that allows Ethereum to operate in the same way that we use oil to propel vehicles, heat buildings, and produce electricity in the physical world. Users must pay a "gas fee" or a transaction fee in ETH for every transaction they perform on the network. The term "gas" refers to the unit that measures the computational effort required to execute specific operations on the Ethereum blockchain. Thus, **ETH is analogous to a digital commodity** powering the Ethereum network, which will be further explained in a later section.

What Is Ether's Supply Like?

Unlike Bitcoin, Ethereum doesn't have a cap on its supply, yet it has a decentralized mechanism to protect its economy from inflation, as shown in Figure 1. As of May 10, 2024, there are 120 million ETH in circulating supply. Historically, Ethereum operated on a similar issuance model to Bitcoin, with miners rewarded with newly minted ETH for validating transactions through the PoW consensus mechanism. In 2015, Ethereum miners were able to mint **5 ETH** per block. In 2017, the mining reward got reduced to **3 ETH** per block, and two years later got reduced to **2 ETH**. Unlike Bitcoin, Ethereum's issuance rate reduction model was not hardcoded on the network's backend. The aforementioned implementation happened on the back of the Byzantium upgrade in October 2017 and Constantinople in 2019. However, Ethereum's journey towards becoming a deflationary asset began with the introduction of the London hard fork in August 2021, which introduced a number of Ethereum Improvement Proposals (EIPs).

ETH Supply = Daily Validator Rewards - Base Fees Burned per Day

How Did Ether Become a Deflationary Asset?

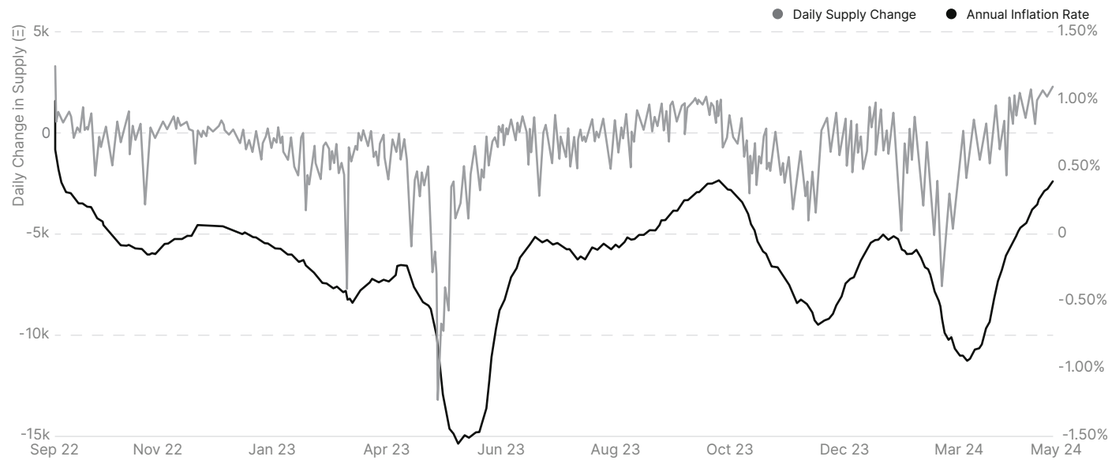
At the heart of Ethereum's deflationary shift is the implementation of the EIP-1559 upgrade, a pivotal milestone in Ethereum's evolution. EIP-1559 overhauled Ethereum's fee structure by introducing a base fee that adjusts dynamically based on network demand. This base fee is "burned", or permanently removed from circulation, similar to a stock buy-back, for each transaction, while validators receive only the "tip". As shown in Figure 2, the burning mechanism reduces the supply of ETH over time, making it deflationary when the burn rate exceeds the issuance. Additionally, EIP-1559 aims to optimize transaction fees and improve user experience by reducing fee volatility and network congestion.

This essentially means that the more activity on the network the more ETH burned and the more deflationary ETH becomes! So far, there has been a total of 4.28 million ETH burned since the implementation of the EIP-1559 upgrade, which has sent Ether's inflation rate to as low as -0.89% in March 2024.

What Is the Role of Ether?

The role of Ether has been growing with the growth of Ethe-

Figure 1 – Annualized ETH Inflation Rate and Daily Change in Supply



Source: 21co on Dune Analytics

reum's use cases along with its sustainability. ETH started off being used by developers to **build decentralized applications** who can then **mint their own fungible tokens**. In 2015, Fabian Vogelsteller proposed the 20th Ethereum Request for Comment (ERC-20) when the lack of interoperability between the tokens minted within the Ethereum ecosystem posed a problem of inefficiency.

There are now around 500K ERC-20 tokens linked to dApps on Ethereum, each having its own utility and governed by its own smart contracts, which have almost 40% of Ethereum's supply locked in them. Although dApps are at the core of Ethereum, Ether's role goes beyond that:

Governance: Although it is a grassroot, community-driven process, Ethereum's governance is conducted off-chain. At the protocol level, the decision-making is done through an informal process of social discussions on forums like **Discord** and the **Fellowship of Ethereum Magicians** between the Ethereum Foundation and its stakeholders. These stakeholders include ETH holders, validators, node operators, EIP authors, application users, and developers. It is kept that way to protect the protocol from second-party risk since voting power in the on-chain framework is proportional to the amount of tokens held. That said, anyone can put forward an EIP, contribute to these proposals as a developer, or run a validator node.

Moreover, all dApps and decentralized autonomous organizations (DAOs) on Ethereum like **Uniswap** and **MakerDAO** fully rely on on-chain consensus, engaging users in building the applications built on Ethereum from the ground up. This makes Ethereum truly decentralized and thus capable of practicing democracy. There have been hundreds of proposals since the launch of Ethereum, dozens of which have been approved. The number of voters has grown to the thousands. In the U.S., for example, bills are voted on by only 435 seats reserved to only a select few in Congress.

Staking: Validators, much like traffic controllers or checkpoints, are responsible for storing data, processing transactions, and adding new blocks to the blockchain. Users wishing to run a validator node require some technical expertise and have to stake 32 ETH. Ethereum users are encouraged to delegate their ETH to validators through staking pools to incentivize them to take on more blocks and, in turn, secure the network, thereby enabling users with small amounts of ETH to participate and earn rewards without needing to stake the full 32 ETH required to become individual validators. In return for their efforts, Ethereum users earn a yield proportional to their contribution, estimated to be 3-7% annually. The yield comes from issuance, the maximal extractable value, priority fees – which we'll discuss later in this report.

Staking Yield =
Maximal Extractable Value + Priority Fees + Issuance

Why Is ETH Important for Ethereum?

Now that we've walked you through the role of Ether and how it fuels Ethereum's economy, there is no better opportunity to challenge the outdated argument that blockchain technology can live without its tokens. **A blockchain without an asset would not scale**. The need for a token is rooted in the need for a public resource that anyone can access and use to contribute to the network's security. This very concept turned Ethereum into a public utility: a global settlement layer that is free from the coercion of centralized entities prone to corruption. Without a token, Ethereum would be another private database that is run exclusively by different companies without utilizing this blockchain to its full potential.

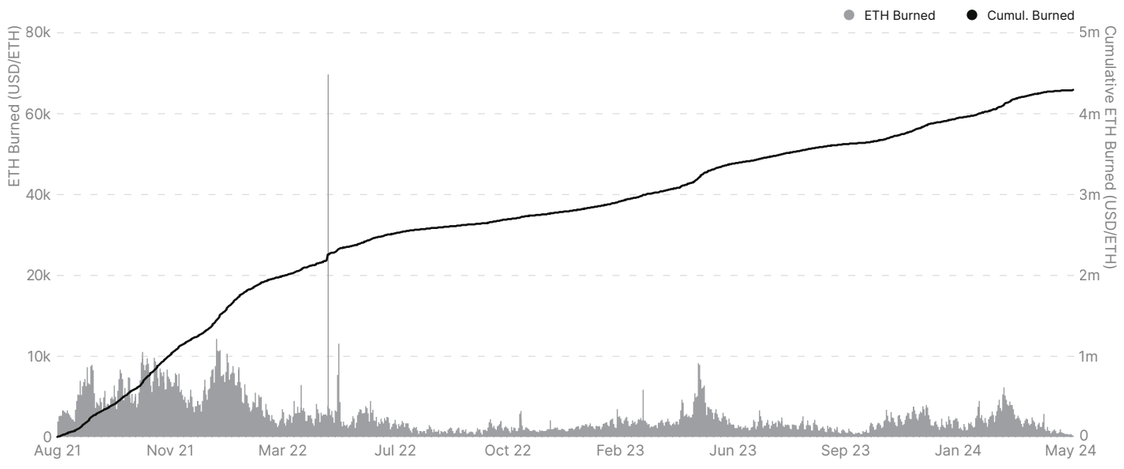
Only a native token unlocks these capabilities, allowing anyone on the globe with an internet connection to participate. **Being a public network ensures there is a credible settlement layer that anyone can audit and isn't gatekept by corporations with vested interests**. Additionally, a native crypto token has many benefits to its blockchain, primarily in the department of security and network effects.

Increased activity eventually pumps the price of the asset and in turn excites more users to accumulate ETH for the yield it has against the dollar and other local currencies, not to mention the staking yield. As previously mentioned, transaction fees, or **gas**, don't only act as an incentive for validators but also effectively implements the burn mechanism, making ETH a deflationary asset, further increasing the value the network holds.

Aside from ETH being used to fuel the network's security, it also fosters a vibrant ecosystem of dApps powered by **smart contracts**. These self-executing contracts act as the backbone of Ethereum's functionality.

Before we delve deeper into the functions and value of these pillars of Ethereum's economy in the coming sections, we can concur that **ETH is practically a more functional stock** that goes beyond yield accrual. Imagine if an AAPL stock directly poured into the company's security and was used to build applications on Apple's operating system, and there was a transparent way to vote on iOS upgrades and track where your money is going... welcome to the Ethereum economy!

Figure 2 – ETH Burned Since the EIP-1559 Proposal

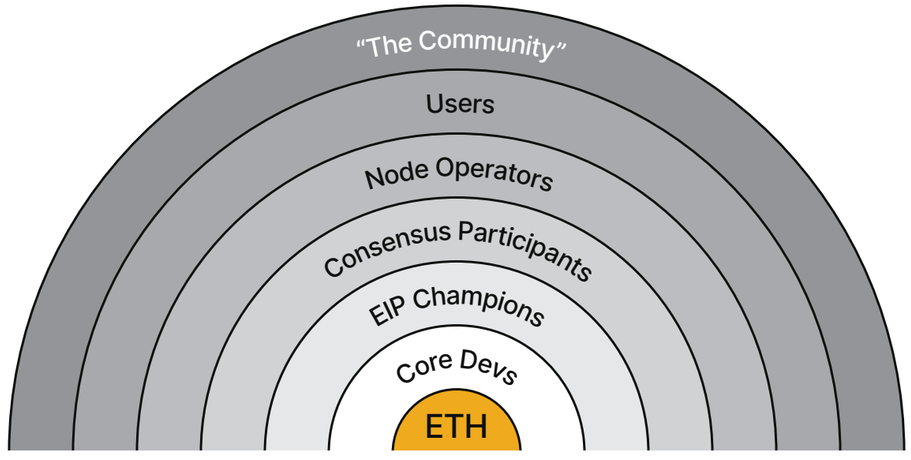


Source: 21co on Dune Analytics

Figure 3 – Percent of Supply Held in Smart Contracts

Source: Glassnode

Figure 4 – Governance Process



Source: Tim Beiko, Ethereum Foundation

What Is Gas?

Gas is the term used to describe transaction fees paid on Ethereum, which is teeming with activity as users buy and sell all sorts of digital goods and services. Each and every transaction delivers information, and Ethereum executes these like a high-speed delivery drone processing an average of 13.7 transactions per second[2] in the last month. However, even in the futuristic city of Ethereum, things don't run for free. Anyone that wants to move around the city and interact with all things native to Ethereum, needs to pay the price of **decentralized mobility**, or in other words, they need to pay gas fees!

How Does Gas Work?

Just like taxis need fuel to navigate the city streets, any transaction on Ethereum needs gas to travel through the blockchain. Gas is measured in tiny units called **gwei**, a billionth of a fraction of Ethereum's native currency, ETH.

Gas fees are essentially the fare paid to use Ethereum's taxi service, to get your transaction processed on the network. The fare is broken down into two parts, the **base fee** and the **priority fee**.

Gas Price = Base Fee + Priority Fee

The base fee is set by the network to keep things running smoothly. During network congestion, this portion of the fee increases, similar to rush hour taxi fares. For instance as shown in Figure 5, in early May 2022, we saw the average base fee temporarily reach over $0.001. This discourages spam transactions and incentivizes validators to process transactions quickly. On top of this, the base fee gets "burned" after processing, meaning it is removed from Ethereum's economy, acting as a deflationary tool benefitting all Ethereum residents.

The priority fees act like a tip to a taxi service. By offering a higher priority fee, you essentially nudge validators to process your transaction sooner, acting like a VIP pass that allows you to skip through the network congestion or traffic. This fee goes directly to the validators who ensured your transaction's security and successful completion. Without these fees, there would be little incentive for validators to run their services!

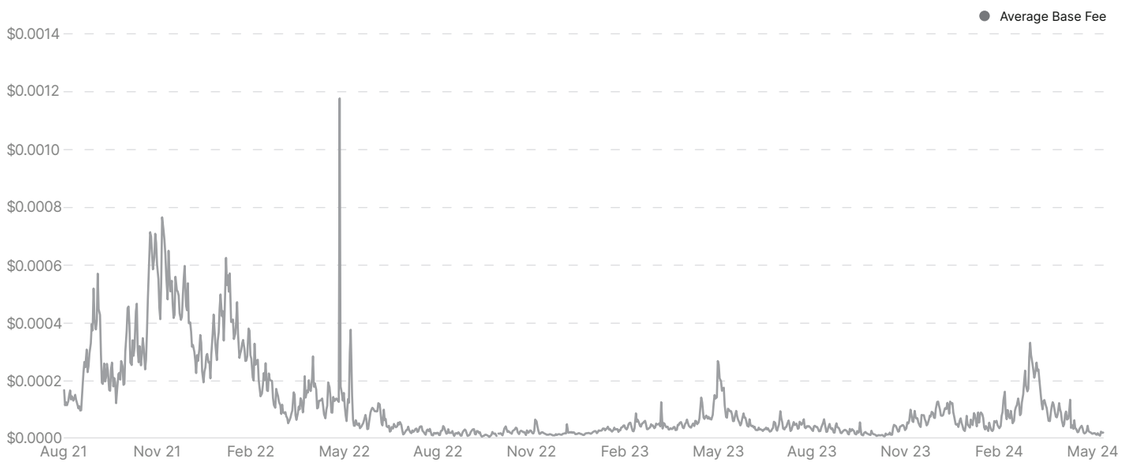
The total gas fee is simply the sum of the base fee and any priority fee you choose to offer, multiplied by the amount of **gas used** by your transaction, shown below. The usage depends on the complexity of the transaction, just how a longer taxi ride would cost more. In essence, the **gas price** reflects the rate of your transaction, while the gas used represents the distance traveled on the Ethereum network.

Total Gas Fee = Gas Price x Gas Usage

Ethereum has a booming economy housing a famous financial district with new-age banks offering lending and borrowing solutions, such as **Uniswap** and **Aave**, and is full of digital art galleries like, **CryptoPunks** which was one of the first of its kind! As such, Ethereum isn't just about sending money from one place to another, but it is a hub for innovation with several businesses or dApps, which all crucially require gas to use or interact with!

Gas fees are the lifeblood of Ethereum, and every interaction within these dApps contribute to the network's value, as they rely on ETH for transactions. When looking at Figure 7, we can see that ETH is used across many different venues such as blockchain-based gaming, contract creation or art trading

Figure 5 – ETH Average Base Fee



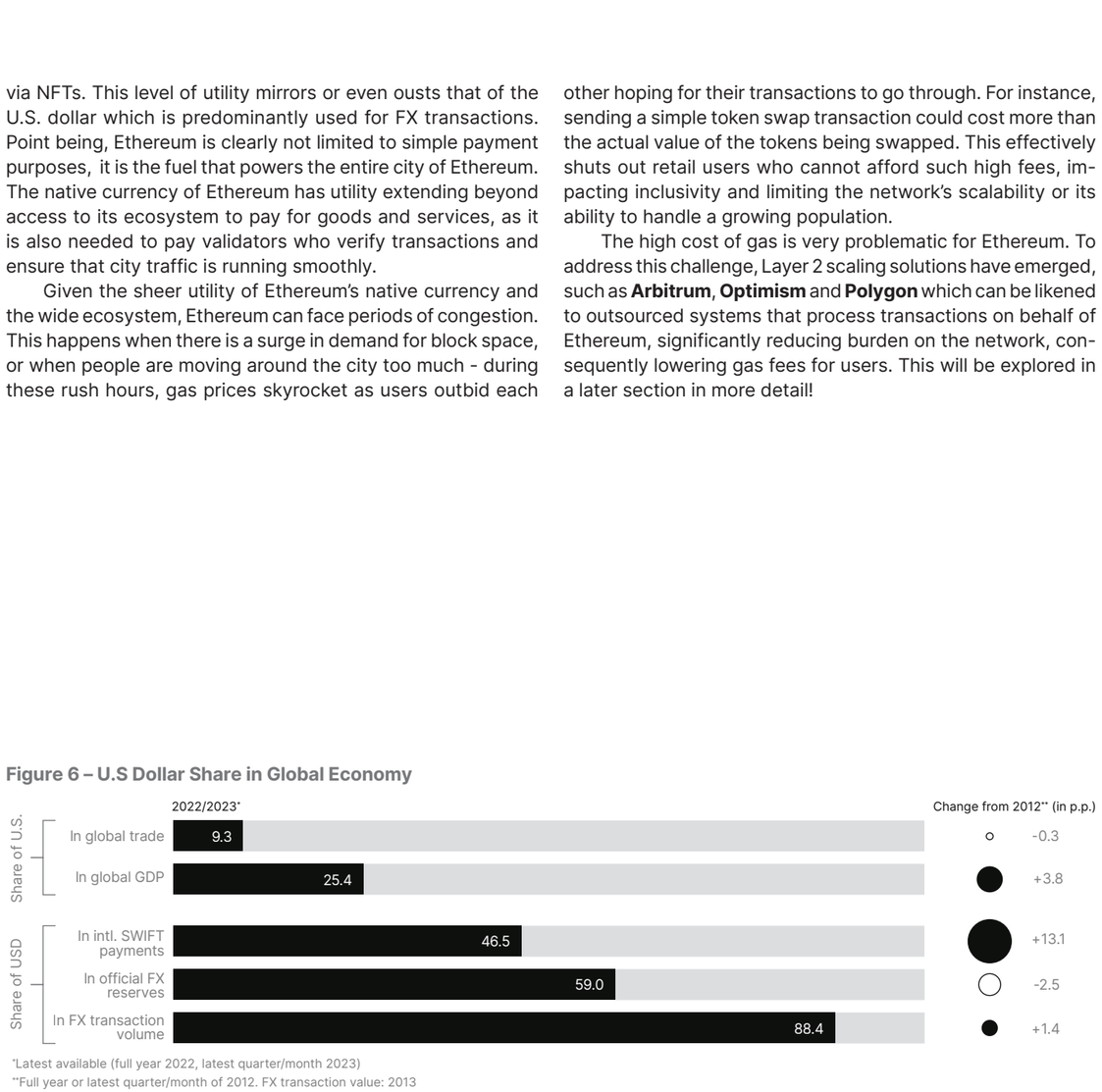
Source: 21co on Dune Analytics

via NFTs. This level of utility mirrors or even ousts that of the U.S. dollar which is predominantly used for FX transactions. Point being, Ethereum is clearly not limited to simple payment purposes, it is the fuel that powers the entire city of Ethereum. The native currency of Ethereum has utility extending beyond access to its ecosystem to pay for goods and services, as it is also needed to pay validators who verify transactions and ensure that city traffic is running smoothly.

Given the sheer utility of Ethereum's native currency and the wide ecosystem, Ethereum can face periods of congestion. This happens when there is a surge in demand for block space, or when people are moving around the city too much - during these rush hours, gas prices skyrocket as users outbid each other hoping for their transactions to go through. For instance, sending a simple token swap transaction could cost more than the actual value of the tokens being swapped. This effectively shuts out retail users who cannot afford such high fees, impacting inclusivity and limiting the network's scalability or its ability to handle a growing population.

The high cost of gas is very problematic for Ethereum. To address this challenge, Layer 2 scaling solutions have emerged, such as **Arbitrum**, **Optimism** and **Polygon** which can be likened to outsourced systems that process transactions on behalf of Ethereum, significantly reducing burden on the network, consequently lowering gas fees for users. This will be explored in a later section in more detail!

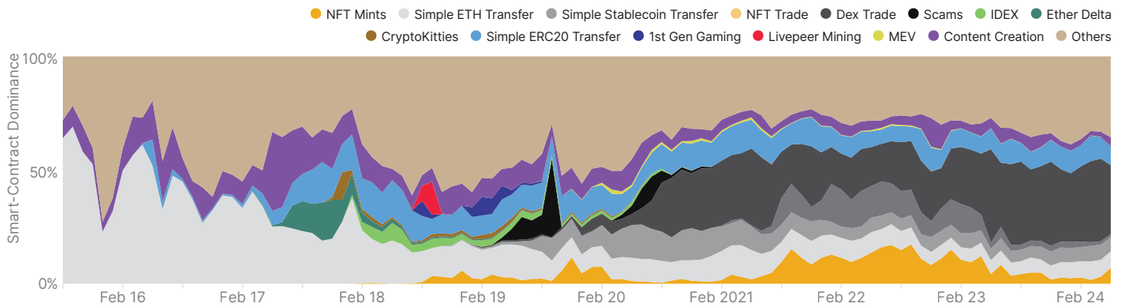
Figure 6 – U.S Dollar Share in Global Economy



*Latest available (full year 2022, latest quarter/month 2023)
**Full year or latest quarter/month of 2012. FX transaction value: 2013

Source: International Monetary Fund, SWIFT, World Trade Organization, Bank for International Settlements

Figure 7 – Percentage of Gas Spent Breakdown



Source: 21co on Dune Analytics

What Is a Smart Contract?

Smart contracts are a groundbreaking innovation on the Ethereum blockchain. It is similar to a vending machine, where specific inputs ensure preselected outcomes. They are self-executing programs stored on a blockchain, triggering predetermined actions when certain conditions are met, eliminating the need for intermediaries, boosting efficiency and security. The concept of smart contracts originated in 1998, pioneered by computer scientist **Nick Szabo**, who conceptualized **Bit Gold**, one of the earliest attempts at a decentralized currency. Though Bit Gold never came to fruition, the idea of smart contracts lived on.

Traditional contracts are reliant on trust in several areas. As such, legal implications ensure all parties fulfill obligations outlined in the contract, however significant challenges can arise due to contract misinterpretation or breaches of good faith. Even simple exchanges require a level of trust not required with smart contract platforms. For instance, in a straightforward agreement between roommates to split rent and utilities equally, each roommate trusts the other to pay their full rent on time and conflict can easily arise from late payments.

Resolving such disputes can involve a third party, such as a landlord, who mediates or enforces the agreement, or could be taken further to court which is time consuming and costly. For instance, in 2022 the global legal services market was estimated at **$952.29 billion**, illustrating the massive loss of capital attributed to contractual disputes and legal battles.

Smart contracts offer a more efficient approach. They are encoded with special powers, acting like self-contained agreements with built-in enforcement mechanisms; a lawyer, cashier and police officer all in one! Unlike traditional contracts, they don't rely on legal terms written in them or ink signatures, but rather use "**if/then**" logic and predefined rules to govern execution.

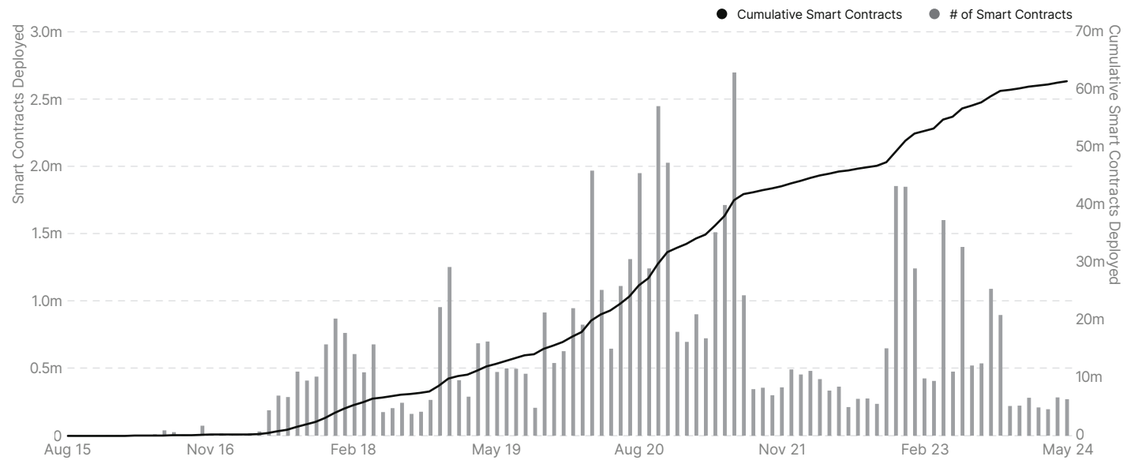
One of the most significant advantages of smart contracts is the **reduced reliance on trust**. The code itself dictates the terms of agreement, eliminating room for misinterpretation or delays caused by negotiating settlements, fostering a more streamlined and efficient process. Furthermore, smart contracts automate the execution or completion of the agreement. When certain conditions are met, the code automatically executes the defined actions, removing the need for intermediaries, in turn reducing costs and expediting the completion of transactions. Due to the high-level of automation and programmability smart contracts offer, multiple transactions can be carried out at once, significantly reducing the manual time spent on executing transactions. On top of that, in the traditional financial world, transactions need to be executed sequentially one by one, which could lead to price fluctuations or slippage, and therefore expose users to unforeseen risks and potential cost implications.

Due to the novelty of the technology, smart contracts come with some risks. Their programmable nature means they are **susceptible to coding errors or bugs**. Like any software, these vulnerabilities can lead to unintended consequences, even honest errors in coding can trigger the wrong actions and cause financial losses. Their immutable nature may be a double-edged sword, as while they ensure predictable outcomes and a clear rulebook, once deployed, modifying them is usually difficult or impossible. While Ethereum smart contracts offer unparalleled transparency due to them being on a public blockchain, it does **expose them to hacking attempts**. In 2022 PolyNetwork smart contracts were breached for **$611 million**, luckily however, the story ended with the hacker returning the funds.

Smart contracts offer a powerful and secure way to conduct agreements, and have gathered immense popularity with over **61 million** deployed on Ethereum until now. While they still have limitations, ongoing development is continuously aiming to improve the technology. Further, the innovation paves the way for dApps – powerful tooling built on blockchains that leverage smart contracts to automate a wide range of applications.

"Smart contracts come with built-in enforcement mechanisms; a lawyer, a cashier, and a police officer, all in one."

Figure 8 – Number of Smart Contracts Deployed



Source: 21co on Dune Analytics

Ethereum dApps

What Are dApps?
Imagine a digital world, where you are in control of your data, can interact directly with others and bypass the drawbacks of the traditional internet model and centralized applications. This is the vision behind Ethereum, and its ecosystem of dApps, built on blockchain technology and operating through a network of computers, removing the need for a single authority to control their functionality or access. This is also the vision that attracted many global brands from a variety of industries, such as Nike, Starbucks, and BlackRock, to start using Ethereum dApps.

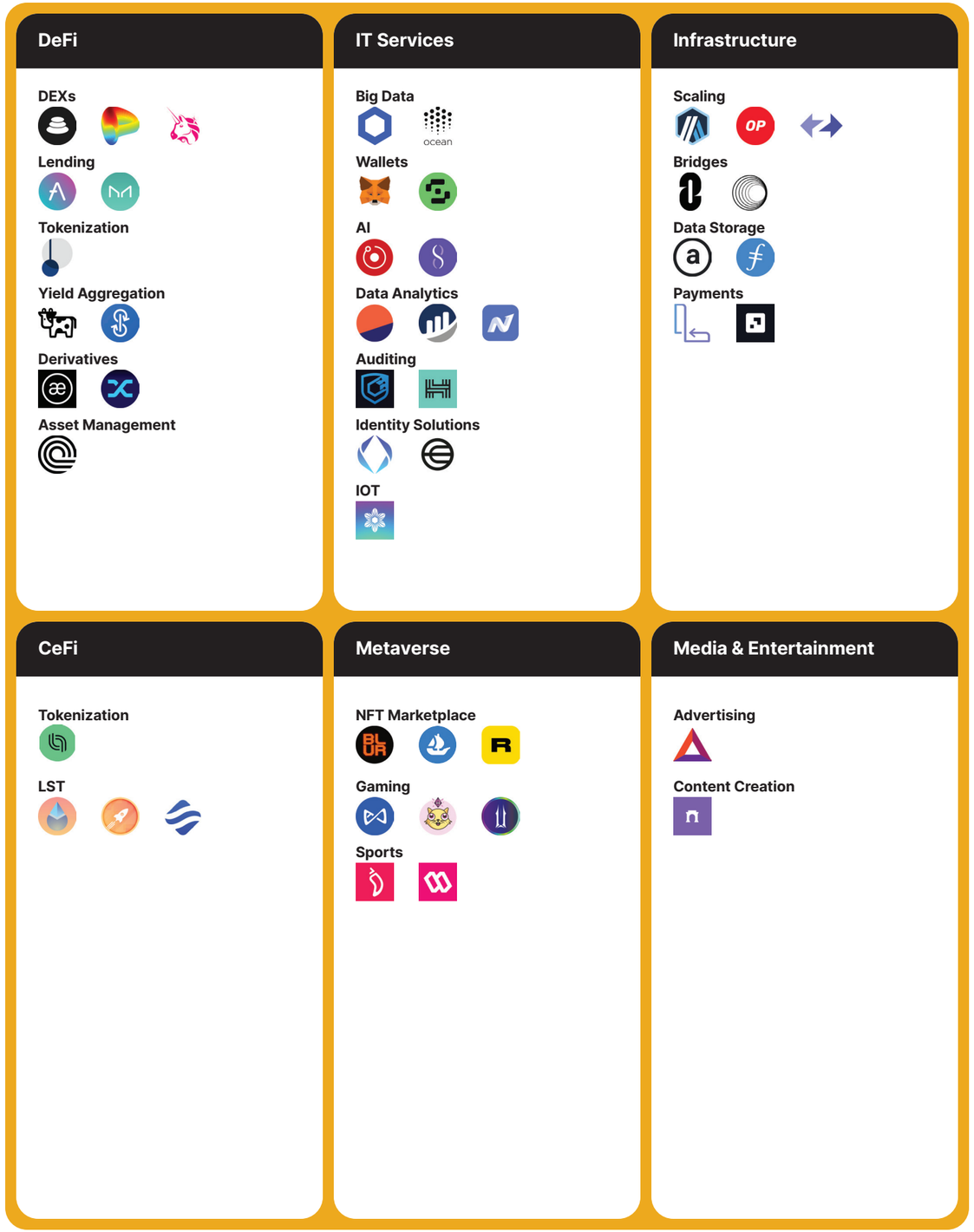
Unlike in traditional finance, dApps have the potential to be more accessible as they allow anyone in the world with an internet connection to get onboarded. For instance, 24% of the global adult population, or approximately 1.5 billion people, remain unbanked likely due to strict KYC requirements or geographical restrictions associated with opening a bank account. Ethereum has a booming financial district with protocols like **Uniswap** and **Aave**. These dApps could offer these individuals access to basic services like lending, borrowing and peer-to-peer trading through tools like non-custodial wallets which abstract away the limitations from traditional institutions, paving the way for a more inclusive financial system.

We can think of dApps as the user-friendly interface sitting on top of the powerful engine of smart contract technology. They are essentially a programmable storefront allowing users to interact with multiple blockchain functionalities, including other dApps! They often combine multiple smart contracts, and external data sources to create complex applications such as social networks or prediction markets which all boast unparalleled transparency. All interactions from past transactions, to current users are recorded, providing complete and real-time auditability, a stark contrast to traditional businesses which record their performance on a quarterly basis.

Now we will explore industries within the wide Ethereum ecosystem shown in Figure 9, which showcases the wide use cases dApps can offer, beyond the aforementioned bustling financial district.

NFTs: Helping Artists Break Free from Expensive Shackles
One of the most renowned use cases for Ethereum remains the digital art ecosystem powered by NFTs. These digital tokens essentially act as ownership certificates for unique digital assets, revolutionizing how creators can monetize their work. The critical challenge for monetizing digital art has historically been

Figure 9 – A Map of dApps on Ethereum



Source: 21Shares

its fungibility and lack of clear ownership, for instance, anyone can make copies of pictures you post online! NFTs tackle this by assigning a unique identifier to each piece of artwork, creating verifiable proof of ownership.

This empowers artists to generate revenue easier, bypassing traditional galleries which often take massive commissions of up to **60%**[3], as artists can sell their work directly to collectors through marketplaces like **Opensea** and **Blur** which take way smaller cuts. Their popularity amongst users is massive, collectively raking in **$470 million** in volume in April 2024 with over 300,000 transactions. The impact of this technology on the art industry is undeniable; prominent auction houses Sotheby's and Christie's partnered with digital artists Pak and Beeple, who have sold NFT-related artwork for **$17 million** and **$69 million**, respectively. So far in, there has been **$3.37 billion** in transaction volume for NFTs, showcasing the massive attraction and impact this industry alone has on the Ethereum ecosystem. Whilst this technology has been largely within art-ownership, it also has the potential to be used across other industries, like verifying event tickets, or for in-game items that allow players to truly own and monetize their gaming experience.

Tokenization: Bringing Real Assets On-Chain

Due to its credible neutrality, Ethereum is poised to be the network of choice for tokenization, representing a paradigm shift in how we represent ownership of real-world assets. Traditionally, assets like real estate or mutual funds, require significant capital investment and are often illiquid. Blockchain technology unlocks new possibilities by making them more accessible to a wide range of investors through fractionalized ownership, eliminating the barrier of high upfront costs. Furthermore, tokenized assets can be easily traded on secondary markets, without weekend disruptions, enhancing liquidity, and allowing for faster and more efficient transactions.

Ethereum is the leader in this space as shown in Figure 10, with over **$2.5 billion** tokenized assets, representing **86.7%** of the landscape excluding fiat-collateralized stablecoins. That said, government securities, primarily U.S. treasuries have been tokenized on Ethereum's blockchain. This sector has experienced accelerated growth due to the U.S. Federal Reserve's high-interest rate policy of maintaining rates at 5.25% the last two quarters, as well as the recent introduction of BlackRock's USD Institutional Digital Liquidity (BUIDL) Fund on the network. This development prompted one of the leading crypto-native applications, **Ondo Finance**, to transfer nearly **$100 million** worth of treasury bills to BlackRock's flagship product, capitalizing on the fund's instantaneous settlement feature.

The growing ecosystem of Ethereum, with currently over **4500 dApps**[4], are a fundamental driver of the Ethereum economy. As mentioned, every interaction on the network is paid with Ethereum's native currency, ETH, including transactions executed on these dApps.

It is important to remember that Ethereum applications are still a lot younger than their traditional counterparts and as such there is still work to be done on their user-friendliness. That said, the benefits are undeniable. Users are able to control their own data end-to-end, away from the prying eyes of centralized authorities, removing concerns over censorship as no single entity can dictate what information to display or what assets are allowed to be traded. dApps are undoubtedly still in their early stages, but represent a more decentralized and user-empowered future.

"Ethereum's blockchain has onboarded over $1 billion in tokenized government securities, led by U.S. treasury bills."

Figure 10 – Tokenization Market Cap by Blockchain

Source: 21co on Dune Analytics

What Is Proof-of-Stake?

Proof-of-Stake (PoS) is an algorithm utilized by blockchains to agree on the network's accurate state. Unlike the energy-intensive process used by Bitcoin and older networks, where miners compete to solve intricate mathematical puzzles for transaction validation and block creation, PoS enables users (**validators**) to stake a certain amount of native crypto as insurance to contend for the chance to propose new blocks. The likelihood of being chosen to propose and validate new blocks in each round (**every ~12 seconds**) increases in direct proportion to the amount staked, encouraging greater involvement from validators. This process, wherein validators engage to verify transactions and safeguard the network, is termed **staking**. From that perspective, Ethereum has onboarded nearly 1 million validators since the launch of the Beacon chain in December 2020, as depicted in Figure 11.

The Parameters Governing Staking

Staking also includes a disciplinary measure known as **slashing**, which deducts a portion of a staker's insurance (**stake**) if they engage in harmful behavior. These violations could encompass **prolonged inactivity in producing blocks, the validation of conflicting blocks (double signing), or proposing invalid blocks that contradict the attestations of other validators**. However, while it's important to note that the severity of slashing consequences varies depending on the gravity of the validator violations, Ethereum had 413 slashing events in total with the majority stemming from a few specific occurrences rather than being a constant issue.

Analagously, staking mirrors the process of depositing money into a savings account, with users committing capital for a set duration to earn passive returns. They retain the flexibility to withdraw both the principal amount and the accrued yield at their discretion, given a de-congested **exit and withdrawal queues.** Both measures are put in place to ensure that validators aren't leaving the network in masses which would compromise Ethereum's security. The current waiting queue takes about 10 hours before a validator can exit the network as of May 2024[6].

That said, akin to how traditional banks use deposited funds for lending, Ethereum utilizes staked ETH to secure transactions and validate blocks, rewarding its stakeholders with ETH. From this perspective, Ethereum's **staking yield** can be viewed as that of a digital bond, offering returns that closely resemble a risk-free rate. Despite variations in the Annual Percentage Yield (APY), influenced by factors such as staking participation and network activity, the yield remains relatively stable due to Ethereum's prominence as the leading settlement platform, resulting in fairly predictable returns unlike the rest of the digital asset ecosystem yields, as depicted in Figure 11.

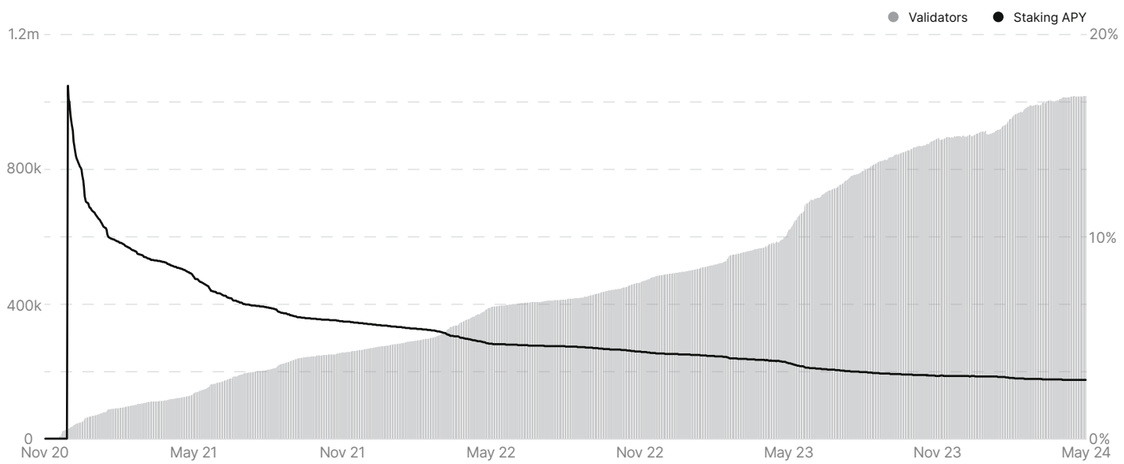
Reward System

Validators earn rewards based on two different sources: Consensus and Execution rewards. **Consensus Layer** (**CL**) rewards serve to incentivize validators to actively engage in reaching consensus, which come from token issuance. They are structured to be predictable and sustainable based on the number of validators, fostering a robust level of participation essential for the network to continuously validate new blocks and maintain its fundamental operations smoothly. Activities eligible for Consensus rewards include proposing new blocks, voting for the block leaders and participating in sync committees. Alternatively, **Execution Layer** (**EL**) rewards are versatile, adjusting in response to the network's activity levels. Tailored to compensate validators for their contributions in transaction processing and execution of smart-contract related operations, these rewards account for **transaction priority tips and Maximal Extractable Value (MEV) tips**, which ultimately enable the Ethereum economy to flourish and keep chugging along.

Priority tips refer to additional charges users pay to ensure swift processing of their transactions within a block. On the other hand, MEV rewards signify the maximum rewards validators can earn through transaction rearrangement or strategic insertion. Within this framework, MEV can lead to occurrences such as front-run and back-run attacks, colloquially known as sandwich attacks, by validators. However, not all MEV can be considered as toxic-flow as certain transactions like liquidations and back-runs are beneficial for DeFi. This can be observed in Figure 12, showcasing that certain on-chain transactions may require more computational resources than others, which would influence the validator's decision to prioritize specific transactions over others. In that regard, validators have accumulated nearly $700 million in gross profit through their involvement with MEV, highlighting the lucrative nature of this activity, as seen in Figure 13.

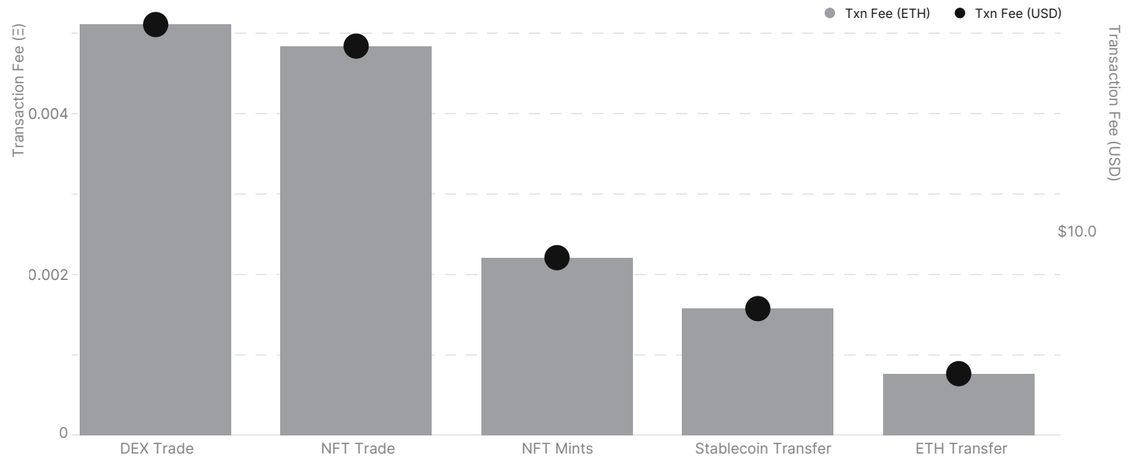
Nevertheless, specific solutions are currently being embraced to safeguard users against this form of market manipulation, such as Flashbots Protect. Flashbots isolate transactions from the network's public waiting room (**Mempool**) and ensure they are confidentially fed directly to validators to avoid any transaction reordering.

Figure 11: Ethereum's Staking APY and Total Number of Validators



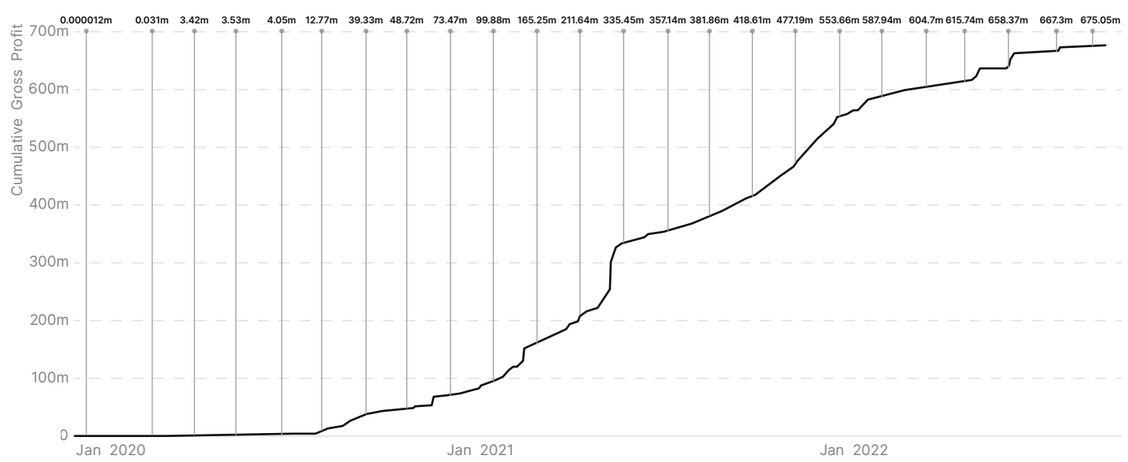
Source: 21co on Dune Analytics

Figure 12 – Transaction Fee Breakdown by Type of Transaction



Source: 21co on Dune Analytics

Figure 13 – Cumulative Extracted Gross Profits through MEV



Source: explore.flashbots.net

The Evolution of Staking: Liquid Staking and Re-Staking

Ethereum began its transition to a PoS network in December 2020 with the deployment of the Beacon chain. Initially, users were only allowed to deposit their ETH, anticipating a waiting period of several years until the eventual Merge. This Merge would bring together the then-ongoing PoW system and the newly-established PoS network, followed by a subsequent upgrade known as the Shapella Upgrade, before users could withdraw their funds. While this wasn't a concern for long-term believers in the network, it did present a capital efficiency problem. Users were unable to participate in ETH staking without relinquishing access to their capital temporarily. This is where Liquid Staking emerged as a solution, a new trend pioneered by Lido Finance.

Liquid Staking: Capital Efficient Staking

In essence, Liquid Staking platforms enable users to deposit their ETH in exchange for a receipt or an IOU token. These tokens symbolize both the deposited ETH and the daily accrued yield from staking. While users can't directly withdraw their initial deposit and rewards, they enjoy the flexibility to trade the tokenized receipt on secondary markets. This innovation renders the ETH staking market liquid, enabling participants to enter and exit without the restrictions of traditional staking. Additionally, it amplifies the utility of staked ETH, as users can stake their assets to earn yield while concurrently participating in DeFi activities, leveraging their receipt tokens as collateral for borrowing.

Moreover, Liquid Staking Tokens (LSTs) simplified the intricacies of staking by enabling users to participate without maintaining the validator operations on their own - by delegating their ETH to any of Lido's operational validators. This concept closely resembles **pooled staking** but offers distinct advantages, such as **staking while retaining capital flexibility** for engaging with DeFi's modular financial services. Additionally, LSTs addressed a barrier that excluded many due to its substantial capital requirement, where users were previously required to stake a minimum of 32 ETH. With Lido, users were able to deposit any amount of ETH, which would then be pooled with other users' assets to collectively run a validator by one of Lido's operators. All in all, LSTs were instrumental in significantly enhancing the overall liquidity of the Ethereum network, making it much more attractive for users while fueling the growth of the network's on-chain ecosystem. For instance, out of Ethereum's TVL of $64.95 billion, $49.4 billion of it comes from LSTs. As seen in Figure 15, they were solving a key pain point for Ethereum, evident by the fact they grew by a multiple of **2,546** since 2021, soaring from about $18 million in late 2020 to the current estimate of **$44 billion**.

"Liquid Staking platforms enable users to deposit their ETH in exchange for a receipt or an IOU token."

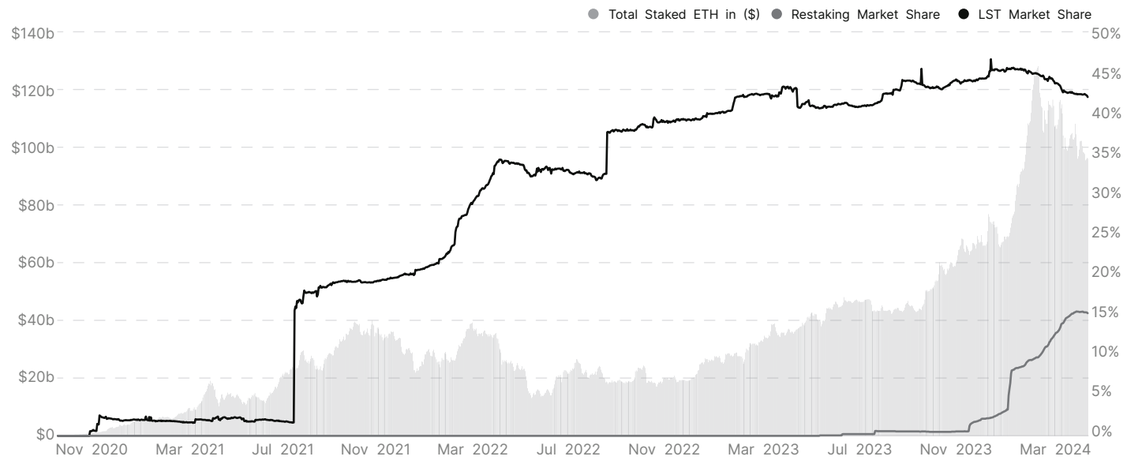
Figure 14 – Ethereum's Different Layer of Staking

Old - New

Staking primitive	Description	Platform
Liquid Re-Staking	Staking on users' behalf in return for freedom to re-stake their LSTs/ staked ETH; in exchange for a receipt token (IOU) that is usable across DeFi to generate further yield.	Ether.Fi, Puffer
Re-Staking	Putting staked tokens (ETH/LSTs) to additional use, in return for additional yield, by helping other protocols secure their network via re-pledging a POS network's staked asset.	EigenLayer
Liquid Staking	Staking on users' behalf in return for freedom to use these tokens in the form of Liquid Staking Tokens (LSTs) as receipt token (IOUs) across DeFi	Lido, Rocket Pool, Swell Liquid
Staking	Locking up a native token to secure its blockchain in return for yield.	Ethereum

Source: 21Shares, *receipt tokens are equivelant to IOU tokens

Figure 15 – Ethereum Staking Ecosystem



Source: 21shares, 21co on Dune Analytics

”Re-Staking” Ecosystem

As briefly discussed, EigenLayer is a new primitive that allows ETH users to “re-stake” their existing staked ETH to validate the security of external networks. EigenLayer has been eagerly anticipated as it **optimizes capital efficiency** by allowing users to **earn additional yield** on top of their native staking rewards. Further, it allows nascent protocols to **borrow Ethereum’s security assurances**, circumventing the need to bootstrap their own security from scratch. This translates to a more **cost-efficient** approach while simultaneously **bolstering their decentralization**.

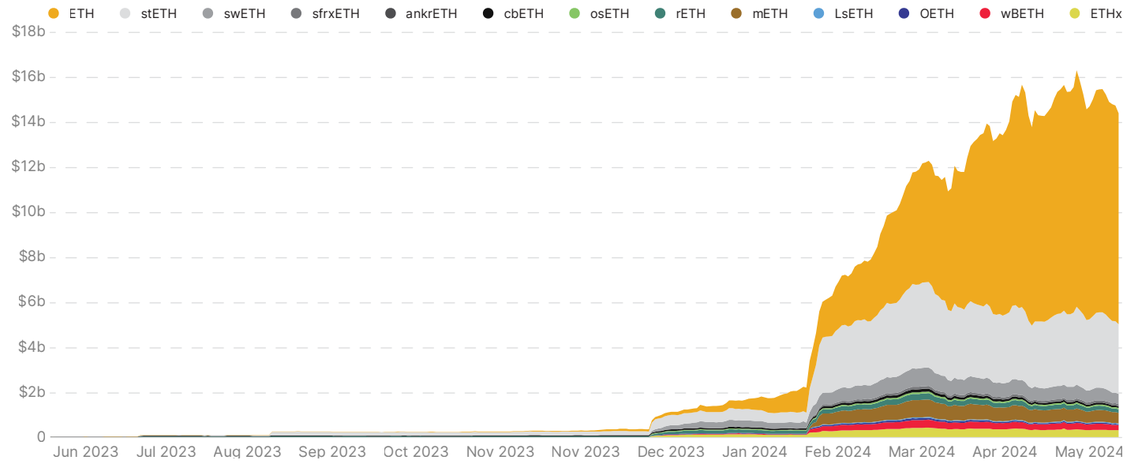
Although the protocol didn’t officially launch until April 9, 2024, EigenLayer allowed users to deposit ETH as early as August 2023. This phased approach, whose growth can be observed in Figure 16, aimed to create a controlled environment for testing the staking mechanism and identifying any potential issues. Additionally, it ensured that the platform’s infrastructure could accommodate the growing load without compromising system stability. Despite EigenLayer’s groundbreaking efforts of extrapolating Ethereum’s crypto-economic security to external networks, evidenced by the unprecedented growth of EigenLayer’s TVL by a factor of 150, from **$100 million to its current estimated value of $15 billion**, the protocol does introduce certain risks to Ethereum itself.

EigenLayer's Risks that Potentially Affect Ethereum

- **Heightened Smart-Contract Risk:** Users are not only exposed to Ethereum’s smart-contract vulnerabilities, but to the additional protocols relying on its security. This could inadvertently mean that bugs on the secondary layer of networks and services built on top of Ethereum could lead to an unpredictable systemic risk to Ethereum’s security.
- **Problem of Misalignment:** Some validators may prioritize maximizing their profits by pursuing strategies that prioritize short-term gains over the long-term security of the network. Put differently, certain services built on top of EigenLayer may offer disproportionately high yield, thereby enticing more operators to validate their security. Consequently, if a substantial amount of ETH is deposited into one of EigenLayer’s Actively Validated Services (AVS), it could lead to an excessively centralized staking system. This heightened centralization would render Ethereum more susceptible to attacks if a single AVS or a small group were to be compromised.
- **Ethereum Centralization:** A significant segment of the digital asset ecosystem may become dependent on Ethereum’s security, leading to concentration risks. Any compromise to Ethereum’s security could potentially jeopardize a substantial portion of the ecosystem, meaning that Ethereum could inadvertently become a single point of failure over a longer time horizon. Currently more than 15% of staked ETH is being re-staked.
- **Wide-Spread Slashing:** If a substantial amount of ETH is re-staked in a singular protocol, then a slashing event due to unintended or malicious behavior could significantly impact honest ETH stakers. Thus, EigenLayer proposed a slashing committee comprising esteemed ETH developers and trusted community members empowered to veto such occurrences and safeguard Ethereum’s integrity.

“EigenLayer is a new primitive that allows ETH users to “re-stake” their existing staked ETH to validate the security of external networks.”

Figure 16 – Total Value Locked on EigenLayer



Source: 21co on Dune Analytics

Flourishing Layer 2 Ecosystem

Daily active users on the leading Ethereum scaling platforms (L2s) have more than doubled from ~1.8 million in September 2023 to almost 3.7 million as of April 2024.

Ethereum's scaling thesis is becoming a reality as multiple L2 networks converge upon similar architectures and compete for the most network effects. While it's still unclear which will win, the fierce competition between L2s is unequivocally positive for Ethereum, which may continue to see an influx of new developers, applications, and users, as seen below in Figure 17.

Why Layer 2s Are Essential for Ethereum's Scalability

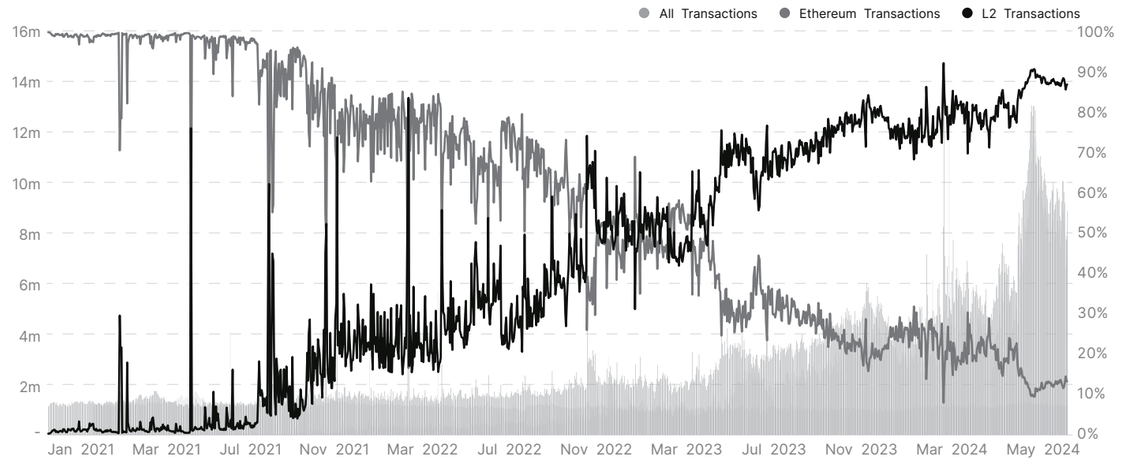
Although L2s may seem to pose a challenge to Ethereum's dominance, a deeper analysis of their economic structure paints a different picture. In particular, current generation of scaling solutions, Optimistic and Zero-Knowledge rollups such as Arbitrum, Optimism, and ZkSync, directly inherit Ethereum's security. This means that users operating on L2s still incur transaction costs in ETH, as transactions are executed on the L2 but ultimately settled on the Ethereum mainnet. This stands in contrast to earlier scaling approaches like Polygon 1.0 and Gnosis, which sought to divert activity away from Ethereum onto sidechains with their own security apparatus, necessitating users to cover transaction fees using the native tokens of these networks. This meant Ethereum wasn't accruing revenue from their redirected activity. In essence, they were in a more competitive relationship with Ethereum.

The Transactional Relationship Between Ethereum and Its Current Generation of Layer 2s

That said, the underlying principle driving this economic model lies in how the current generations of L2s operate. Namely, these solutions process user transactions off-chain to improve speed and cut costs, which are then bundled and submitted to the Ethereum mainnet in batches to validate their data availability. Rollups pay for this service in ETH, covering what's known as data rollup fees and verify proofs as seen in Figure 18. For example, during peak on-chain activity, Ethereum's rollups spent approximately $40 million to store their data on the mainnet at the peak in March, reflecting Ethereum's revenue generated from serving as a settlement layer for the current generation of the L2 ecosystem. Subsequently, costs decreased due to reduced on-chain activity and the implementation of the Dencun upgrade, which slashed data storage expenses on Ethereum by up to 90%. However, we anticipate this figure to climb again as decreasing costs attract more activity, enabling broader participation by users and facilitating the launch of applications that were previously financially unfeasible due to the high cost of on-chain interactions. Consequently, the existing security model for L2s allows them to harness Ethereum's robust security and immutability, offering users a swifter and more cost-effective transaction experience.

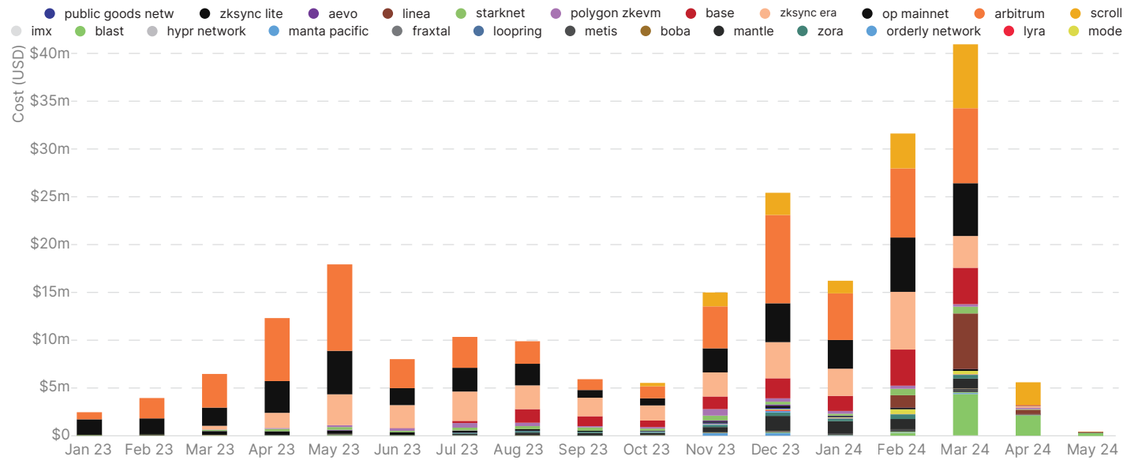
As we'll demonstrate in the following section, the allure of Ethereum's network effects and security assurances as the primary settlement layer has rendered it an exceedingly appealing choice for networks aspiring to expand their presence and user base.

Figure 17 – Share of Transactions Handled by Ethereum vs L2s



Source: GrowThePie

Figure 18 – Rollups Data Fees and Verify Proofs (in USD)



Source: NiftyTable on Dune Analytics

All Roads Lead to Ethereum

Ethereum has emerged as a groundbreaking computing protocol operating atop the internet's communication layer that facilitates seamless data transfer. While TCP/IP pioneered decentralization on the infrastructure layer, Ethereum extends this decentralization to the application and services layer, as can be seen in Figure 19. This extension enables trustless interactions within the internet-native application realm. Leveraging the internet's open standards and protocols, Ethereum empowers developers to create applications and engage with smart contracts without central authority permissions. This approach fosters a diverse ecosystem spanning finance, gaming, social, and numerous other sectors. In addition to its role as a global settlement layer, the **Ethereum Virtual Machine** (EVM) serves as a robust operating system, akin to the transformative impact of the Windows operating system.

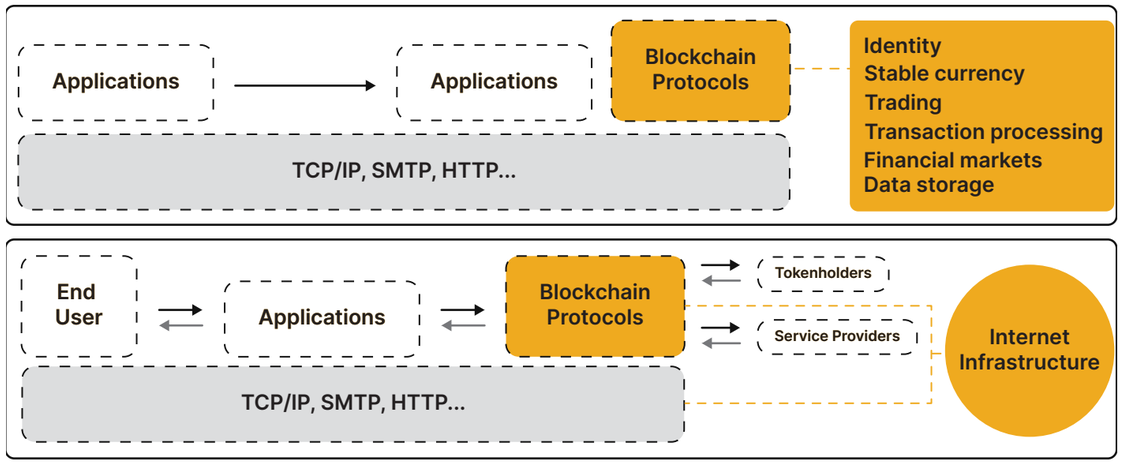
The arrival of the Windows operating system played a pivotal role in popularizing personal computing and making it accessible to the public. Its user-friendly interface, combined with its broad support of third-party software created vibrant and diverse ecosystem of applications that served a multitude of purposes. This fueled innovation and productivity leading to the growth of industries such as software development, gaming, and digital financial services. Windows also standardized the computing experience across a myriad of different devices, providing a consistent platform for users to interact with the technology.

When we think of it this way, we begin to see how Ethereum is continuing the revolution that the emergence of the computer operating system laid the foundation for. On one hand, Ethereum's EVM became so influential to the point that competitors with their own respective operating systems decided to pivot to building on the EVM in order to create a standardized experience. This was done to ensure they're building and operating nearby the heart and soul of the digital asset ecosystem, evidenced by networks such as Fantom, Celo, Astar, Canto who decided to become a network that is either compatible with Ethereum, or in some cases building as an additional layer on top of Ethereum. Despite all the criticisms that the EVM OS receives for its computational and storage constraints, which impact transaction speed, companies keep iterating to build a more efficient version of EVM. Nevertheless, they would still be compatible with Ethereum in a way that allows users to leverage the same tooling for interacting with their respective networks.

Hence, Ethereum and its operating system have solidified their positions as the foremost network of choice and the preferred technological foundation supporting a substantial segment of the digital asset ecosystem. For example, EVM-compatible smart-contract platforms or Layer 2 solutions operating atop Ethereum account for nearly 80% ($73 billion) of the TVL ($92.45 billion) across the entire crypto landscape. This dominance corroborates the unparalleled network effects of Ethereum and its operating system.

"While TCP/IP pioneered decentralization on the infrastructure layer, Ethereum extends this decentralization to the application and services layer"

Figure 19 – Comparison between Web2 and Ethereum's Infrastructure and Application Layers

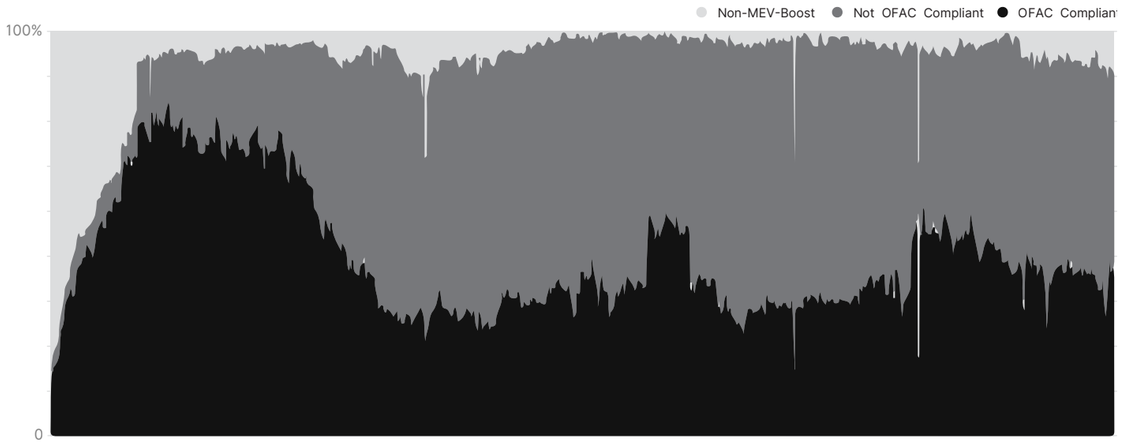


Source: Token Terminal

Risks

- **Macroeconomic and regulatory uncertainty:** Macroeconomic conditions, such as resilient inflation and consequently elevated interest rates, can impact ETH, given its classification as a risk-on asset. This stems from its susceptibility to constrained liquidity conditions. Regulatory uncertainty can also affect its long-term adoption and threaten its censorship-resistant and credible neutrality. For instance, in May 2024, 40% of Ethereum blocks have been OFAC-compliant, as shown in Figure 20, showing the challenge of balancing regulatory compliance with decentralization. If ETH were to be classified as a security, as the Securities and Exchange Commission (SEC) seems to be hinting at with its recent Wells notice against the Ethereum Foundation, it could indeed pose short-term challenges, especially in the U.S. This would carry significant weight given the considerable presence of investors and the foundations in the country. However, it wouldn't necessarily spell the end for ETH.
- **EigenLayer:** The protocol's exponential growth and surging user engagement may inadvertently give rise to centralization concerns. Put simply, Ethereum's increasing role in expanding its crypto economic security could paradoxically turn it into a single point of failure within the digital asset ecosystem. If validators on EigenLayer experience a cascade of slashes, it could potentially compromise Ethereum's security posture.
- **Scaling risk, as other smart contract platforms that offer higher throughput may take market share from Ethereum:** Other smart contract platforms like Solana offer faster settlement time, which may affect the adoption of Ethereum. For instance, Visa expanded its USDC cross-border settlement pilot to include the Solana blockchain to onboard more clients, citing "significant demand to leverage newer, high-performance blockchains that can send and receive stablecoins with higher speed and lower costs."
- **Liquidity Fragmentation Risk:** L2s are presently employing a novel, efficient data storage solution (blobs) to harness the network effects and security of Ethereum. However, they are currently generating minimal value for Ethereum, as MEV accrual and transaction fees are predominantly captured by L2 validators (sequencers).
- **Smart contract risk aggravates as DeFi and its TVL grows:** As any software, there is a risk of undetected bugs that put the billions of dollars locked in Ethereum applications at risk.
- **Growing adoption of institutional-backed settlement networks like the Regulated Settlement Network (RSN):** Ten financial institutions, including Citi and JP Morgan, are engaging in a distributed ledger (DLT) feasibility trial to assess settlement capabilities on a common regulated platform known as the RSN. This trial, conducted under existing regulations, involves simulating USD delivery versus payment transactions. Notably, this initiative builds on a previous iteration known as the Regulated Liability Network, launched last year. While still in its early stages, this project holds promise for financial institutions, particularly due to its compliance-oriented design. However, we anticipate that Ethereum, with its already established and interoperable ecosystem, may demonstrate its value proposition as a credible neutral public settlement network. Leveraging Ethereum's existing infrastructure could streamline onboarding processes for institutions, eliminating the need for extensive coordination and infrastructure development.

Figure 20 – Breakdown of Post-Merge Daily OFAC Compliant Blocks



Source: MevWatch

Valuation

One of the primary concerns for investors is the valuation of cryptoassets. Valuing Bitcoin presents unique challenges due to its lack of yield, which necessitates a reliance on comparative valuation methods. Ethereum, however, operates on a PoS system, where validators commit a portion of their capital—specifically, ETH—as a "stake" to earn recurring value from the network's activities. This positions Ethereum within the Capital Asset framework, allowing for the use of staking yield and transaction fees as proxies for future cash flows. The value of Ethereum can thus be estimated using the discounted cash flow (DCF) method, which calculates the net present value (NPV) of the annual flows to validators. While the accuracy of any DCF model depends significantly on the underlying assumptions, this approach demonstrates that traditional valuation frameworks can indeed be adapted for some of the assets in the crypto sector.

From the standpoint of a validator, PoS cryptoassets like Ethereum are akin to a stock that pays an annual dividend yield (the "staking yield") in return for securing the network and validating on-chain activity.

DCF valuation

1. **Estimate the cash flows during the life of the cryptoasset.**
   - **a.** Transaction fees received by validators (after the burn mechanism) from May 5, 2023, to May 5, 2024, amounted to $456.44 million[7].
   - **b.** Token Issuance from May 5, 2023, to May 5, 2024, amounted to $1.95 billion.
   - **c.** Total Cash Flows: a + b = $2.41 billion in the last year.
2. **Estimate expected future cash flows and the lifespan of the cryptoasset.**
   We propose a three-stage growth model, as shown in Figure 21.
3. **Estimate the discount rate to apply to these cash flows to get NPV.**
   - **Lower-bound discount rate (9.70%):** Since inception, the Invesco QQQ Trust ETF obtained a 9.70%[8] compound annual return.
   - **Higher-bound discount rate (20.88%):** Obtained using the Fama and French Three-Factor Model (market premium, size premium, and value premium).

Results: Assuming a discount rate of 9.70%, the implied price per one **ETH today would be ~$6,974, a ~122%** increase from ETH's current price ($3,137). On the other hand, if we use a 20.88% discount rate, the implied price per one **ETH would be ~$1,912**. Investors should interpret the results of this DCF valuation with caution and run their own assumptions regarding projected cash flows and discount rates. The rationale behind our approach was to be conservative and capture the high volatility of ETH in the discount rate to accurately reflect the asset's riskiness. Another implicit assumption of this approach is that the asset's monetary premium (Store of Value) is embedded into the DCF.

"Assuming a discount rate of 9.70%, the implied price per one ETH today would be ~$6,974, a ~122% increase from ETH's current price."

Figure 21

Ether Supply	120,099,365.73

May 5,2024

#	Year	Annual Growth	Revenues	
1	2024	80%	$2,408,857,663.41	Aggressive Growth
2	2025	80%	$4,335,943,794.13	
3	2026	80%	$7,804,698,829.44	
4	2027	60%	$12,487,518,127.10	
5	2028	60%	$19,980,029,003.36	
6	2029	40%	$27,972,040,604.70	Incremental Decrease
7	2030	40%	$39,160,856,846.58	
8	2031	35%	$52,867,156,742.88	
9	2032	35%	$71,370,661,602.89	
10	2033	30%	$92,781,860,083.75	
11	2034	30%	$120,616,418,108.88	
12	2035	30%	$156,801,343,541.54	
13	2036	25%	$196,001,679,426.93	
14	2037	25%	$245,002,099,283.66	
15	2038	15%	$281,752,414,176.21	Stabilization
16	2039	15%	$324,015,276,302.64	
17	2040	15%	$372,617,567,748.04	
18	2041	10%	$409,879,324,522.84	
19	2042	10%	$450,867,256,975.13	
20	2043	10%	$495,953,982,672.64	

Source: 21Shares

Figure 22

May 5,2024

Discount Rate	NPV (Market Cap)	Price per ETH
9.70%	$837,582,335,563.04	$6,974.08
20.88%	$229,601,702,505.79	$1,911.76

Source: 21Shares

Conclusion

Ethereum stands as the pioneering force within the realm of smart-contract platforms, boasting a rich history and a position of prominence across the digital asset landscape. Originating from the ambition to address the constraints of Bitcoin, Ethereum was conceived as a global computing platform, akin to an application store, fostering an unrestrictive digital economy free from central oversight. Fueling this ecosystem is ETH, serving as both a transactional currency and a means of accessing the platform's expanding array of services and products. Distinguishing itself from Bitcoin, Ethereum employs a more efficient consensus mechanism known as Proof-of-Stake, enhancing the network scalability and sustainability. Over time, various advancements have sought to mitigate Ethereum's capital inefficiencies like Liquid Staking solutions, while recent innovations such as Re-Staking are extrapolating its security assurances to the broader crypto economy. Moreover, Ethereum boasts a suite of scaling solutions within its ecosystem, augmenting its capacity without compromising its revenue. These solutions, referred to as Layer 2s, complement Ethereum and position it as the preferred settlement layer for a diverse ecosystem of networks due to the dependent economic relationship they share. Finally, given that ETH functions as a capital-generating asset, with validators earning recurring rewards through transaction fees and newly issued ETH, its valuation can be approached using conventional metrics such as the Discounted Cash Flow (DCF) model. This parallels the valuation of stocks that offer dividends.

Footnotes

1. https://www.nasdaq.com/articles/what-tokenization-is-and-how-it-can-unlock-illiquid-and-opaque-markets
2. https://chainspect.app/chain/ethereum
3. https://www.thenomadsalon.com/post/the-art-collector-s-guide-decoding-art-pricing-and-commission-structures
4. https://dappradar.com/rankings/protocol/ethereum/92?resultsPerPage=50
5. https://cryptonews.com/news/the-most-expensive-transaction-on-ethereum-cost-usd-23-million.htm#:~:text=The%20Most%20Expensive%20Transaction%20on%20Ethereum%20Cost%20USD%2023.5%20Million,-Fredrik%20Vold&text=Today%2C%20crypto%20exchange%20Bitfinex%20paid,public%20transaction%20data%20on%20Etherscan.
6. https://www.validatorqueue.com/
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8. https://www.invesco.com/qqq-etf/en/performance.html#:~:text=Calculate%20your%20return&text=Invesco%20QQQ%20Market%20Price%3A%20YTD,%25%3B%20Since%20Inception%3A%209.40%25.

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