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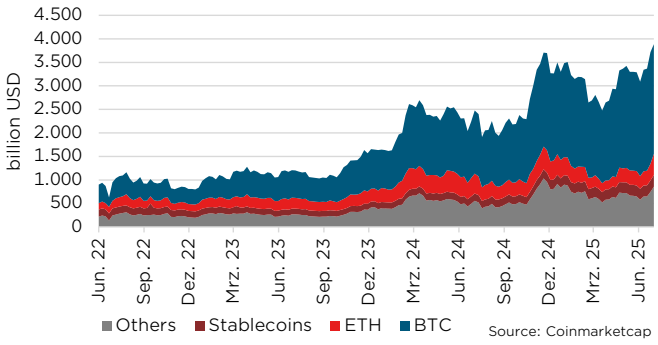
Understanding Ethereum (Part I/II): The new operating system for the digital financial world

A significant milestone for the blockchain world: Almost exactly ten years ago, on July 30, 2015, Ethereum launched as an experimental platform for so-called smart contracts, i.e., self-executing digital contracts. What began as a visionary project by Vitalik Buterin and his team has developed into the second-largest cryptocurrency and the digital infrastructure for a new generation of financial services. While Bitcoin has already found its place in professional portfolios, Ethereum is increasingly attracting the attention of institutional investors. Traditional financial institutions are investing billions in Ethereum-based applications, from automated trading protocols to programmable bonds. But what is it exactly that makes Ethereum so interesting for the financial world? And why do experts speak of a "new operating system" for digital financial services? Our two-part article explains the fundamentals of this technology – cutting through the usual hype and speculation.

Ethereum - a platform, not just a “coin”

Most people often mistakenly associate Ethereum with the second-largest cryptocurrency by market capitalization. However, Ethereum is far more than a digital currency. It is a globally distributed network that enables both the execution of applications and the transfer of assets – without a central authority. The vision described by Vitalik Buterin in the Ethereum white paper is that of a global computer infrastructure on which everyone can store their own business logic in the form of code. In contrast to Bitcoin, which was conceived as a pure digital ledger limited to the transfer of value, Ethereum brings a crucial innovation: the programmability of financial logic.

Market capitalization of cryptocurrencies



One can imagine Ethereum as a global app store in which applications run not on individual smartphones but on a shared, immutable blockchain. To understand how Ethereum works, it is helpful to take a look at the underlying blockchain technology: the blockchain functions like a shared, digital ledger that is maintained simultaneously on thousands of computers worldwide. Each new page (block) is added chronologically and cryptographically linked to the previous page—like a chain in which each link is firmly connected to the next. If someone attempts to change a link, the entire chain breaks, and all other computers immediately notice the attempted manipulation. Since all participants have the same version of the ledger, fraud is virtually impossible.

This openness and flexibility make it possible to create new forms of digital collaboration. While it serves as the technological foundation of cryptocurrencies, it also finds applications in areas such as finance, supply chains, and digital identities. A more detailed explanation of

blockchain technology can also be found in our article "Understanding Bitcoin (Parts I/II): The Technology Behind the Digital Currency."

Smart Contracts – Contracts that fulfill themselves

At the heart of Ethereum are so-called “smart contracts”. These are small programs stored on the blockchain and executed automatically as soon as predefined conditions are met. A particularly vivid example of such a contract from everyday life is the Coca-Cola vending machine: you insert money into the machine, and it then decides what happens. If too little money is inserted, the machine spits the money back out. If the inserted amount is correct, a Coke bottle comes out. If too much money is inserted, the Coke bottle plus the change comes out. This is a simple example of a contract that is executed automatically, without the need for a salesperson to intervene. If this scenario were to take place at a kiosk, however, the salesperson would be the "smart contract" instance, checking various conditions and acting accordingly. Smart contracts work in exactly the same way: they automatically check whether certain conditions are met and then trigger corresponding actions – for example, the transfer of assets or the distribution of a dividend.

What's makes these contracts special is that a central authority is no longer required to execute them. The code is executed across many computers in a decentralized network, making manipulation virtually impossible and ensuring the integrity of the processes. The practical application can also be illustrated by the example of automated insurance: a smart contract continuously monitors weather data and automatically triggers a payout when defined thresholds are met, such as in the event of a drought or storm. No paperwork, no appraisers, no waiting time. Such automation shows why Ethereum is becoming interesting for the financial industry: complex processes can be fully digitized and controlled by verifiable rules instead of institutions.

Ether (ETH) as fuel

To understand how this system works, we need to look at the network's "currency": Ether. Every transaction and every computational operation on Ethereum costs "gas," a measure of the computational effort paid for in the cryptocurrency Ether (ETH). Ether is to Ethereum what gasoline is to a car: without this fuel, no smart contract can be executed and no transaction can take place. For investors, this means that Ether is not just a speculative asset, but an integral part of the system that ensures the execution and security of smart contracts. Validators who operate the network and confirm transactions receive Ether as a reward. Ether thus forms the economic backbone of the Ethereum ecosystem.

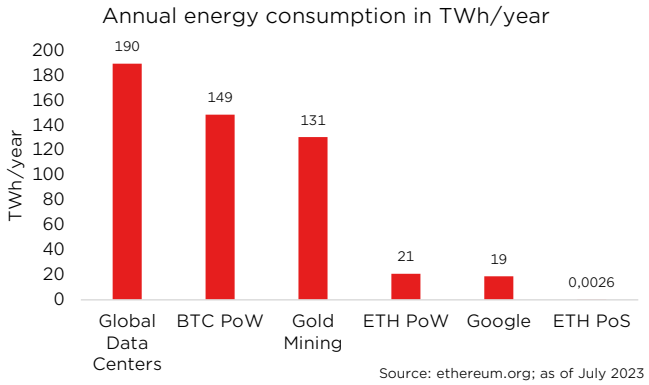
Differences to Bitcoin – More than just digital money

Bitcoin and Ether are the two largest cryptocurrencies, but they pursue fundamentally different goals: while Bitcoin was conceived as a decentralized, digital store of value ("digital gold"), Ethereum sees itself as a flexible platform for smart contracts and decentralized applications (dApps).

A key technical difference lies in the consensus mechanism. Bitcoin uses the energy-intensive "Proof of Work" (PoW) process, in which miners worldwide solve complex computational tasks. Ethereum, on the other hand, switched to the more sustainable "Proof of Stake" (PoS) model in 2022.

Ethereum's validation process functions in a fundamentally different way. Instead of energy-intensive mining, a transparent but secure selection process determines who is allowed to create the next block. Anyone wishing to participate as a validator must deposit at least 32 ETH as a stake, which serves as security for correct behavior. The network then randomly selects a validator who can propose a new block, while other validators review and confirm this block. If a validator performs correctly, they receive additional ETH as a reward; in the event of misconduct or attempted fraud, a portion of their stake can be permanently destroyed – a strong incentive for honest behavior.

This "Proof of Stake" transition brought dramatic improvements: Ethereum's energy consumption fell by over 99 percent, as computationally intensive tasks no longer need to be solved. Instead of thousands of computers constantly competing to solve the same puzzle, with Proof of Stake a normal computer is sufficient to act as a validator. This makes Ethereum not only more environmentally friendly but also more democratic: participation in the network is not determined by the greatest computing power, but rather by financial commitment and correct behavior. At the same time, security is guaranteed, as attackers would have to risk a significant financial investment to manipulate the network.



Another fundamental difference concerns the supply of each cryptocurrency: while Bitcoin's maximum supply is set at 21 million Bitcoins, which provides a hard limit from the outset and thus built-in protection against inflation, Ethereum has no such cap. The circulating supply of ETH is currently around 120 million, and theoretically, new Ether can continue to be issued. However, with various network updates, Ethereum's annual inflation rate has been significantly reduced; currently, it is only around 0.7 percent. Bitcoin relies on absolute scarcity, while Ethereum offers flexibility for different applications.

But how can Ether function as a currency if there is no fixed cap? The key lies in the interplay of issuance and the "burning" of Ether. On the one hand, new ETH is distributed to the validators who secure the network. On the other hand, with each transaction, a portion of the fees (the so-called "base fee") is permanently removed from circulation and "burned." This creates a balance: during periods of high network congestion, even more Ether can be burned than is issued, temporarily shrinking the supply. The amount of Ether does not grow uncontrollably, but is actively controlled by these mechanisms. Importantly, changes to these rules are only possible through broad consensus within the community. The system is thus decentralized and automatically controlled. Based on the principle that once established in the protocol, it applies equally to everyone and is transparent to everyone. The goal is to ensure the security of the network while keeping inflation low.

Ethereum has evolved from an experimental blockchain platform into a serious financial infrastructure. In the second part of this series, we will delve deeper into understanding the Ethereum ecosystem and explore further developments relevant to the practical application of this technology. Recent regulatory advances, particularly the GENIUS Act, and rising prices demonstrate that institutional investors are recognizing the potential of programmed financial logic. While Bitcoin primarily serves as a store of value, Ethereum enables the automation of complex business processes through smart contracts.

Jan Mooren

Market data

Stock marktes	As of 01.08.2025 10:24	Change versus 25.07.2025 -1 week	30.06.2025 -1 month	30.04.2025 -3 months	31.07.2024 -1 year	31.12.2024 YTD
Dow Jones	44131	-1,7%	0,1%	8,5%	8,1%	3,7%
S&P 500	6322	-1,0%	1,9%	13,5%	14,5%	7,5%
Nasdaq	21122	0,1%	3,7%	21,1%	20,0%	9,4%
DAX	23689	-2,2%	-0,9%	5,3%	28,0%	19,0%
MDAX	30493	-3,1%	0,0%	6,1%	20,2%	19,2%
TecDAX	3784	-1,9%	-2,4%	4,1%	12,7%	10,7%
EuroStoxx 50	5245	-2,0%	-1,1%	1,7%	7,6%	7,1%
Stoxx 50	4416	-2,1%	-0,8%	0,3%	-1,7%	2,5%
SMI (Swiss Market Index)	11836	-1,0%	-0,7%	-2,3%	-3,9%	2,0%
Nikkei 225	40800	-1,6%	0,8%	13,2%	4,3%	2,3%
Brasilien BOVESPA	133071	-0,3%	-4,2%	-1,5%	4,2%	10,6%
Indien BSE 30	80796	-0,8%	-3,4%	0,7%	-1,2%	3,4%
China CSI 300	4055	-1,8%	3,0%	7,5%	17,8%	3,1%
MSCI Welt	4076	-1,2%	1,2%	11,5%	14,1%	9,9%
MSCI Emerging Markets	1243	-1,2%	1,7%	11,7%	14,6%	15,6%
Bond markets						
Bund-Future	129,70	38	-45	-208	-403	-374
Bobl-Future	117,14	-7	-54	-249	-37	-72
Schatz-Future	107,03	-5	-22	-54	95	4
3 Monats Euribor	2,02	5	7	-14	-163	-70
3M Euribor Future, Dec 2025	1,92	3	11	28	-39	3
3 Monats $ Libor	4,41	-1	0	10	-100	4
10 year US Treasuries	4,39	1	17	23	33	-18
10 year Bunds	2,72	5	12	31	48	36
10 year JGB	1,56	-2	13	28	53	48
10 year Swiss Government	0,37	-6	-6	6	-9	9
US Treas 10Y Performance	617,42	0,2%	-0,7%	-0,4%	1,9%	4,3%
Bund 10Y Performance	559,41	0,2%	-0,2%	-1,1%	-0,5%	-0,9%
REX Performance Index	457,76	0,2%	-0,3%	-0,4%	2,2%	1,1%
IBOXX AA, €	3,09	-2	-1	9	-9	6
IBOXX BBB, €	3,39	-4	-6	-10	-32	-7
Commodities						
MG Base Metal Index	424,31	-2,4%	-1,5%	4,3%	5,3%	4,6%
Crude oil Brent	71,81	4,9%	6,1%	11,6%	-10,9%	-3,9%
Gold	3287,00	-1,4%	0,1%	-0,6%	35,7%	25,2%
Silver	32,54	0,0%	0,0%	-0,6%	12,9%	9,6%
Aluminium	2562,36	-2,8%	-1,3%	8,0%	15,0%	1,4%
Copper	9560,24	-1,6%	-4,9%	4,8%	5,0%	10,5%
Iron ore	99,86	1,3%	5,7%	0,1%	-5,7%	-3,6%
Freight rates Baltic Dry Index	2003	-11,3%	34,5%	44,5%	17,3%	100,9%
Currencies						
EUR/ USD	1,1416	-2,6%	-2,6%	0,4%	5,4%	9,9%
EUR/ GBP	0,8660	-0,8%	1,1%	1,8%	2,8%	4,7%
EUR/ JPY	171,88	-0,7%	1,6%	5,7%	5,6%	5,4%
EUR/ CHF	0,9311	-0,3%	-0,4%	-0,8%	-2,3%	-1,1%
USD/ CNY	7,2113	0,5%	0,6%	-0,9%	-0,2%	-1,3%
USD/ JPY	150,76	2,1%	4,7%	5,4%	0,5%	-4,1%
USD/ GBP	0,76	1,9%	4,0%	1,3%	-2,5%	-5,0%

Source: LSEG Datastream

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