Alpha Digital Research

Initiating Coverage: Ether

Ether the smart digital asset of the web 3

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INITIATION

Ether

BUY
Initiation
Price ($) 1878
16/08/2022
Target price ($) 3423

Upside +82%

Market Cap (M$) 229 118

Ether the smart digital asset of the web 3

Ethereum was launched in 2015 as the first ever smart contracts blockchain. The hype for Ethereum peaked in 2017 with the rise of ICOs pushing the price of Ether to the highest before falling dramatically. Ether got a second wind from 2019 thanks to the development of decentralised finance and NFTs. At the time of writing this note, the hype for Ether has died down again, however there are plenty of growth drivers like the metaverse could be. Despite growing competition, Ethereum remains by far the leading smart contracts blockchain at all levels: number of developers, number of decentralised applications, TVL size of its Defi, volume of NFTs, institutional adoption. Finally, the Merge, which is scheduled to take place on 15 September 2022, would be a positive catalyst if successful.

A project supported by a wealthy foundation and a large developer community

At the time of the Ether ICO in 2014, part of the funds were allocated to the Ethereum Foundation which aims to finance the development of the project. The foundation has a cash flow of $1.6bn and a long-term approach. Ethereum is also surrounded by over 1300 full-time developers, making it the largest blockchain developer community. Finally, Ethereum is known for some of its strong and visionary personalities such as its founder Vitalik Buterin who after stepping down from technical development has taken on the role of missionary of the digital asset sector.

Already attractive tokenomics set to improve after the Merge

Ether tokenomics has always been healthy since its launch where investors have acquired Ether at an almost identical price around $0.31 and without lock-ups. Inflation has remained under control while demand has increased leading to an appreciation of Ether. This tokenomics should be improved following the Merge with Ethereum's transition to PoS which is far less inflationary than PoW. In fact, thanks to its former supply reduction mechanism (EIP-1559), post-Merge Ether will become deflationary around -0.5%/-1.5%. In addition, stakers' income should increase by at least 40%.

An extensive ecosystem of decentralised applications

Ethereum's great strength lies in its ecosystem of decentralised applications, which outstrips the competition in size. It is revolutionising whole areas of the economy from decentralised finance to NFTs that are disrupting the ownership economy. With a TVL of $60.46bn, far higher than the rest of the blockchains combined, Ethereum seems untouchable for its competitors.

An ambitious roadmap that is necessary but not without risks

In order to solve its scalability problems and maintain its growing adoption, Ethereum has put in place an ambitious roadmap of which the Merge in September 2022 is only half the way through. The future looks bright for Ethereum, but it is not without its risks, from regulatory to technological.

A valuation with a price target of $3423

We have a price target of $3423 for Ether based on a valuation by comparables via Metcalfe's Law, TVL and the number of developers.

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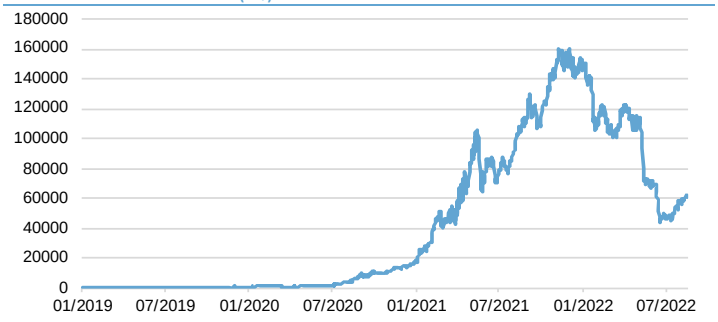
Summary

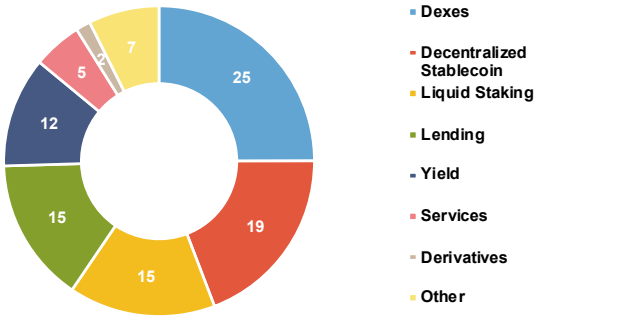
Digital Asset Profile

I. Growth of TVL 2019-2022 (M$)



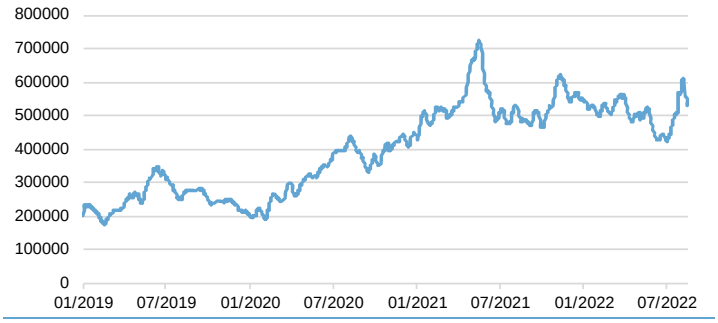
Source: Alpha Digital Research, Defi Lama

II. TVL divided by type of protocols 2022 (%)



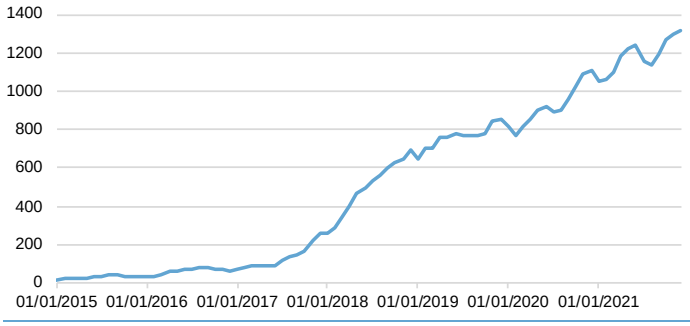
Source: Alpha Digital Research, Defi Lama

III. Growth of daily active adresses 2019-2022 (7-day MA)



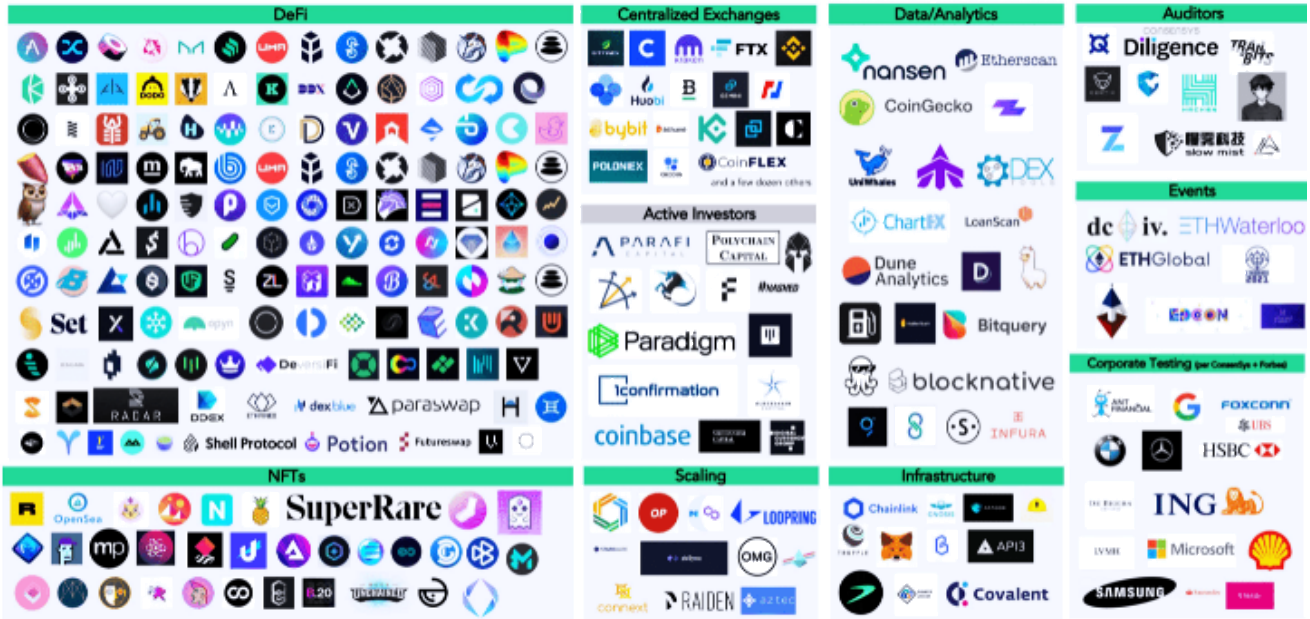
Source: Alpha Digital Research, Etherscan

IV. Growth of full-time developers 2015-2021



Source: Alpha Digital Research, Electric Capital

V. Ethereum Ecosystem



Source: Alpha Digital Research, Hive Blockchain

VI. Key members of the Ethereum ecosystem

	Role
Vitalik Buterin	Founder of Ethereum
Tim Beiko	Coordinator of the Merge
Joseph Lubin	Founder & CEO of Consensys
Aya Miyaguchi	Ethereum Foundation Exec. Dir
Sandeep Nailwal	Founder of Polygon
Sergey Nazarov	Founder of Chainlink

Source: Alpha Digital Research

VII. Ether ICO Distribution

	% Supply
Crowdsale	83
Developers	13
Ethereum Foundation	4

Source: Alpha Digital Research

A valuation of Ether with a theoretical price target of $3423

We value Ethereum using a comparable valuation method based on three multiples that we believe are relevant in the world of digital assets and from which a theoretical value can be calculated.

These three multiples are 1) Metcalfe's law multiple, 2) MktCap /TVL and 3) MktCap / Number of full time developers

1) The multiple of Metcalfe's law is calculated as follows Number of active addresses in the network ^ 2 /Market Cap. Metcalfe's Law was originally invented by Robert Metcalfe to determine the value of a communications network. It has subsequently been applied to measure the value of any other network related to computer technology and states that the more users there are in a network, the more valuable that network will be. The multiple of Metcalfe's law also makes sense in the sphere of digital assets by considering that the value of a digital asset is correlated to the value of its network which is derived from its number of users/addresses. In order to capture this value as accurately as possible, the addresses retained are only those active on one day and then we calculated the average over the last 3 months.

2) The MktCap /TVL multiple corresponds to the Market Cap of the digital asset divided by the total value locked into its blockchain protocols. This indicator is widely followed in the digital asset sector and is particularly effective in measuring the value of layer 1 blockchain tokens with smart contracts. Indeed, the value of these blockchains can be considered as correlated to their capacity to capture value in their protocols.

3) The MktCap / Number of full time developers multiple (M$/n) corresponds to the Market Cap of the digital asset divided by all full-time developers working directly for the blockchain or a blockchain-related project. We have deliberately excluded casual and part-time developers from this ratio due to their greater volatility. Indeed, from 2018 to 2019, nearly 80% of developer departures came from this category. A developer is identified as working full time when he or she submits more than 10 code changes on github per month. This multiple is relevant because after measuring the demand-side network effect through Melcafe's law we now deduce the value of a blockchain through its supply-side network effect (developers and the solutions they offer to users).

For this valuation by comparables with triple multiples we based ourselves on a universe of comparables including layer 1 smart contract blockchain tokens whose members have very similar characteristics to Ethereum. We excluded some layer 1 tokens whose characteristics and utility were too different.

We have therefore excluded Tron, whose main use for the moment is limited to the transfer of value through its TRX token and through the USDT that is present on its blockchain. Tron's role is thus more comparable to that of a value transfer blockchain such as Litecoin, Stellar and Ripple.

We also excluded layer 0s from the blockchain interoperability universe such as Cosmos and Polkadot whose metrics we analysed are skewed because much of the value of these projects resides in the other blockchains in their ecosystem. Our valuation method outlined above does not capture this additional value.

Our universe of comparables is thus composed of 8 digital assets: BNB (Binance Smart Chain), ADA (Cardano), SOL (Solana), AVAX (Avalanche C-Chain), XTZ (Tezos), FTM (Fantom), Near (Near Protocol), ALGO (Algorand).

All our valuations are made at time N and are not based on growth projections for year N+1. In this analysis, for each of the comparable multiples, we eliminate the two digital assets with the most extreme values in the average calculation. This adjusted average is then more relevant and we can compare it to Ether to obtain a theoretical price target.

Evaluation by the multiple of Metcalfe's law

On average, Ether has 487,646 daily active addresses, giving it a Metcalfe ratio of 0.96x. Eliminating Near and SOL which have a ratio of 34.85x and 0.02x respectively, we obtain an adjusted average of 1.84x for Ether's competitors. Thus, it appears that Ether is undervalued based on its Metcalfe ratio with a theoretical price target of $3581 implying a 91% upside.

Peer comparison: Metcalfe's Law Normalized (Nb of active adresses)(average last 3 months)

	Nb of addresses	Market Cap (M$)	Metcalfe's ratio	
ETH	487646	229118	.96 x	
BNB	918726	51051	.06 x	
ADA	70569	18823	3.78 x	
SOL	936143	15055	.02 x	Removed for Average Calculation
Avax	44098	7740	3.98 x	
NEAR	10756	4032	34.85 x	Removed for Average Calculation
ALGO	34447	2432	2.05 x	
XTZ	45292	1711	.83 x	
FTM	54241	939	.32 x	
Adjusted Peer Average			**1.84 x**	
Peer Median			**1.44 x**	

	Nb of addresses	Adjusted Peer Average	Target cir. MktCap (M$)	Closing Price ($)	Target price ($)	% Upside/Downside
ETH	487646	1.84 x	436899	1878	**3581**	**91%**

Source: Alpha Digital Research

Valuation by the MktCap /TVL multiple

Ether has a TVL of $60.46bn giving it a MktCap / TVL ratio of 3.79x. Eliminating ADA and FTM which have a ratio of 187.29x and 1.14x respectively, we get an adjusted average of 11.78x for Ether's competitors. Thus, it appears that Ether is undervalued based on its MktCap / TVL ratio with a theoretical target of $5839 implying a 211% upside.

Peer comparison: MktCap / TVL

	TVL (M$)	Market Cap (M$)	Mktcap/TVL ratio	
ETH	60463	229118	3.79 x	
BNB	6985	51051	7.31 x	
ADA	101	18823	187.29 x	Removed for Average Calculation
SOL	2480	15055	6.07 x	
Avax	2669	7740	2.90 x	
NEAR	410	4032	9.82 x	
ALGO	232	2432	10.50 x	
XTZ	50	1711	34.09 x	
FTM	827	939	1.14 x	Removed for Average Calculation
Adjusted Peer Average			**11.78 x**	
Peer Median			**8.57 x**	

	TVL (M$)	Adjusted Peer Average	Target cir. MktCap (M$)	Closing Price ($)	Target price ($)	% Upside/Downside
ETH	60463	11.78 x	712313	1878	**5839**	**211%**

Source: Alpha Digital Research

Valuation by the multiple MktCap / Number of full-time developers

Ether has 1312 full time developers giving it a dev ratio MktCap / Number of full time developers of 174.63x. Eliminating BNB and XTZ which have a ratio of 622.57x and 20.13x respectively, we get an adjusted average of 78.89x for Ether's competitors. Thus, it appears that Ether is overvalued on the basis of its dev ratio with a theoretical target of $848 implying a -55% downside.

Peer comparison: MktCap / Number of full time developers

	Developers	Market Cap (M$)	Dev Ratio	
ETH	1312	229118	174.63 x	
BNB	82	51051	622.57 x	Removed for Average Calculation
ADA	115	18823	163.68 x	
SOL	222	15055	67.82 x	
Avax	68	7740	113.82 x	
NEAR	138	4032	29.22 x	
ALGO	38	2432	64.01 x	
XTZ	85	1711	20.13 x	Removed for Average Calculation
FTM	27	939	34.77 x	
Adjusted Peer Average			**78.89 x**	
Peer Median			**65.91 x**	

	Developers	Adjusted Peer Average	Target cir. MktCap (M$)	Closing Price ($)	Target price ($)	% Upside/Downside
ETH	1312	78.89 x	103500	1878	**848**	**-55%**

Source: Alpha Digital Research

Final valuation

By averaging the valuation of Ether over these three multiples, we arrive at a theoretical price target of $3423, implying a +82% upside. This theoretical price is strongly pulled upwards by the MktCap/TVL multiple which is very attractive for Ether. On the other hand, this theoretical price is pulled down by the Dev ratio which is not to Ether's advantage. Ether has too few developers compared to the size of its market cap. However, we believe that the transition to PoS with the Merge would send a strong signal to the developer community and Ethereum would get back the developers who had turned away because of its scalability problem and high fees.

Ether Target Price Summary

	Metcalfe's ratio	Mktcap/TVL ratio	Dev ratio	Summary
Target Price ($)	3581	5839	848	**3423**
Closing Price ($)				**1878**
% Upside/Downside				**82%**

Source: Alpha Digital Research

The Ethereum project

By becoming the first smart contracts blockchain in history in 2015, Ethereum revolutionised the blockchain industry by enabling new uses and paving the way for new markets. However, the journey has only just begun for Ethereum, criticised by its detractors for its high fees, the blockchain faces the challenge of scalability to cope with growing competition. Ethereum remains well armed to face this challenge by holding $1.6bn in cash to fund its development and having the largest developer community of any blockchain.

Overview of the Ethereum project

The Ethereum blockchain was launched in July 2015 following an ICO in 2014 which raised just over 30,000 BTC equivalent to nearly $18.4M at the time. The project behind the Ethereum blockchain was to exceed the capabilities of the Bitcoin Core blockchain by enabling the implementation and use of smart contracts. These smart contracts make new interactions with the blockchain possible and pave the way for a whole new economy based on decentralised applications (Dapp). These Dapps can, for example, enable the transfer of property deeds using NFT technology or the decentralised execution of financial transactions.

At the time of writing, Ether is trading at a price of $1878, which implies a return of 605,706% for investors who participated in the ICO in 2014. Ether is the second most valuable digital asset with a capitalization of 229bn$ behind BTC which has a capitalization of 457bn$. Ether remains 2x less valued than BTC even though we believe that Ether's greater potential thanks to its smart contracts will eventually allow it to take the top spot, an event known as "flippening" in the digital asset sector.

The Ethereum Blockchain is also the most used blockchain in terms of value with **1.11M transactions** made daily for an amount of **4.81bn$** (without taking into account the amount transmitted by smart contracts). In addition, the Ethereum Blockchain is also the one with the highest value of funds locked into its ecosystem through its various Dapps and protocols, peaking at **$60.46bn.**

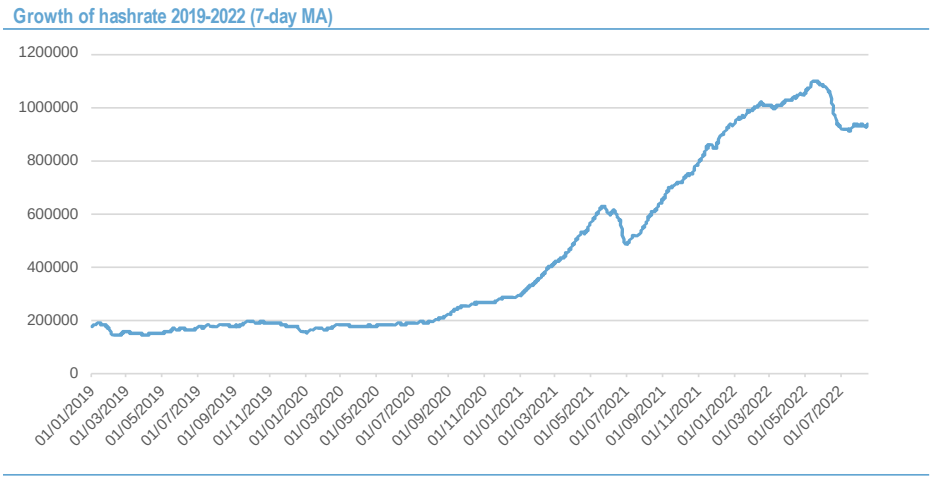
As far as institutional adoption is concerned, Ethereum remains by far the most prominent blockchain used by institutions and large corporations such as the French bank Société Générale or the international insurance company AXA.

Ethereum also remains the blockchain with by far the most active developers. At the end of 2021, there were nearly **1300 full-time developers**, far ahead of Solana with its 220 developers.

Technical Presentation

The Ethereum blockchain is historically based on a Proof of Work (PoW) consensus model like the Bitcoin Core network. In this system, miners must solve complex calculations in order to validate transactions and in return receive a fixed reward of 2 Ether for each block mined, plus a variable reward corresponding to a portion of the transaction fees. Ethereum's hashrate, which corresponds to the computing power of all the miners on Ehereum, is **935TH/**s, a very high number that ensures a very high level of security for the network. Ethereum's hashrate

has been steadily increasing since 2019 and has grown by more than **+450%,** which proves the attractiveness of the Ethereum blockchain for miners.



Source: Alpha Digital Research, Etherscan

Since December 1, 2020 and the launch of the Beacon chain, the Ethereum blockchain relies on a hybrid validation system between PoW and PoS. The Proof of Stake (PoS) is a type of consensus that relies on the staking of tokens to obtain the right to validate blocks and receive rewards in exchange. This hybrid PoW and PoS system aims to prepare Ethereum's transition to a 100% PoS model, which will **reduce energy consumption by 99.9%** and make it more acceptable to legislators and the general public. This transition to PoS will take place following the **Merge** event, the merger between the PoW and PoS networks, which is scheduled for **September 15, 2022.**

The transition to PoS will eventually allow Ethereum to implement sharding technology, which will increase transaction speed and drastically reduce transaction costs, one of its major challenges. The date of the implementation of sharding is still speculative but developers estimate that it should take place between 2023 and 2024.

The blocks on the Ethereum blockchain are validated on average every 13 seconds and thus allow for almost 30 transactions per second (TPS). This is low compared to other competing blockchains such as Solana, which can achieve up to 50,000 TPS, or even the VISA group, which achieves 40,000 TPS. However, as founder Vitalik Buterin has stated, the implementation of sharding in future Ethereum updates will allow Ethereum to process more than **100,000 TPS**, surpassing VISA.

As seen previously, one of the main issues with the Ethereum blockchain is the high cost of performing transactions and activating smart contracts. As of 16/08/2022, a user of the network had to pay an average of $1.20 to carry out a classic transaction and $10.50 to use a smart contract, such as executing a purchase order on the decentralised exchange Uniswap. At the peak of network congestion on 1 May 2022, the fee for executing a single transaction was $200. These very high fees on the Ethereum blockchain are due to a scalability problem (the arrival of sharding in 2023-2024 aims to increase scalability) and to the very high activity on the Ethereum network, which is a victim of its success.

In order to become an Ethereum validator on its PoS network, the user must run a node on a server and stake 32ETH (i.e. almost $60,000 as of 16/08/2022) and this gives a return of about **4.6%.**

History of the Ethereum project

The Ethereum blockchain and its token Ether were officially launched in July 2015, following an ICO in 2014 that raised 30,000 BTC, equivalent to nearly $18.4M at the time. Prior to its launch the founders worked for a year on the project led by Vitalik Buterin, its first founder. Vitalik Buterin came up with the idea of the Ethereum blockchain in order to solve the

problems inherent in Bitcoin and to enable the creation of smart contracts. However, during the development of the project, many differences were revealed between the various co-founders, leading to the departure of some. This is the case of Charles Hoskinson, founder of Cardano, who left the project due to differences of opinion about the purpose of the Ethereum organisation. Hoskinson wanted the organisation to be commercial, whereas Vitalik Buterin wanted it to be non-profit. Vitalik Buterin's idea was chosen and the Ethereum Foundation was created in July 2014 and set up in the canton of Zug in Switzerland, where it is still based today.

Less than a year after the launch of the Ethereum blockchain, on 17 June 2016, a hack worth $70M occurred targeting one of the first Ethereum blockchain-based projects; this event is known as the DAO hack. A DAO is a form of decentralised organisation based on the blockchain, which allows its token holders to make decisions about the organisation's operational and strategic choices by voting. This DAO, based on the Ethereum blockchain, was intended to act as a venture capital fund by investing in blockchain projects. Unfortunately, a security flaw in the smart contract exploited by a hacker allowed it to steal 3.6 million Ether worth $70M. This huge hack could have been a fatal blow to the Ethereum blockchain, which only had a market cap of $1.7bn at the time. The question then arose among all Ethereum developers and miners whether they should invalidate the transaction leading to the hack and reimburse the DAO investors by performing a hardfork, i.e. by creating a new blockchain that would resume the initial state of the blockchain before the hack. This has been one of the most heated debates in the digital asset community, as doing so would be contrary to the blockchain's principle of immutability, although it would allow the stolen investors to be repaid. The choice made by the majority of developers and miners was finally to perform a hard fork and thus cancel the hack at the blockchain level. The developers and miners opposed to this decision then decided to continue operating on the old blockchain despite the disagreement of the Ethereum Foundation. This blockchain was then renamed Ethereum Classic with the token Ether Classic (ETC) and continues to be functional today with a smaller community of developers and miners compared to Ethereum. This blockchain thus contains the traces of the hack in its history whereas the new blockchain renamed Ethereum does not.

The support of a wealthy foundation, committed developers and important personalities

The Ethereum Foundation was created on 6 July 2014. The initial purpose of this foundation, which is non-profit, was to organise the governance of the Ethereum project in order to ensure the proper development of the project and the proper management of the $18.4M of funds raised in BTC allocated to finance the project over the short and medium term. The Ethereum Foundation also had to manage the 3M Ether reserve that it allocated to itself during the ICO for the long-term financing of the project.

The mission of the Ethereum Foundation, as it describes itself, is to support the Ethereum network and the technologies associated with it. However, the Ethereum Foundation is there to support the network without ever controlling it.

One of the key roles of the foundation is to fund and provide operational support to the teams within the Ethereum Foundation. These teams operate with varying degrees of autonomy and include Geth, Solidity and Devcon. One of the major roles of the Ethereum Foundation is also to provide grants through its Ecosystem Support Program to both developers enhancing the current Ethereum protocol (core developers) and to external projects built on the Ethereum blockchain that contribute to enriching the ecosystem. For example, the decentralised exchange Uniswap, which is the world's largest in terms of volume and operates primarily on the Ethereum blockchain, received $50k in 2018 which enabled its founder Hayden Adams to fund the smart contract audit, documentation and user interface design. In 2021, the Ethereum Foundation has paid out $19.6M in grants.

The Foundation's role also includes organising events to promote the Ethereum blockchain and encourage interaction between developers. These events, which are well attended by the Ethereum community, are organised by the Ethereum Foundation's Devcon team. These events include the Devcon event, the annual Ethereum developer conference, the first of

which, Devcon-0 took place in November 2014. It includes other events depending on the Devcon team's initiatives, such as the Devconnect event, which was first held in 2022 and hosts round table discussions on specific blockchain topics. Finally, the Devcon team also supports other community events that aim to grow the Ethereum community.

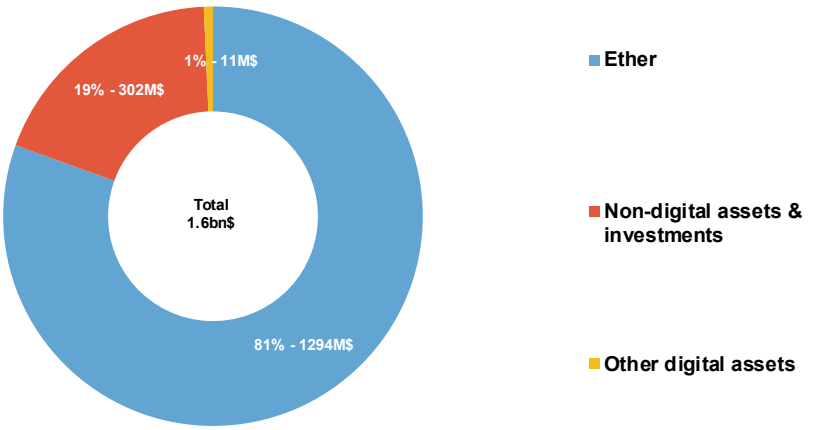
The Ethereum Foundation is organised through several teams with different areas of expertise but all sharing the same vision. In the Foundation's own words, it describes itself as a community of several teams whose aspirations are aligned but loosely coupled. These teams have different areas of expertise:

- Development and maintenance of the Ethereum network
- Reflection on future improvements of Ethereum with regard to technical possibilities
- Reflection on the ecosystem around Ethereum and identification of opportunities and threats
- Focus on the internal workings of the organisation and the proper allocation of financial resources

The Ethereum Foundation is led by a 3 member executive board. The position of CEO is held by Aya Miyaguchi who has been serving since 2018 and remains relatively unknown to the general public. The two remaining seats are held by Vitalik Buterin, the founder of Ethereum, and Patrick Storchenegger.

The Ethereum Foundation is financed by the sale of Ether from the reserve that it allocated to itself at the time of the ICO. In addition, all the vestings that were set at the time of the ICO have now expired, allowing the foundation to freely dispose of its entire reserve. As of March 31, 2022, the Ethereum Foundation's **reserve amounted to $1.6bn**, of which $1.3bn in digital assets (99% Ether) and $300m in non-crypto financial assets. The Ethereum Foundation owns about 350,000 Ether representing 0.3% of Ethereum's circulation supply as of March 31. The Ethereum Foundation has a relatively conservative approach and tends to sell its Ether in the event of strong price inflation to ensure that it can continue to operate for several years even in a bear market.

Q3 2022 Ethereum Foundation Treasury Split (%)



Source: Alpha Digital Research, Ethereum Foundation

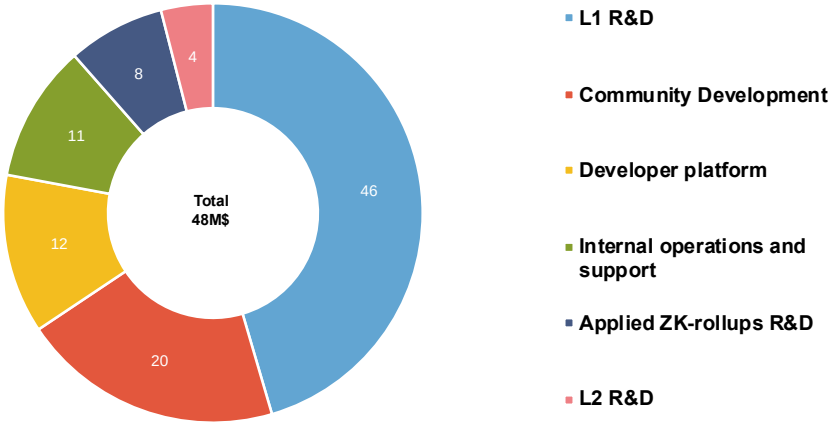
In 2021, the Ethereum Foundation spent nearly $48M, of which $28M was spent on funding teams and projects within the Ethereum Foundation itself and $20M on external expenses such as grants, partnerships and bounties.

The total expenditure of $48M can be broken down into several categories:

- **L1 R&D – $21.8M**: All expenses related to network improvements, internal research in security and cryptography, long-term research to achieve the roadmap

- **Community Developement – $9.7M**: All expenses related to the development of the Ethereum community and the organisation of events such as Devcon
- **Developer platform – $5.9M**: All expenses related to improving Ethereum as a developer platform
- **Internal operations and support – $5.1M**: All general expenses of the Ethereum Foundation teams such as legal, accounting, data services and technical infrastructure
- **Applied ZK-rollups R&D – $3.6M**: All funding related to ZK-rollups
- **L2 R&D – $1.9M**: All expenses related to the internal and external development of layer 2 solutions

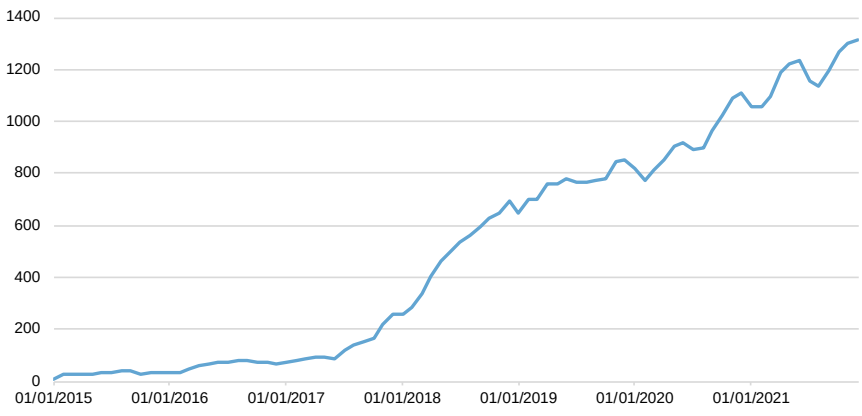
2021 Ethereum Foundation Spending Split (%)



Source: Alpha Digital Research, Ethereum Foundation

Beyond the foundation, the Ethereum blockchain and by extension the value of Ether would be nothing without the strong commitment of its developer community. Among the latter are the so-called core developers, who are at the centre of the development of the Ethereum protocol and its upgrades. Beyond the core developers, Ethereum's strength lies in its large number of developers who develop decentralised protocols and applications based on the Ethereum blockchain. In total, there are no less than **1,300 full-time developers** on the Ethereum blockchain, making it by far the leading blockchain in terms of developers. Ethereum has **6 times more** full-time developers than the layer 1 blockchain Solana and its 220 developers, which is in second place. This growth in the number of full-time developers has been almost continuous and strong for Ethereum and has been **+24%** for the year 2021.

Growth of full-time Ethereum developers 2015-2021



Source: Alpha Digital Research, Electric Capital

The value of a blockchain is theoretically correlated to its usage and by extension to its number of developers. The Ethereum blockchain's vastly superior number of developers may

explain in part Ether's significantly higher market cap among other competing layer 1 tokens. Dividing Ether's circulating market cap by its number of developers gives a ratio of 174.63x. Eliminating BNB and XTZ which have a ratio of 622.57x and 20.13x respectively, we get an adjusted average of 78.89x for Ether's competitors. Thus, it appears that Ether is overvalued in terms of its number of full-time developers.

With regard to Ethereum and its various personalities, it is clear that despite the decentralised aspect of Ethereum, some members of the ecosystem are more influential than others. This is notably the case of its founder Vitalik Buterin, who although gradually withdrawing from active blockchain development, participates in reflections on blockchains and technology that still remain closely followed throughout the Ethereum community. Other personalities, less publicly known, but of great importance to Ethereum exist such as the developer Tim Beiko. Tim Beiko is in charge of the technical coordination between the different teams regarding the Merge, which is the biggest update of Ethereum to date. All the meetings organised by Tim Beiko between the different teams of developers, which are often public, are crucial and precious, for the community as well as for informed investors looking for more information on the progress of the roadmap. This information is still very little exploited and analysed by the press specialising in digital assets, which gives a head start to well-informed investors. Other important personalities include Joseph Lubin who is a former founder of Ethereum and is the CEO of Consensys, a company that develops decentralised applications on the Ethereum network. The company, which employs more than 800 people, is known for being behind the Metamask application, the most widely used software digital asset wallet for Ethereum in the community. Other notable names include Sandeep Nailwal, the founder of Polygon, a project that provides a set of layer 2 solutions for Ethereum, and Sergey Nazarov, the founder of Chainlink, a project that brings together a set of oracles primarily for the Ethereum network.

Thoughtful and promising tokenomics

Ethereum has benefited from healthy tokenomics since its launch, never having to rely on venture capital funds to finance itself. Its inflation has always remained moderate, resulting in low investor dilution. This investor-friendly tokenomics, combined with a growing demand for Ether, has led to a strong appreciation of the latter. Ethereum's transition to a PoS consensus through the completion of the Merge in September 2022 will greatly reduce Ether inflation to the point of deflation. This will further increase the appreciation of Ether, and even more so as the gains for staking will be greatly increased.

Basic Tokenomics

At the time of writing, Ether has a circulating supply of 120.1M corresponding to a circulating market cap of $229.1bn. Ether does not have a maximum circulating supply unlike Bitcoin which is limited to 21 million.

Ether inflation comes from the issuance of rewards to remunerate the work of PoW miners or PoS validators. This inflation is around **2.4%** per year since the implementation of EIP-1559 which strongly reduced the inflation which was previously around **4.5%**. As a reminder, EIP-1559 introduced a base fee for each transaction made on the Ethereum blokchain which will then be burnt, i.e. permanently removed from the circulating supply.

To come back to the issuance of new Ether, this comes from the rewards distributed to miners and validators for their work to secure the network. At the moment the rewards for a PoW miner are 2 Ether per block mined. For PoS, rewards are given for various tasks such as proposing new blocks and verifying the information transmitted.

An Ethereum validator on the PoS network has to stake 32ETH (i.e. nearly $60,000 as of 16/08/2022) and this gives it a yield of about **4.6%** which decreases as the number of validators increases. However, this return might increase to more than **6.5%** after the Merge, according to our estimates, as PoS validators will receive most of the transaction fees that were previously given to PoW validators.

A tokenomics disrupted and made more attractive to investors after the Merge

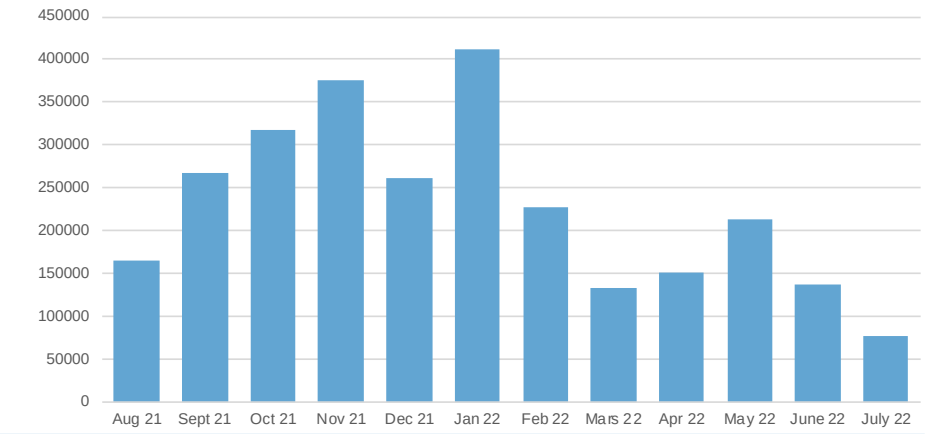
The Merge which, as a reminder, consists of the merger between the historical PoW blockchain and the PoS Beacon Chain to form a single entity based on a PoS consensus model, will bring significant changes to Ether tokenomics.

First of all, the circulating supply will be deflationary, making Ether the first ever major digital asset to be deflationary. The deflation of Ether will depend on several parameters and could be between **-0.5%** and **-1.5%** after the Merge.

The main reason for this deflation of the circulating supply is linked to a drastically reduced issuance of new Ether following the switch to 100% PoS. Indeed, the PoW system is very costly in terms of inflation in order to reward miners who receive 2 Ether per mined block, which is about 4,672,000 Ether per year representing 3.9% of the current circulating supply. On the other hand, the PoS network is much less inflationary, as the emissions from the PoS Beacon Chain represent only 10% of the total emission of new Ether, the remaining 90% being due to the PoW network.

The second reason for Ether's deflation is its burn mechanism introduced by EIP-1559 in August 2021. This mechanism consists of "burning", i.e. removing from the circulating supply, a part of the transaction fees that used to be given entirely to miners. These burned fees correspond to the base fees, the basic fees for issuing a transaction, which is different from the priority fees that allow a miner to choose which transactions to include in a block according to the tip received. The base fees are calculated dynamically according to the activity and overload of the network. As of 16/08/2022, no less than 2.58M Ether have been burned, representing 2.1% of the circulating supply. On average 6875 Ether/day have been burned although the average over the last 30 days has dropped to 1491 Ether/day due to reduced activity on the Ethereum blockchain. This burn mechanism will continue after the Merge and the rate should increase as activity on Ethereum picks up.

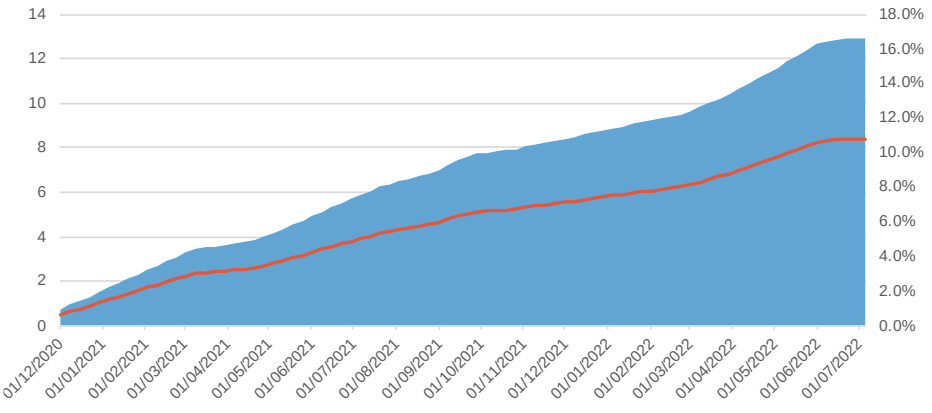
ETH fees burnt by month 2021-2022



Source: Alpha Digital Research, Etherscan

To date, no less than 13.3M Ether are staked on the Beacon Chain, which represents 11.1% of the circulating supply. The increase in Ether staked has been relatively linear since the launch of the Beacon Chain on 01/12/2020. However, it is very likely that after a smooth implementation of the Merge the number of Ether staked will increase drastically to reach the level of other layer 1 smart contract blockchains which is around 75% of tokens staked. In this context, we expect the percentage of Ether staked to reach 70% by the end of 2023, sometime after the Shanghai upgrade scheduled for the end of H1 2023, which will unlock the Ether staked as well as the rewards.

Growth of eth staked (grey, M), percentage of eth staked (red, %)

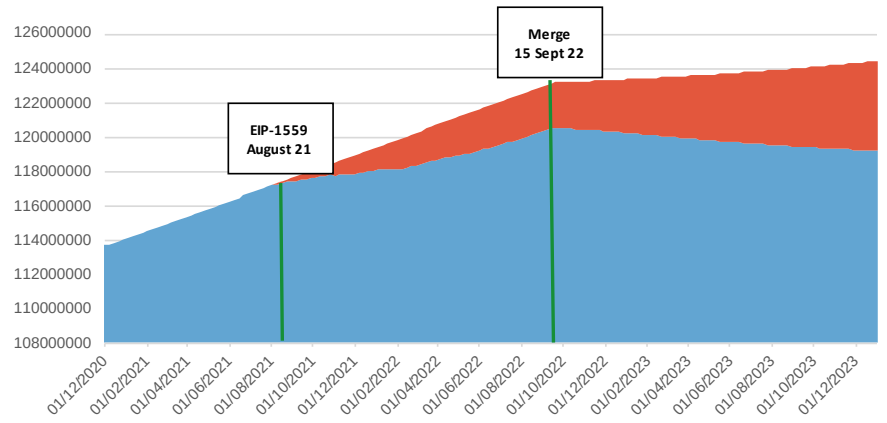


Source: Alpha Digital Research, Etherscan

Thus, the decrease in the issuance of new tokens after the Merge could lead to an inflation, excluding the effects of the burn, of only **0.7%** assuming an increase in the percentage of Ether staked to 70% by the end of 2023. As for the burn, on the basis of 5600Eth/burnt per day, close to its 2022 historical average, it should deduct nearly **1.7%** from the supply one year after the Merge. As a result, the total deflation would be between **-0.5% and -1.5%** after the Merge.

Another deflationary factor also exists and concerns Ether lost forever due to transaction errors or lost private keys. This factor could concern about 20% of the supply for Bitcoin but it should be much less for Ether which is a more recent. Although the deflationary effect of lost Ether is difficult to estimate, it is additional to the natural deflation of between -0.5% and -1.5%.

Growth of circulating supply (grey), ETH burnt (red) (assumptions: burning effect close to avg levels)



Source: Alpha Digital Research (Assumptions: burning effect close to avg levels, stacking rate reaching 70% by end of 2023)

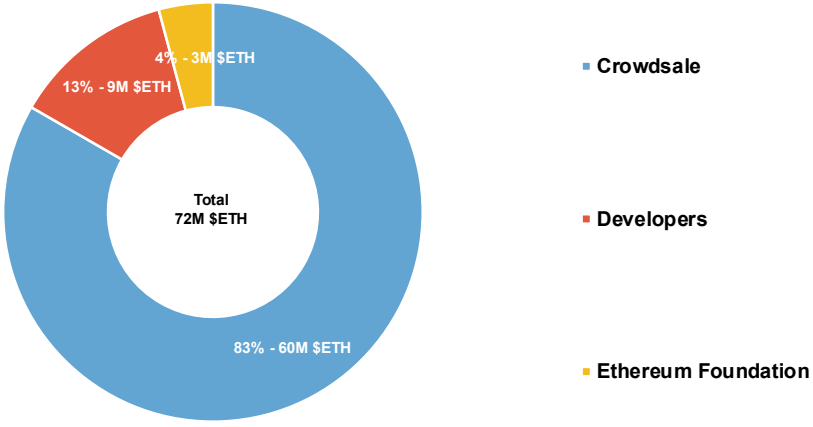
It should be noted, however, that this inevitable deflation of Ether after the Merge could be modified in the long term by the developers by changing some variables in order to reach an inflationary equilibrium (zero inflation).

With regard to the rewards for validators for their work in securing the network, these are expected to increase. At the moment, the return to validators is 4.56%. However, this return will increase sharply after the Merge and the end of PoW on Ethereum, as the priority fees and MEV received exclusively by miners will go entirely to PoS validators. These priority fees are at their lowest now, but we assume that they will quickly recover following the Merge to reach 1300ETH/day, the average since the introduction of the EIP-1559 in August 2021. In this context, according to our estimates, staking yields should increase by more than **40%** shortly after the merge to reach more than **6.5%.** However, we believe that staking yields are likely to decrease again, as the continued increase in priority fees would not offset the dilution caused by the rapid arrival of new validators interested in an attractive yield and reassured by the successful completion of the Merge.

Token distribution

Following the Ethereum ICO in 2014, Ether had a circulating supply of 72M of which 80% was allocated to crowdsale investors. The remaining 20% of the supply was allocated to developers who contributed to the project prior to the ICO and to the Ethereum Foundation.

Ethereum ICO supply breakdown



Source: Alpha Digital Research, Messari

The fact that Ethereum did not conduct a private sale or seed allowing Venture Capital to buy tokens at a discounted price limited the downward pressure at the time of the launch of the Ethereum blockchain in July 2015. Thus Ether has never in its history fallen below its ICO purchase price of around $0.31.

At the time of writing, all lock-ups on some of the Ether from the ICO have already been lifted, so no more downward pressure for Ether can come from this side unlike other more recent layer 1 tokens such as AVAX.

Nearly half of all Ether are owned by long-term holders who have not moved their Ether for more than a year. This is a strong positive sign which shows that the majority of Ether are held by investors with a long-term view which mitigates the strong volatility movements unlike other digital assets held by short term speculators.

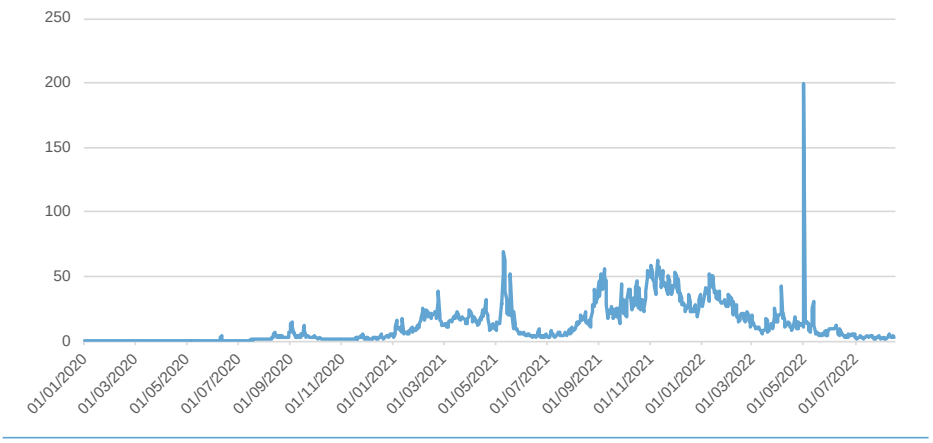
A vibrant ecosystem around Ethereum with unlimited potential

Beyond being a secure, decentralised and quite performing blockchain, the real strength of the Ethereum blockchain lies in the huge ecosystem that has been built around it, between decentralised applications and private companies, due to its advantage of being the first mover. Ethereum is crushing the competition with its project-rich ecosystem and a $60.46bn TVL.

Layer 2 solutions to ease an Ethereum network victim of its success

As one of the most widely used blockchains in the world, Ethereum is buckling under the weight of its success and has seen transaction fees skyrocket, making it difficult to use some of its decentralised applications. Fees have soared since 2020, averaging $21 per transaction over the course of 2021, although at the time of writing this note it has been reduced to around $2.54. In addition, transaction fees are highly volatile overall and have been subject to some dramatic spikes, such as on 1 May 2022 when a record $200 per transaction fee was reached due to the launch of the metaverse land sale of the NFT Bored Ape project.

2020-22 Average Ethereum transaction fees chart

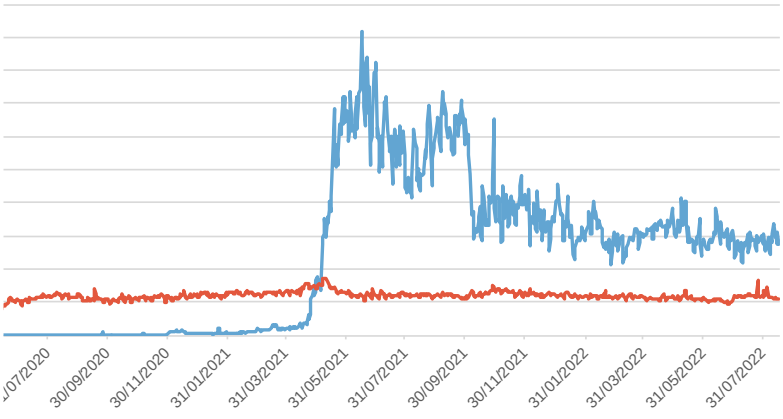


Source: Alpha Digital Research, Etherscan

These high average transaction fees combined with short periods of high volatility have led projects to develop protocols around Ethereum in order to offload some of the transactions executed on the network. These protocols are known as layer 2 solutions and also help to overcome the transaction speed of Ethereum, which is considered too slow. As their name suggests, layer 2 solutions will build a layer on top of the layer 1 blockchain, allowing for a drastic increase in transaction speed and a decrease in transaction fees while maintaining a high level of security. Many of the new layer 2 solutions on Ethereum fall into the category of rollups. Rollups will execute transactions outside of the Ethereum network and publish only the proof of all transactions on the Ethereum network afterwards, thus enjoying the security of the Ethereum network.

The most important project for layer 2 solutions on Ethereum is the **Polygon** project launched in 2017 under the name Matic. Polygon gathers a set of different layer2 solutions for Ethereum serving different purposes. Its best-known solution is Matic PoS Chain, a layer2 sidechain solution, which greatly increases scalability and reduces Ethereum's transaction fees in exchange for less security. The Matic PoS Chain solution has been very successful, exceeding the number of transactions on the Ethereum blockchain as of May 2021. Since May 2021, the Matic PoS Chain has completed more than **3.4x more transactions** than the Ethereum blockchain with transaction fees reduced by more than 99% attracting more than 100 million addresses.

2020-22 Daily Transactions on Polygon sidechain (grey), on Ethereum blockchain (red) (000')



Source: Alpha Digital Research, Etherscan, Polygonscan

Other layer 2 solutions are developed by Polygon such as rollups which have the advantage of offering very high security unlike the PoS Matic sidechain. In this regard, Polygon acquired in August 2021 the decentralised rollup Hermes through a $250M M&A transaction. The work done by Polygon's teams and other players is helping to overcome the major problem of scalability and network fees in Ethereum. Some of their solutions even reach a security level equivalent to that of Ethereum.

Oracles are essential to connect with the outside world

In order to be able to execute smart contracts, conditioned to the realisation of events outside the Ethereum blockchain, they rely on oracles. An oracle is a trusted entity that is part of a computer network that will transmit information from the outside world to the smart contracts of the blockchain, such as information on the price of a digital asset or on the rainfall level of a geographical area. Oracles are thus essential for the functioning of an important part of the decentralised applications of the Ethereum blockchain, in particular those related to decentralised finance (DeFi). More widely, the combination of smart contracts and oracles is crucial for many domains such as information on the last quoted price of an asset for finance, weather information for insurance, random numbers for video games and gambling, IoT sensor information for the supply chain sector, identity verification for governments, etc. To avoid data from an oracle being falsified and dependent on a single actor, oracles can be fully decentralized. To do this, decentralised oracles have multiple validators and use multiple trusted sources of information for the data being searched. On Ethereum, the main decentralised oracle network is **Chainlink**, which has over 1000 oracles providing services to 180 decentralised protocols. Taking all blockchains into account, Chainlink is the leading oracle with **50% market share** and no less than **$15bn** belonging to decentralised protocols relies directly on data transmitted by Chainlink oracles.

Chainlink's utility token, which is used to pay oracles for their services and to become an oracle validator, is the LINK, the most commonly used form of which is an ERC-20 on the Ethereum blockchain. It is positive for Ether to have on its blockchain the utility token of the largest network of decentralised oracles in the blockchain ecosystem.

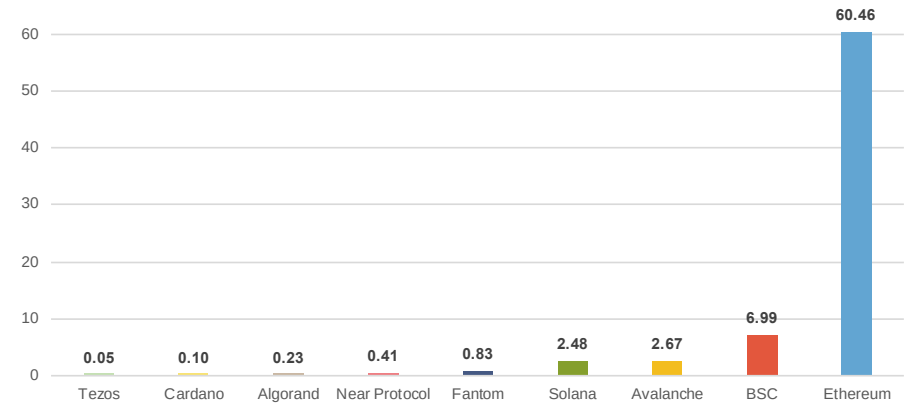
Chainlink is crucial to Ethereum and its very good integration on the Ethereum blockchain is convincing many companies wishing to develop services on the blokchain to choose Ethereum first. In a world where data has become central to the functioning of our economies, Chainlink is a great strength for the Ethereum network.

A new universe of decentralised financial services enabled by Ethereum

Thanks to the deployment of decentralised smart contracts on its network, the Ethereum blockchain has enabled the creation of DeFi, a third way in finance halfway between institutionalised finance and over-the-counter finance. All the services offered by DeFi are enabled by the security and decentralisation of the network which removes the traditional trusted third parties such as banks to deliver financial services. Some of the most well-known services offered by DeFi on the Ethereum blockchain include decentralised exchanges (DEX), crypto lending and liquid staking.

In total, Ethereum's DeFi protocol funds represent a TVL (Total Value Locked) of nearly **$60.46bn** placing Ethereum **far and away in first place** among blockchains in terms of TVL. Amongst Ethereum's layer 1 competitors, Binance Smart Chain is a distant second to Ethereum with $6.99bn of TVL. In total Ethereum has a TVL more than 3x higher than all its layer 1 competitors combined.

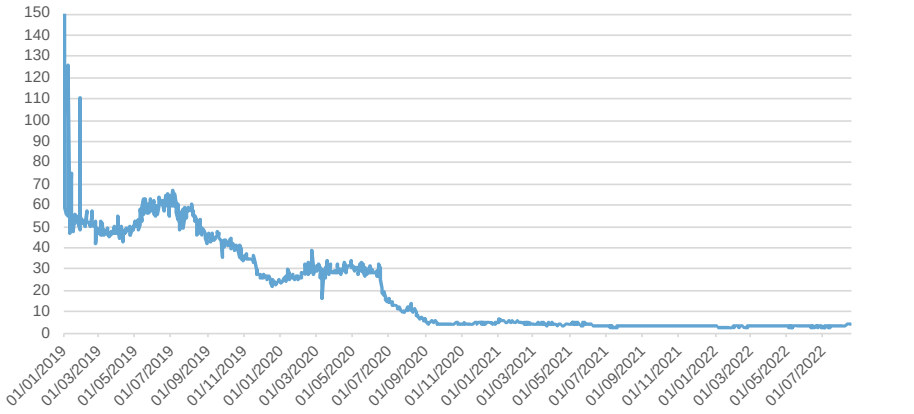
TVL from other layer 1 competitors to Ethereum (bn$)



Source: Alpha Digital Research, Defi Lama

When analysing the ratio of Market Cap to TVL this ratio comes out at **3.79x** for Ether which seems to be relatively attractive, three times below its historical average over 2020-2022 at 8.8x. If we look at the average over 2021, which seems to be a better target as this is when Ether's MktCap / TVL ratio started to stabilise, the ratio comes out at 3.81x. It therefore appears that Ether is undervalued by less than 1% compared to its historical MktCap / TVL ratio.

Marketcap / TVL ratio Ether 2019 - 2022

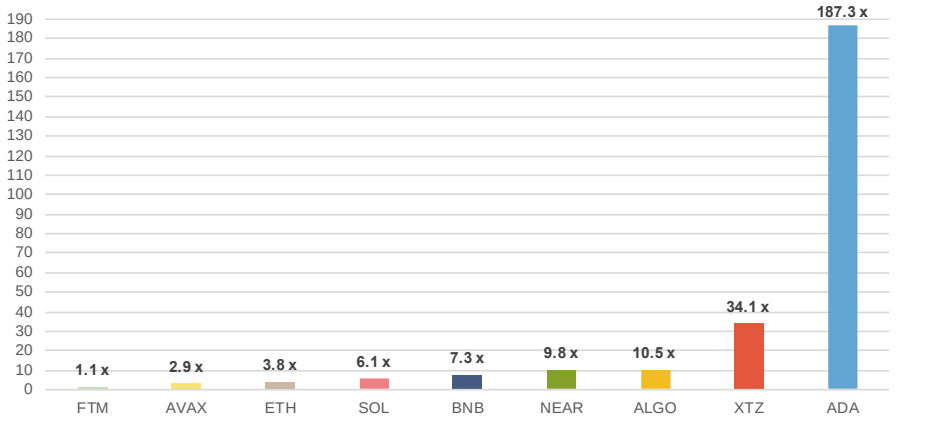


Source: Alpha Digital Research, Defi Lama

Furthermore, the median of Ether's competitors is 8.6x making Ether an undervalued asset also compared to its competitors regarding its TVL. Only AVAX and FTM, whose token price fell sharply after the departure of its star developer Andre Cronje, have a more attractive multiple

than Ether. The high MktCap/TVL ratio of some of Ether's competitors is linked to an almost non-existent DeFi, with investors betting on strong future growth and TVL catching up on these digital assets. However, we question the fair valuation of some of Ether's competitors when multiples become too excessive, such as Ada, which has a MktCap/TVL of 187.3x with a DeFi that seems to be experiencing great difficulties since its launch in January 2022. We therefore confirm our interest in Ether on the basis of the MktCap/TVL ratio and expect the Ether price to catch up and converge towards a MktCap/TVL ratio of around 8x.

Market Cap / TVL from other layer 1 tokens competitors to Ether



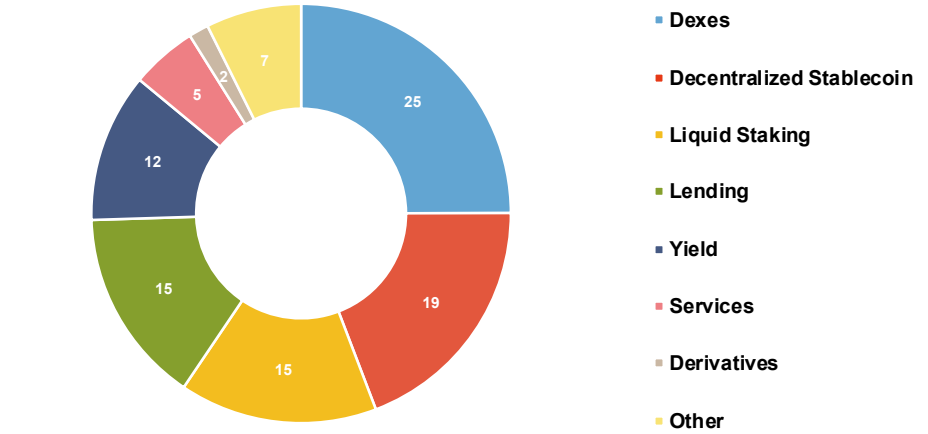
Source: Alpha Digital Research, Defi Lama

The DeFi on Ethereum which gathers 60.46$bn of TVL is composed of different main categories:

- **Decentralised Exchanges** (DEX)
- **Liquid Staking**
- **Decentralised stablecoins** divided into two sub-categories, Collateralized Debt Position (CDP) and algorithmic stablecoins
- **Yield protocols**, which include a broad range of different protocols for generating interest
- Decentralised **lending protocols** that involve the collateralisation of digital assets for borrowers
- Protocols belonging to the **services** category, which includes a diverse set of protocols that enhance the user experience of the DeFi protocols
- **Other categories** such as derivatives, payments, launchpad, etc.

DEX, liquid staking protocols and decentralised stablecoins combined account for over 50% of the TVL on Ethereum.

TVL divided by type of protocols 2022 (%)



Source: Alpha Digital Research, Defi Lama

Decentralised exchanges gather **$14.9bn** of TVL representing **25%** of Ethereum's total TVL. As the name implies, these exchanges allow digital assets to be traded in a completely decentralised manner, without the need for a trusted third party, as opposed to centralised exchange platforms (CEX) such as Binance and Coinbase. Most decentralised exchanges on Ethereum are not based on a traditional order book system but on an innovative liquidity pool system. In this system, liquidity providers lend two tokens of the same amount each to a liquidity pool in return for a fee. The trader will then be able to use the liquidity pool that has the same amount of the two different digital assets to carry out his buy or sell transaction. The imbalance in the liquidity pool caused by the trade will then be quickly filled by market makers. A disadvantage of these automated DEX without an order book is the risk of slippage when the transaction is too large. There is also the risk of front running by a "MEV researcher" who, after having seen the user's trade order that is transmitted publicly, will try to buy/sell beforehand to take advantage of the price gap in what is called a MEW sandwich.

The top twenty DEXs on the Ethereum network are larger in terms of TVL than all other blockchains combined with over **54% market share** and a TVL of nearly $14.9bn. In addition, Ethereum DEXs have collected nearly **$60m in fees** over the last 30 days compared to only $58m for all DEXs on other blockchains combined. The largest DEX in the blockchain ecosystem is Uniswap and is present mostly on the Ethereum blockchain (97% of its TVL based on Ethereum). However, Ethereum's high fees and relatively low number of transactions per second are driving some DEXs such as Sushiswap to migrate part of their activity to layer2 solutions such as Matic PoS Chain or competing blockchains such as Avalanche. The value per transaction on Ethereum's DEX are much higher than other blockchains, meaning that Ethereum is favoured by large holders but avoided by small holders due to high fees. Thus, Ethereum remains the undisputed leader in decentralised exchanges, supported by its main DEX Uniswap, which offers its users greater security and a reduced risk of hacking due to its greater maturity. Layer 2 solutions offload some of the transactions from Ethereum's main network. In the short and medium term, the other blockchains do not represent a serious threat to Ethereum in terms of decentralised exchanges.

Decentralized stablecoins on Ethereum have a TVL of **$11.5bn** representing **19%** of the total TVL of Ethereum. Decentralized stablecoins on Ethereum can be broken down into two subcategories, **Collateralized Debt Position** (CDP) and **algorithmic stablecoins**, accounting for **17%** and **2%** of Ethereum's TVL respectively. CDP stablecoins are issued through decentralised protocols in exchange for users putting up other digital assets as collateral. Upon receipt of collateral, CDP protocols issue debt in the form of a decentralised stablecoin that can be freely used by users. The protocols often require over-collateralisation from their users to protect against price fluctuations of the digital assets deposited as collateral, which would then result in their immediate liquidation. Algorithmic stablecoins include a broad set of different protocols based on different algorithmic solutions, all of which aim to ensure the stability of the stablecoin. Algorithmic stablecoins have been distrusted by users in recent months after the spectacular crash of the UST algorithmic stablecoin based on the Terra blockchain in May 2022. The main decentralised stablecoin on Ethereum is **DAI** which is a CDP stablecoin provided by the **MakerDAO** protocol that has a TVL of **$8.83bn**. The majority of Ethereum's decentralised stablecoins have a parity with the dollar of 1:1. Decentralised stablecoins are essential to the Ethereum ecosystem as they allow the exchange of digital assets and services against a token that replicates the dollar exchange rate while avoiding the services of centralised stablecoins that rely on physical dollar reserves. The latter have the weakness of being in the crosshairs of regulators and of being able to make arbitrary decisions regarding the management of their reserves and the circulation of their stablecoin.

The **liquid staking** protocols on Ethereum have a **TVL of $9.1bn** representing **15%** of the total TVL of Ethereum. Liquid staking involves a protocol issuing a mirror token that acts as a proof of deposit for any token staked. The interest of this solution lies in the fact that in most protocols, unstaking is not immediate but takes a certain amount of time, often between 15 and 30 days, during which no return is received. Liquid staking solutions are very popular on the Ethereum network as ETH2 unstaking on the Beacon Chain is currently unavailable and will not be until the Shanghai upgrade scheduled for the end of H1 2023. The most popular

liquid staking protocol on Ethereum is **Lido** which has a TVL of **$8.1bn** on Ethereum. The Lido protocol issues a stETH token for each Ether staked on the Beacon Chain when using its validators. The stETH then becomes tradable, at an obvious discount to ETH, which is around 2.6% at the time of writing. Liquid staking solutions are essential to Ethereum to ensure an efficient staking environment. Indeed, these solutions open the way for a range of various strategies to hedge against the actual staked ETH.

Yield protocols on Ethereum have a TVL of **$6.9bn** representing **12%** of the total TVL of Ethereum. Yield protocols include a heterogeneous universe of protocols offering users various yield solutions for staking and contributing to liquidity pools. The main Yield protocol on Ethereum is **Convex Finance** which has $**4.55bn** of TVL and allows to optimise returns on the Curve DEX.

Lending protocols on Ethereum have a TVL of **$9bn** representing **15%** of the total TVL of Ethereum. Lending in DeFi is characterized by the making of a loan in a digital asset through the collateralization of another digital asset. The system is very similar to a loan against gold that can be found in the traditional banking system. The difference is that the collateral pledged is a digital asset and the whole process is done in a completely decentralised way. This solution allows the borrower to withdraw stablecoins such as USDT for use in the real economy while not selling the digital assets they wish to keep. These platforms can also be used by some players to overexpose themselves with leverage by buying even more digital assets than those collateralized with the money provided by the loan. However, the risk of liquidation is relatively high in the event of a downturn. The lenders who provide the loan receive a return through the decentralised lending protocol that varies according to supply and demand. To prevent lenders from being negatively impacted in the event of a sharp drop in the value of the collateral, the platforms ask borrowers to over-collateralise their loans and proceed to an automatic liquidation once a certain threshold is reached.

Ethereum is the leading blockchain for decentralised lending in digital assets and **hosts almost half (50%)** of the TVL gathered in all decentralised lending protocols across layer 1 blockchains. The largest decentralised lending platform, which was initially launched on the Ethereum blockchain in January 2020, is **AAVE** which has a TVL of over **$5.41bn** on Ethereum. More than **$3.5bn in loans** are currently active through AAVE on the Ethereum blockchain.

New decentralised insurance services enabled by the Ethereum blockchain

The Ethereum blockchain has enabled the creation of new, fully decentralised insurance models. The various insurance products built on the blockchain operate in a completely autonomous and decentralised way by relying on smart contracts. The policyholder of the insurance product will thus be automatically indemnified if the indemnification conditions are met. In order to verify conditions external to the perimeter of the blockchain, such as compensation linked to a meteorological event, the smart contracts will use oracles which will act as intermediaries with the outside world.

Most of the decentralised insurance contracts on the blockchain come from new platforms from the DeFi ecosystem that have their own token. The main insurance product of these platforms is that of indemnifying users of DeFi protocols in case some of the funds are stolen by hackers. The clients of these products are usually the users of the DeFi protocols or sometimes even the DeFi protocols themselves who choose to insure a part of the funds in order to reassure their users. One of the best known insurance platforms in the industry is Armor (renamed Ease in May 2022) whose protocols have had over $1.5bn of insurance policies purchased securing over 90 protocols. Amor has already been put to the test as in January 2021 when it repaid nearly $200,000 worth of Ether following the Yearn Finance protocol hack.

Traditional insurers are also beginning to experiment by developing their own insurance solutions on the Ethereum blockchain. Insurers see these new insurance products as a way to attract new customers interested in the greater transparency of these products. The international insurer Axa, for example, launched a project in 2017 on the Ethereum blokchain to automatically compensate a policyholder for a delayed or cancelled flight. However, despite a technically working solution, the project was not as successful as expected, leading Axa to stop the project in 2019. The main reason for this failure is a more difficult marketing than expected with intermediaries such as travel agencies still unfamiliar with these new types of products. We expect that the growing adoption of blockchain technology will allow traditional insurance players to experience the same success with their decentralised insurance products on Ethereum as the DeFi start-ups.

The NFT industry is revolutionising the ownership economy

NFT, non-fungible token, is a type of token that has the particularity of being non-fungible, indivisible and representing a unique digital object. NFTs on the Ethereum blockchain were introduced in September 2017 with the emergence of the ERC-721 smart contract standard.

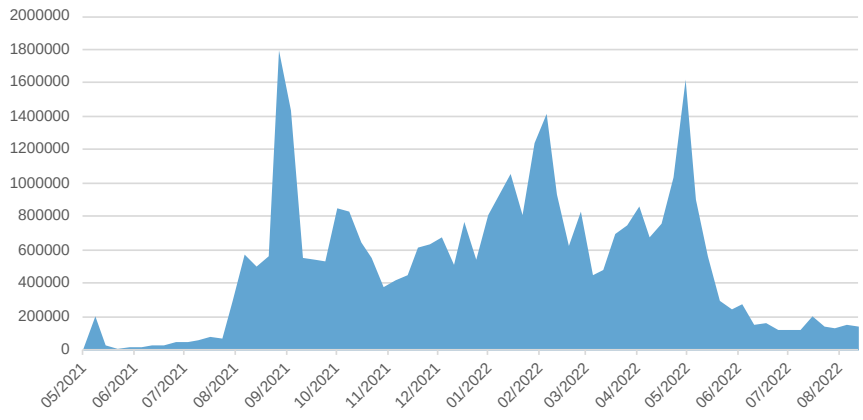
The NFT industry was widely popularised on the Ethereum network with the introduction of CryptoKitties in November 2017. CryptoKitties were ERC-721 NFTs representing virtual cats that could be bought, bred and resold. Such was the success of these NFTs that the Ethereum network became congested, leading to an explosion in transaction fees.

Despite this, NFT gradually fell out of favour after the crash of 2018, only to see a resurgence of interest in 2021 through NFT art collections, notably the Bored Ape Yacht Club collection, which has a total transaction volume of over $1bn since its creation. Most of these NFT art collections are characterised by a common theme (gorillas in the case of Bored Ape Yacht Club) that is replicated in numerous versions by changing certain details. The renewed interest in NFTs in the art world culminated in 2021 with the sale of the NFT "Everydays: the First 5000 Days" by the artist Beeple for $69.3m, becoming the most expensive digital artwork ever sold.

The majority of the NFT market is captured by Ethereum, which crushes competing blockchains with a **market share of 80%.** However, the market share of other blockchains such as Solana has been steadily increasing since 2021 by attracting users discouraged by the high fees of the Ethereum blockchain.

As far as NFT sales volumes on Ethereum are concerned, they are very high, reaching $33.6bn in one year. Most of the NFT volume on Ethereum occurs on a single platform, the **OpenSea** platform, which captures 70% of the volume. It is worth noting that NFT volume has collapsed since May 2022, following the fall in the price of Ether, proving the still highly speculative nature of NFT.

2021-22 NFT trading volumes on Ethereum (M$)



Source: Alpha Digital Research, Nansen

While it is clear that NFTs have been widely popularised through the art market, NFTs cannot be reduced to this single application. Indeed, the scope of NFTs is much wider and many

sectors of the economy could be disrupted by this technology which is revolutionising the ownership economy. By making it possible to certify that a digital object belongs to an individual thanks to the immutable transactions of the blockchain, NFT technology could replace the work of intermediaries who performed this role. It is thus possible to imagine that the profession of notary could be revolutionised by NFT technology. Indeed, the role of the notary as a trusted third party to authenticate a contract for the purchase or sale of real estate could be partially replaced by the blockchain. Property deeds will then simply be associated with an NFT which will give the owner the legal right to dispose of the property. The first ever sale of property using an NFT was conducted in 2017 by Michael Arrington through the Propy platform, based on the Ethereum blockchain.

The metaverse revolutionizes our uses by moving our interactions into the digital world

NFT technology, which identifies the ownership of a virtual object associated with an Ethereum address, has enabled the creation of the metaverse. The metaverse can be described as a highly immersive virtual world where users meet to socialize, play games and work. The first metaverse on Ethereum was born in 2017 with the launch of the **Decentraland** project. In the Decentraland metaverse, it is possible to buy your own land, customize it to your liking, and invite other users to explore it. The peak of transactions occurred in December 2021, when almost 48 million were spent on land purchases. Since then, sales have dropped sharply to about **$2.1M** per month. Other metaverse projects similar to Decentraland have emerged, such as The **Sandbox** in 2021, which has become the largest metaverse in the Ethereum blockchain. The Sandbox has realized over the month **$5.5M** in land sales. Many multinationals and famous personalities have entered the metaverse built on Ethereum, such as Samsung, Adidas and JPMorgan who have purchased land on The Sandbox. From their land, these multinationals can offer their customers all kinds of services and also use the metaverse as a new marketing channel like social networks.

Ethereum revolutionizes gaming

The gaming experience on Ethereum is enhanced by NFT, which offers new possibilities. Thanks to the NFT technology, it becomes possible to actually own game items and exchange them with other users via the blockchain. This allows a new category of video games to emerge: the play-to-earn. In a play-to-earn, players often have to invest at the beginning by buying equipment with the project tokens. Once players have purchased their first pieces of equipment, they can fight against in-game creatures or other players to gain new equipment and resources. Players can then resell them and pay back their initial investment. Ethereum is a leading blockchain for play-to-earn video games with nearly **35% market share** and has hosted many projects. In particular, Ethereum has hosted for several months the play-to-earn game **Axie Infinity**, whose NFTs as a whole have more value than the NFTs of all the other play-to-earn games combined as of mid-2021. However, play-to-earn has been widely criticized for contributing to a form of "digital colonialism": the majority of players come from underdeveloped countries and share their income with their Western sponsors who provide the initial investment.

However, the concept of games whose experience is enhanced by blockchain is still new and seems promising. The traditional big players in the video game industry are particularly interested in the combination of gaming and blockchain, such as EA Sport and the French-Canadian giant Ubisoft, which has however favoured the Tezos blockchain over Ethereum. It seems undeniable that the Ethereum blockchain will capture a significant share of the largest video game companies' projects due to its larger developer base and greater legitimacy as the oldest smart contracts blockchain.

An ambitious roadmap for Ethereum and growing adoption not without risks

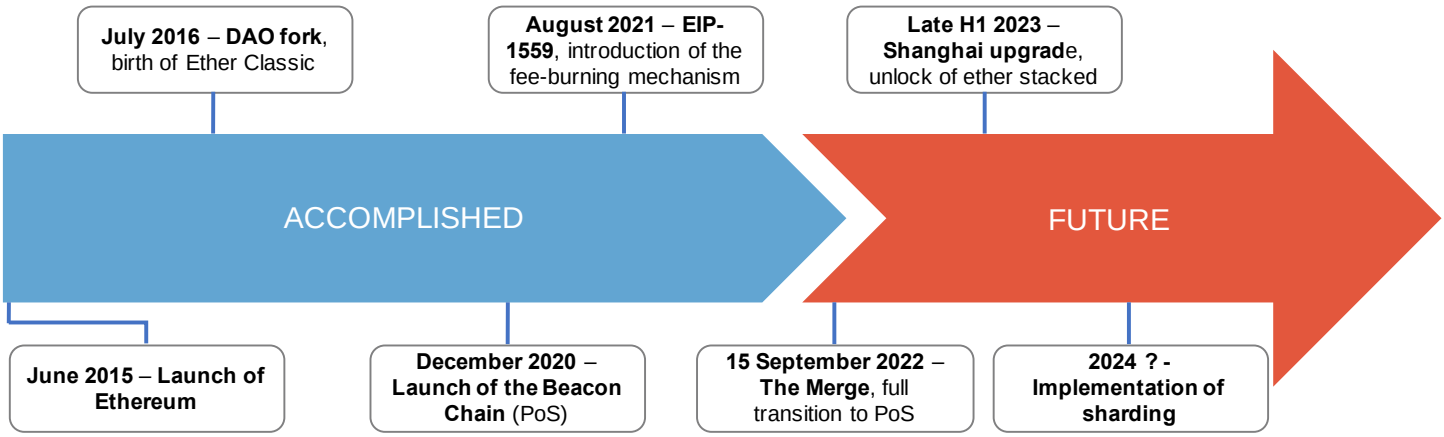
As the first layer 1 smart contracts blockchain, Ethereum is buckling under the weight of its activity and its network is congested. In order to address this problem, Ethereum has put in place a long and ambitious roadmap, of which the Merge, scheduled for September 2022, is only half the way through. The successful completion of this roadmap will allow Ethereum to solve its scalability problem and freeze its leadership position forever. Ethereum can then continue to take the lion's share of the growing adoption of blockchains and digital assets. However, the road ahead is fraught with risks, both regulatory and technological.

An ambitious and promising roadmap

Ethereum's roadmap focuses on increasing the scalability of its blockchain while maintaining its security and decentralisation, which would enable it to achieve what no blockchain has been able to do so far: solve the security, decentralisation and scalability trilemma. To solve this trilemma, Ethereum needs to move from a PoW model to a PoS model, which will pave the way for the implementation of scalability solutions such as sharding, while maintaining a good level of security and decentralisation. When the Ethereum roadmap is complete, founder Vitalik Buterin estimates that Ethereum will be capable of performing nearly **100,000 transactions per second**. Several steps are needed to meet this challenge:

- The first step towards solving this trilemma was initiated on **1 December 2020** with the launch of the **Beacon chain**, a parallel Ethereum network running on a PoS model in preparation for the future transition to a 100% PoS model.
- The second step took place in **August 2021** with the London upgrade and the introduction of **EIP-1559**. EIP-1559 allowed for a temporary increase in block size, better estimation of transaction fees with the introduction of base fees and the burning of base fees.
- The third step is scheduled for **September 15** with the launch of the Merge, the transition to PoS by merging the PoS network and the PoW network. Once this is completed, founder Vitalik Buterin estimates that Ethereum will be 55% complete.
- The fourth step is expected to take place at the **end of H1 2023** and corresponds to the Shanghai upgrade. The Shanghai upgrade will enable the unlocking of staked Ether and rewards as well as the implementation of scalability solutions with a focus on increasing synergies with layer 2 rollups (EIP-4488 or EIP-4844).
- The date of the fifth step is still unknown but should correspond to the implementation of the **sharding** solutions. This fifth step could also be broken down into several intermediate steps. We could speculate on a sharding implementation around **2024**.

History and Roadmap of Ethereum

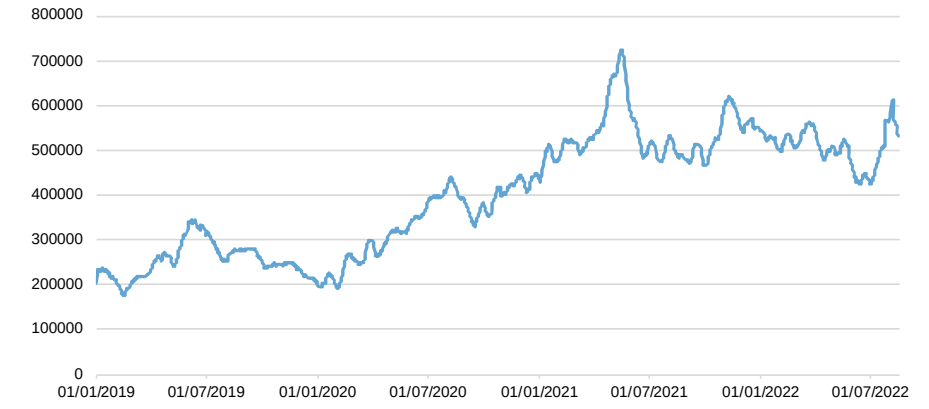


Source: Alpha Digital Research

Growing adoption expected to continue

The growing adoption of Ethereum is already noticeable and is taking place at different levels. Firstly, at the level of its users, the number of daily active addresses has more than doubled since 2019 with an average of more than **530,000 daily active addresses** over the last 7 days.

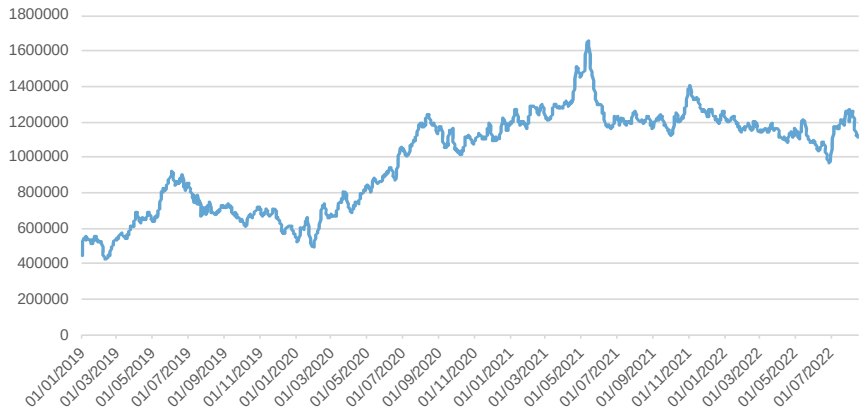
Growth of daily active adresses 2019-2022 (7-day MA)



Source: Alpha Digital Research, Etherscan

As far as user interaction with the blockchain through transactions is concerned, it has increased significantly in 3 years. Between 2019 and today, the number of transactions performed on the Ethereum blockchain has almost tripled and amounts to almost **1.1 million** transactions per day. A very large part of these transactions is related to the interaction with smart contracts, especially those of the Defi or NFT protocols.

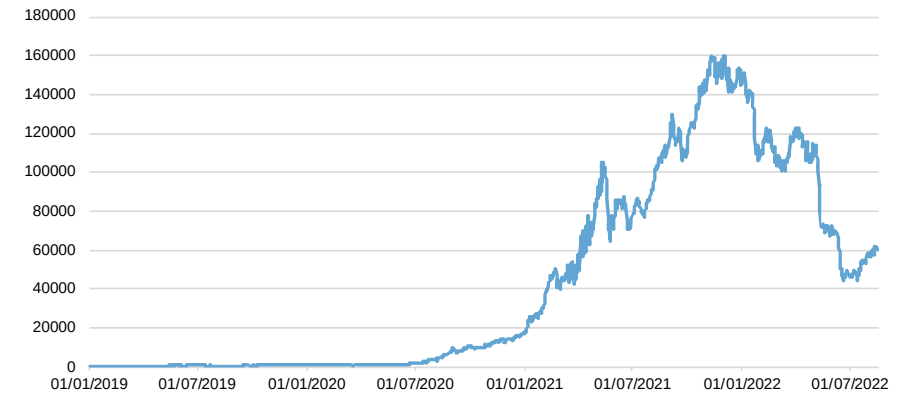
Growth of daily transactions 2019-2022 (7-day MA)



Source: Alpha Digital Research, Etherscan

As far as the Ethereum ecosystem is concerned, it continues to grow with new protocols deployed every day and now has over 450 Defi protocols. In the same vein, Ethereum's TVL locked into its Defi protocols has increased dramatically since 2019, when it was almost non-existent, now reaching **$60.46bn** after peaking at $160bn in November 2021. The number of developers in the Ethereum ecosystem has also increased dramatically, doubling since 2019 with now over 1300 full-time developers on Ethereum helping to develop the blockchain and its ecosystem.

Growth of TVL 2019-2022 (M$)



Source: Alpha Digital Research, Etherscan

On a purely speculative level, the value of Ether has risen sharply. At the current price, Ether's price has increased more than 23 times from the bottom of its last bull run. Compared to its price at the time of the ICO in 2014 at around $0.31, Ether has performed +605.705%.

From an economic point of view, thanks to its growing and innovative ecosystem, Ethereum has been able to create new markets, notably around DeFi and NFTs. Many large companies are embracing the Ethereum blockchain, such as the French bank Société Générale, which is using it to issue €100m bonds. Payments giant Paypal has also integrated some digital assets, including Ether, into its services and allows its US customers to use Ether to pay through its merchant network. This functionality is expected to be extended outside the US in the future. Public administrations and governments have also explored the use of the Ethereum blockchain, such as the Canadian government, which has developed a solution to visualise grants paid out to increase transparency.

The future of Ethereum and Ether is not without risks

There are several risks around Etereum and Ether:

- **Regulatory Risk:** As the adoption of digital assets including Ether grows, regulators in various states are seeking to regulate and frame this new sector. Thoughtful and measured regulation of digital assets should benefit the sector and increase adoption. However, poorly designed and overly restrictive regulation could severely hamper the growth of the sector. Across the world, current and pending regulation of digital assets is generally measured as in Switzerland and the US. However, current regulations in the EU are moving in the wrong direction and pose a serious risk to the growth of the sector in the EU. The problem goes beyond the EU as their pending regulation of digital assets, deemed by industry players to be flawed, could serve as a standard for other regions in the world. The first EU regulation is **MiCA**, which is expected to come into force in 2024 and includes strong restrictions on digital assets based on energy-intensive PoW consensus. Ethereum will not be affected by this regulation after its transition to PoS in September 2022. The second regulation is **TFR**, which regulates the transfer of digital assets between centralised exchanges and digital wallets with the requirement to perform some form of KYC. This regulation, which is expected to come into force during 2024, could be very detrimental to the industry and in particular to Ethereum where most of its ecosystem players use these digital wallets and have a desire for anonymity. P2P transfer is not affected by this regulation but the main gateway for digital assets are the CEXs before the funds land in the Ethereum ecosystem like DeFi. This regulation will have a negative ripple effect on all the Ethereum DeFi in the EU and beyond.
- **Technological Development Risk**: The first risk in the technological development of Ethereum in the short term would come from a faulty launch of the Merge and the transition to PoS. Although the consequence of such an event would probably be limited to a simple delay of the Merge, the market would be likely to punish Ether very severely for this setback. However, this risk remains limited insofar as the teams in charge of the Merge have carried out numerous very thorough tests (i.e. Merge on the various Ethereum tests) before carrying out the Merge on the main network. Another risk in the technological development of Ethereum could be that the implementation of sharding is more complicated than expected, if not impossible. There are many unknowns surrounding the implementation of sharding on Ethereum and the technology is still very theoretical. It would therefore not be surprising if delays and complications arose in the implementation of sharding.
- **Competition risk**: One of the risks for Ethereum and by extension the value of Ether is that a competing blockchain will overtake Ethereum. Indeed, the long deployment of solutions to improve Ethereum's scalability and reduce high fees has led to the emergence of several layer 1 competitors that do not have these flaws: Binance Smart Chain, Solana, Avalanche. For now, the solutions proposed by these blockchains are the result of a trade-off with less decentralisation and unstable networks. However, it is not excluded that one day one of the competing layer 1 blockchains will propose a solution deemed more efficient than Ethereum's and surpass the latter in terms of adoption.
- **Risk of speculative attacks**: It is not excluded that the price of Ether can be manipulated through its futures contracts as it has been the case in the past for some precious metals. Indeed, the volume of Ether futures contracts has risen sharply and stood at $935bn in July. The Ether futures market has become sufficiently developed to allow for price manipulation, one technique being to drive the price of Ether down through the futures market while accumulating in the spot market.
- **Crash and Bear Market risk:** Historically, market cycles for digital assets are composed of bubble and crash phases, and Ether is no exception to this phenomenon. It is possible that this atypical value search for digital assets will diminish or even disappear over time, but a new risk of a crash followed by a long bear market for Ether is always present. A prolonged bear market in Ether could lead

to a slowdown in the adoption and development of the Ethereum ecosystem, or worse, a decline of the ecosystem.

- **Risk of hacking:** Hacks and other exploits in the world of digital assets are relatively common. However, hacks around Ethereum and the decentralised protocols that rely on it are less common due to their greater maturity. However, a hack or exploit in the Ethereum ecosystem could have dramatic effects and would cause significant downward pressure on Ether. A hack of Ether funds on a centralized exchange would also have the same effect.

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