



DEPARTMENT OF ELECTRICAL, ELECTRONICS AND COMPUTER ENGINEERING
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Installation and User Instructions

ENERGI- Blockchain-Based Peer to Peer Energy Trading Platform

(Version 1.0)



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Contents

SOFTWARE INTRODUCTION.....	3
SYSTEM REQUIREMENTS	3
HARDWARE	3
SOFTWARE.....	3
SOFTWARE INSTALLATION PROCEDURE.....	4
SETTING UP OF ACCOUNTS	4
OBTAINING OF TEST TOKEN FOR ENERGY TRADING.....	9
PEER TO PEER ENERGY TRADING.....	12
USING THE PLATFORM AS A PROSUMER:	13
USING THE PLATFORM AS A CONSUMER:	18
TRANSACTION STRUCTURE DESCRIPTIONS.....	22

SOFTWARE INTRODUCTION

Energi is a proof of concept. It is a blockchain-based peer to peer energy trading platform which allows users to place and bid virtual energy. Non-Fungible Tokens (NFTs) where utilized to represent energy on the blockchain.

SYSTEM REQUIREMENTS

For a successful use of the platform, computers running this application must meet the following minimum requirements;

HARDWARE

Processor: Intel Celeron

Processor speed: 1.50GHz

Random access memory (RAM):2GB

Hard disk capacity: 250GB

Operating System: 64-bit Microsoft Windows 7

SOFTWARE

Web browser (Chrome or Opera)

Meta Mask (Chrome browser Extension)

Web links: <https://energi-tau.vercel.app/>

<https://faucet.polygon.technology/>

<https://Mumbai.polygonscan.com>

SOFTWARE INSTALLATION PROCEDURE

SETTING UP OF ACCOUNTS

- Download and install a web browser.
- Open a tab of the web browser and search for Metamask browser Extension.
- Click on “Add to Chrome” to install Metamask Extension as shown in Figure 1.

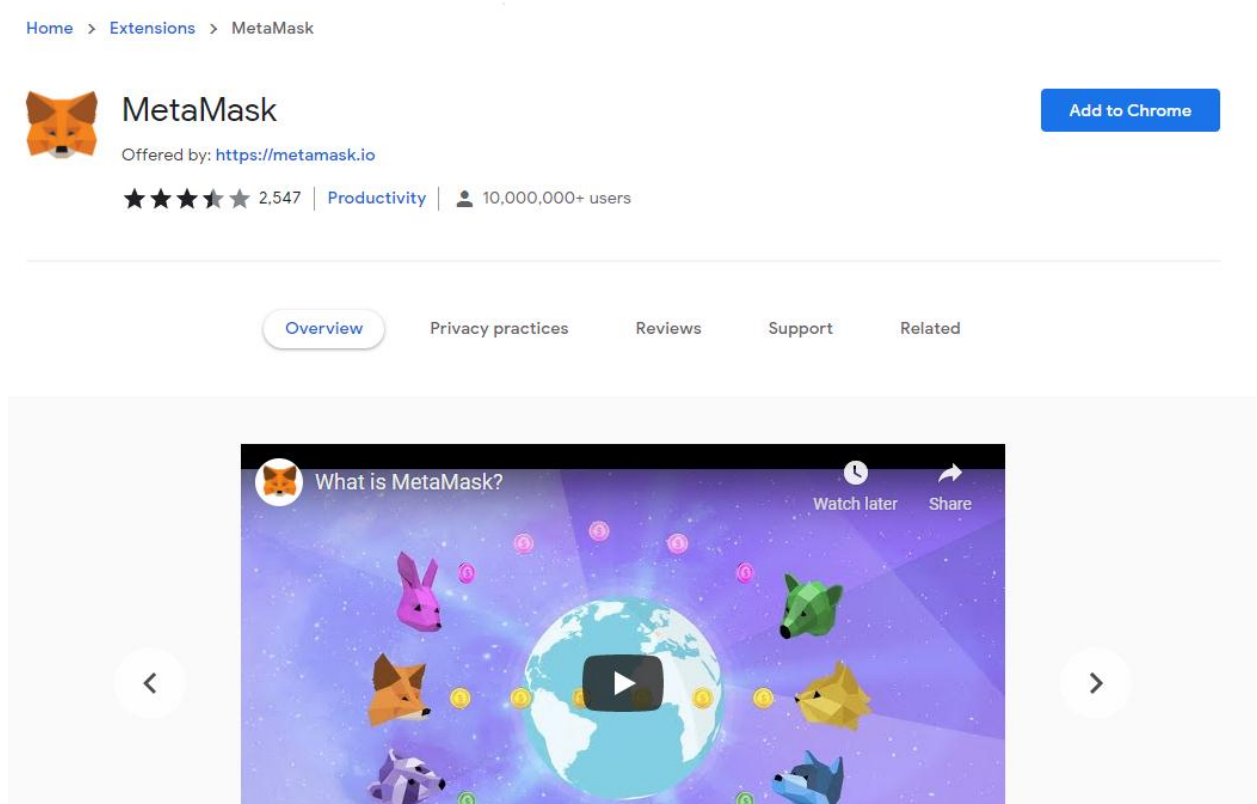


Figure 1: Metamask chrome browser extension

- Create a wallet using the Metamask by signing up. This generates an address (public key) used to interact with the platform. Some of the sign up stages are shown below.
- Click on get started as shown in Figure 2.



Welcome to MetaMask

Connecting you to Ethereum and the Decentralized Web.

We're happy to see you.

Get Started

Figure 2: Metamask welcome page

- Next click on “create a wallet” as shown in Figure 3.



New to MetaMask?



No, I already have a Secret Recovery Phrase

Import your existing wallet using a Secret Recovery Phrase

Import wallet



Yes, let's get set up!

This will create a new wallet and Secret Recovery Phrase

Create a Wallet

Figure 3: Metamask create wallet page

- Choose a password as shown in Figure 4.

Create Password

New password (8 characters min)

Confirm password



I have read and agree to the [Terms of Use](#)

Create

Figure 4: Metamask password page

- A secret recovery phrase is finally used to set up the account as shown in Figure 5.

Secret Recovery Phrase

Your Secret Recovery Phrase makes it easy to back up and restore your account.

WARNING: Never disclose your Secret Recovery Phrase. Anyone with this phrase can take your Ether forever.

wide chest step hurt dish engage
never harbor primary wealth ask
theme

[Remind me later](#)

Next

Figure 5: Metamask phrase recovery page

- After setting up the Metamask account, the account network will be on Ethereum Mainnet by default as shown in Figure 6.

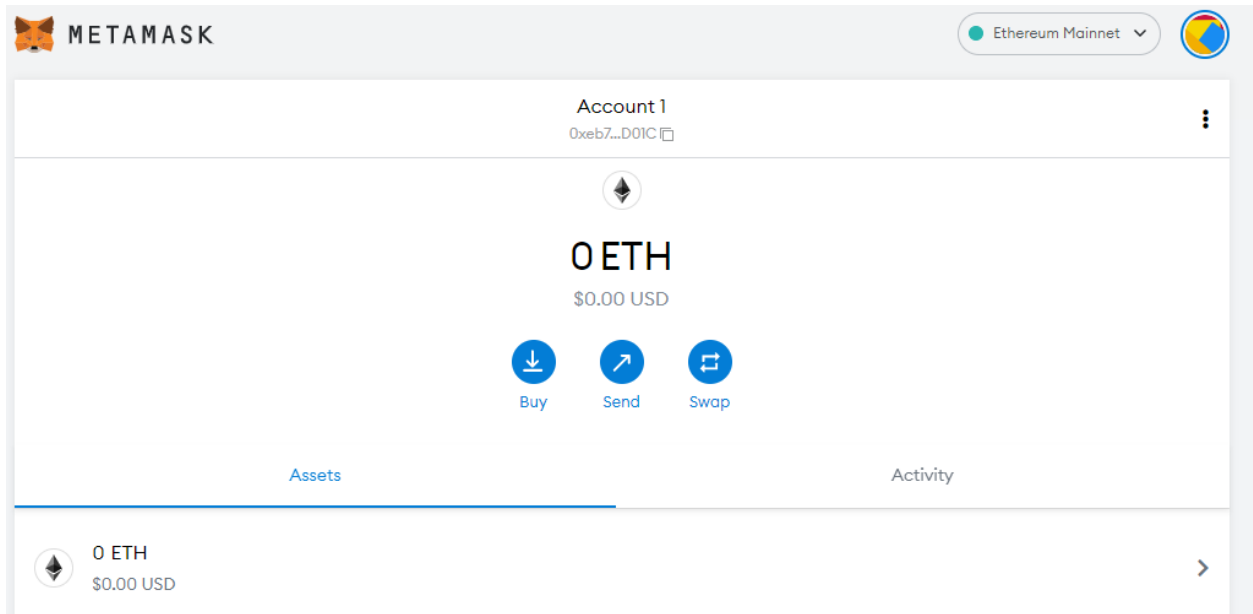


Figure 6: Metamask account

- Since the project is being implemented on a blockchain test network i.e. Polygon Mumbai Testnet, as shown in Figure 7, another network will be added by clicking on the Ethereum Mainnet tab and selecting “Add Network”. Configure the Metamask account network by setting up the Network name: Mumbai Testnet, New RPC URL: <https://rpcmumbai.maticvigil.com/> , Chain ID: 80001, Currency Symbol: MATIC and Block Explorer URL: <https://mumbai.polygonscan.com/>

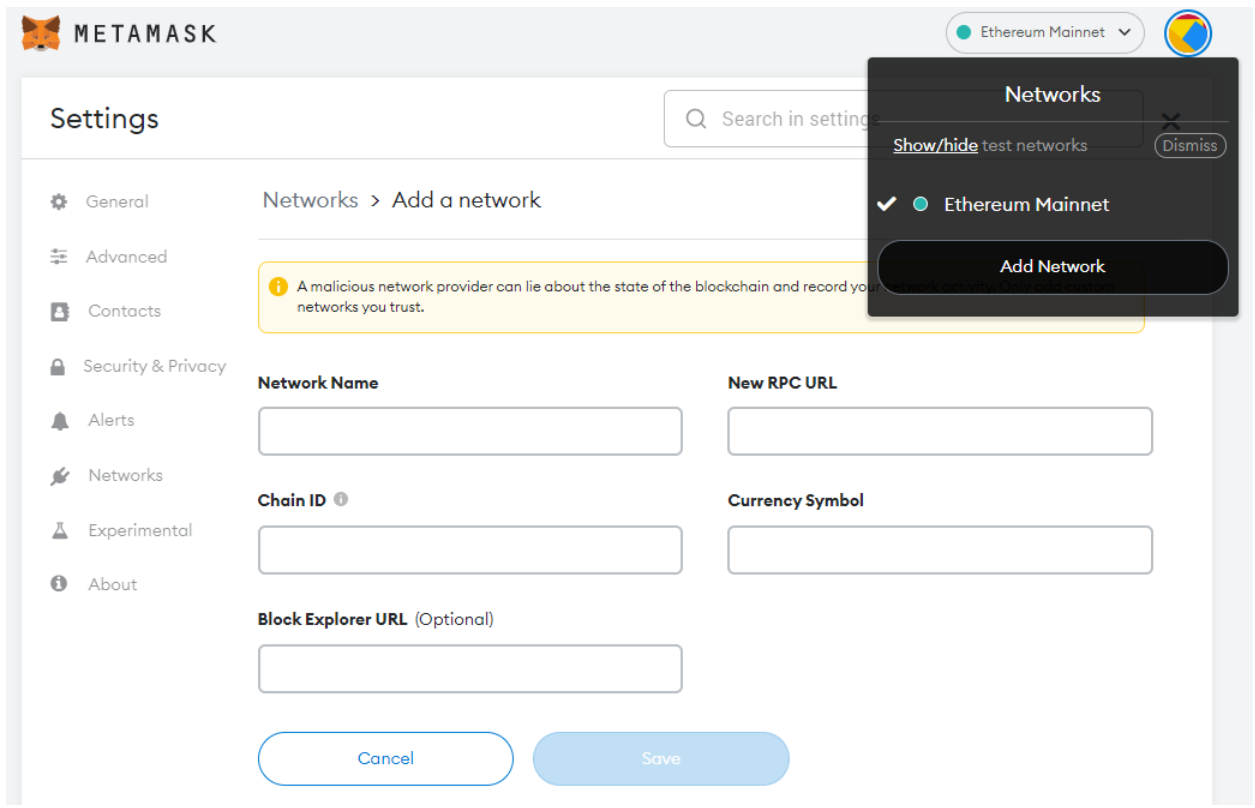


Figure 7: Metamask add network page

- Set up the account as prosumer 1 and consumer 1 as shown in Figure 8 and 9 respectively. (N/B: the public key of Prosumer 1 is 0xeb7763b8700c0c5dfeac2bbb3fba06518e0d01c and Consumer 1 is 0x333121258fd820bf9c1d7263dd339c49930e176 and they both have 0 MATIC).

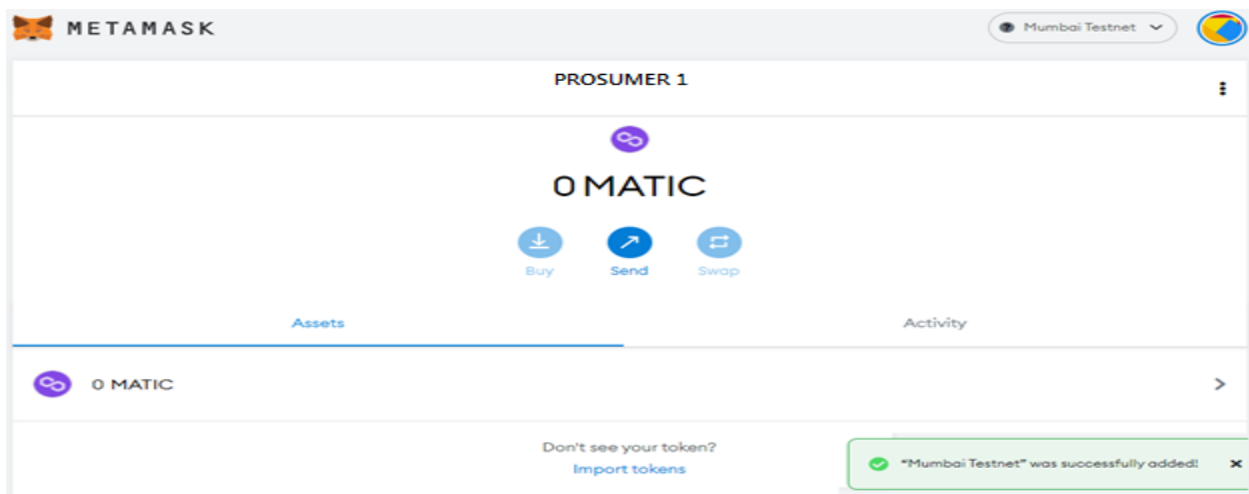


Figure 8: Metamask Prosumer 1

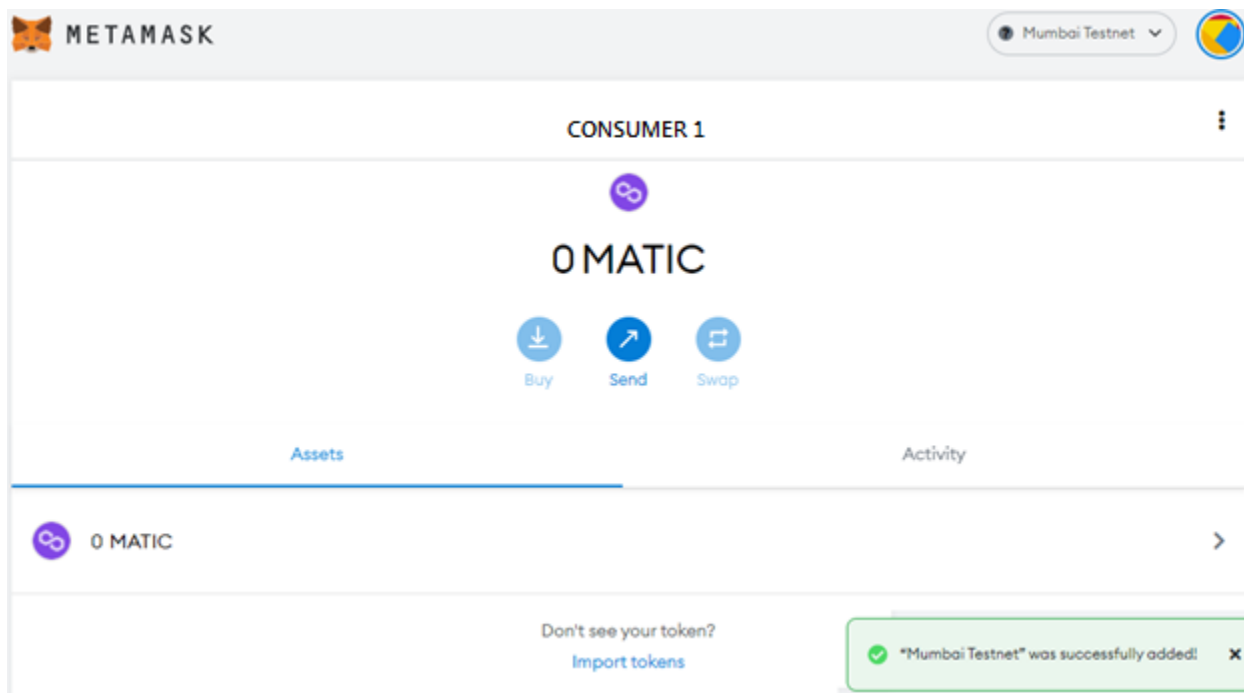


Figure 9: Metamask Consumer 1

OBTAINING OF TEST TOKEN FOR ENERGY TRADING

- Copy either the public key address of the prosumer 1 or consumer 1.
- Visit <https://faucet.polygon.technology/> on a web browser as shown in Figure 10.

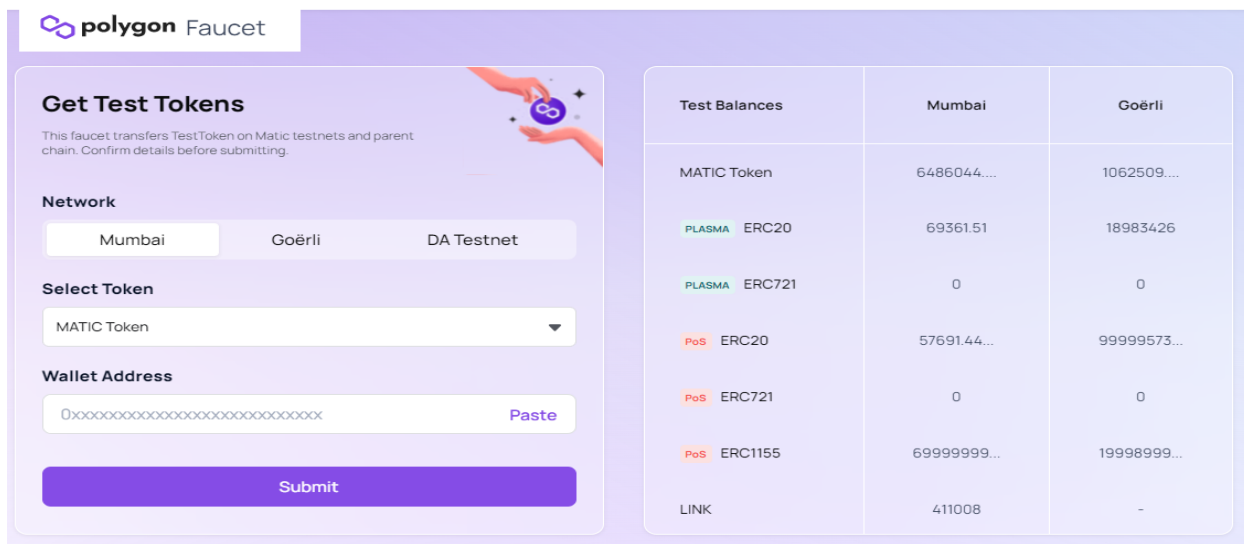


Figure 10: Polygon Faucet home page

- Paste the address on “Wallet Address”
- Ensure that the “Network” is on Mumbai, and “Select Token” is MATIC Token
- Click on the submit button and Confirm the pop up which comes up as shown in Figure 11.

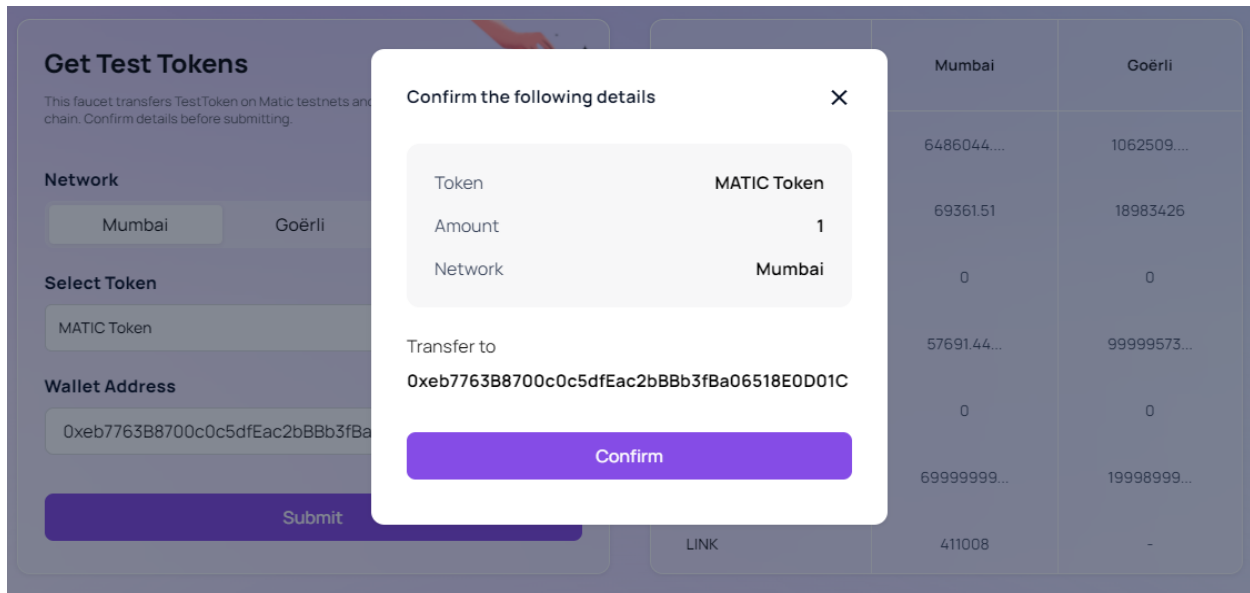


Figure 11: Polygon Faucet confirmation page

- Usually, a MATIC token of 0.5 is credited to the user (prosumer’s or consumer’s address) on every confirmation and this can be done multiple times to get 0.5 MATIC on each confirmation as shown in Figure 12 and 13.

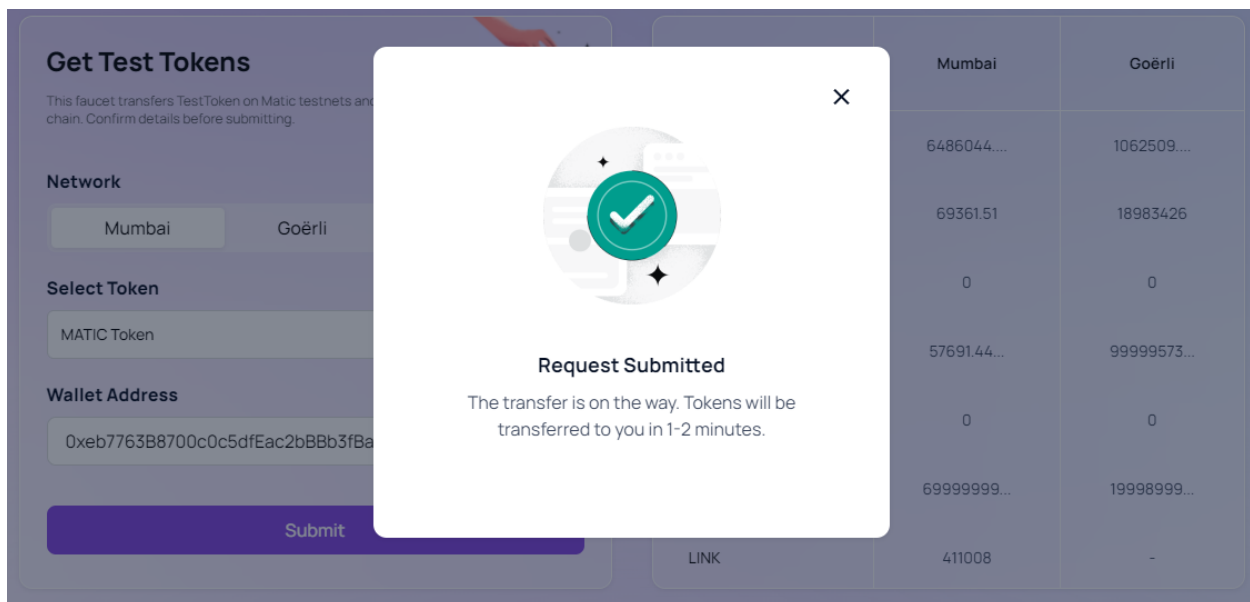


Figure 12: Polygon Faucet request submission page

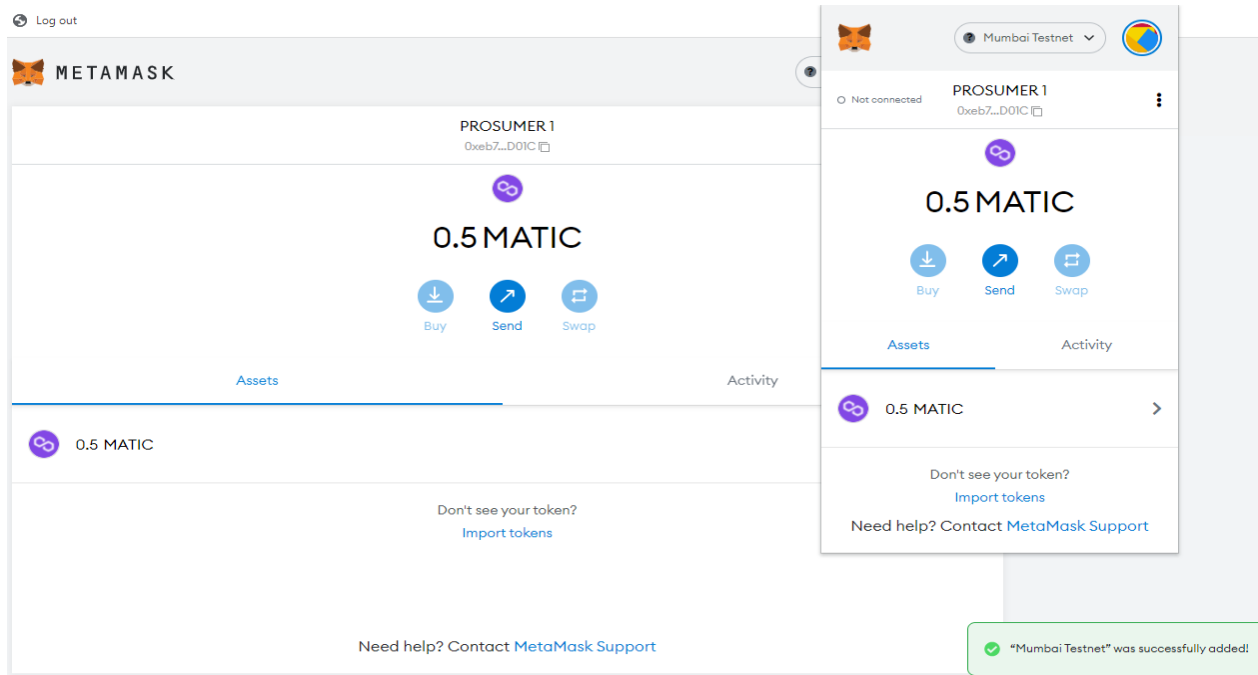


Figure 13: Prosumer's Metamask token credited page

- Visit <https://Mumbai.polygonscan.com> on a web browser, paste the address of the prosumer or consumer to view further information on transactions and internal transactions associated with the account as shown in Figure 14.

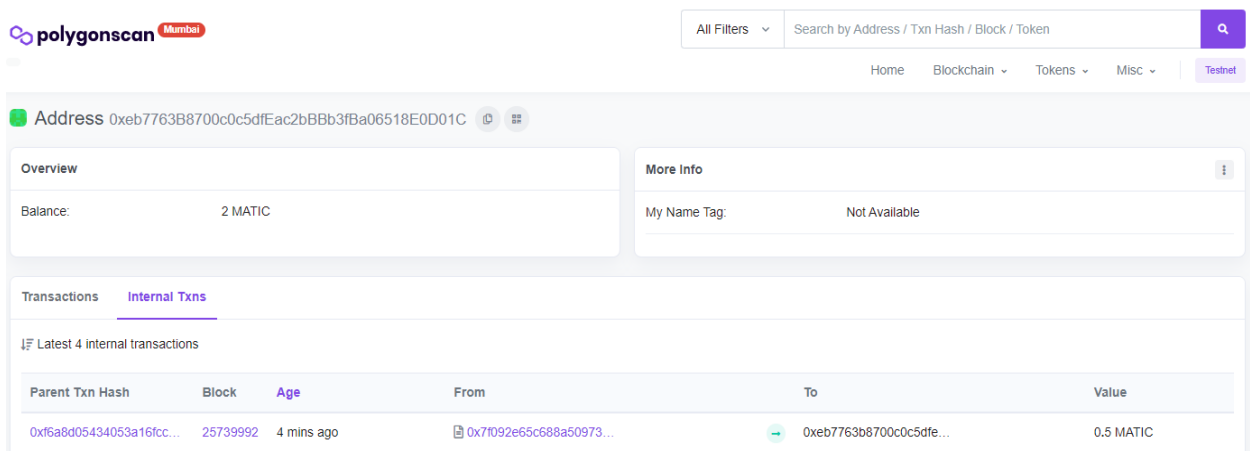


Figure 14: Polygonscan account detail page

PEER TO PEER ENERGY TRADING

An example of an energy trade between prosumer 1 who has 2.4478 MATIC in his account and a consumer 1 who has 1.9995 MATIC is illustrated in Figure 15 and 16 respectively.

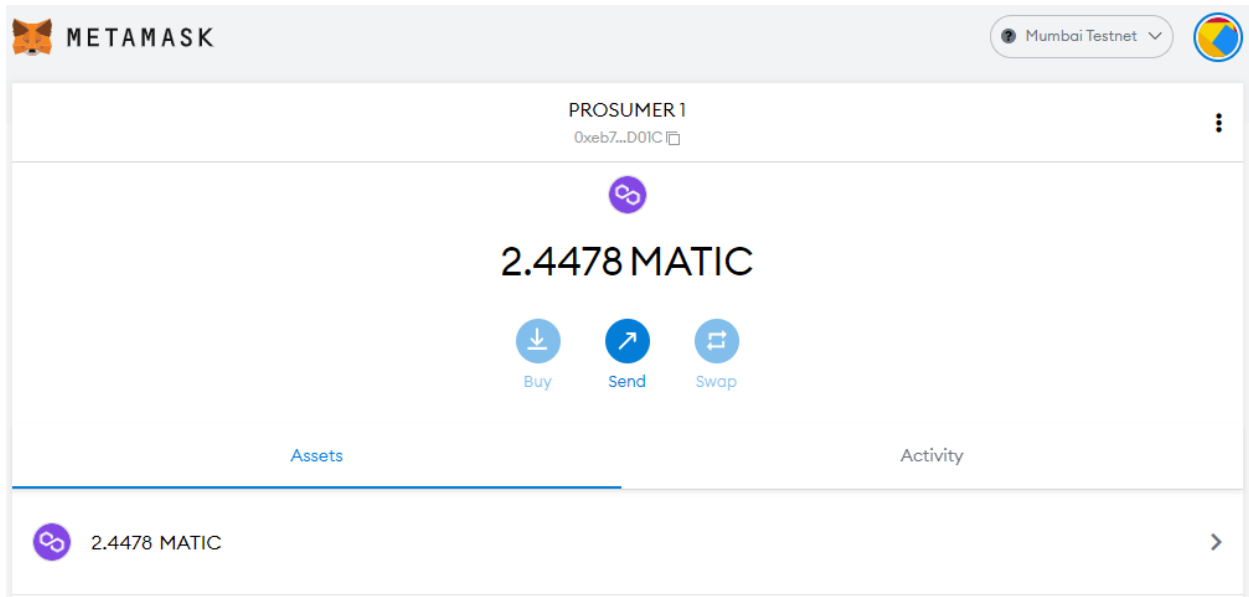


Figure 15: Metamask account balance page for prosumer 1

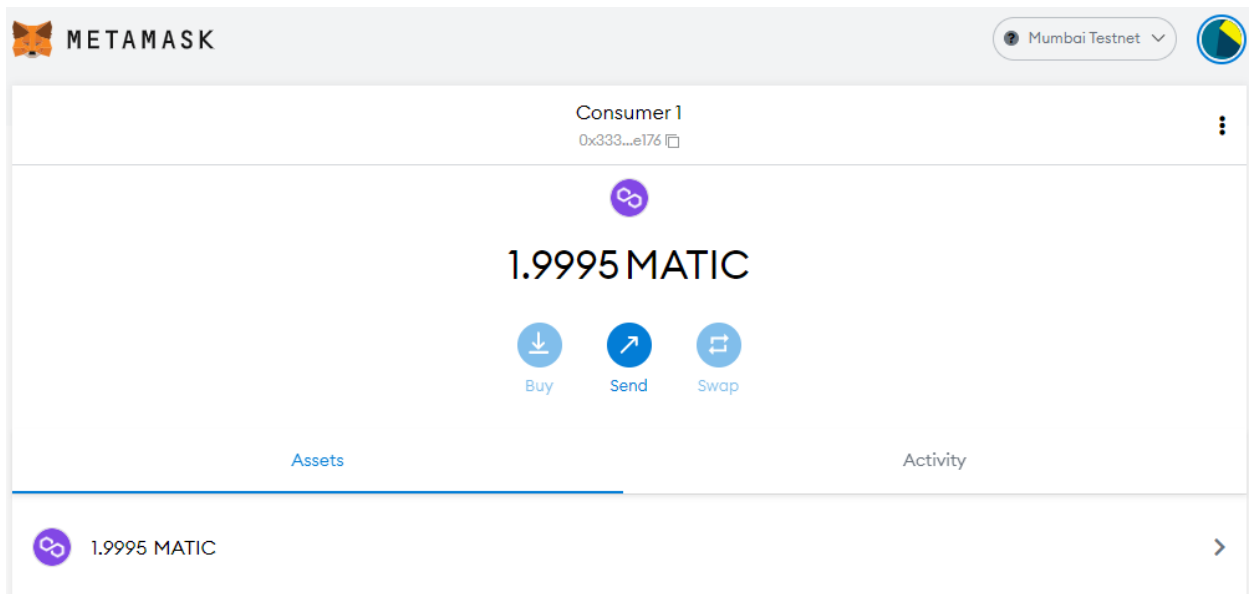


Figure 16: Metamask account balance page for consumer 1

USING THE PLATFORM AS A PROSUMER:

- Visit <https://energi-tau.vercel.app/> on a web browser as shown in Figure 17.

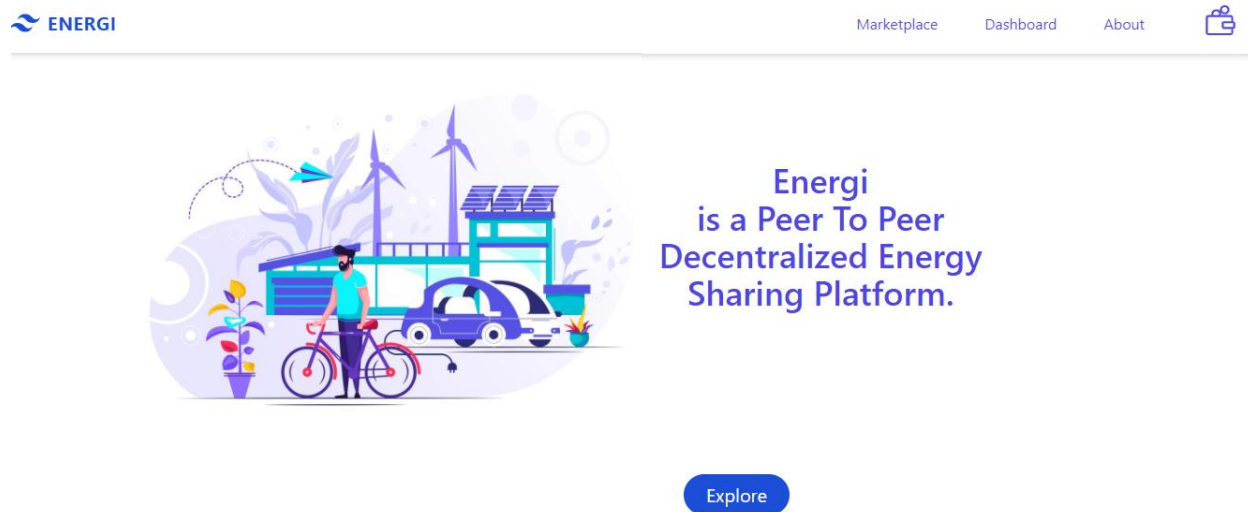


Figure 17: Energi home page

- Click on “marketplace”, this takes the prosumer to the “marketplace” page where the user can create her new energy for auctioning as shown in Figure 18.

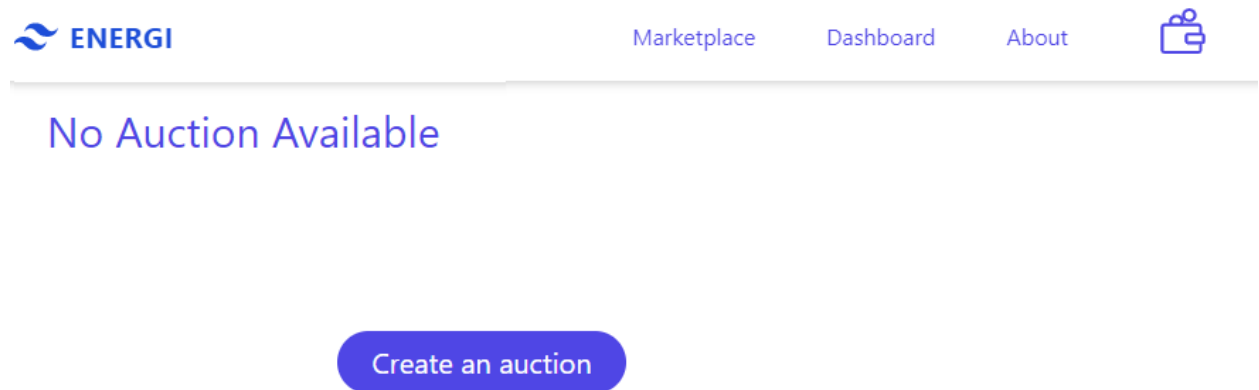


Figure 18: Energi market place page

- As a prosumer, click on “create an auction”, which provides a form to retrieve metadata of the auction. In this case, the Auction name: Edmund energy, Amount (Kwh): 0.6 and Price (MATIC): 1.0 (N/B: Ensure that the Metamask account is on Prosumer 1)



Auction Name	Edmund energy
Amount (KWh)	0.6
Price(MATIC)	1.0
Auction Energy	

Figure 19: Energi create auction page

- After filling the form, click on “Auction Energy” (this creates an NFT token called “energi” representing the Energy to be auctioned). As shown in Figure 20, a first pop up notification automatically comes up to prompt the prosumer to confirm or reject authorizing the “**creation of Token**”. The prosumer is required to pay a gas fee in MATIC determined by the blockchain network (in this case 0.00041543 MATIC).

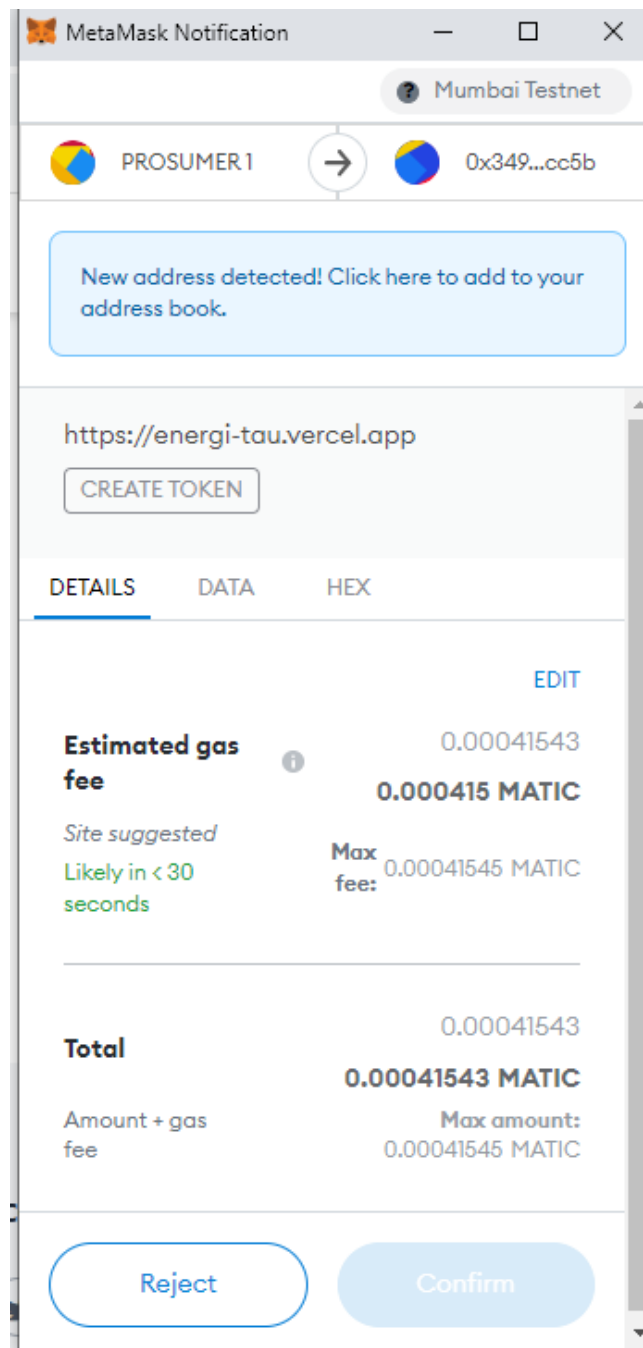


Figure 20: Metamask first pop up notification page

- After clicking on “Confirm”, a second pop up notification comes up to put the created token on sale in the market place (**Create market item**) as shown in Figure 21.

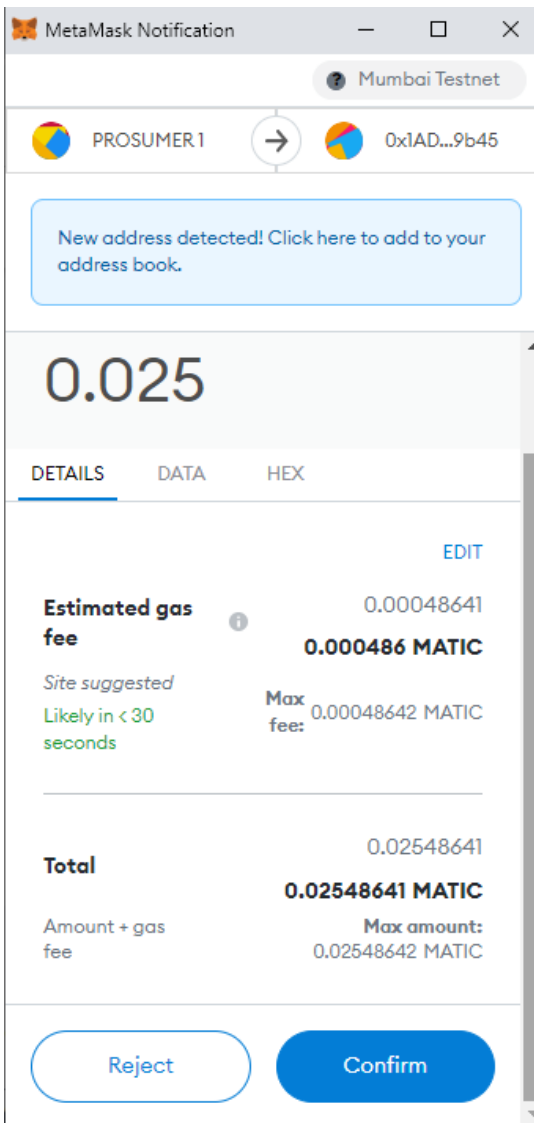


Figure 21: Metamask second pop up notification page

- As shown in Figure 22, a gas fee of approx. 0.025 MATIC is deducted from the prosumer's Metamask wallet and sent to a Contract wallet (The contract wallet is where the token are kept before they are released to the consumer). Details of the token creation and create market item can be verified in the polygonscan by visiting <https://Mumbai.polygonscan.com> on a web browser, pasting the address of the prosumer.

Transaction Details	
Overview	Logs (5)
[This is a Polygon PoS Testnet transaction only]	
Transaction Hash:	0x5ab2bd1a7c98635147122294520f24469ed528f15a0b9bd6ee07e26169dc421d
Status:	Success
Block:	25755985 168 Block Confirmations
Timestamp:	14 mins ago (Apr-01-2022 01:23:02 PM +UTC)
From:	0xeb7763b8700c0c5dfeac2bbbb3fba06518e0d01c
Interacted With (To):	Contract 0x1ad34cbf4ad8626b85ba070bd6ace5a0ce8b9b45
Tokens Transferred:	From 0xeb7763b8700c0c5dfeac2bbbb3fba06518e0d01c To 0x1ad34cbf4ad8626b85ba070bd6ace5a0ce8b9b45 For ERC-721 TokenID [6] Energi (ENG)
Value:	0.025 MATIC (\$0.00)
Transaction Fee:	0.000463378653006048 MATIC (\$0.00)
Txn Type:	2 (EIP-1559)
Click to see More	

Figure 22: Metamask first pop up notification page

- After the steps above, visit <https://energi-tau.vercel.app/> to see the created Edmund energy ready for auction as shown in Figure 23.

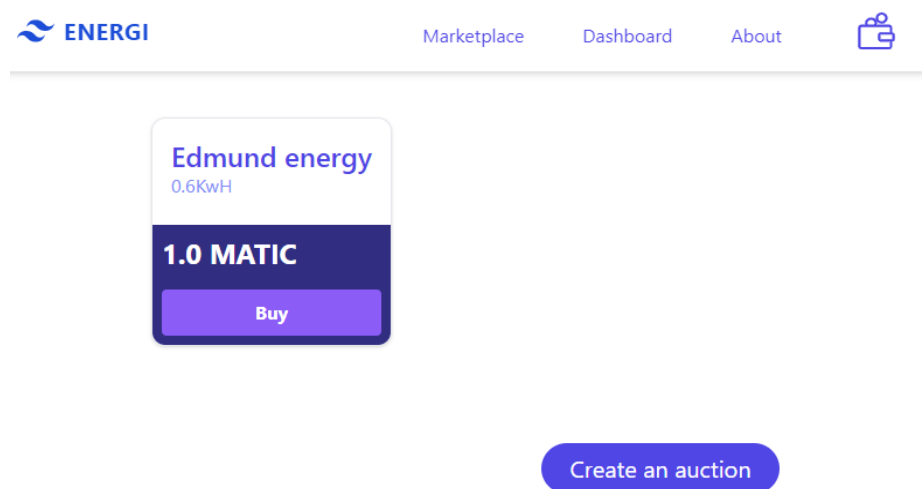


Figure 23: Energy ready for auction

USING THE PLATFORM AS A CONSUMER:

(N/B: Go to metamask and change to Consumer 1 as shown in Figure 24.)

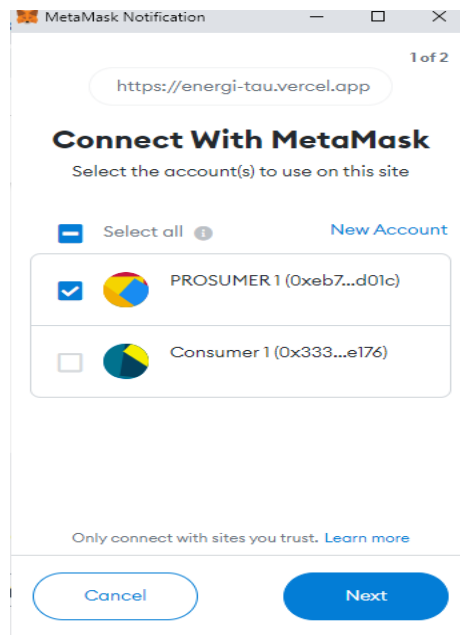


Figure 24: Metamask wallet page

- To buy energy, visit <https://energi-tau.vercel.app/> on a web browser and the available energy is displayed in Figure 25.

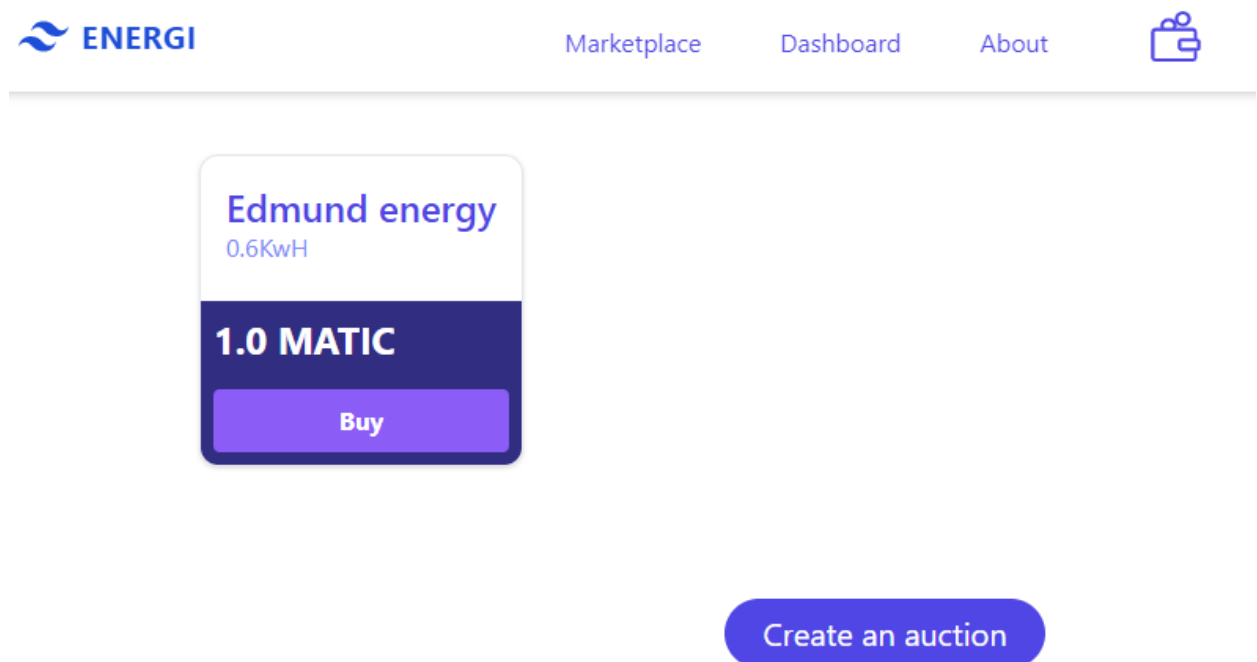


Figure 25: Available energy for auction

- Click on “Buy” on the available energy, a pop up notification come up and prompts the consumer to confirm or reject and also indicates the gas fee that will be charged for the purchase of energy token as shown in Figure 26.

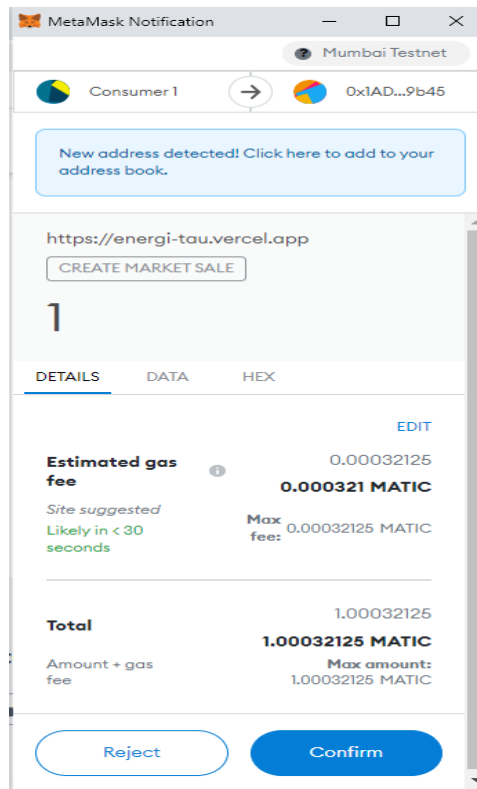


Figure 26: Metamask pop up notification page

- On clicking the “confirm” button, the 1 MATIC plus the gas fee of 0.000321 MATIC will be deducted from the consumer 1 Metamask account i.e. from the contract account to the prosumer’s metamask wallet. The transaction details is shown in Figure 27.

Transaction Details	
Overview	Internal Txns Logs (6)
[This is a Polygon PoS Testnet transaction only]	
⑦ Transaction Hash:	0xcc05c1e3b9e62a12c3ca533cf8c1d628639f4f0daf6c21a28680d267f1fd47f7
⑦ Status:	Success
⑦ Block:	25756052 78 Block Confirmations
⑦ Timestamp:	⌚ 6 mins ago (Apr-01-2022 01:28:38 PM +UTC)
⑦ From:	0x333121258fd820bfb9c1d7263dd339c49930e176
⑦ Interacted With (To):	Contract 0x1ad34cbf4ad8626b85ba070bd6ace5a0ce8b9b45 <ul style="list-style-type: none"> ↳ TRANSFER 1 MATIC From 0x1ad34cbf4ad8626b85ba070b... To → 0xeb7763b8700c0c5dfeac2bbb... ↳ TRANSFER 0.025 MATIC From 0x1ad34cbf4ad8626b85ba070b... To → 0x1c25f9bbada9d47b93064ee2...
⑦ Tokens Transferred:	▶ From 0x1ad34cbf4ad86... To 0x333121258fd82... For ERC-721 TokenID [6] Energi (ENG)
⑦ Value:	1 MATIC (\$0.00)
⑦ Transaction Fee:	0.000309521436146935 MATIC (\$0.00)
⑦ Txn Type:	2 (EIP-1559)

Figure 27: polygonscan Transaction detail page

- The new token balance in the prosumer's and consumer's Metamask wallet is shown Figure 28 and 29 respectively.

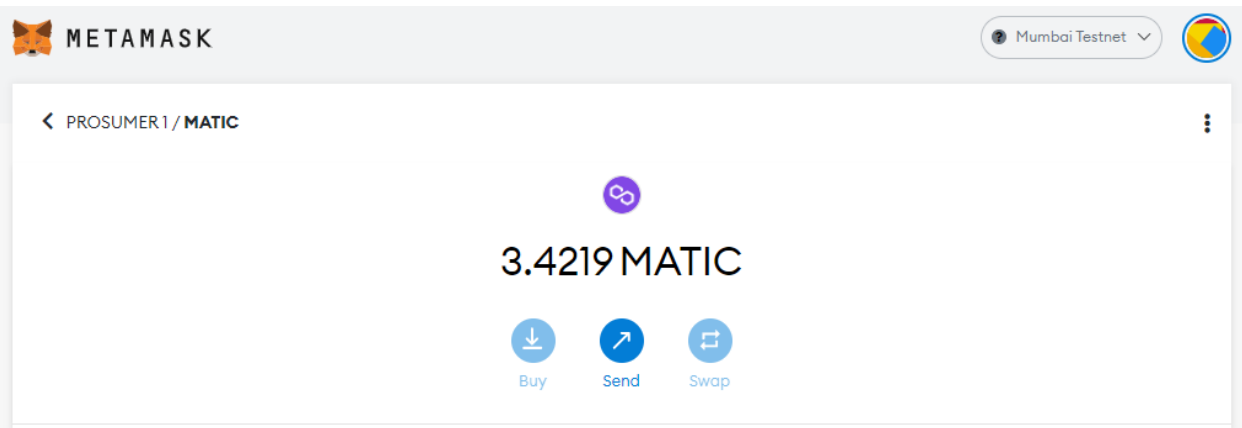


Figure 28: Prosumer's Metamask wallet balance

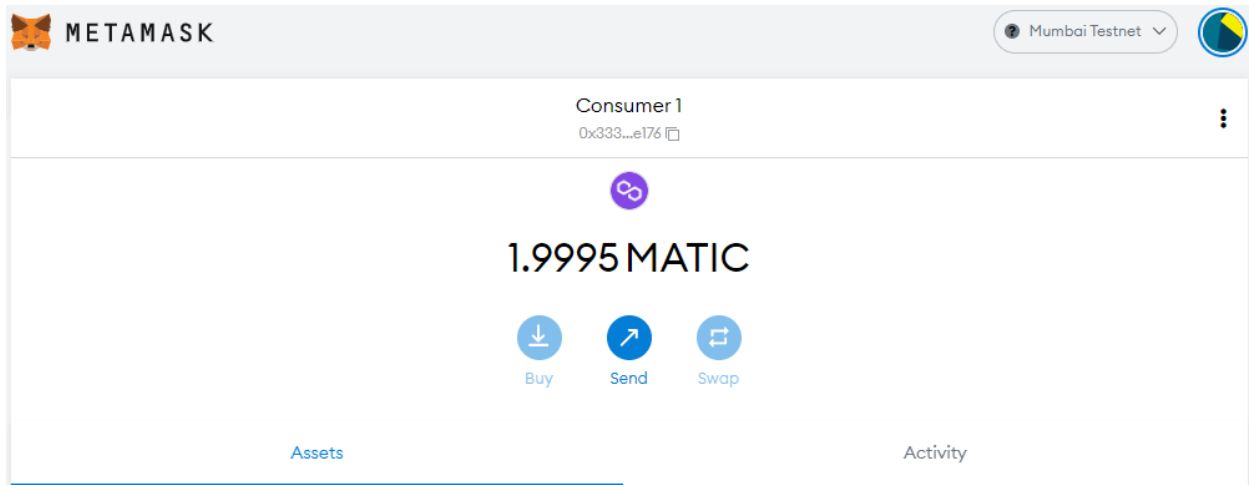


Figure 29: Consumer's Metamask wallet balance

- At the Dashboard of the energi's home page is the items created and items sold as shown in Figure 30.



Figure 30: Energi Dashboard

TRANSACTION STRUCTURE DESCRIPTIONS

Transaction Details	
Overview	Internal Txns Logs (6)
[This is a Polygon PoS Testnet transaction only]	
Transaction Hash:	0xcc05c1e3b9e62a12c3ca533cf8c1d628639f4f0daf6c21a28680d267f1fd47f7
Status:	Success
Block:	25756052 78 Block Confirmations
Timestamp:	6 mins ago (Apr-01-2022 01:28:38 PM +UTC)
From:	0x333121258fd820bfb9c1d7263dd339c49930e176
Interacted With (To):	<p>Contract 0x1ad34cbf4ad8626b85ba070bd6ace5a0ce8b9b45 </p> <ul style="list-style-type: none"> TRANSFER 1 MATIC From 0x1ad34cbf4ad8626b85ba070b... To → 0xeb7763b8700c0c5dfeac2bbb... TRANSFER 0.025 MATIC From 0x1ad34cbf4ad8626b85ba070b... To → 0x1c25f9bbada9d47b93064ee2...
Tokens Transferred:	From 0x1ad34cbf4ad86... To 0x333121258fd82... For ERC-721 TokenID [6] Energi (ENG)
Value:	1 MATIC (\$0.00)
Transaction Fee:	0.000309521436146935 MATIC (\$0.00)
Txn Type:	2 (EIP-1559)

TRANSACTION HASH: a unique string of characters that is given to every transaction that is verified and added to the blockchain.

STATUS: the status of each transaction either success or failed.

BLOCK: data structures within the blockchain database, where transaction data in a cryptocurrency blockchain are permanently recorded.

TIMESTAMP: exact moment in which the block has been validated by the blockchain network.

FROM: the address of the Prosumer.

INTERACTED WITH (TO): address of the Consumer and the contract account.

TOKENS TRANSFERRED: indicates the accounts the token was transferred to.

VALUE: amount of MATIC sent.

TRANSACTION FEE: amount charged by the network validators

TRANSACTION TYPE: Ethereum Improvement Proposal (EIP) 1559, which aims to change the way transaction fees, or “gas fees,” are estimated. Currently, users must bid for how much they're willing to pay to have their ether transaction picked up by a miner, which can be extremely costly.