xBacked Litepaper

Version: 2.0

Overview

xBacked is building the decentralized stablecoin for Algorand. xBacked ensures all xUSD in circulation is over collateralized via vaults. These vaults are collateralized debt positions (CDPs)

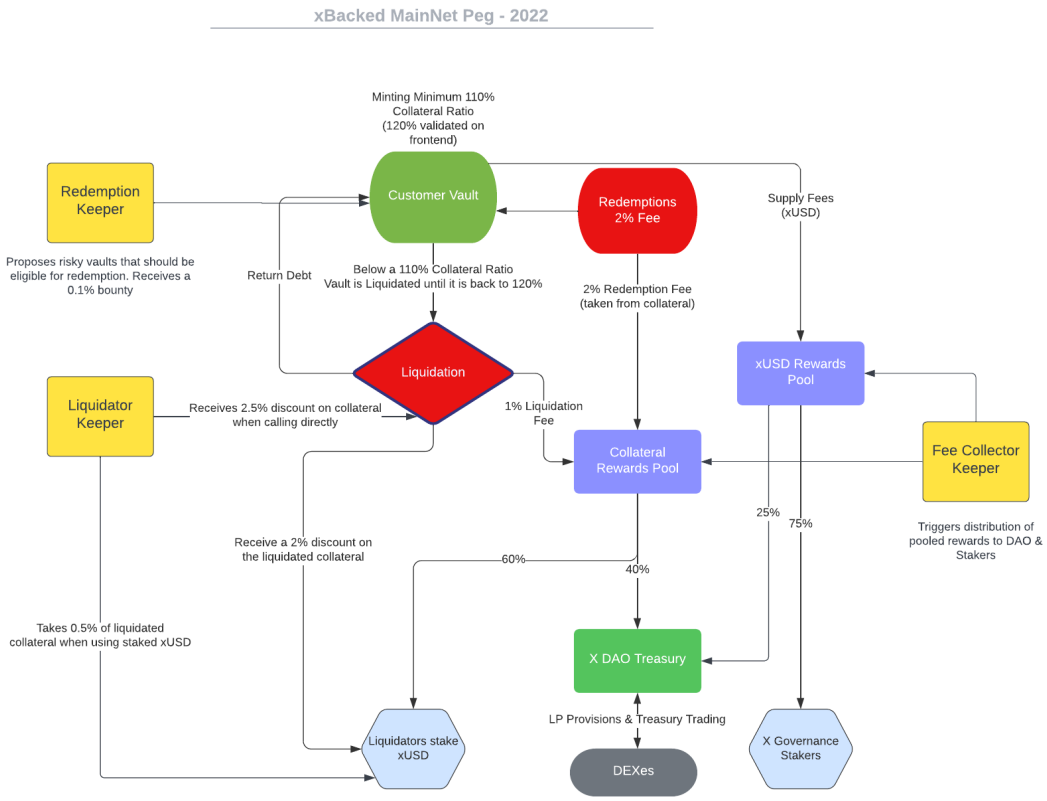
Token Issuance

100M X Governance tokens will be minted. **This is subject to change prior to TGE, which is scheduled for Q3 2022.**

Allocation

Aa Name	% Allocation	Vesting
Community, Marketing & Growth	53%	3-5 year distribution
Core Contributors	20%	3 years linear, can opt for longer lockup
1st Seed Round	10%	2 years linear, can opt for longer lockup
Pre-seed Allocation	5%	2 year linear vesting, can opt for longer lockup
2nd Seed Round	5%	2 years linear, can opt for longer lockup
Advisors	4%	3 year linear, can opt for longer lockup
Initial Token Sale	3%	Subject to change

System Diagram



Core principle: the system uses xUSD to represent debt & fees, not dollars.

Example

```
Alice creates a vault with $100 USD worth of ALGO.
Alice mints 50 xUSD tokens.
Alice must repay 50 xUSD tokens, plus any accrued supply fees,
to close her vault.
```

Note: there is system debt (total supply of xUSD) and vault debt. However, when a user mints xUSD there is no expectation they repay it to the protocol. The only expectation is that eventually the vault will close, either via liquidation, by the owner repaying vault debt, or via redemption.

Self Sustaining Protocol Revenue

Ensuring that the xBacked protocol is self sustaining is paramount in the design of the protocol. Over time, there must be significant incentive for governance token holders & community members to maintain and govern the protocol.

Fee Structure

- Liquidation fee: 1% of liquidated collateral
- Redemption Fee: 2% of redeem collateral
  - Incentive: discourage redemption in times of low market volatility
  - Also creates a floor to the xUSD price. Redemption will only make sense when xUSD is worth less than $0.98 USD.
- Supply fee: varies per vault collateral type
  - This is an ongoing fee accrued when xUSD is supplied.

Distribution of protocol fees - these metrics can be changed via governance

Supply fees

- 50% to DAO treasury → incentivize people to work on the protocol
- 50% to staked governance token holders → ensure people are incentivized to govern the protocol

Liquidation & Redemption fees

- 50% to DAO treasury → incentivize people to work on the protocol
- 50% to Liquidators staking xUSD → incentivize people to act as liquidators and ensure the protocol remains solvent.

Minting, Withdrawal & Returning Debt

Users of the xBacked smart contracts will be able to deposit collateral into a Vault. Vaults with different collateral types are **sepa**r**ate** smart contracts. See the section on Isolated Risk markets for more detail.

Vaults have a collateral ratio (c-ratio), and the system requires c-ratio to be `110%`.

There are no limits enforced on the smart contract, however the frontend application built by the core team has the following restrictions:

- Must be created with a `120%` c-ratio.
- Cannot withdraw funds with a c-ratio less than `120%`. This creates a strong incentive to repay vault debt so that the user can withdraw collateral.

Minting Example

```
Alice has deposited $100 USD worth of ALGO into a Vault.
Alice would like to initialise mint 80 xUSD.

If the value of Alice's collateral drops to $87.55 USD,
her collateral ratio would be 109% and she would be liquidated.
```

At any point, a user is able to withdraw their collateral, **as long as their c-ratio is 10% above the liquidation threshold**.

Withdrawing Example

```
Alice deposits $100 USD worth of ALGO as collateral
She mints of 50 xUSD tokens.
With this, her Vault c-ratio is 200%.
Alice is able to withdraw up to $40 USD worth of her ALGO, leaving $60
in collateral, and the CR is 120%
```

Furthermore, if the collateral value increases, Alice could either withdraw the asset or create mint more xUSD.

Example

```
Alice deposits $100 USD worth of ALGO as collateral
She mints 50 xUSD tokens.
With this, her Vault c-ratio is 200%
Alice is able to withdraw up to $40 USD worth of her ALGO.

The price of ALGO goes up, and Alice's collateral is now worth $120 USD.
The c-ratio is 240%.

Alice could now withdraw an extra $60 USD worth of her ALGO, or she could
mint (at maximum) 59 xUSD.
```

When repaying a vaults debt, the user must do so in-kind with the stablecoin. As the platform currently mints xUSD, all users must repay with xUSD. There is no fee for repaying xUSD.

Returning Example

```
Alice deposits $100 USD worth of ALGO as collateral
She mints of 50 xUSD tokens.
```

```
With this, her Vault c-ratio is 200%

Alice comes back a month later, and still has a system debt of 50 xUSD, plus
accrued supply fees. In this case, assume 1 xUSD of extra debt has accrued.
In this time she has bought more xUSD from Liquidity Pools and now has a
balance of 100 xUSD in her wallet.
Alice uses 51 xUSD to repay her vault debt.

Alice now has no xUSD outstanding, and has $100 USD worth of ALGO in her
vault and 49 xUSD in her wallet.
```

Liquidation

As stated before, Vaults are required to have a collateral ratio about `110%`. If an individual Vault drops below this, the users Vault becomes available for liquidation.

How do Liquidations work?

xBacked relies on a network of keepers to run liquidations. There are two options for these liquidation keepers

1. Use their own xUSD to liquidate unhealthy vaults. Receive all of the liquidated collateral
2. Use staked xUSD to liquidate healthy vaults. Receive 0.5% of the liquidated collateral, after putting up **zero** of their own capital.

A users vault is **only partially** liquidated. Once it drops under 110%, liquidations take place until the vault is back over 120%.

The maximum liquidation amount can be calculated using this formula

```
const discountRateInv = 1 - 0.035 // 96.5%
const MINIMUM_COLLATERAL_RATIO = 1.2 * 100;
const valueOfCollateral = 1000;
const vaultDebt = 910;
const maxLiquidation =
  ((discountRateInv * 100 * valueOfCollateral) -
    discountRateInv * MINIMUM_COLLATERAL_RATIO * vaultDebt) /
    (-discountRateInv * MINIMUM_COLLATERAL_RATIO + 100)
// 561 xUSD
```

Example: Keeper using using their own xUSD

```
The liquidation fee is 1%, and the discount is 3.5%. This means liquidators net
a 2.5% discount on liquidated collateral.

Bob's vault hits a c-ratio of 109%, and his $1000 worth of ALGO is now available
for liquidation. The vault debt is 910 xUSD.

A keeper bot sees this, and calculates the maximum liquidation to be 561 xUSD.
This reduces the vaults debt to 349 xUSD.

This would pay out $580 in collateral, leaving the vault
```

```
with $419 of collateral

1% of the liquidated collateral is taken by the protocol as a fee ($5.6)
The rest of the collateral is taken by the liquidator bot.

After fees, the keeper will receive $574.4 of collateral
This is a $14.4 profit, or 2.5%.

The vault collateral ratio is now back at 120%, a healthy level.

60% of the $5.6 in collateral fee gets transferred into
xUSD staking pool for stakers to claim pro-rata
```

Example: Keeper using staked xUSD

```
The liquidation fee is 1%, and the discount is 3.5%. This means liquidators net
a 2.5% discount on liquidated collateral.

Alice stakes 20,000 xUSD in the liquidator pool.

Bob's vault hits a c-ratio of 109%, and his $1000 worth of ALGO is now available
for liquidation. The vault debt is 910 xUSD.

A keeper bot sees this, and calculates the maximum liquidation to be 561 xUSD.
This reduces the vaults debt to 349 xUSD.

This would pay out $580 in collateral, leaving the vault
with $419 of collateral

1% of the liquidated collateral is taken by the protocol as a fee ($5.6)
0.5% of the liquidated collateral is taken by the keeper as a fee ($2.8)
The rest is transferred to the pool for Alice to claim ($577).

The vault collateral ratio is now back at 120%, a healthy level.

60% of the $5.6 in collateral fee gets transferred into
xUSD staking pool for stakers to claim pro-rata
```

Example: Multiple Keepers liquidating a vault

```
The liquidation fee is 1%, and the discount is 3.5%. This means liquidators net
a 2.5% discount on liquidated collateral.

Alice stakes 20,000 xUSD in the liquidator pool.

Bob's vault hits a c-ratio of 109%, and his $1000 worth of ALGO is now available
for liquidation. The vault debt is 910 xUSD.

A keeper bot sees this, and uses 100 xUSD of their own capital to begin
liquidating a vaullt.

The vaults debt is reduced to 810, and the vaults collteral value
is reduced to $896.5. The CR is 110%.
This keeper receives $102.5 of collateral, with the protocol taking
1% as a fee.

Another keeper re-calculates the maximum liquidation to be 461 xUSD.
```

```
This reduces the vaults debt to 349 xUSD. They use 349 of Alice's staked xUSD.

This would pay out $477 in collateral, leaving the vault
with $419 of collateral.

1% of the liquidated collateral is taken by the protocol as a fee
0.5% of the liquidated collateral is taken by the keeper as a fee
The rest is transferred to the pool for Alice to claim.

The vault collateral ratio is now back at 120%, a healthy level.

60% of the liquidation fees gets transferred into
xUSD staking pool for stakers to claim pro-rata
```

Redemption

Redemption is a separate mechanism to withdrawal. Redemption **guarantees** that 1 xUSD token can be redeemed for $1 USD of underlying collateral from the **riskiest vault(s)** in the system. The fee for this mechanism is `2%`. This redemption mechanism creates a hard peg, and a floor to the xUSD price.

This redemption feature also creates a strong incentive for users to ensure their vault has a healthy c-ratio, as the riskiest vaults will experience the highest risk of redemption.

Example: Simple Redemption

```
Alice sees xUSD is trading for $0.97 USD on a DEX

Alice buys 100 xUSD that are worth $97 (xUSD is trading at $0.97).

Alice redeems all of her xUSD tokens.
The redemption fee is 2% of redeemed collateral.

In total Alice redeems 100 xUSD, worth and receives $98 worth of
collateral. She makes $1 profit.
```

Alternatively in this scenario, Alice might have an open vault. She could redeem her xUSD for Algos, then trade her Algos for more xUSD to repay her vaults debt cheaper.

Important to note: this only becomes worthwhile once xUSD is worth less than $0.98.

What happens if the redemption is > total collateral?

xUSD can **only be minted when backed by ALGO**. For example, the total amount of xUSD minted is $1m. This would be backed by (at minimum) $1.1m ALGO.

The peg would need to be trading at a significant discount for someone to be able to get enough xUSD. Even then, they would need to own **a majority** of the xUSD minted, and buying more of it would effect the price and bring it back to the target.

```
1m xUSD has been minted, backed by at least $1.1m of ALGO (110% TCR)
xUSD is trading at $0.9.
```

```
An individual malicious trader could redeem 1m xUSD for $900,000, and
receive $1m of ALGO. However they would need to buy all of the
xUSD issued.

Perhaps instead, some of the largest vaults could collude and redeem
750,000 xUSD for $750,000 worth of ALGO. They would make a profit of $75,000.

If this did happen the peg should be maintained as designed.

The system would have 250,000 xUSD minted, backed by $350k worth of ALGO
(excl. fees)
```

What happens if multiple vaults need to be redeemed?

The xBacked protocol tracks the **two** riskiest vaults in the protocol.

```
Vault 1 has $10,000 of ALGO, c-ratio is 111%
Vault 2 has $50,000 of ALGO, c-ratio is 111.5%

Someone redeems 55,000 xUSD.
Vault 1 is essentially liquidated.
Vault 2 is left with $10,000 worth of ALGO, and the vault debt is
partially paid off
```

Vault Proposals

See the section of keepers for how new redeemable vaults are proposed. In short; a bot can propose a new vault, and if it is riskier than those in the current list it replaces the least risky vault. The proposer is paid 0.075% o the collateral as a bounty.

Isolated Risk Markets

When you open a vault on xBacked, your vaults are **separate** from each other. That means one vault with a more volatile collateral asset will not effect your other open vaults. Thgis is a risk management tool for our users; if one asset is particularly volatile while others are not, you are not completely at risk.

This also means the risk to xUSD stability can be maintained, giving higher risk collateral types lower xUSD minting capacity, higher collateral ratios, and higher fees. Think of it like a diversified portfolio; low risk (”blue chip”) tokens have the best collateral ratios, and higher amount of xUSD to mint. More speculative collateral types can be constrained to a healthy ratio within the protocol.

This also allows xBacked to experiment with different types of collateral rapidly.

Staking

xUSD Staking

Anyone, regardless if they have created a vault or not, can stake xUSD that is used in liquidations. For doing so, users are rewarded by the protocol which shares 60^ of fees generated by liquidations, redemptions, and vault proposals, with these stakers.

Over time, stakers accrue points. These points can be exchanged at any time for the proportionate amount of point sin the system. Pointd accrue based on length of staking & size of the users stake.

```
Alice stakes 1000 xUSD.

Alice stays staked for 1 month, and keeps depositing more xUSD after it
has been used in liquidations.

Alice has accrued 10,000 points, and currently the contract has a total of
100,000 points accrued.

Alice decides to exchange these points for 10% of the current fees
availabele in the contract ($1,000).

The total points has been reduced to 90,000 and Alice now has zero points and
begins accuing again.
```

Governance Staking & Voting

> ⚠️ Details for this will be released at a later date

Keepers

These are largely details for developers.

Fee Collectors

Calling the `collectFees` function in a vault contract will reward the caller with `0.5%` of accrued fees. The rest of the fees are distributed to the DAO and xUSD stakers

Supply Fee Settlers

Calling `settleInterest` function will distribute accrued supply fees to the DAO and governance stakers. Callers are not rewarded; but it might be advantageous to call this function if they are staking governance tokens.

Liquidators

See liquidations for more details.

Vault Proposers

These keepers watch for which vaults might be riskiet than the current ones available for redemptions in the contract. The keeper can propose a vault, and if it is more risky than either of the two vaults in the contract eligible for redemptions, they receive `0.75%` of the collateral as a bounty.

Please see https://docs.xbacked.io/developers/sdk for more

Debt Oversupply

In the event there is an oversupply of debt in the system, the peg will be under the target of $1 USD. To counteract this, there are several controls in place. Protocol c-ratio in this scenario will be less than `110%` target. At this point, vaults will be liquidated but there are other forces too.

Arbitrage

People are able to repay their xUSD at a reduced rate, contracting the supply of debt in the system. At the same time, people would be able to take advantage of arbitrage opportunities presented on exchanges.

Example

```
Alice has a vault with a debt of 100 xUSD, which was worth $100 USD at the time
Alice sees the price of xUSD is $0.9 USD.
Alice buys 100 xUSD on a DEX for $90
Alice repays xUSD for $10 less than the original amount.
```

Redemption

It is in this kind of scenario where users will likely use the redemption functionality more than they usually would. This is explained in detail above.

Debt Shortage

In the event that there is a shortage of debt in the system, the peg will be over the target of $1 USD. To counter this, the system will partially liquidate risky vaults, until the system achieves a healthy c-ratio.

Market participants will also take advantage of this arbitrage opportunity. They will mint xUSD, and then sell this xUSD for a profit in a DEX.

Example

```
Alice sees that xUSD price is currently $1.10
Alice mints 100 xUSD, worth $110 instead of $100.
Alice sells this on a DEX for a profit.
```

Appendix

Variable Definitions

Supply fee - on going fee that accrues debt in a vault. This debt is distributed to the DAO & Governance token stakers

$$Collateralization\ Ratio\ (CR) = \frac{\sum Value\ of\ Collateral}{\sum Value\ of\ Debt}$$

Maximum Liquidation amount

```
const discountRateInv = 1 - 0.035 // 96.5%
const MINIMUM_COLLATERAL_RATIO = 1.2 * 100;
const valueOfCollateral = 1000;
const vaultDebt = 910;
const maxLiquidation =
  ((discountRateInv * 100 * valueOfCollateral) -
    discountRateInv * MINIMUM_COLLATERAL_RATIO * vaultDebt) /
    (-discountRateInv * MINIMUM_COLLATERAL_RATIO + 100)
// 561 xUSD
```