BINANCE RESEARCH

The Future of Bitcoin #4: DeFi

MARCH 2025

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01 / Key Takeaways

- **Bitcoin's Role is Expanding**: Once primarily a store of value, Bitcoin is evolving into a broader decentralized financial (DeFi) ecosystem with the emergence of Bitcoin DeFi (BTCFi)—a sector aiming to unlock Bitcoin's capital efficiency through financial applications such as lending, staking, stablecoins and decentralized exchanges (DEXes), among others.

- **BTCFi's Addressable Market is Significant**: With only ~0.79% of BTC currently utilized in DeFi, BTCFi may present a large untapped opportunity. Even a single-digit penetration rate of Bitcoin's idle supply may drive billions in inflows, creating new avenues for financialization.

- **Infrastructure is the Bottleneck**: Unlike smart contract-based Layer 1s (L1s), Bitcoin lacks native programmability, making Layer 2 (L2) solutions essential for BTCFi's growth. While Bitcoin L2s are progressing, they remain early-stage, requiring further development, adoption, and liquidity incentives to scale effectively.

- **Security Budget Concerns & BTCFi's Role**: The Bitcoin network's security model faces long-term sustainability challenges as block rewards continue to halve. BTCFi could help sustain miner incentives by generating higher on-chain transaction fees, reinforcing Bitcoin's long-term security budget.

- **Adoption Hurdles Remain**: While BTCFi's growth potential seems clear, cultural resistance, technical barriers, and regulatory uncertainty pose challenges. The Bitcoin community has traditionally resisted programmability-focused changes, prioritizing security and decentralization over rapid innovation.

- **Liquidity & Institutional Interest**: Bitcoin's historically passive investor base presents a challenge for liquidity bootstrapping, requiring new incentive mechanisms to activate idle BTC holdings. Institutional players are showing early interest, but adoption will likely be contingent on regulatory clarity and user-friendly solutions.

- **Cross-Chain Interoperability is Key**: With most BTC currently used in DeFi existing in wrapped forms on Ethereum and other chains, BTCFi must develop secure cross-chain solutions to bridge liquidity and attract users from existing DeFi ecosystems.

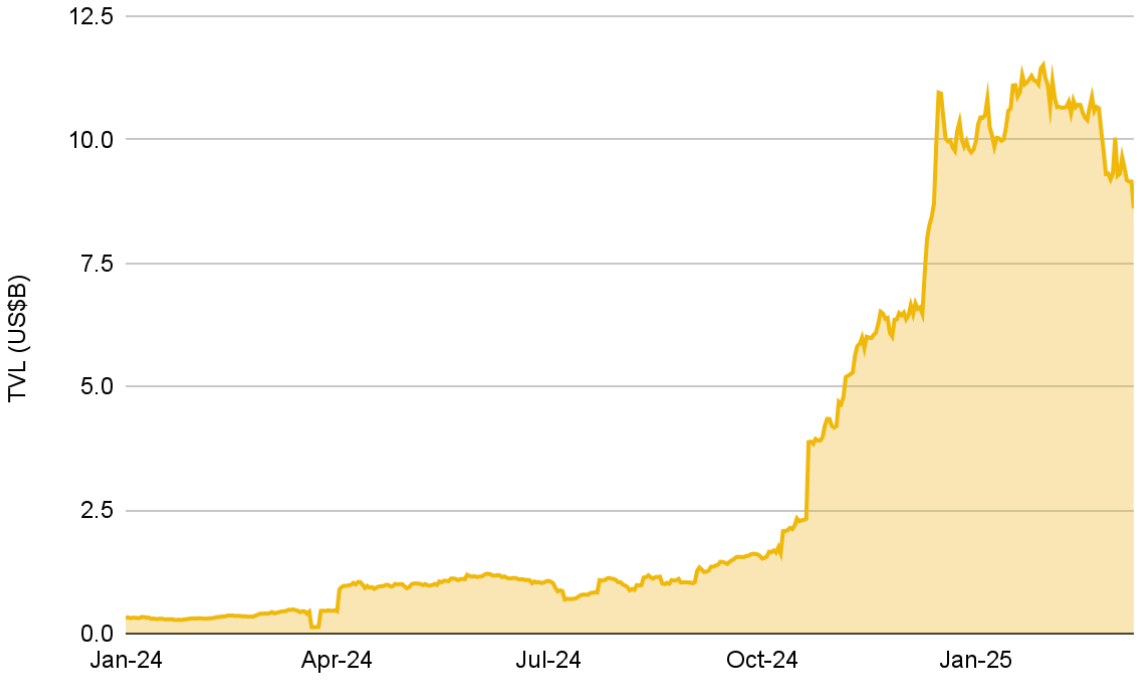
- **BTCFi Needs Its Own Development Path**: Unlike Ethereum's DeFi ecosystem, BTCFi cannot simply replicate existing models. Success may depend on tailored solutions that align with Bitcoin's holder base, particularly in areas like yield generation, payments, and institutional-grade products.

- **Outlook**: BTCFi is in its early stages, and while infrastructure and capital inflows are growing, its long-term viability will depend on successful execution, continued L2 development, and the ability to align with Bitcoin's unique value proposition.

02 / Introduction

Decentralized Finance (DeFi) on Bitcoin is no longer just a concept — it's becoming a reality. Over the past year, Bitcoin DeFi (BTCFi) has become one of the fastest-growing sectors, with total value locked (TVL) surging by 2,767%, from US$0.3B to US$8.6B. This growth has positioned Bitcoin among the **top three DeFi ecosystems**, creating new opportunities for BTC to be utilized in financial decentralized applications (dApps).

Figure 1: BTCFi TVL has grown 2,767% since the start of 2024, rising from US$0.3B to US$8.6B



Source: DefiLlama, Binance Research, as of March 12, 2025

BTCFi marks a major shift in how Bitcoin is utilized. By combining Bitcoin's trillion-dollar asset base with a growing financial ecosystem, it **expands Bitcoin's role beyond a store of value**. Whether through lending, liquidity provision, or collateralization in financial products, BTCFi is bringing new functionality to Bitcoin and reshaping its role in markets. As such, BTCFi may be one of the most underexplored opportunities within the Bitcoin economy, with the potential to **unlock billions in dormant BTC liquidity** and **enhance Bitcoin's capital efficiency**.

This report is part of our Future of Bitcoin series, where we explore key areas shaping Bitcoin's evolution. In this edition, we analyze the financialization of Bitcoin as an asset class, highlighting emerging opportunities and market trends driving the BTCFi ecosystem.

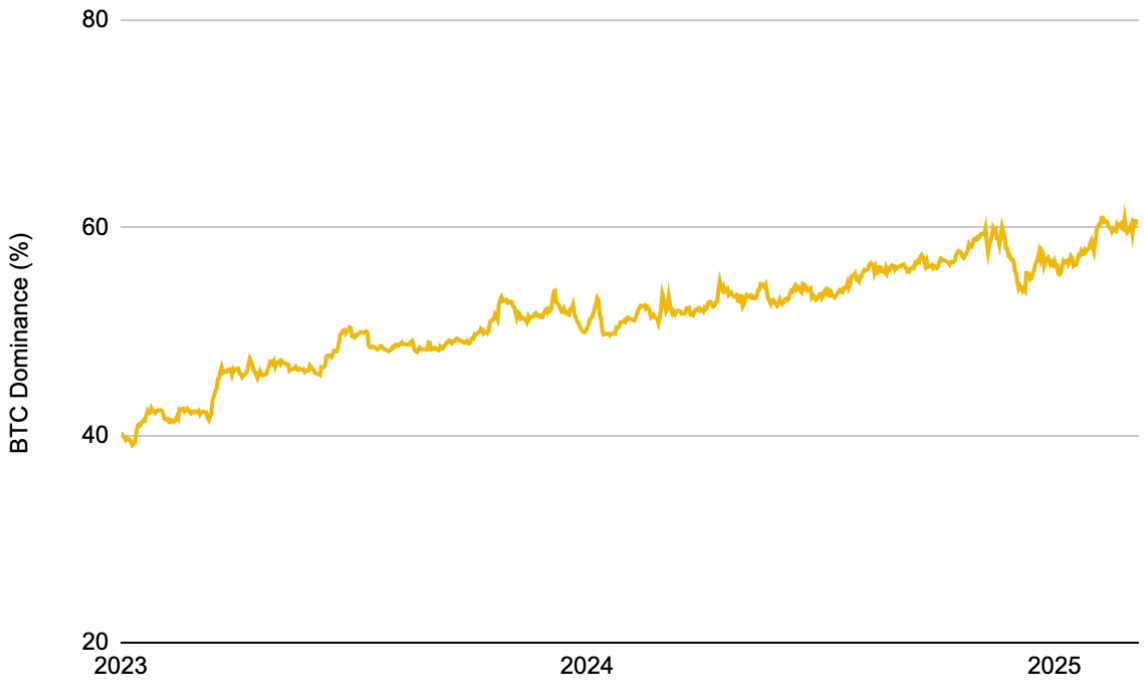
Note: When referring to Bitcoin, we may sometimes use its ticker, BTC. Technically speaking, Bitcoin (BTC) is the native token of the Bitcoin blockchain.

03 / The Case for BTCFi

3.1 Bitcoin's Rising Market Presence

Bitcoin dominance has risen significantly this cycle, with capital flowing into BTC at a faster pace than the broader crypto market. This trend reflects broader accumulation from long-term holders and retail investors, as well as Bitcoin's expanding integration with traditional finance (TradFi). Spot BTC ETFs have enabled the largest asset managers to gain direct exposure to BTC, while corporations — and even nation-states — are increasingly considering it as part of their reserve strategies.

Figure 2: Bitcoin market dominance has been on a strong upward trajectory this cycle, reaching ~60% this year — its highest level in four years



Source: Glassnode, Binance Research, as of March 11, 2025

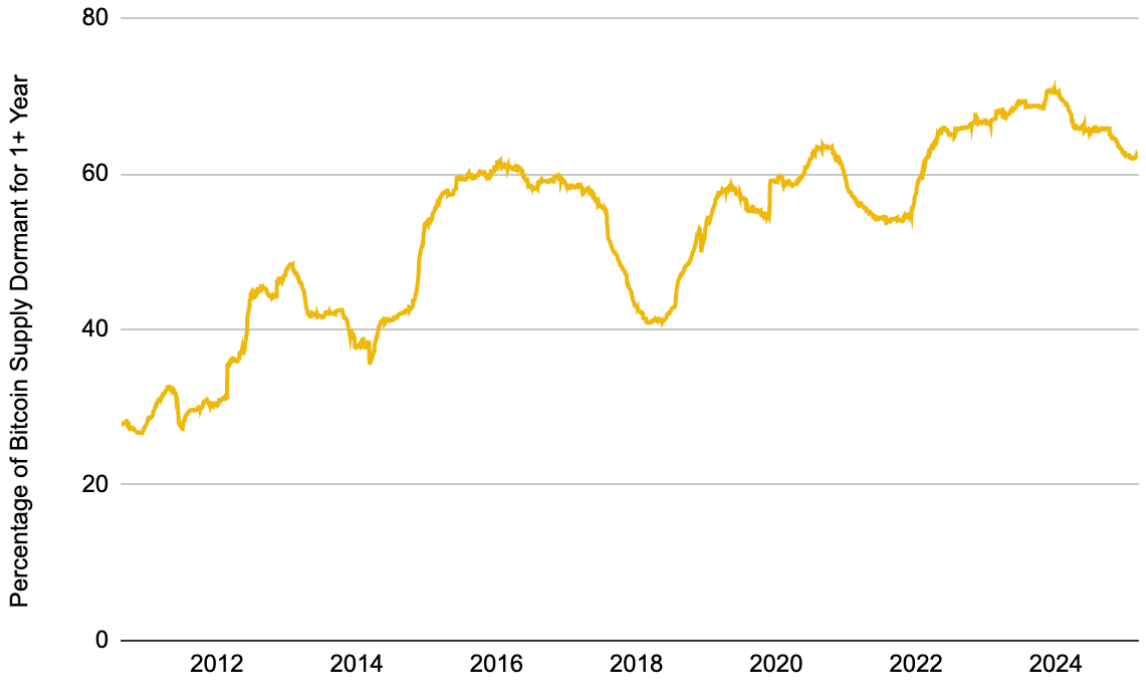
As BTC holdings continue to grow across different segments, the interest in **making these assets more productive** is likely to follow — similar to how traditional assets like treasuries and gold are often utilized in financial markets. Regulatory shifts may also further accelerate this trend. The SEC's recent **rescinding of SAB 121** removed a key restriction that previously required banks to classify custodial crypto assets as liabilities. This change improves the accounting treatment of BTC holdings, which were previously subject to impairment losses under GAAP standards, making it less attractive for companies to actively manage BTC.

With these barriers easing, BTC holders now have greater flexibility to put their Bitcoin to work — whether by using it as collateral for financing, lending it out for yield, or engaging in structured products — without facing accounting penalties. As demand for BTC continues to grow and regulatory clarity improves, the opportunity to **unlock Bitcoin's financial utility** is becoming increasingly viable.

3.2 The Problem: Underutilized HODLed Bitcoin

While Bitcoin demand has grown, leading to increased accumulation, a significant portion remains idle and unproductive. **A growing share of BTC is HODLed long-term,** without being actively utilized in financial markets. In fact, over 60% of Bitcoin has not moved from one wallet to another in more than one year, a percentage that continues to rise — highlighting the **increasing presence of long-term inactive holders**.

Figure 3: The percentage of Bitcoin that has remained idle for at least 1 year is rising, now over 60%



Source: Bitcoin Magazine Pro, Binance Research, as of March 11, 2025

This rise in dormant BTC is primarily due to Bitcoin's **established role as a store of value**, but it is also a reflection of **limited options for holders to put their BTC to work**. While Bitcoin has been largely used as a digital gold-like asset, the lack of accessible financial applications in the past has been a key barrier. Without native yield-generating opportunities, holders have little incentive to deploy their BTC in a productive manner. This leaves a massive untapped opportunity. Even unlocking a fraction of this

underutilized BTC could improve Bitcoin's capital efficiency, enabling it to function as more than just a passive store of value and unlocking new avenues for value creation.

3.3 Untapped Bitcoin Economy

Bitcoin's adoption in DeFi remains low. Currently, only 0.79% of BTC is locked in DeFi, while the vast majority of holdings remain custodial or centralized — whether through ETFs, nation-states, or corporate treasuries. This reflects Bitcoin's exclusion from financial applications, highlighting the untapped potential of the Bitcoin economy.

Figure 4: Only 0.79% of BTC holdings are being put to work and locked in DeFi

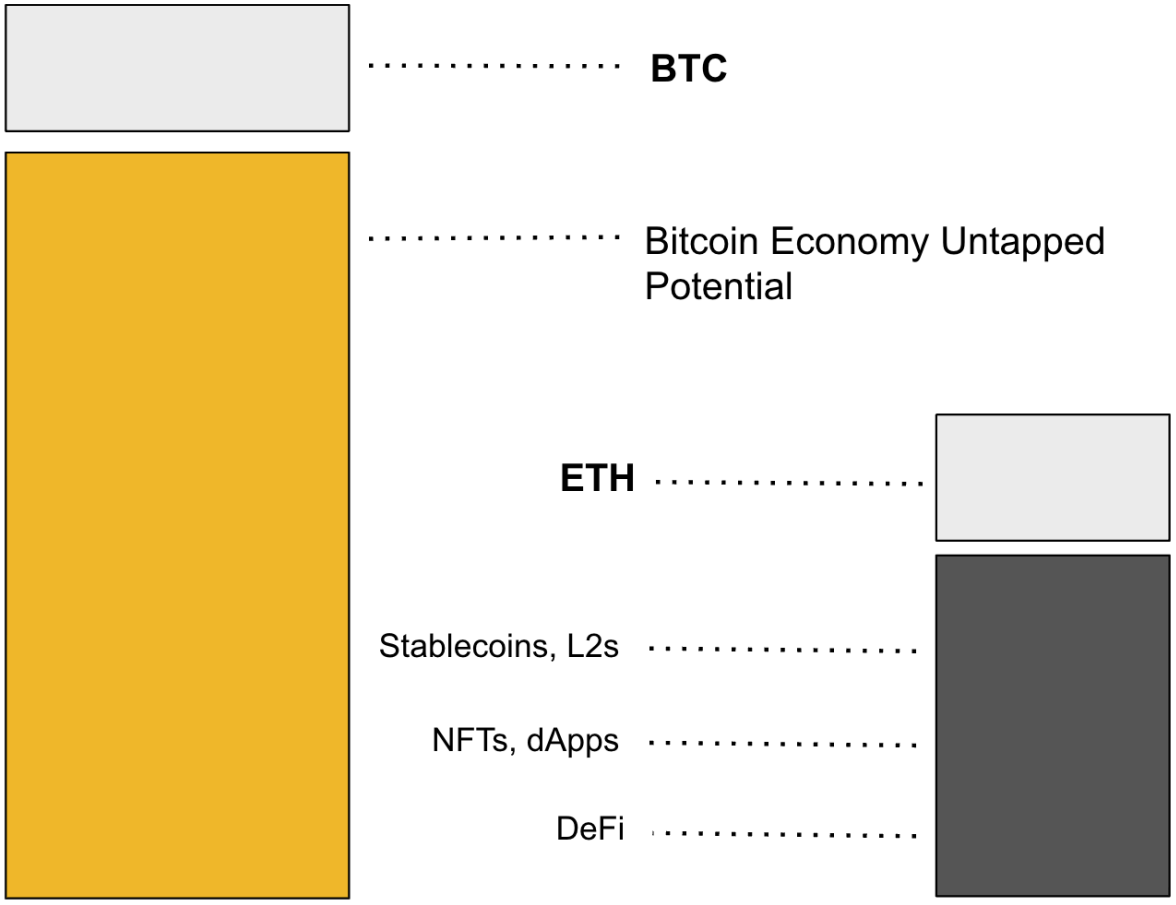
Category	# of BTC	Value Today (US$B)	% of 21M
ETFs	1,307,022	102.8	6.22%
Public Companies	653,739	51.4	2.52
Countries	529,705	41.7	3.11
Private Companies	368,042	29.0	1.75
BTC Mining Companies	90,249	7.1	0.43
DeFi	166,330	13.1	0.79

Source: Bitcoin Treasuries, Binance Research, as of 11 March, 2025

A key factor behind this is that Bitcoin's architecture was **not designed to support complex financial applications.** Unlike smart contract platforms like Ethereum, Bitcoin has historically lacked native programmability, making it difficult to enable DeFi use cases without centralized intermediaries. As a result, BTC holders have had few options to put their assets to work, with most opportunities limited to custodial lending or wrapped BTC on other chains — each carrying trade-offs such as low yields, centralization risks, or security concerns.

This contrasts sharply with Ethereum, where ETH holders can stake, lend, provide liquidity, and access a broad range of financial products. Bitcoin's financial ecosystem, by comparison, has **not met investors' diverse needs for risk and return**s — from simple yield opportunities to more sophisticated hedging and structured strategies.

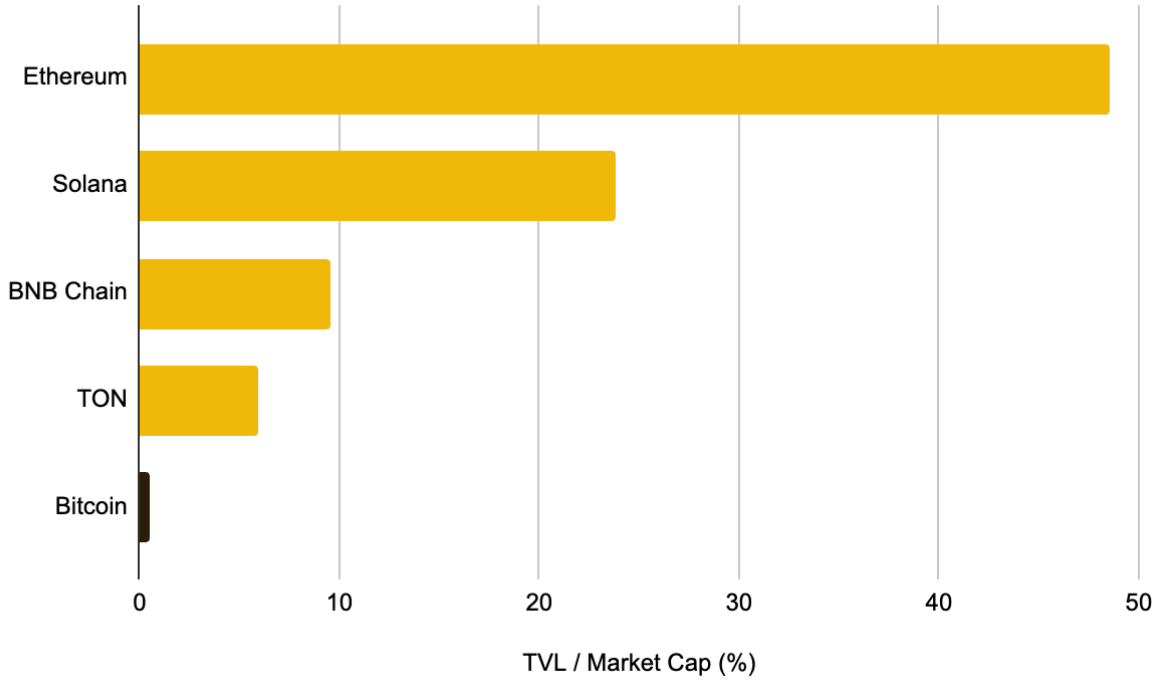
Figure 5: Bitcoin's limited usability has resulted in significant untapped potential, in contrast to more developed ecosystems like Ethereum



Source: Binance Research

As a result, Bitcoin has remained one of the **least active public blockchains**, despite its trillion-dollar market cap. The impact is clear in the TVL-to-market cap ratios across major networks. **Bitcoin's TVL-to-market cap ratio is just ~0.5%** (~US$8.3B TVL), whereas **Ethereum's sits at 48.6%**, **Solana at 23.8%**, **BNB Chain at 9.5%**, and **The Open Network (TON) at ~5.9%**. If just 10% of Bitcoin's market cap were activated, this would equate to over US$150B in TVL, surpassing the entire DeFi ecosystem across all chains today.

Figure 6: Bitcoin's use in DeFi represents less than 1% of its total market capitalization



Source: DefiLlama, CoinMarketCap, Binance Research, as of 11 March, 2025

However, this is beginning to shift. Significant **advancements in Bitcoin's infrastructure are unlocking new opportunities for BTCFi**, enabling DeFi applications to function directly on Bitcoin. In 2024, major Layer 2 (L2) scaling solutions have improved Bitcoin's **programmability**, **throughput**, and **interoperability**, including: BitVM for advanced computations, improved bridge designs for asset movement and higher throughput to support more complex applications. These developments are transforming Bitcoin from a passive store of value into an active financial ecosystem, setting the stage for BTCFi to emerge as a major force in DeFi.

04 / State of the Market

4.1 Market Size and Composition

While BTCFi is growing, **the majority of BTC used in DeFi still exists on other blockchains in the form of wrapped BTC tokens**. Across all DeFi ecosystems, BTC's total market presence stands over ~US$30B, with a large proportion locked as collateral in lending or yield-generating protocols. However, within BTCFi, adoption remains in its early stages, with most activity concentrated in staking protocols like Babylon.

Figure 7: The current market size for BTC in DeFi is ~US$10.2B

BTC in DeFi	# of BTC	TVL (US$B)
Wrapped BTC in DeFi Contracts	253,234	21.0
Native BTC in Staking Protocols	59,252	4.9
BTC in DeFi on Bitcoin L2s	44,559	3.7

Source: Bitcoin Layers, DefiLlama, Binance Research, as of 12 March, 2025

User adoption of BTCFi is closely linked to broader Bitcoin market cycles. During periods of strong BTC price appreciation, there is a notable surge in demand for BTCFi services, particularly in lending and staking platforms, as **users seek yield-generating opportunities without selling BTC**. The rise of new Bitcoin-native financial applications has also expanded BTC's on-chain activity, increasing both the number of active BTCFi wallets and transaction volume.

In terms of market composition, projects are emerging across multiple on-chain ecosystems, mirroring trends seen in alt-Layer 1s (L1s) and Ethereum L2s. These chains are becoming gateways for BTCFi activity, competing to attract liquidity and projects that will drive adoption. As BTCFi grows, the **distribution of protocols across chains will play a critical role** in shaping its growth and network effects.

The race to establish Bitcoin's dominant execution layer is still open, as no single L2 has yet captured market-wide adoption. A closer look at value distribution by chain reveals that **Core currently leads the BTCFi space, accounting for 25.2% of active BTCFi projects**, reinforcing its dominant role in the ecosystem. **Rootstock and Bitlayer follow, each supporting 13.0%**, while **Merlin Chain accounts for 9.9%**. Other key platforms, including **BOB (8.4%), BSquared (6.9%), and Stacks (6.1%)**, contribute to the sector's expansion, while **BEVM (5.3%), BounceBit (3.1%), and MAP Protocol (3.1%)** are gaining traction by offering specialized solutions.

The success of these L2s will likely be determined by their ability to attract liquidity and applications, making business development, infrastructure partnerships, and market-making strategies crucial for long-term viability. As more BTCFi projects launch, competition among Bitcoin L2s will intensify, with potential for application-specific execution layers that enable novel use cases unique to Bitcoin.

Beyond the chains themselves, **Avalon Finance — spanning four chains — stands as the largest BTCFi project with US$510.7M in TVL**. **DeSyn Safe (US$217.5M TVL, across two chains), Buzz Farming (US$216.5M TVL, on BSquared) and Pell Network (US$185.6M TVL, across seven chains)** also play key roles in BTCFi's lending, yield and staking derivatives sector. Other notable projects, such as MoneyOnChain and Sovryn, reflect the diversity of BTCFi use cases, ranging from stablecoins to structured financial products.

Figure 8: BTCFi project value is distributed across various use cases and L2 chains

Project	Area	Chains	TVL (US$M)
Avalon Finance	Lending	Bitlayer, BOB, Core, Merlin	510.7
DeSyn Safe	Yield	AILayer, Bitlayer	217.5
Buzz Farming	Yield	BSquared	216.5
Pell Network	Restaking	Bitlayer, BOB, BounceBit, BSquared, Core, Merlin	185.6
Colend Protocol	Lending	Core	113.1
MoneyOnChain	Stablecoin	Rootstock	102.6
BitFlux	DEX	Core	84.1
Sovryn	Lending, DEX	BOB, Rootstock	68.4
Zest	Lending	Stacks	58.3

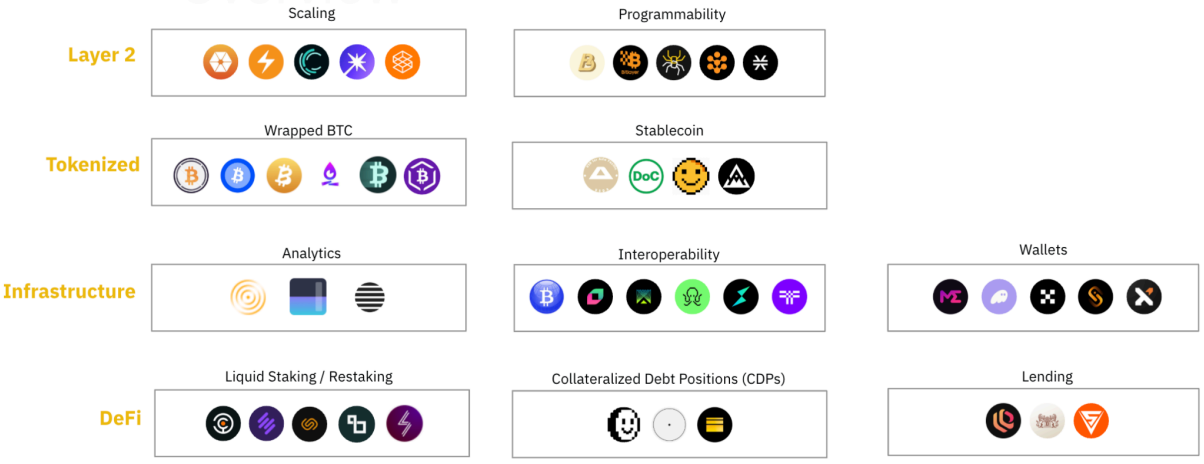
Source: Footprint Analytics, Binance Research, as of March 10, 2025

4.2 Market Landscape

BTCFi applications span **staking, lending, stablecoins, trading, and cross-chain infrastructure**, with different protocols playing specialized roles. While staking derivatives and lending hold the largest share of BTCFi activity today, development has extended into **Decentralized Exchanges (DEXs), Automated Market Makers (AMMs), Stablecoins, and other financial products** that integrate Bitcoin into on-chain financial markets.

These applications operate on Bitcoin L2 solutions, sidechains, and cross-chain protocols, providing the necessary scalability and programmability for Bitcoin's use beyond simple transfers. Institutional demand is also shaping BTCFi, with products emerging around custodial services, Bitcoin-backed stablecoins, and regulatory-compliant lending.

Figure 9: The Bitcoin ecosystem is expanding, with development extending across various financial products and applications



Source: Binance Research

- **Staking Derivatives**: **Staking derivatives account for the largest share of BTCFi TVL**, led by **Babylon and Core**, which collectively control a dominant proportion of BTCFi's TVL. These protocols allow BTC holders to secure proof-of-stake (PoS) networks in exchange for yield, turning Bitcoin into a security layer for other chains.

  Bitcoin staking extends beyond PoS validation to support **oracles, cross-chain bridges, and data availability services**, tying BTCFi closer to Bitcoin's L2 infrastructure. However, the success of this model depends on partnerships with PoS chains that integrate BTC for shared security.

  Staking serves as one of the primary gateways to BTCFi, generating native yield for holders, increasing on-chain liquidity, and **creating synergies across liquid staking, lending, and trading**. As a result, staking protocols have enabled the development of secondary BTCFi layers, including Pell Network, a restaking multi-layer protocol, and Cactus Custody, an institutional-focused custody service by Matrixport that allows secure BTC staking with enhanced yields.

- **Liquid Staking**: **Liquid staking expands the usability of staked BTC by allowing holders to retain liquidity** while earning staking rewards. Solutions like Lombard's LBTC and SolvBTC enable BTC to be restaked into protocols like Babylon while maintaining integration with DeFi money markets (Morpho), yield strategies (Pendle), and restaking services (EigenLayer, Symbiotic). SolvBTC, for example, serves as a yield-bearing token, aggregating interest from staking, lending, and delta-neutral trading strategies into a single asset.

  Ethereum-based staking providers are also entering BTCFi. Etherfi's eBTC leverages Lombard and Babylon, while uniBTC (by Bedrock) integrates Babylon's staking model for Bitcoin-based yield strategies. These solutions enable cross-chain staking participation, expanding BTC's role in DeFi beyond its native ecosystem.

- **Money Market**: **BTCFi money markets allow users to collateralize Bitcoin for loans or earn interest on deposits**, offering new capital efficiency options. These protocols are particularly relevant for BTC holders seeking yield, as well as ETF holders and institutional investors exploring new Bitcoin financing strategies**.**

  For institutions, on-chain BTC yields can be attractive due to their **independence from conventional lending markets**. Unlike TradFi, where lending rates are largely influenced by central banks, BTC lending rates are also driven by leverage demand. As risk-free interest rates decline, BTC lending rates tend to rise, reflecting increased borrowing demand. The BTC basis trade yield serves as a key indicator of this trend.

  Key BTCFi lending platforms include Liquidium, Shell Finance, Avalon Labs, Sovryn, Badger, and Colend, each differing in liquidity depth, collateral types, leverage, fees, and composability across DeFi. Money markets are also **expanding into multi-product ecosystems**, integrating yield strategies, borrowing, and derivatives to enhance capital efficiency. Some platforms, like Avalon, also offer derivatives trading and stablecoin issuance.

- **DEX**: **DEXes provide on-chain liquidity for Bitcoin-based assets** and facilitate trading for BTCFi-native tokens. As BTCFi develops, DEXes will serve as primary venues for price discovery and token issuance. BTCFi DEXs fall into two categories: Order-book based exchanges and AMM-based liquidity pools.

  UniSat operates as a Bitcoin-native marketplace and trading hub, integrating various BTC-based financial services. ALEX (on Stacks) and Sovryn are other leading BTCFi DEXes. Since **liquidity is a key competitive factor**, many DEXes are bundling lending, infrastructure, and other financial services to attract capital, effectively positioning themselves as **multi-service financial layers** within BTCFi.

- **Stablecoin**: **Bitcoin-backed stablecoins offer USD-denominated stability while remaining BTC-collateralized**. Protocols like MoneyOnChain and Sovryn Zero issue stablecoins like DoC (Dollar on Chain) and ZUSD, backed entirely by Bitcoin. In particular, MoneyOnChain offers BPRO, a token providing **leveraged Bitcoin exposure**, allowing holders to earn passive returns while mitigating volatility through a risk-sharing mechanism. Other DeFi players, including Babylon and

Shell Finance, have also developed their own Bitcoin-backed stablecoins, adding new liquidity layers to BTCFi.

Bitcoin-based stablecoins improve liquidity, transaction efficiency, and accessibility. In January 2025, Tether launched USDT on Bitcoin and Lightning, opening new use cases in payments, remittances, and fiat-BTC interoperability.

- **Bridge**: **BTCFi relies on cross-chain interoperability, enabling BTC to be used across multiple networks**. Portal-to-Bitcoin enables native BTC swaps across chains without relying on wrapped Bitcoin. Instead, it uses Multi-Party Hash Time-Locked Contracts (MP-HTLCs) for atomic swaps. Bridging solutions like Xlink, Atomiq, and Auran further facilitate Bitcoin's integration into other ecosystems.

  However, **wrapped Bitcoin solutions like WBTC continue to dominate Bitcoin's use in DeFi**, with a large share of WBTC locked in Ethereum-based protocols—far surpassing the amount of BTC in native BTCFi. Institutions may increasingly use wrapped BTC models to activate idle Bitcoin, aligning with the custodial structure of spot ETFs. Ondo Finance is already working on tokenizing ETFs for on-chain yield generation, a trend that could extend to tokenized Bitcoin ETF assets. As a result, cross-chain solutions will be critical for integrating these assets into BTCFi.

  Although WBTC holds a 60% share of the tokenized BTC market, custodial risks (such as BitGo's recent market share decline) are **driving demand for alternatives**. Native BTCFi solutions have their own set of advantages as they **operate directly on Bitcoin's security framework**, **avoiding custodial risks**, though their scale remains limited due to high collateralization requirements and limited on-chain liquidity.

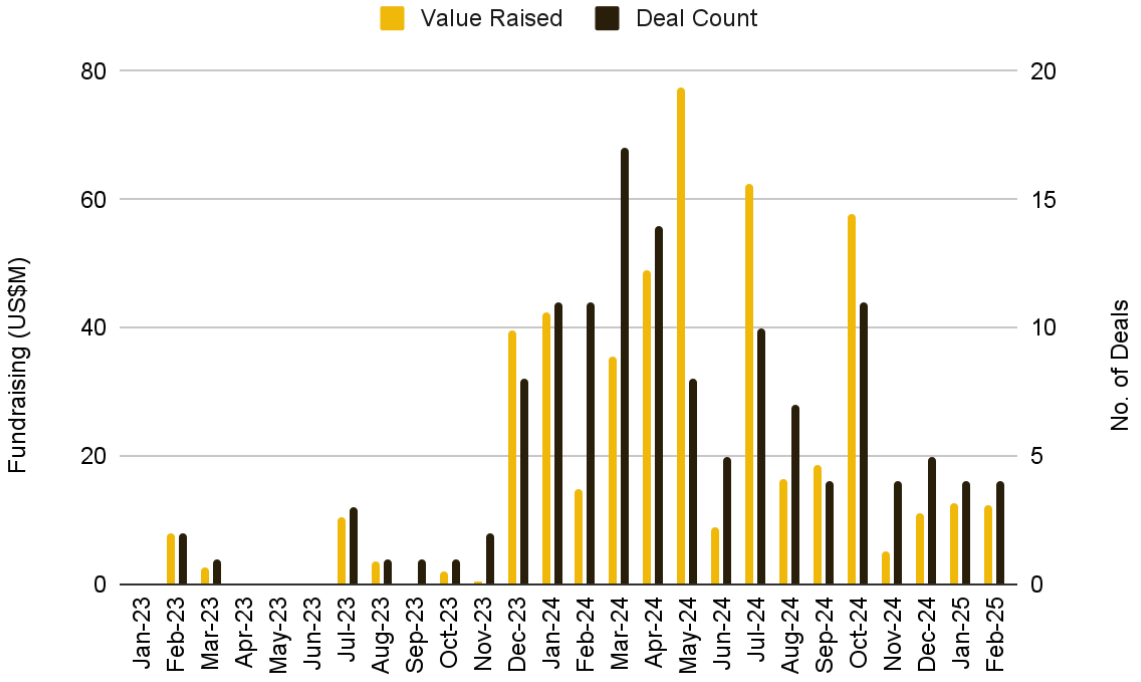
  Currently, a large proportion of all WBTC locked in DeFi is used in lending protocols like Aave and Maker, suggesting that most BTC holders engaging with DeFi are primarily interested in lending-based applications. BTCFi's ability to compete with wrapped BTC markets will depend on whether native lending protocols can **(1) Offer higher yields through increased BTC borrowing demand** and **(2) Ensure sufficient stablecoin liquidity for borrowing**.

4.3 Fundraising and Capital Flows

Investor appetite for BTCFi has been growing, as seen in the increasing fundraising activity and capital flows into the sector. Interest has been fueled by the broader rise of native Bitcoin use cases, including Ordinals, Inscriptions, Runes, UTXO models, and BRC-20 tokens — all of which have reinforced Bitcoin's expanding role beyond a simple store of value.

The Bitcoin ecosystem — primarily L2s and infrastructure, but also DeFi — has attracted a significant share of funding, with the number of deals rising from 19 to 115 over the past two years. During this period, **more than US$491M has been invested, with over 86% of venture capital allocated post-2024**. This influx of funding underscores expectations that trust-minimized L2s and native Bitcoin infrastructure will play a key role in BTCFi's evolution, with multiple projects set to launch mainnet in 2025.

Figure 10: Fundraising activity in the Bitcoin ecosystem has surged, with the number of deals rising from 19 to 115 since 2024

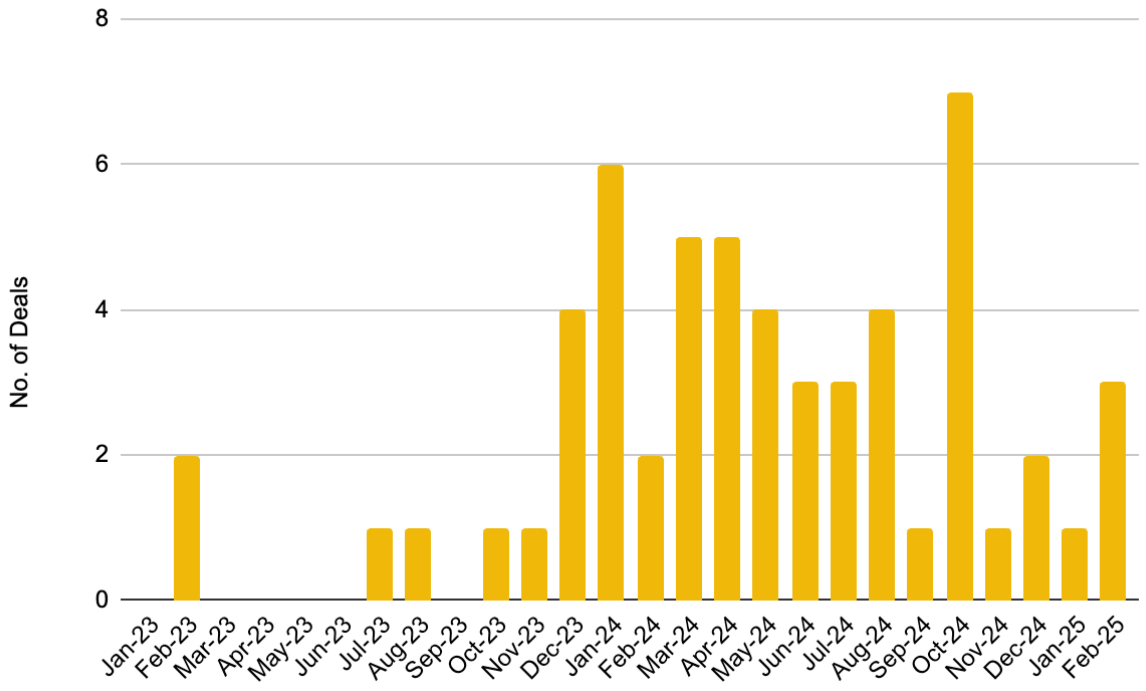


Source: Rootdata, Binance Research, as of March, 12, 2025

As Bitcoin L2s become more established, **investor focus is gradually expanding beyond infrastructure development** to include Bitcoin-native applications. Unlike other public chains, BTCFi has not yet seen one dominant entity monopolizing liquidity or development, making it an attractive opportunity for investors and developers looking to capture early market share. As a result, more capital is expected to eventually flow into BTCFi's application layer, marking a shift from infrastructure-heavy investments toward products that enable on-chain liquidity and financial activity.

At the same time, BTCFi-focused accelerators have played a role in nurturing early-stage startups, with several cohorts having already completed their first rounds. As more Bitcoin L2s deploy their raised capital toward infrastructure and BTCFi product development, the sector is poised for a **wave of new applications and liquidity growth**, mirroring the Ethereum L2 ecosystem's competitive expansion. With more product launches expected in 2025, investor interest is likely to continue rising as BTCFi solidifies its role in Bitcoin's broader financial ecosystem.

Figure 11: BTCFi projects have seen a rising number of deals since 2024



Source: Rootdata, Binance Research, as of March, 12, 2025

4.4 Future Growth

With capital flowing into BTCFi development, assessing the market potential of these applications is critical to understanding the scale of the opportunity ahead. To estimate BTCFi's total addressable market (TAM), one approach is to analyze what proportion of Bitcoin's existing supply could realistically be deployed in BTCFi and assess the initial demand propensity from holders.

While certain entities — such as nation-states and institutional investors holding BTC via ETFs — are likely to continue favoring custodial or centralized storage, BTCFi presents a compelling and **more immediate opportunity for idle BTC holders seeking additional financial utility**. If BTCFi were to follow the same adoption trajectory as Wrapped Bitcoin (WBTC, BTCB, etc.), it would imply a potential market of ~US$31.9B in value awaiting capture.

For context, **~US$31.9B in BTCFi assets would place it among the top 10 largest projects** in crypto by market cap today. This highlights BTCFi's potential to unlock financialization and utility for a vast segment of BTC holders, a prospect with significant implications given Bitcoin's sheer economic scale and deeply embedded investor base.

Figure 12: The initial potential market size for BTCFi is ~US$31.9B, based on projected adoption under certain market conditions

Potential Market Size	
Total BTC Supply	19,670,000
Exchange Balance	-2,715,898
ETF	-1,307,022
Satoshi	-1,000,000
Government	-529,705
Adjusted TAM	14,117,375
BTC Price	US$78,626
TAM (US$)	US$1,110,086,490,750
Utility Penetration (%) *based on WBTC*	2.87%
Initial Market Size	US$31,868,477,869

Source: Bitcoin Treasuries, Glassnode, The Block, Binance Research, as of March 10, 2025

However, it's worth noting that **BTCFi's addressable market extends beyond WBTC's existing user base**. The fundamental distinction is that wrapped BTC solutions cater to a smaller subset of Bitcoin holders, as many long-term BTC investors prefer holding BTC natively. Wrapped BTC introduces accessibility limitations, regulatory considerations, and additional security trade-offs, making it less attractive to Bitcoin's core base of self-custodial holders. BTCFi, by contrast, is being built directly on Bitcoin's own infrastructure, reducing these barriers and broadening the pool of potential participants.

That said, **estimating BTCFi's true growth potential remains uncertain**, as multiple variables will shape its trajectory. Realizing this potential will depend on successful execution, infrastructure readiness, and the ability to offer competitive financial products that align with Bitcoin's security and liquidity characteristics.

05 / Outlook

5.1 Importance of Bitcoin Infrastructure

The development of Bitcoin L2s is critical not only for enabling BTCFi — by introducing smart contract functionality — but also for expanding Bitcoin's overall programmability and scalability. Just as DeFi on other blockchains relies on scalable infrastructure, **BTCFi requires efficient execution layers** to overcome Bitcoin's inherent limitations in smart contract deployment.

By design, Bitcoin's Unspent Transaction Output (UTXO) model is optimized for simple transactions but lacks the flexibility needed for complex DeFi operations. Unlike Ethereum's account-based system, Bitcoin's scripting language is not Turing complete, limiting its ability to handle sophisticated state transitions required for smart contracts. Additionally, Bitcoin's block size constraints and longer block times create scalability challenges, making it costly for L2s to use Bitcoin for data availability and limiting transaction throughput compared to DeFi-centric chains.

Developers also face infrastructure barriers, as Bitcoin lacks comprehensive tooling for deploying financial applications, unlike the mature development ecosystems of Ethereum or BNB Chain. Existing solutions such as statechains, off-chain processing, and sidechains introduce security trade-offs, as they do not always inherit Bitcoin's robust security model, creating additional risks that can impact user confidence. Until Bitcoin L2s mature further, these **limitations will continue to constrain BTCFi's growth and usability**.

Fortunately, Bitcoin L2 innovation is making progress, addressing these structural limitations to bring scalability and enhanced smart contract capabilities. The emergence of BitVM and other trust-minimized solutions has spurred interest in Bitcoin-native programmability, setting the stage for future BTCFi applications. Various L2 approaches introduce different trade-offs in decentralization, security, and scalability, but together they are pivotal in **shaping Bitcoin's next phase of financialization** and expanding BTCFi's market potential.

Another key determinant of BTCFi's long-term viability will be **upcoming traction on Bitcoin covenants and Bitcoin Improvement Proposals (BIPs)**. Proposals such as reintroducing the OP_CAT opcode via a soft fork could significantly enhance Bitcoin's scripting capabilities, making trust-minimized L2s more efficient by leveraging the BitVM framework.

For more information on the infrastructure side in scaling chains for Bitcoin, check out our previous report, The Future of Bitcoin #3: Scaling.

5.2 Transaction Fees and Miners

A key benefit of BTCFi is its **potential to bolster Bitcoin's long-term security budget**. With the block subsidy halving every four years — most recently reducing from **6.25 BTC to 3.125 BTC** — miners must increasingly rely on transaction fees to sustain profitability. BTCFi could play a crucial role in generating on-chain fee revenue, helping to offset the declining block subsidy and ensuring miners remain economically incentivized to secure the network.

Without a sufficient and sustainable fee market, Bitcoin's security model faces long-term risks. Each halving results in a sharp revenue drop for miners (up to 50% in some cases), which could lead to hashrate declines as less profitable miners exit the market. A weaker mining ecosystem increases the risk of network centralization and security vulnerabilities, making Bitcoin more susceptible to potential attacks.

Concerns around Bitcoin's future security budget largely hinge on whether on-chain activity can generate enough transaction fees to sustain miner incentives. The recent surge in Ordinals and BRC-20 token activity demonstrated **how BTCFi-driven demand can significantly increase network fees**, reinforcing the idea that financial applications on Bitcoin could help sustain its long-term security model.

5.3 Additional Considerations

- **Culture Impact**: **The idea of altering Bitcoin's base layer to accommodate L2s remains a divisive issue** within the Bitcoin community. Many Bitcoin proponents value its minimalism and advocate for Bitcoin to remain a decentralized store of value, resisting trade-offs that involve bridging BTC, using sidechains, or compromising self-custody. For these users, the development of complex L2 solutions can be seen as conflicting with Bitcoin's core ethos.

  Additionally, Bitcoin's conservative approach to protocol upgrades—prioritizing security and stability over rapid innovation—presents a unique challenge for BTCFi's development. Unlike other L1 ecosystems that frequently implement major upgrades, Bitcoin's slow and deliberate upgrade process could slow BTCFi's progress. Long-term adoption will depend on community acceptance, requiring BTCFi innovations to align with Bitcoin's foundational principles of security, decentralization, and trust minimization.

- **User Experience**: User experience (UX) is a crucial factor in BTCFi's success. DeFi interfaces on other blockchains have often been fragmented and complex, making usability a barrier to adoption. Given Bitcoin's widespread adoption across retail holders—including many with minimal technical expertise—BTCFi must prioritize intuitive and accessible front-end solutions. Simplified onboarding and seamless UX for activities like staking, yield generation, and lending will significantly lower entry barriers and encourage broader adoption.

- **Importance of Optionality**: **Bitcoin's diverse holder base** includes public companies, miners, nation-states, central banks, TradFi institutions, and retail

investors, each with unique investment strategies and risk tolerances. BTCFi must offer a range of financial products to cater to these varied needs.

Developers should design BTCFi applications that enable customizable risk-return strategies, including BTC yield strategies that aggregate across different sources. Ensuring flexibility in staking terms—such as avoiding minimum staking amounts and restrictive lock-up periods—will further drive adoption across different Bitcoin holder segments.

- **Volatility and Risk Mitigation**: While Bitcoin's volatility has declined over time, price fluctuations remain one of the biggest risks for BTCFi platforms. Rapid changes in BTC's value can lead to loan defaults, liquidation events, and collateral instability, impacting lending markets and overall system stability. BTCFi protocols must implement **robust risk management frameworks**, including dynamic collateralization mechanisms, automated liquidations, and insurance models to mitigate these risks.

- **Regulation Clarity**: BTCFi platforms must **navigate varying regulatory frameworks** across jurisdictions. While the political landscape in the U.S. under a Republican administration (including Donald Trump's potential policies) may bring regulatory clarity, much remains uncertain. Conservative BTC holders will require well-defined compliance structures, including custodial and AML/KYC frameworks, before allocating significant capital to BTCFi.

- **Interoperability**: BTCFi platforms would benefit from **improved compatibility with other blockchains**, allowing Bitcoin to integrate with existing DeFi markets. Today, most BTC collateral used in DeFi exists in wrapped forms on non-Bitcoin chains. By building secure cross-chain solutions, BTCFi can tap into this liquidity while enabling native BTC holders to access DeFi without bridging their assets.

  Beyond interoperability at the base layer, **third-layer strategies** — such as Pendle's yield pools — are introducing yield optimization techniques that could extend to BTCFi. By leveraging Bitcoin-native staking platforms as a foundation, BTC holders can stack additional yield layers, similar to Ethereum's restaking models.

  However, it's worth noting that cross-chain bridges add security risks, as centralization, smart contract vulnerabilities, and bridge exploits have historically led to significant losses. Strengthening Bitcoin's native interoperability while mitigating these risks will be key.

- **Oracles and Price Efficiency**: Bitcoin's architectural **limitations make on-chain oracle services difficult to deploy**, unlike Ethereum's well-integrated ecosystem (i.e., Chainlink). BTCFi may need to rely on off-chain solutions for price feeds, creating dependencies on centralized services. Additionally, cross-chain price synchronization issues may arise if BTCFi protocols map Bitcoin assets onto external chains. Addressing these technical and security challenges will be essential for reliable on-chain price discovery.

- **Real-World Integration**: For BTCFi to achieve mainstream financial adoption, it must **extend beyond crypto-native applications**. Partnerships with banks,

payment providers, and financial institutions can facilitate traditional financial products, such as Bitcoin-backed credit markets, structured ETFs, and options markets. Additionally, BTCFi's integration into consumer finance could enable seamless payments and settlement layers, **bridging the gap between Bitcoin and real-world commerce**.

- **Liquidity Challenges**: Despite Bitcoin's trillion-dollar market cap, BTC's liquidity in DeFi remains significantly lower than other digital assets due to the passive nature of BTC holdings. This creates a cold-start problem, where **low initial liquidity limits BTCFi's efficiency and adoption**.

  Other blockchains with established DeFi ecosystems — such as Ethereum and BNB Chain — had fewer constraints in building money markets, DEXs, and AMMs, helping them bootstrap liquidity and attract users. In contrast, Bitcoin's native DeFi ecosystem faces more structural limitations, requiring targeted incentives to drive early liquidity migration.

  Solving BTCFi's liquidity gap will likely require bootstrap mechanisms, such as: **Incentive programs** (e.g., yield farming rewards for BTC deposits), **institutional partnerships** to bring off-chain liquidity on-chain, and on-chain/off-chain **integrations to connect existing BTC capital** to BTCFi markets. Once BTCFi achieves critical liquidity mass, network effects can reinforce adoption, enabling BTCFi to function as a fully integrated financial ecosystem within Bitcoin.

06 / Closing Thoughts

The Bitcoin network is undergoing a fundamental shift. Last year marked Bitcoin's transformation from a passive store of value to a network supporting new token standards and emerging use cases. This year, as key infrastructure advancements take shape, attention is turning toward BTCFi — with growing efforts to bring financial utility to Bitcoin and unlock its capital potential.

The appeal of activating dormant Bitcoin capital for financial applications is clear. As BTCFi develops, several distinct sub-sectors are emerging—including yield-generating products, DEXes, and cross-chain solutions—each targeting a large and underutilized market. Even a modest adoption rate for BTCFi may translate into billions of dollars in inflows, underscoring the scale of the opportunity.

Yet, BTCFi remains in its infancy, with early TVL growth not yet signaling sustained demand. Developers building Bitcoin utility face a significant challenge, as the Bitcoin network was never designed for programmability or high-performance applications. This structural reality means that BTCFi cannot simply replicate existing DeFi models from Ethereum or BNB Chain — it must carve out its own development path that aligns with Bitcoin's technical and cultural landscape.

Beyond infrastructure, BTCFi's success will depend on execution — specifically, whether protocols can appeal to Bitcoin's unique holder base. Unlike traditional DeFi users, BTC holders have historically prioritized security, self-custody, and long-term value preservation over active capital deployment. BTCFi applications will need to align with these preferences, likely finding early traction in areas such as yield solutions and payment integrations, which naturally extend Bitcoin's existing use cases. Additionally, Bitcoin's growing integration with TradFi markets means that macro factors, government policy, and regulation will play a pivotal role in shaping BTCFi's trajectory.

At present, many BTCFi protocols are still in early development, and it will take time for their impact to be fully realized. But if successful, DeFi is coming to Bitcoin—and by leveraging the security and resilience of the original blockchain, BTCFi stands to be a sector worth watching closely.

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08 / New Binance Research Reports

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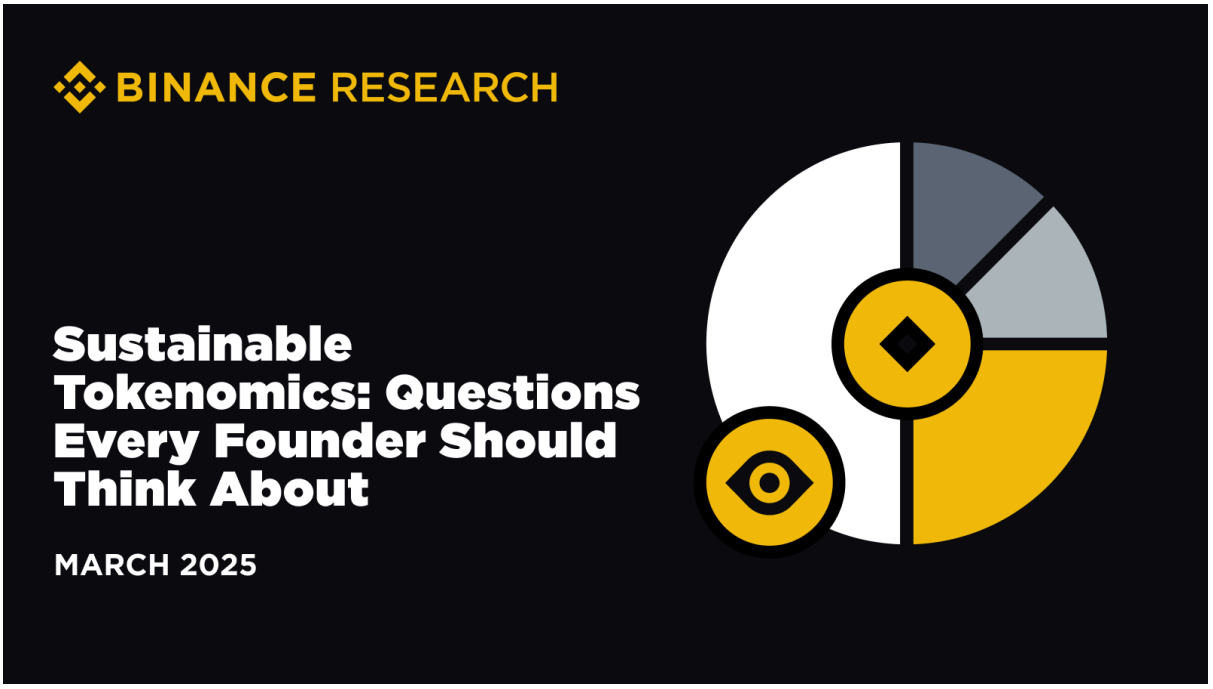
A summary of the most important market developments, interesting charts and upcoming events

Sustainable Tokenomics: Questions Every Founder Should Think About Link
An exploration of tokenomics design



About Binance Research

Binance Research is the research arm of Binance, the world's leading cryptocurrency exchange. The team is committed to delivering objective, independent, and comprehensive analysis and aims to be the thought leader in the crypto space. Our analysts publish insightful thought pieces regularly on topics related but not limited to, the crypto ecosystem, blockchain technologies, and the latest market themes.

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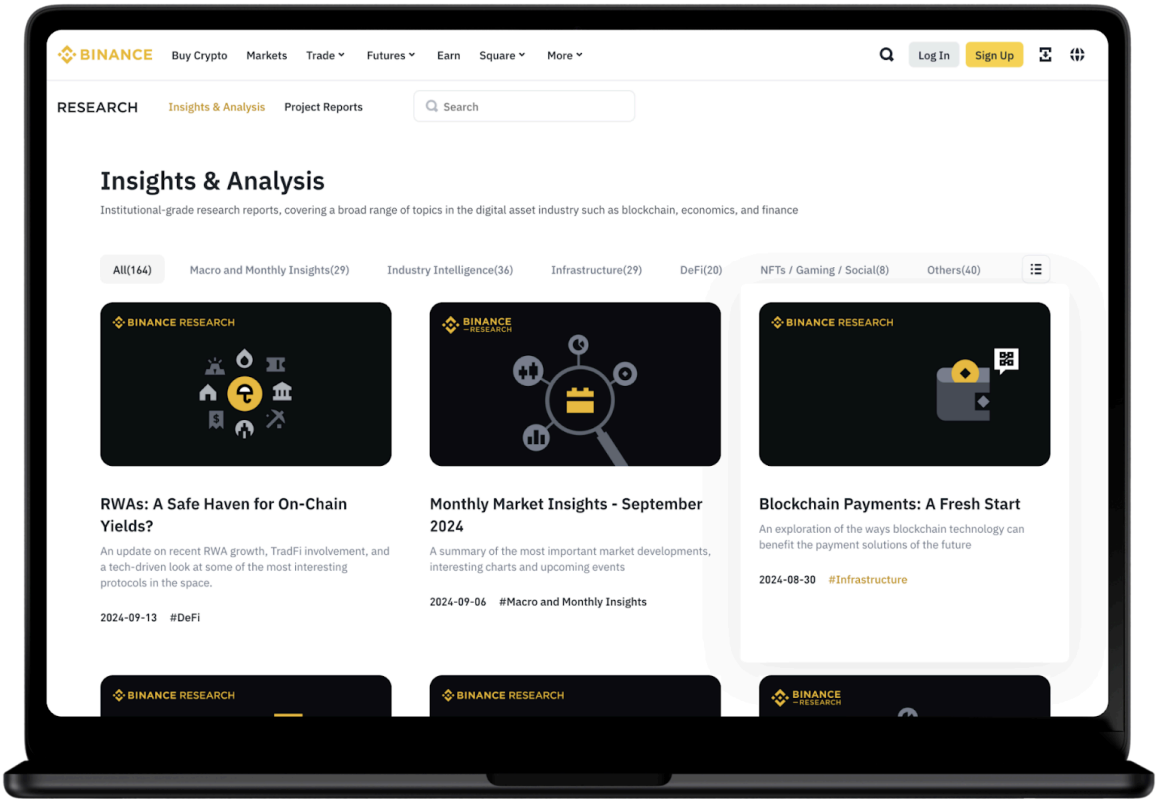

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