Liquity Research

May-13-2024

01

Overview of Liquity

Overview of Liquity

Liquity is a decentralized borrowing protocol that allows you to draw interest-free loans against ETH used as collateral. Loans are paid out in LUSD (a USD-pegged stablecoin) and need to maintain a minimum collateral ratio of 110%.
Liquidity as a protocol is non-custodial, immutable, and governance-free.

LUSD

Price	$0.99
Market Cap	$122.34M
24h Trading Volume	$2.18M
Circulating Supply	122.46M

Source: https://coinmarketcap.com/currencies/liquity-usd/

LQTY

Price	$0.98
Market Cap	$94.06M
24h Trading Volume	$16.2M
Circulating Supply	95.94M

Source: https://coinmarketcap.com/currencies/liquity/

Project Roadmap

Apr 5, 2021	Protocol launched
Apr 15, 2021	LUSD/3CRV Pool launch
Jul 1, 2022	Community Grant Program
Next Week	Liquity v2 Whitepaper comes

key benefits of Liquity

LUSD

0% interest rate	As a borrower, there's no need to worry about constantly accruing debt. ETH holders can freely access liquidity matched to their collateral. The borrowed LUSD empowers users to explore DeFi's yield-generating opportunities without constraints.
Low Collateral Ratio of 110%	Liquity offers interest-free loans and is more capital efficient than other borrowing systems (i.e. less collateral is needed for the same loan).
Liquidation mechanism	Auction-based liquidations can often be lengthy and error-prone. For example, the longer the collateral is sold, the higher the risk that its value will fall further, so its liquidation ratio must be set high enough to provide additional margin against subsequent price drops during liquidation. Liquity does not need to seek buyers; instead, it employs a two-step liquidation mechanism to immediately liquidate undercollateralized positions. This significantly increases the speed of liquidation and reduces the price risk during the liquidation process.
Governance free	Liquity does not rely on governance mechanism to vote on monetary interventions like changing an interest rate. All operations are algorithmic and fully automated, and protocol parameters are set at the time of contract deployment
Fully decentralized	Liquity contracts have no admin keys or administrator to control it, Frontend operation is provided by third parties that make the whole system decentralized and censorship-resistant
Directly redeemable	LUSD can be redeemed at face value for the underlying collateral at any time

02

Liquity Mechanism

Borrowing

Users will lock up ETH as collateral in a smart contract and create an individual position called a “Trove.” The user can get instant liquidity by minting LUSD, a USD-pegged stablecoin.

Only ETH is accepted as a collateral type.

Trove

A Trove is where you take out and maintain your loan. Each Trove is linked to an Ethereum address and each address can have just one Trove.

Troves maintain two balances: one is an **asset (ETH) acting as collateral** and the other is a **debt denominated in LUSD**. You can change the amount of each by adding collateral or repaying debt.

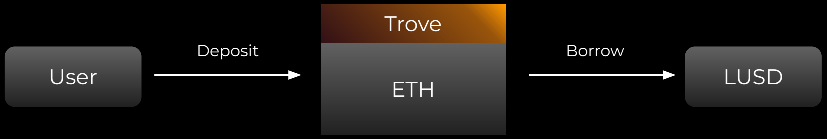
Collateral Ratio (CR)

This is the ratio between the Dollar value of the collateral in your Trove and its debt in LUSD. The collateral ratio of your Trove will fluctuate over time as the price of Ether changes. You can influence the ratio by adjusting your Trove’s collateral and/or debt

Formula

$$\frac{\text{Price of ETH * No. of ETH deposit}}{\text{No. of LUSD borrowed}} = \frac{\$1100 * 10\text{ETH}}{10000 \text{ LUSD}}$$

Workflow



Borrowing Fees

Borrowing fee include two parts: liquidation reserve and borrowing fee

Liquidation Reserve	One-time charge of **200 LUSD** everytime a borrower opens a new Trove. It is set aside as a way to compensate gas costs for the transaction sender in the event your Trove being liquidated.
Borrowing Fee	One-time fee that is added to the Trove's debt and calculated by base rate +0.5% multiplied by the amount of liquidity drawn. The fee rate is confined to a range between 0.5% to 5%.

Borrowing Fee Formula

$$\underbrace{200\ \text{LUSD}}_{\text{Liquidation Reserve}} + \underbrace{\text{【Base rate } 0.5\% \sim 5\ \%\text{】} * \text{No. of LUSD}}_{\text{Borrowing Fee}}$$

Example

Borrowing Rate: 0.5%

Borrowed LUSD: 4000 LUSD

Borrowing Fee: 4000 x 0.5% = 20 LUSD

Liquidation Reserve Fee: 200 LUSD

Total Fee: 200 + 20 LUSD = 220 LUSD

Total Debt Incurred: 4000 + 220 = 4220 LUSD

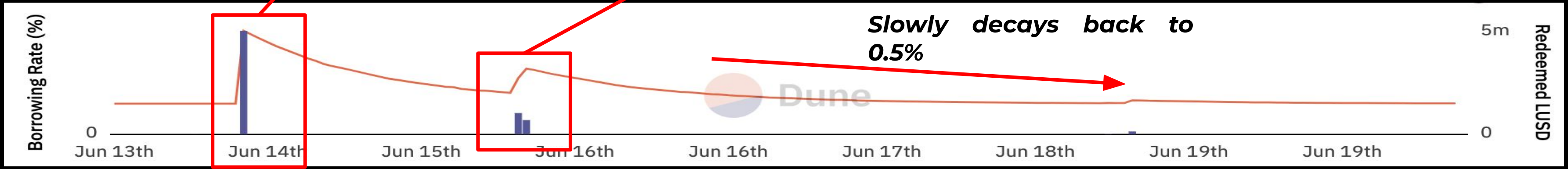
Borrowing Rate

Borrowing rate gradually decays to the minimum 0.5% after each redemption happened. The more LUSD being redeemed, the higher the resulting borrowing rate.

June 14	
Borrowing rate	1.6956%
Redeemed LUSD	~5.04M

June 15	
Borrowing rate	0.9213%
Redeemed LUSD	~1.03M

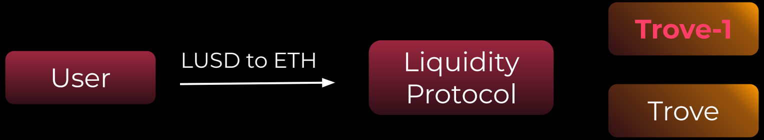
Borrowing Rate (7d)



Slowly decays back to 0.5%

Trove Redemption

A redemption is the **process of exchanging LUSD for ETH at face value**, as if 1 LUSD is exactly worth $1. When LUSD is redeemed, the ETH provided to the redeemer is allocated from the Trove(s) with the lowest collateral ratio (even if it is above 110%). If at the time of redemption you have the Trove with the lowest ratio, you will give up some of your collateral, but your debt will be reduced accordingly.



Trove-1

1 ETH = 1000 LUSD

$$\frac{5\ \text{ETH} = 5000\ \text{LUSD}}{2800\ \text{LUSD}} \rightarrow \frac{4\ \text{ETH} = 4000\ \text{LUSD}}{1800\ \text{LUSD}}$$

179% 222%

Partial redemption Only repay part of the LUSD debt, redemption will not reduce the debt to 0

Full redemption Repay all of the LUSD debt, redemption that reduces the debt to 0

Redemption Fee

Redemption fee is in a function of the base rate and the redeemed LUSD amount as a proportion of the entire stablecoin supply. Minimum redemption fee is 0.5% and the fee is subtracted from the redeemed LUSD.

Redemption Fee: (Base rate + 0.5%) * ETH drawn

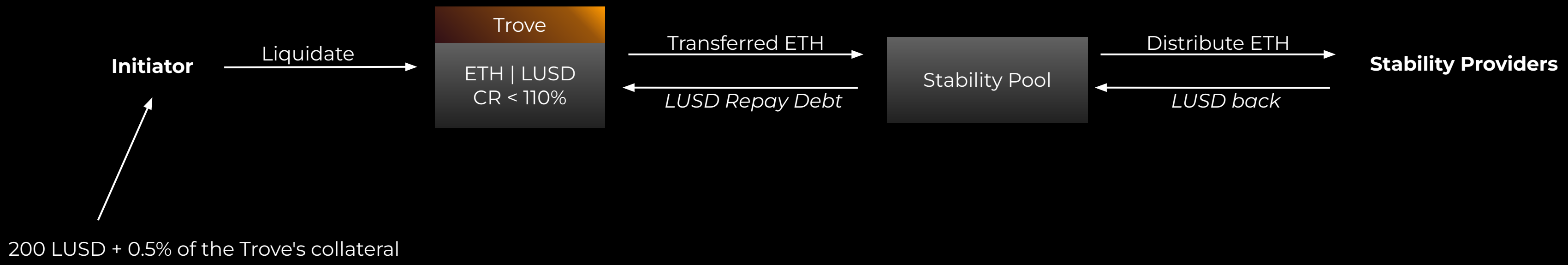
For example, if the current redemption fee is 1%, the price of ETH is $500 and you redeem 100 LUSD, you would get 0.198 ETH (0.2 ETH minus a redemption fee of 0.002 ETH)

The base rate increases with each redemption and drops to 0% if no redemptions occur over time, to ensure redemptions are not too frequent

Trove Liquidation & Stability Pool

Liquidation	To ensure that the entire stablecoin supply remains fully backed by collateral, Troves that fall under the minimum collateral ratio of 110% will be closed (liquidated).
Stability Pool	The Stability Pool is the first line of defense in maintaining system solvency. It achieves that by acting as the source of liquidity to repay debt from liquidated Troves—ensuring that the total LUSD supply always remains backed.

Liquidation Process



Initiator

Liquidate

Trove

ETH | LUSD
CR < 110%

Transferred ETH

LUSD Repay Debt

Stability Pool

Distribute ETH

LUSD back

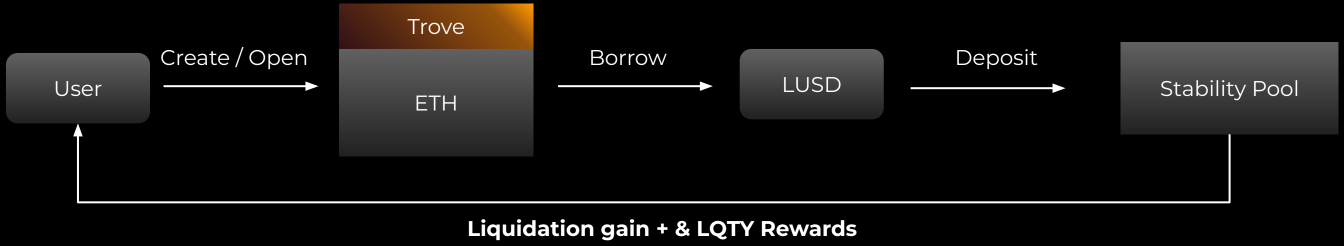
Stability Providers

200 LUSD + 0.5% of the Trove's collateral

Stability Provider

Stability Providers refer to users who deposit their LUSD into the Stability Pool. They are expected to make liquidation gains and receive early adopter rewards in form of LQTY tokens.

Workflow



User

Create / Open

Trove

ETH

Borrow

LUSD

Deposit

Stability Pool

Liquidation gain + & LQTY Rewards

Liquidated Example

ETH price: $545

Total LUSD in Stability Pool 1,000,000 LUSD

Trove

Debt: 200,000 LUSD
Collateral: 400 ETH

CR: 400* 545 / 200000 = 109%

User

10,000 LUSD

Proportion of LUSD user own in Stability Pool: $\frac{100{,}000 \text{ LUSD}}{1{,}000{,}000 \text{ LUSD}} = 10\%$

User will be responsible for 10% of the debt: 10% x 200,000 LUSD = 20,000 LUSD

Remaining Deposit: $100000-$20000 = 80000 LUSD

ETH Share: 400 x $545 x 10% = $21,800

Net Gain: $21,800 - $20,000 = $1800

Stability Provider

There are two situations where a stability provider may suffer losses from depositing funds into the stability pool.

CR < 100%

ETH price get flash crash or due to an oracle failure.

Result: The collateral gain will be smaller than the reduction of the deposit

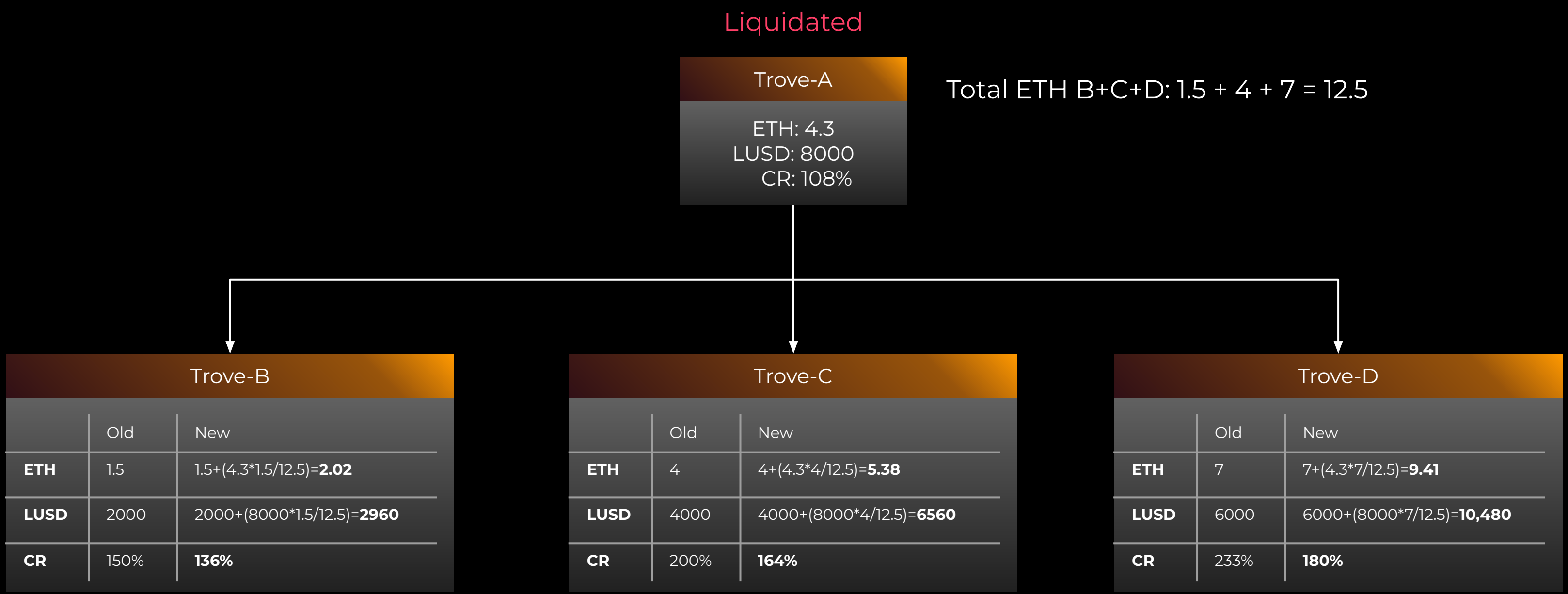
LUSD > $1

Liquidations may become unprofitable for Stability Providers even at collateral ratios higher than 100%

This is only hypothetical since LUSD is expected to maintain or return to the peg.

Redistribution

If the Stability Pool is empty, the system uses a secondary liquidation mechanism called redistribution. In such a case, the system redistributes the debt and collateral from liquidated Troves to all other existing Troves. The redistribution of debt and collateral is done in proportion to the recipient Trove's collateral amount.



Liquidated

Trove-A

ETH: 4.3
LUSD: 8000
CR: 108%

Total ETH B+C+D: 1.5 + 4 + 7 = 12.5

Trove-B

	Old	New
ETH	1.5	1.5+(4.3*1.5/12.5)=**2.02**
LUSD	2000	2000+(8000*1.5/12.5)=**2960**
CR	150%	**136%**

Trove-C

	Old	New
ETH	4	4+(4.3*4/12.5)=**5.38**
LUSD	4000	4000+(8000*4/12.5)=**6560**
CR	200%	**164%**

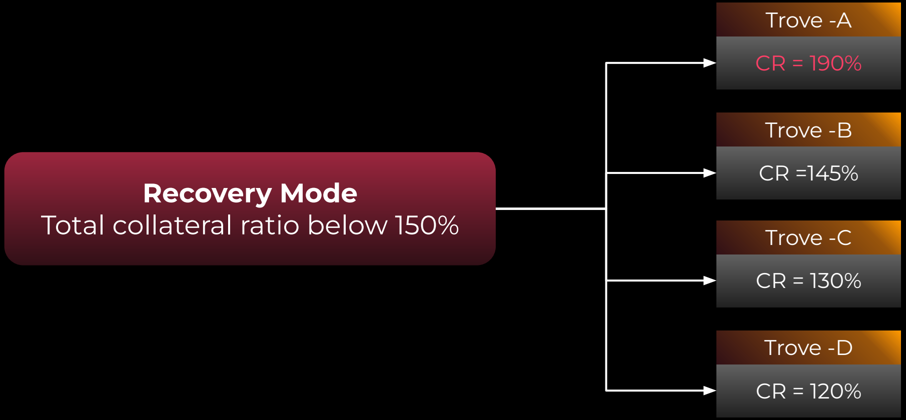
Trove-D

	Old	New
ETH	7	7+(4.3*7/12.5)=**9.41**
LUSD	6000	6000+(8000*7/12.5)=**10,480**
CR	233%	**180%**

Recovery Mode

Recovery Mode kicks in when the Total Collateral Ratio (TCR) of the system falls below 150%.
During Recovery Mode, Troves with a collateral ratio below 150% can be liquidated.
The purpose of Recovery Mode is to incentivize borrowers to behave in ways that promptly raise the TCR back above 150%, and to incentivize LUSD holders to replenish the Stability Pool.

$$\textbf{Total Collateral Ratio (TCR) :} \quad \frac{\text{Total collateral of all Troves (ETH)}}{\text{Total debt of all Troves (LUSD)}}$$



Recovery Mode
Total collateral ratio below 150%

Trove -A
CR = 190%

Trove -B
CR =145%

Trove -C
CR = 130%

Trove -D
CR = 120%

Only Trove-A will not Liquidated

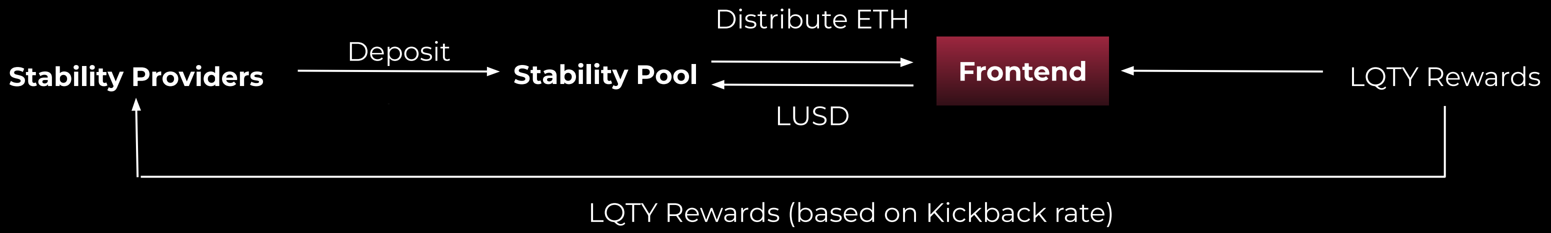
Recovery Mode

The liquidation mechanism for recovery mode:

Trove's Collateral Ratio	Liquidation Procedure
< 100%	Redistribute all debt and collateral to active Troves.
between 100% and 110%	As under normal operation, the Trove is liquidated by first **offsetting its debt and collateral against the Stability Pool** and redistributing any remainders to other Troves.
between 110% and TCR(Total Collateral Ratio)	The Trove is liquidated by **offsetting its debt against the Stability Pool**, provided that the entire debt can be liquidated. The liquidated collateral is capped at 110% of the debt, and the remainder above 110% is reclaimable by the borrower.
> TCR	No liquidation possible.

Frontend Operators

Frontend Operators provide a web interface to the end-user enabling them to interact with the Liquity protocol. For that service, they will be rewarded with a share of the LQTY tokens their users generate.



Stability Providers

Deposit

Stability Pool

Distribute ETH

LUSD

Frontend

LQTY Rewards

LQTY Rewards (based on Kickback rate)

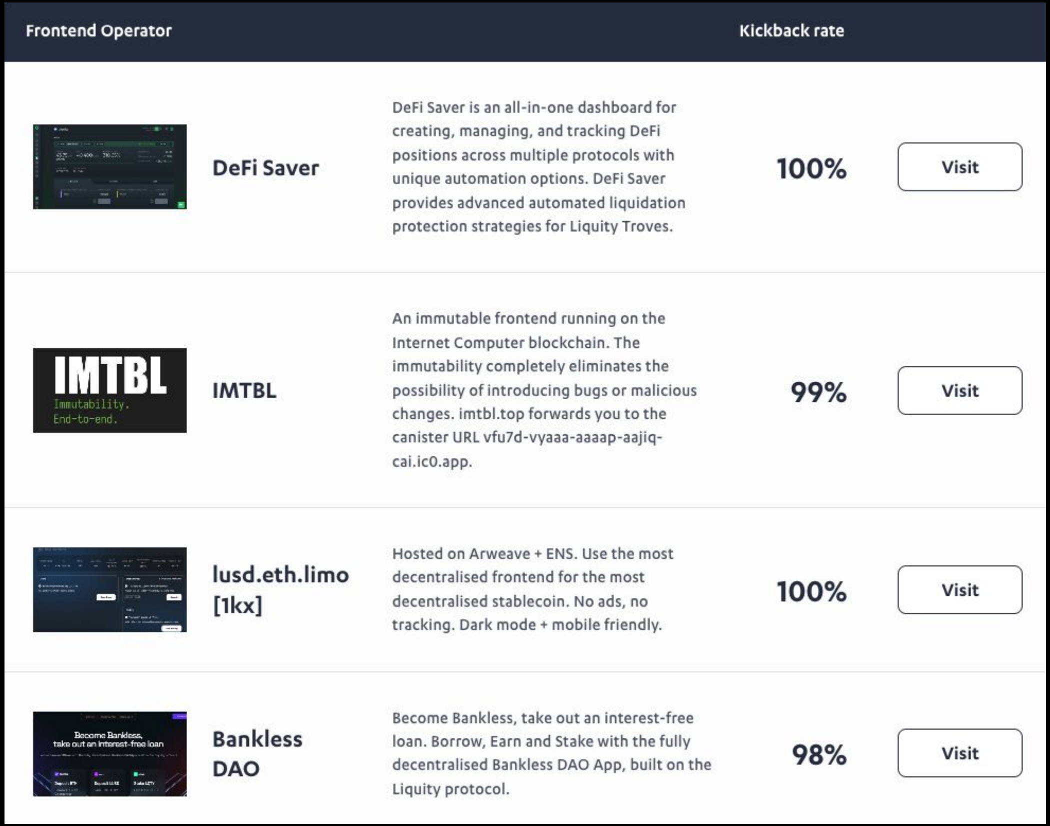
Kickback Rate

The Kickback rate is a percentage set by the front-end operator, indicating how much LQTY rewards they are willing to give back to users who use their services.
Kickback rates can range from 0% to 100%

Why doesn’t the Liquity team run a frontend?

Not running our own frontend **increases censorship resistance** and **decentralization**, but also helps us **bootstrap a distributed ecosystem**.

Frontend Operators



Frontend Operator		Kickback rate	
DeFi Saver	DeFi Saver is an all-in-one dashboard for creating, managing, and tracking DeFi positions across multiple protocols with unique automation options. DeFi Saver provides advanced automated liquidation protection strategies for Liquity Troves.	**100%**	Visit
IMTBL	An immutable frontend running on the Internet Computer blockchain. The immutability completely eliminates the possibility of introducing bugs or malicious changes. imtbl.top forwards you to the canister URL vfu7d-vyaaa-aaaap-aajiq-cai.ic0.app.	**99%**	Visit
lusd.eth.limo [1kx]	Hosted on Arweave + ENS. Use the most decentralised frontend for the most decentralised stablecoin. No ads, no tracking. Dark mode + mobile friendly.	**100%**	Visit
Bankless DAO	Become Bankless, take out an interest-free loan. Borrow, Earn and Stake with the fully decentralised Bankless DAO App, built on the Liquity protocol.	**98%**	Visit

If Kickback rate 99%

- Frontend: 1% rewards
- LP:: 99% rewards

Pegging Mechanism

How does LUSD closely follow the price of USD?

Hard peg Mechanism

-The ability to redeem LUSD for ETH at face value (i.e. 1 LUSD for $1 of ETH)

- Price ceiling at $1.1: the minimum collateral ratio of 110% creates a natural price ceiling at $1.1. When LUSD:USD exchange rate exceeds 1:1.1, borrowers can make an instant profit by depositing ETH and borrow LUSD to sell it.

Soft peg Mechanism

-LUSD > $1: Incentivize borrowing and total LUSD supply will grow which should make LUSD depreciate

-LUSD <$1: Incentivize repayment and total LUSD supply will decrease which should make LUSD appreciate

When the price of LUSD is below $1, arbitrageurs can exchange LUSD for ETH and sell the redeemed ETH.

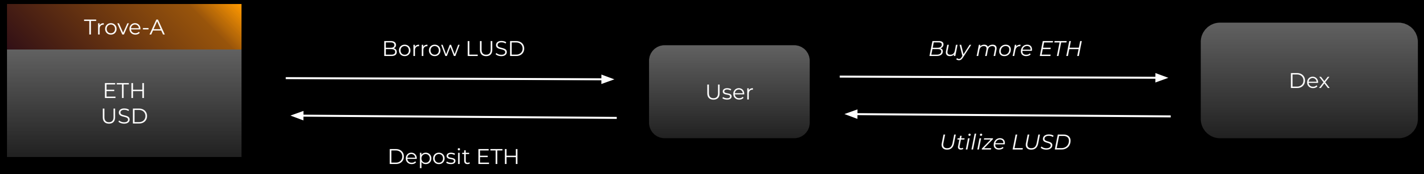
LUSD = $0.98 < $1

$$\text{Arbitrageurs} \xrightarrow{\text{Buy}} \text{LUSD \$0.98} \xrightarrow{\text{Redeemed}} \text{ETH}$$

Meaning that the arbitrageur received the equivalent of $1 in ETH for each LUSD, but they actually only paid $0.98

LUSD Use Case & Leverage

You can sell the borrowed LUSD on the market for ETH and use the latter to top up the collateral of your Trove. That allows you to draw and sell more LUSD, and by repeating the process you can reach the desired leverage ratio.



Maximum achievable leverage ratio is **11x**

03

Tokenomics

Tokenomics

LQTY is the secondary token issued by the Liquity protocol. It captures the fee revenue that is generated by the system and incentivizes early adopters and Frontend Operators.

LQTY

LQTY is not a governance, as there is no Liquity governance.

Max supply:	100M
Price	$0.98
Market Cap	$94.06M
24h Trading Volume	$16.2M
Circulating Supply	95.94M

Source: https://coinmarketcap.com/currencies/liquity/

LQTY is earned in three ways

Stability Provider: depositing LUSD into the Stability Pool

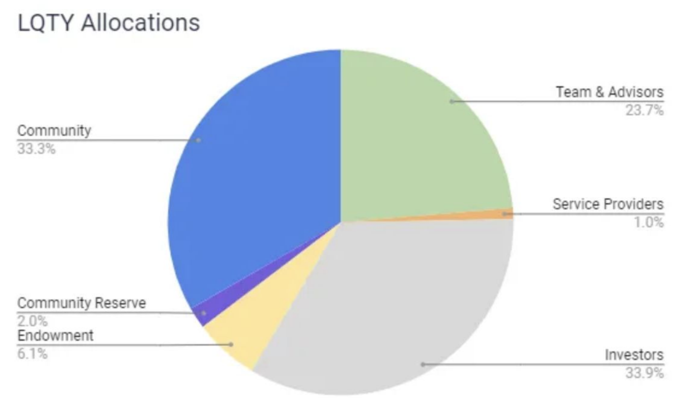
Frontend Provider: who facilitate those deposits

Providing liquidity to the LUSD:ETH Uniswap pool

LQTY Allocations

Allocation Detail

Max supply: 100,000,000

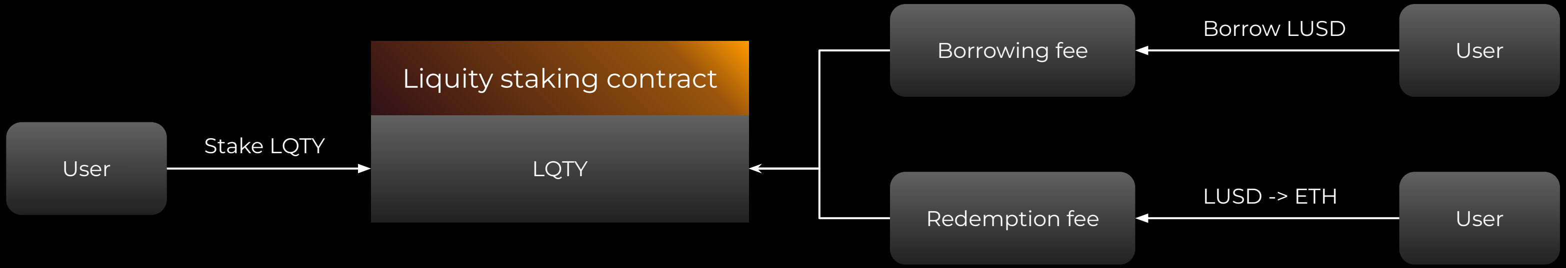


Liquity Community	35.3%	32,000,000 LQTY - Frontend operators and Stability Providers 1,333,333 LQTY - Uniswap LP (ended) 2,000,000 LQTY - Community Reserve
Team and Advisors	23.7%	23,664,633 LQTY have been allocated to current (and future) Liquity AG employees and advisors All LQTY in this category are under a 1-year lockup and are 1/4 vested after 1 year of engagement, then 1/36 every month after.
Investors	33.9%	33,902,679 LQTY - 1 year lockup
Liquity AG Endowment	6.1%	6,063,988 LQTY - 1 year lockup
Service Providers	1%	1,035,367 LQTY - 1 year lockup

LQTY Staking

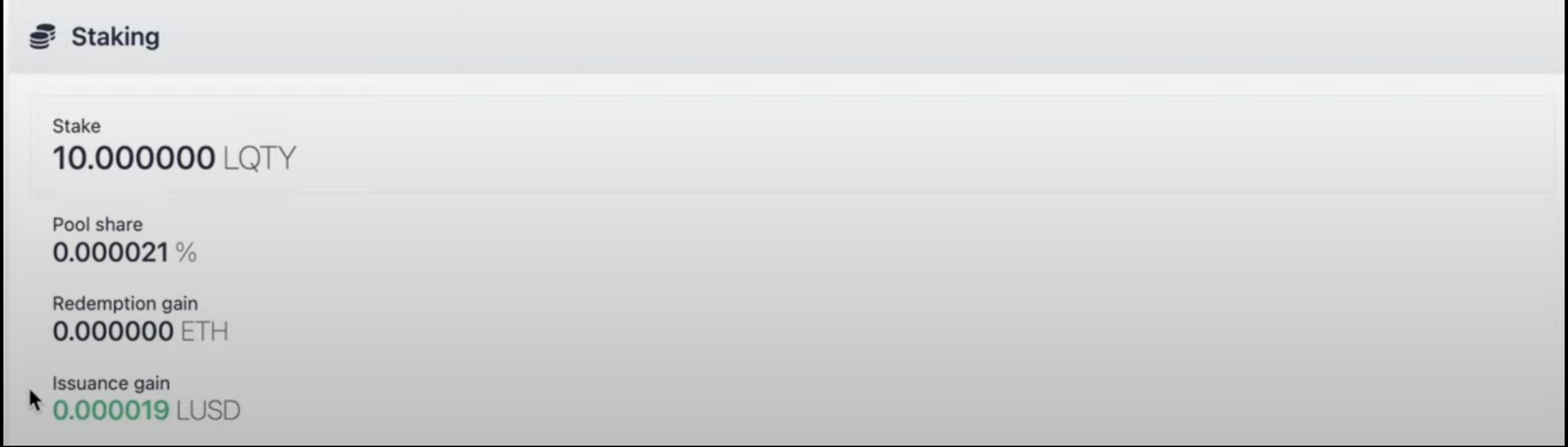
To start staking all you need to do is deposit your LQTY token to the Liquity staking contract. Once done you will start earning a pro rata share of the borrowing and redemption fees in LUSD and ETH.

What can I do with LQTY?
LQTY holders can stake their tokens to earn the fees generated by loan issuance and LUSD redemptions. Learn more about staking.



LQTY Staking Return

Your LQTY stake will earn a share of the fees equal to your share of the total LQTY staked, at the instant the fee occurred.



Staking

Stake
10.000000 LQTY

Pool share
0.000021 %

Redemption gain
0.000000 ETH

Issuance gain
0.000019 LUSD

LQTY & LUSD Listing

LQTY Listing

Total: 51 Exchange

Exchange	Pair
Uniswap	LQTY/WETH
Huobi Global	LQTY/USDT
Gemini	LQTY/USD
MEXC Global	LQTY/USDT
Coinbase Exchange	LQTY/USD

Source: https://www.coingecko.com/en/coins/liquity

LUSD Listing

Total: 56 Exchange

Exchange	Pair
Uniswap(v3)	LUSD/DAI
	LUSD/USDC
Uniswap(v2)	LUSDC/WETH
Gemini	LUSD/USD
Curve Finance	LUSD/DAI

Source: https://www.coingecko.com/en/coins/liquity-usd

Thank you