Executive Summary

What we do:

- Decentralized cloud computing platform
- Host rich, yet fully decentralized apps
- 2 layer Web3 tech stack
- Trusted computation environment

Why we're doing it:

- Existing blockchains are decentralized but slow
- Cloud computing is centralized and unreliable
- Traditional dApps still require a host and aren't truly decentralized

How we do it:

- Root of Trust - hardware, blockchain, and proof of time
- Dual token system - utility token and NFT
- Bonding curve for app tokens

Who are the players:

- Miners - mining, hosting, investing
- Developers - app development, investing
- Curators/investors - investing

Problems with existing blockchains and cloud computing

Traditional blockchains are slow...

Existing blockchains are decentralized but slow, which prevents applications from running at the speed of traditional cloud computing apps.

... and aren't fully decentralized

dApps aren't truly decentralized. Through they may be built on the blockchain, many still require a host, making them centralized. They share the fundamental weakness that cloud computing apps have: centralization.

Cloud Computing? Still centralized and untrustable.

The cloud computing business model relies on monetizing user data; even though basic data security is in question, private data is held by Tech giants who also have the ability to censor web users.

The TEA Project Combines the Best of Blockchain & Cloud Computing
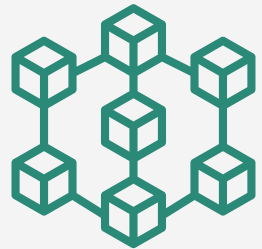
Traditional Blockchain

- Decentralized but slow
- Consensus required because of Byzantine fault tolerance (BFT)
- Small number of rich apps
- Needs special privacy protocol

Cloud Computing

- Centralized
- Consensus doesn't require BFT but does require trust between nodes
- Can run rich apps/possibly censored
- Potential privacy breaches

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+ Rich Application

+ Decentralization

- Decentralized
- **Rich UX dApps run on layer-2 non-BFT consensus; layer-1 blockchain handles BFT**
- Runs rich apps at full speed + no censorship
- Privacy protected by TPM chip

OUR SOLUTION

TEA Project: A two-layer Web3 tech stack and token ecosystem.

A Decentralized Cloud

A decentralized trusted cloud computing DAO where miners run the nodes.

2-Layer Web3 Tech Stack

A 2-layer tech stack combining blockchain with the ability to let individual miners host rich UX dApps. While traditional cloud apps achieve speed at the high cost of centralization, TEA Project's TApps run full speed while still remaining decentralized.

Trusted Computation Environment

A trusted and secure computation environment that protects privacy and is censorship-resistant.

The TEA Project's Two Layer Setup

Layer 2

- Layer2 nodes (CML* nodes) only trust other CML with certificates issued by layer1. This allows them to ignore Byzantine faults and reach cloud computing performance and scale.
- Rich applications run on layer 2 decentralized nodes that have already gained trust from Layer 1.
- Programming logic and data are secured inside hardware protected enclaves.
- Verifies other nodes' PoT and sends verification result to Layer 1.

*CML is an NFT in the TEA network. A TEA mining node can only be activated by associating a CML with it.

Scalability ✓

The Blockchain Trilemma

Security   Decentralization ✓

Layer 1

- Layer1 nodes don't run application logic. They deal with Byzantine fault and issue certificates to layer 2 CMLs that pass validation.
- Polkadot PoA for consensus.
- Consensus on the verification result from Layer 2.
- Manages remote attestation.
- Manages TEA token economy.
- Verifies blocks.

Scalability

The Blockchain Trilemma

Security ✓   Decentralization ✓
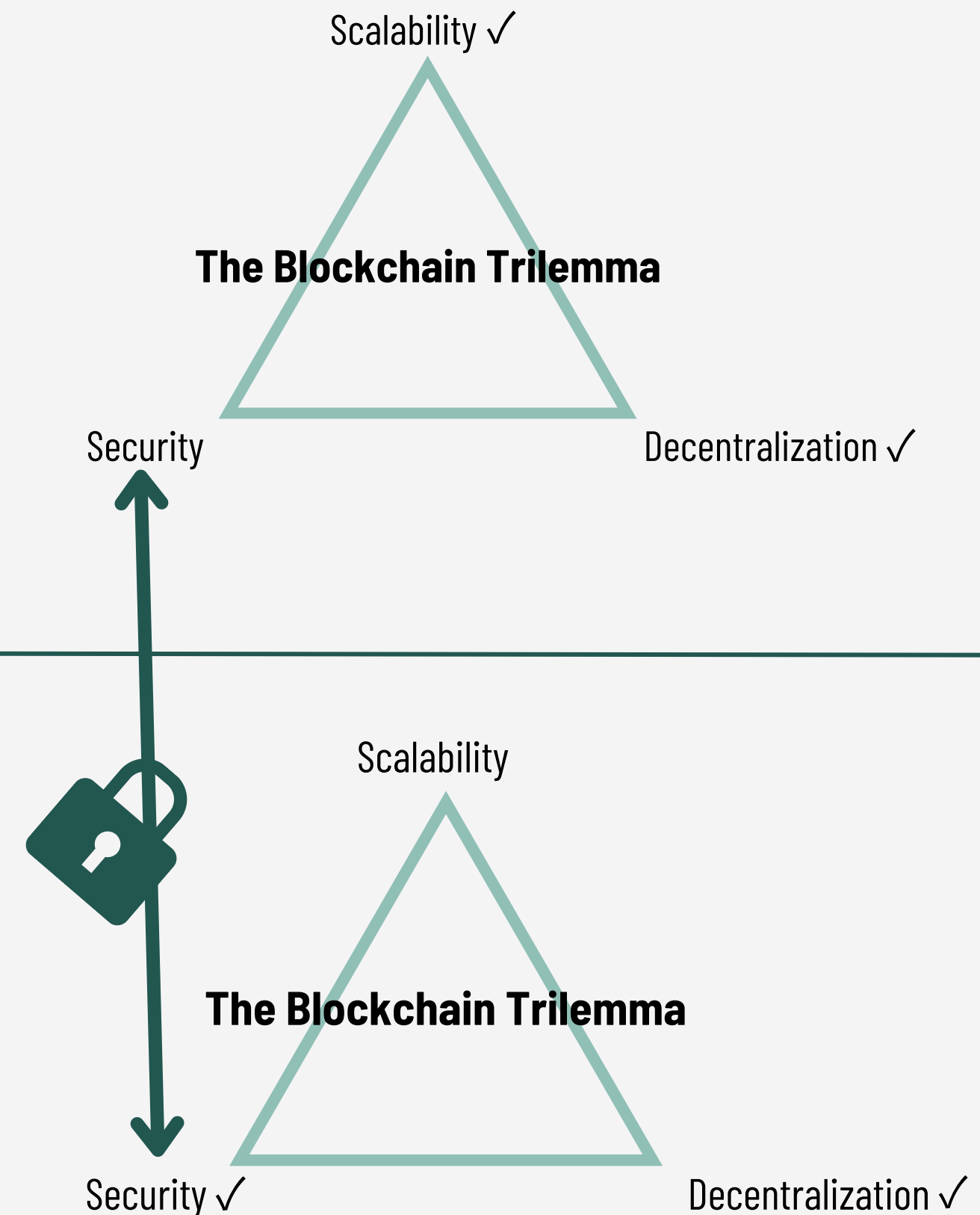
Security: The TEA Project's Root of Trust (RoT)

In traditional blockchain...

- There is two RoT (Root of Trust), consensus and cryptography.
- dApps run on the blockchain directly (layer-1)
  - Not possible to get scalability while maintaining decentralization and security.
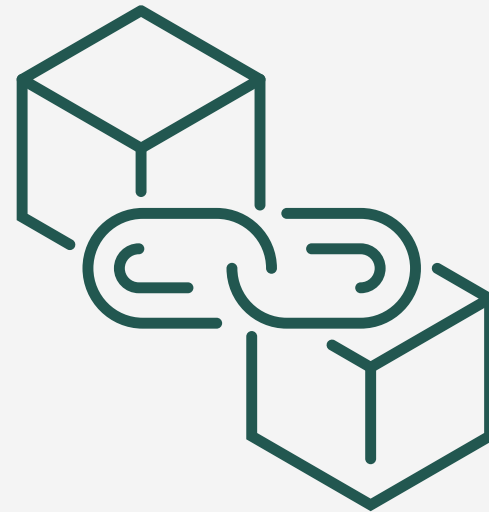
The TEA Project

- Three RoT: hardware, blockchain, and time.
- dApps run inside hardware protected enclaves on layer-2. No humans (including the app developer and the miners) can have any control of the apps nor can they extract any data from the running enclaves.
- Applications run on layer2 (CML nodes) without any knowledge about blockchain and consensus, as if it were running on cloud computing. These apps are magically decentralized by the TEA Project's 2-layer blockchain design.

Three-tier Architecture for App Developers

1. Presentation

- Static compiled SPA (Single Page Application for web) or mobile client stored on IPFS with a unique CID as identifier.
- Because IPFS is completely decentralized storage, that's all that's needed for the front-end to be decentralized
- As long as there's a CID, the front-end code can always be loaded. And since there's no web server, even a domain name is no longer needed.

2. Application

- Compiled into WebAssembly (WASM) modules hosted in any type B CML node's hardware enclave
- Many programming languages are easily compiled into WASM which reduces app dev time
- Nobody (including the devs and miners) has any control of the apps nor can extract any data from the running enclaves.

3. Data

- Two types of data
  - A CRDT database for eventually-consistent data
  - A distributed state machine for strong-consistency data
    - Relies on Proof of Time data from GPS satellites to keep events in the same order among replications
    - GPS satellites provide accurate time under the watch of trusted TPM chips and are used as the basis for the final ranking of all replicas. Since time is stable in our universe, it follows that each replica can achieve strong consistency through trusted time data.
- The strongly consistent state machine is necessary for funds accounting while the CRDT database can be used less crucial aspects such as the TApp UI messages.

Handling Bad Actors

- No one knows if any one node will be running a valuable task.

- The constant remote attestation, phishing tasks, & token economy governance saddles Byzantine faulting with a high opportunity cost.

Increasing Cost of Attacks

- Verified randomness
- Distributed computing
- Hardware protection
- Cost of hardware life-cycle
- Diversity in tech stack
- Blockchain-based penalty and incentive

Decreasing Payouts of Successful Attacks

- Decentralized storage
- Partial data
- Phishing tasks

Hardware Support

The roadmap for supporting various Root of Trust (RoT) verification chains depends on the underlying hardware

Architecture	TEA Support	Technology + RoT Verification	Cloud IaaS for Rent?
Amazon Nitro	Completed	• Similar to TPM • Centralized cloud	✓
Raspberry Pi w. GPS & TPM	On roadmap	• TPM-Based • Decentralized	✗

The TEA Project's Two Tokens

Stable coin: TEA

- Utility token. Stable coin pegged to computing cost, not fiat.
- Used as gas, and has unlimited supply.
- No genesis block supply: every TEA needs to be mined.
- Born from public service rewards and burnt by DAO when CML seeds are bought at auction.
- Can be staked to Camellia for revenue sharing.

NFT: Camellia (CML)

- A TEA mining node can only be activated by associating a Camellia NFT with it. CML functions as a mining license and credit record.
- Miners buy new Camellia seeds through open bidding and burning TEA.
- Camellia has a life cycle determined randomly via an algorithm. DAO regulates the supply & burns it when it dies.
- Camellia has a technical stack used for diversity control.
- Investors can stake to Camellia-enabled mining machines for revenue sharing.

How tokens are used

Miners

At the very beginning, miners buy CML to start pre-mining and earn TEA.

Presale Investors

Presale investors buy TEA to stake on miners and earn TEA revenue from their mining.

dApps

When dApps are deployed, clients buy TEA to purchase computing services (dApps). Miners earn the TEA from the clients and share the revenue with their stakeholders.

DAO Burns TEA

New miners joining the TEA network & bid for new CML seeds necessary for mining. The DAO burns the received TEA payment from the winning bidder.

DAO Ensures CML Scarcity

The DAO generates seeds based on auction prices and maintains a reasonable scarcity of CML. Each CML seed has a limited lifetime which adds to its scarcity.

Token Circulation
# Vouchers & Funding Rounds

Funding Rounds With Vouchers

- Investors receive temporary seed vouchers (ERC20-like tokens on the TEA blockchain).
- Before pre-mining starts, vouchers are redeemable for randomly generated frozen Camellia seeds (the NFT).
- During pre-mining, defrosted Camellia seeds are planted to TEA nodes and can begin harvesting TEA tokens at an accelerated speed for a short duration.
- When public mining starts, everyone can start mining without needing a voucher.
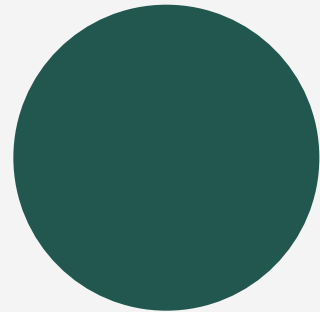
Each Camellia Seed is Unique

- Camellia seeds are unique NFTs. They each have varying defrost times, life spans, and productivity.

Voucher for investors   Seeds

Plant

Grow

Harvest

Reinvest for more seeds or stake to Camellia
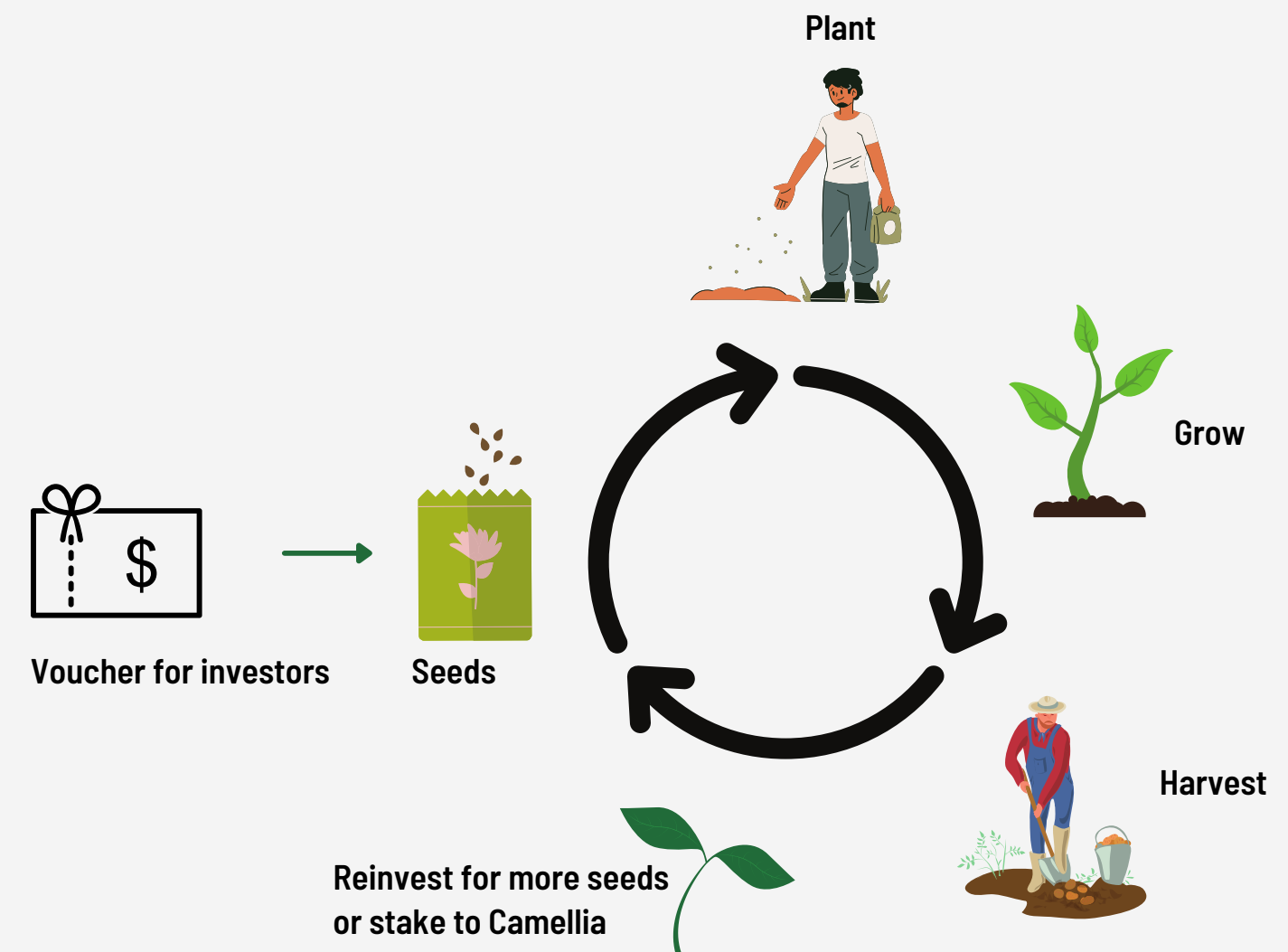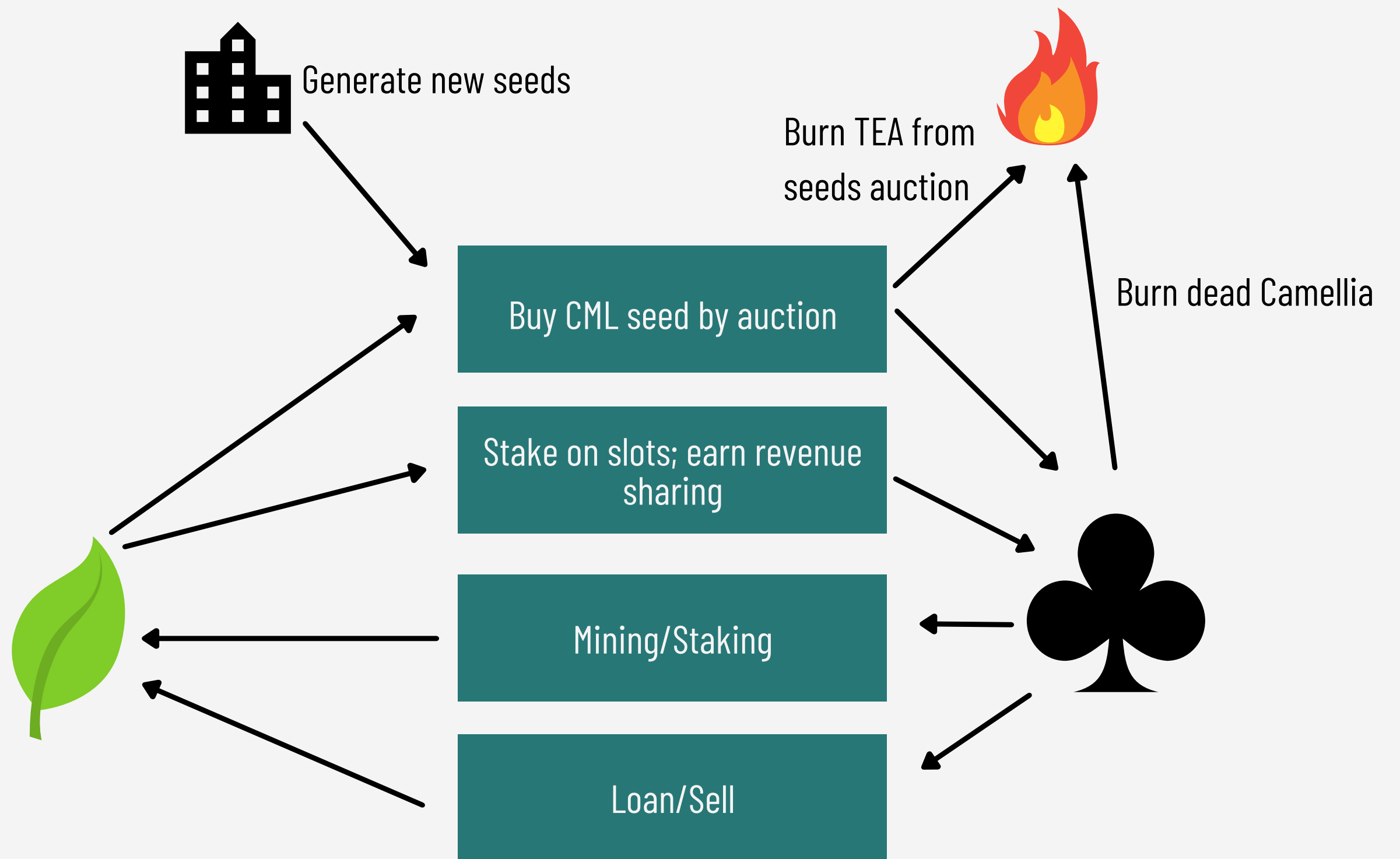
Early Stage Miner Economy: FOMO & Scarcity

Prior to the maturity of the TEA Project's Web3 Rich dApps ecosystem, a mining economy is necessary to keep the TEA economy running.

TEA's carefully designed token economy creates NFT scarcity during mining. The scarcity encourages miners to reinvest their harvest back into CML instead of selling. Miners are of course free to host whatever TApps they wish with free market principles guiding them towards hosting TApps that are popular and able to reward miners.
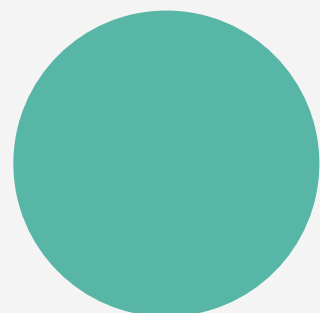
TEA doesn't require a GPU, ASIC or a hard drive. It only requires the Camellia NFT and cheap secure hardware such as an RPi with a GPS module and a TPM chip. The TEA Project will offer a TEA Box Raspberry Pi mining machine in the future complete with TPM chip, GPS module, and preinstalled with a B CML seed necessary for mining.

FUNDING ROUNDS AND VOUCHER RELEASE SCHEDULE

	TEA Project Community Members	SEED ROUND INVESTORS	A ROUND INVESTORS	PRIVATE SALES
FROZEN SEED %	60	10	10	20
DEFROST SCHEDULE	• 2 month lockup • 5% per month for 20 months	• 10% immediately • 5% per month for 18 months		

Bonding Curve Token Sales for TApps

Bonded token sales help generate interest in the TEA Project network

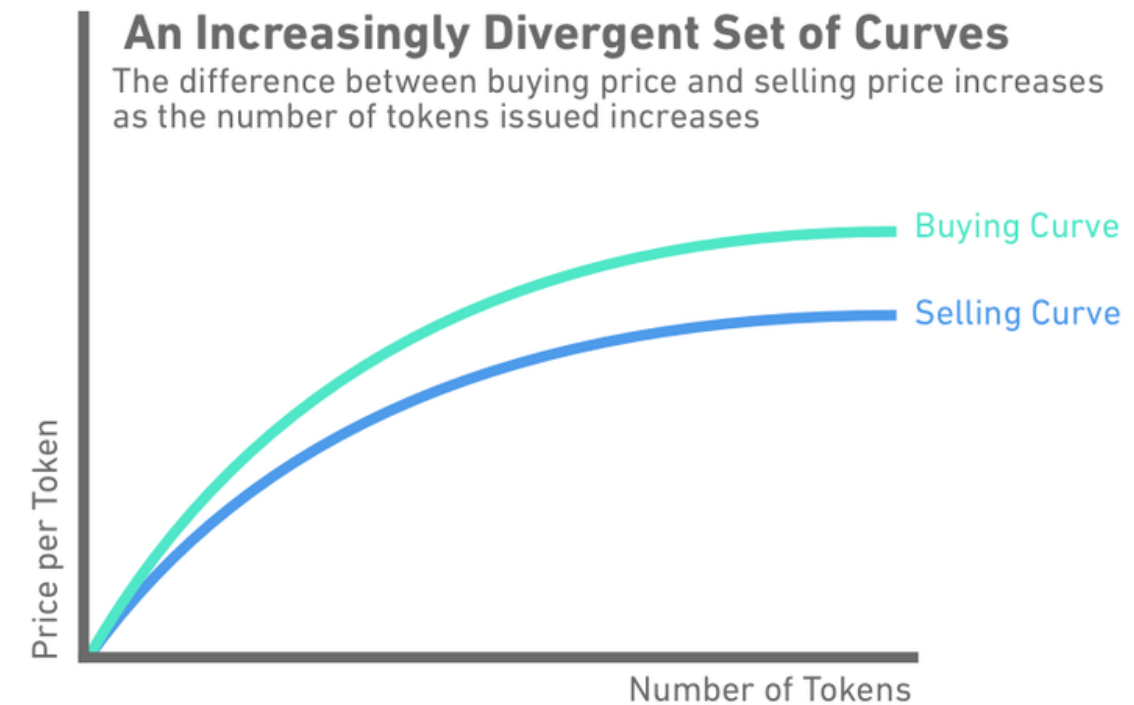The TEA Project will host bonding curves for dApp developers and other creators to monetize their ideas. Investors back projects by purchasing the TApp tokens on its bonding curve. Early adopters are rewarded for their investment as their TApp token price increases when more people buy the project's token on its bonding curve.

Investors can share the revenue and risk with miners and developers by purchasing a TApp's tokens. As early investors benefit from more investors buying into the TApp token, many will advertise on their social media profiles to attract others. These various bonding curve projects act as another method of onboarding new users into the TEA ecosystem.

An example of a bonding curve sale

- A developer looking to launch a dApp on the TEA network could hold a bonding curve sale to generate early liquidity. Part of every sale goes to fund their project, and the other part goes to fund the project token's bonding curve.
- The project's bonding curve provides on-chain liquidity to enter and exit positions, providing security for investors. In the bonding curve on the right hand, the price increases as more tokens are bought. Investors buy at the green line and sell at the blue line where there will always be liquidity at each level along the bonding curve.

An Increasingly Divergent Set of Curves
The difference between buying price and selling price increases as the number of tokens issued increases

Buying Curve

Selling Curve

Price per Token

Number of Tokens

The TEA Token Economy and its players

Miners

- Obtain CML from auction by burning TEA (a utility token pegged to computing resources).
- "Plant" CML to mining hardware equipped with trusted computing chips and a GPS module that provides an accurate time source from GPS satellites.
- Mining machines host Web3 applications and are rewarded in TEA token based on the app's consumed computing resources.

Developers

- Build apps using the TEA dev framework (similar to existing cloud applications, but without a host).
- The apps are uploaded to the TEA app market hosted by miners.
- App revenue goes directly to a bonding curve shared by app developers, hosting miners, and investors.

Curators + Investors

- Consumers can invest in TApps through its bonding curve and promote them on social media.
- As more people purchase the token, the price increases.
- Consumers exchange ETH to buy TEA to grow the TEA economy.
- Investors invest TEA in CML or TApps by buying their bonding curve token.

Milestones

2019
- TEA Project starts in 2019
- Self funded until 2021

2020
- First milestone in Nov 2020: Released the AI image recognition demo running on simulator

2021 Q2
- Second milestone ongoing in 2021
- Gluon wallet
- Web3 Foundation Open Grant
- Migrating TEA runtime to Amazon Nitro
- Seed round secured including investment from Hashkey

2021 Q3
- Preview 1 version launch
- Begin Go2Market strategy starting with miners' economy

We are here > **2021 Q4**
- Public mining in preview mode
- Rich dApps running on network
- Testnet starts

2022 Q1
- Mainnet starts
- TEA <-> ETH bridge operational

The 3-Phase Rollout

Phase 1:
Miners

- The TEA Project aims to build a healthy ecosystem by starting with the miners.
- Miners harvest TEA tokens from hardware mining with CML.
- Miners are able to exchange TEA in a liquid market with relative price stability.
- Miners can burn TEA to buy more CML.
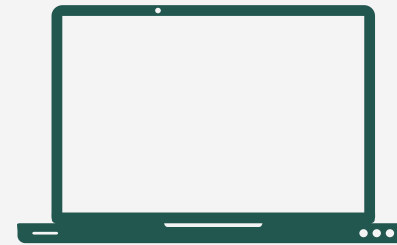
Phase 2:
Developers

- Focus shifts to onboarding developers, including tech education & outreach on how to build on the TEA ecosystem.
- Hackathons / grant program released.
- SDK available.
- TApp store of rich dApps launched showcasing apps in the TEA ecosystem.
- Miners invest their TEA into TApp tokens which supports both early developers & TEA token price.

Phase 3:
Consumers

- Consumer outreach phase: now that rich TApps are available in the TApp store, the TApps are marketed to consumers.
- Positive feedback loop: more consumers enter ecosystem -> devs can see what apps consumers want -> devs focus on making TApps that meet consumer demand -> popular TApps financially reward both miners and developers.

TRUSTED EXECUTION & ATTESTATION

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Run rich dApps on the blockchain at cloud speeds by leveraging silicon security and time.