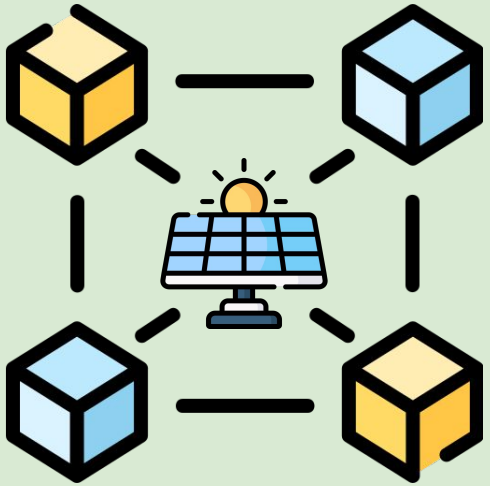
Energy Heaven

By EnergyBoyzs

The future of renewable energy consumption in web 3.0

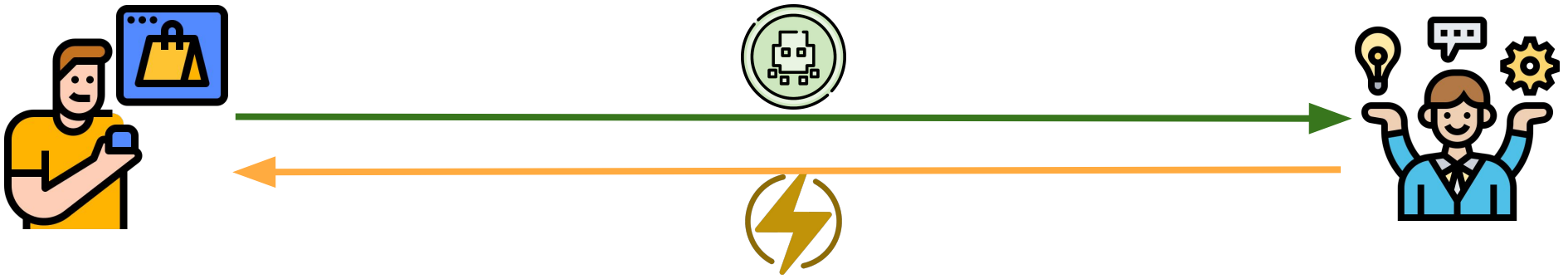


Francesco Marcuccio
Simone Andriani

Our Team: EnergyBoyzs

- Roles and responsibilities
  - Simone Andriani: Token engineering, Solidity development, HTML front-end.
  - Francesco Marcuccio: Architectural design, Solidity development, Javascript development.

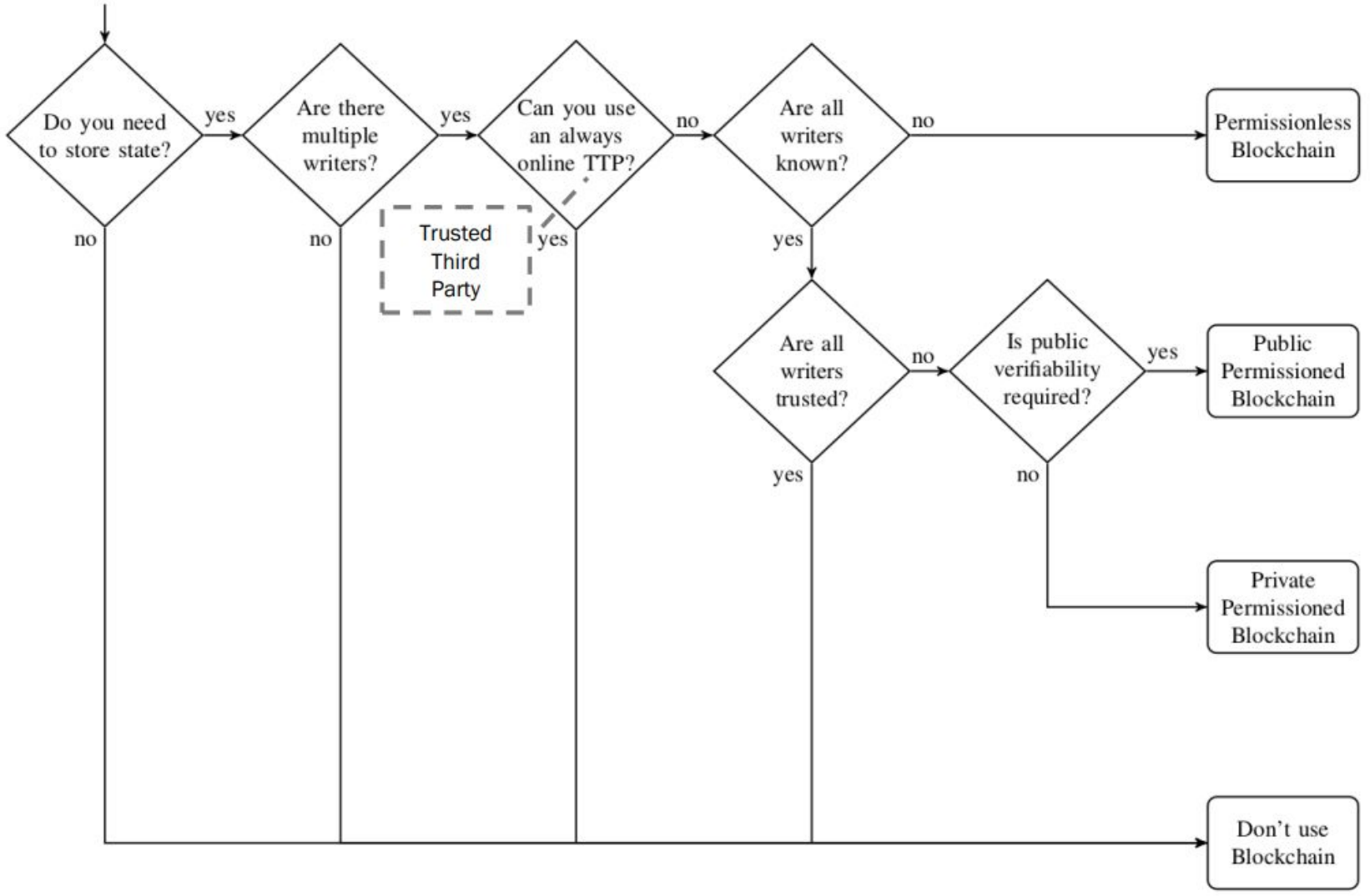
The idea



- Energy Heaven (Blockchain for Decentralized Renewable Management) project aims to build a **blockchain-based technology platform** for renewable energy deployment and **energy exchange management**.

- The goal is to enable the exchange of energy between consumers and producers so that a smart community can develop.

Why do we need a blockchain?
What kind of blockchain do we need? (Wüst & Gervais)



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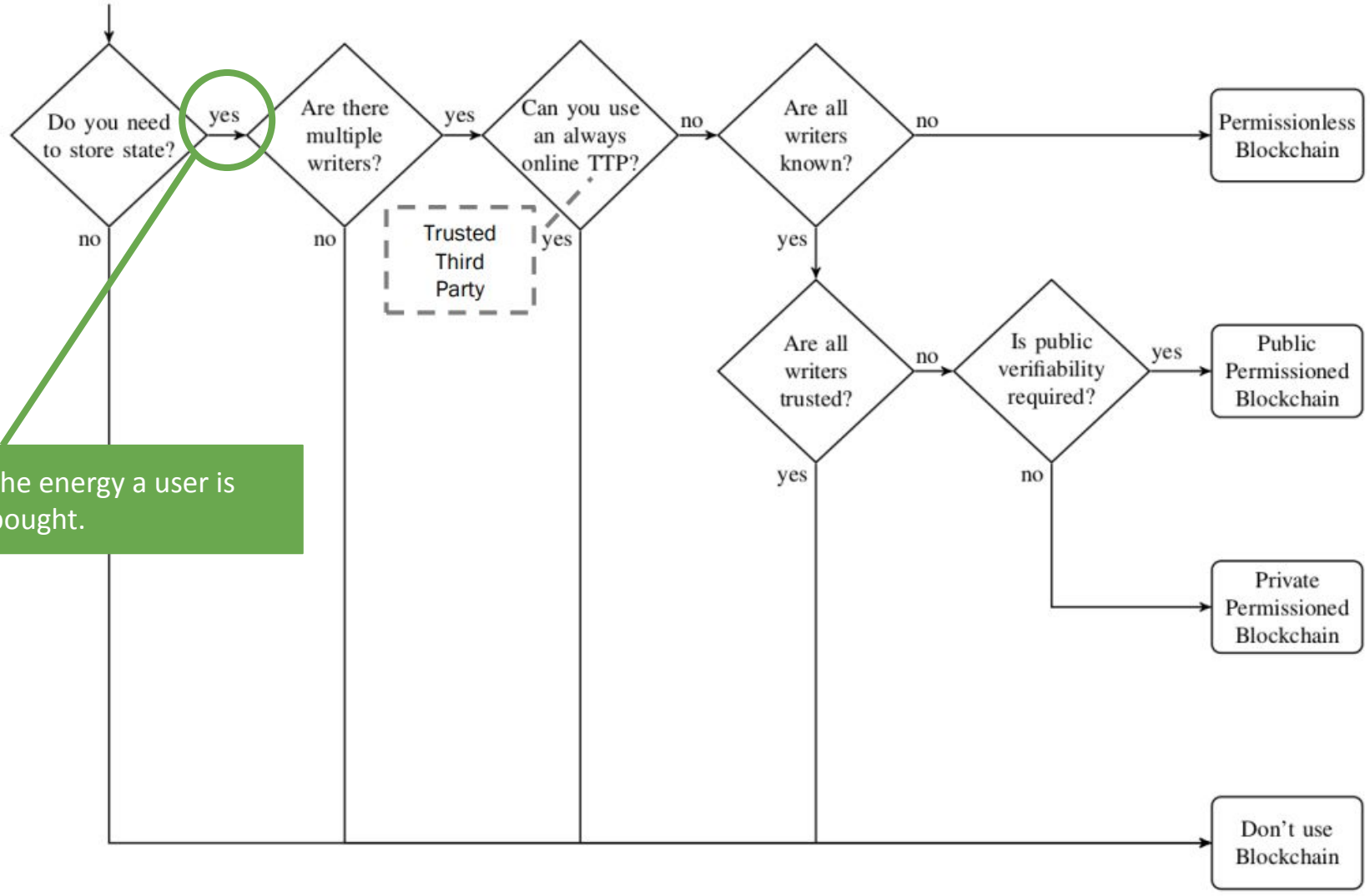

Yes, we have to store the energy a user is selling and when it is bought.

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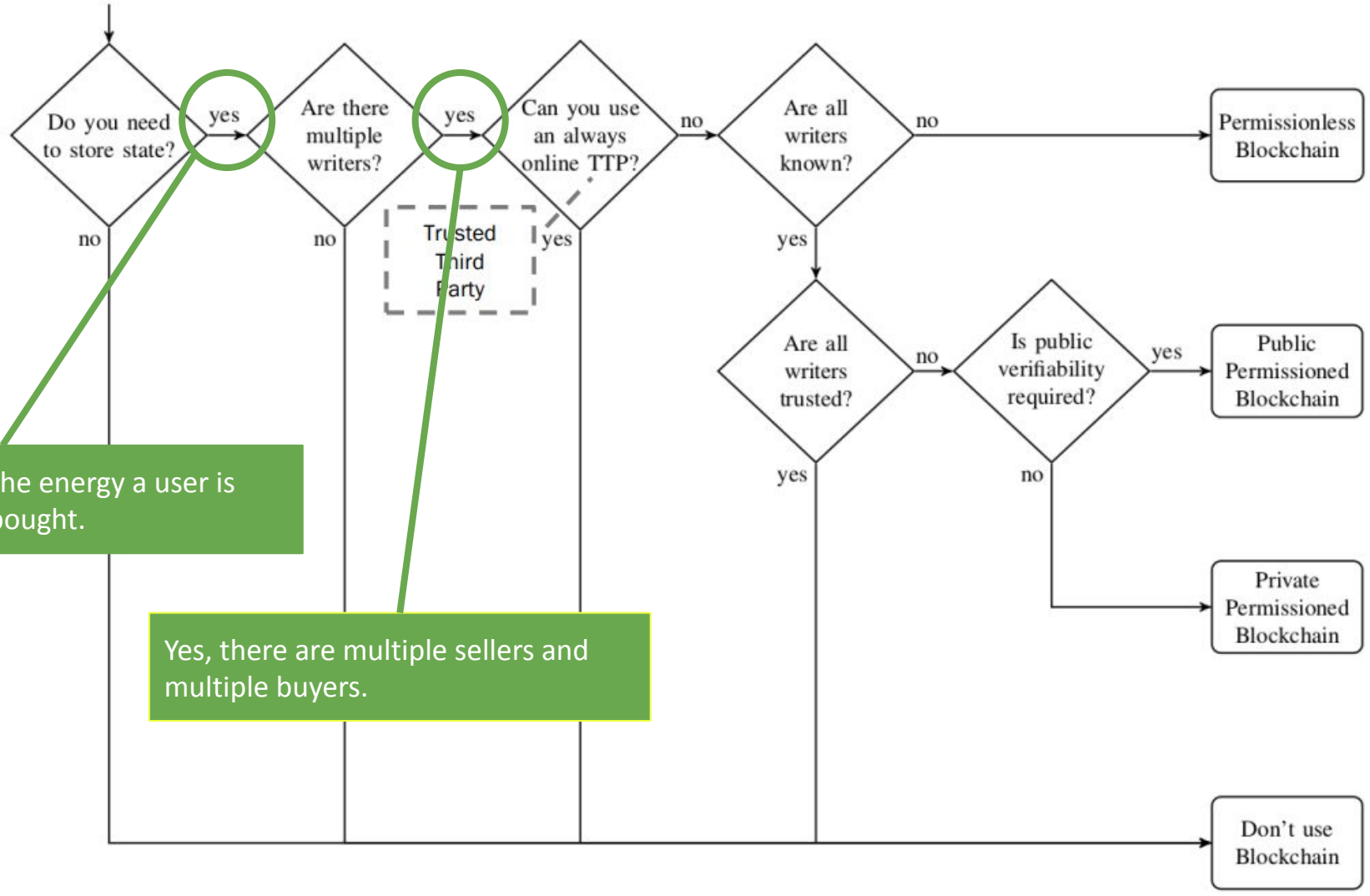

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Yes, there are multiple sellers and multiple buyers.

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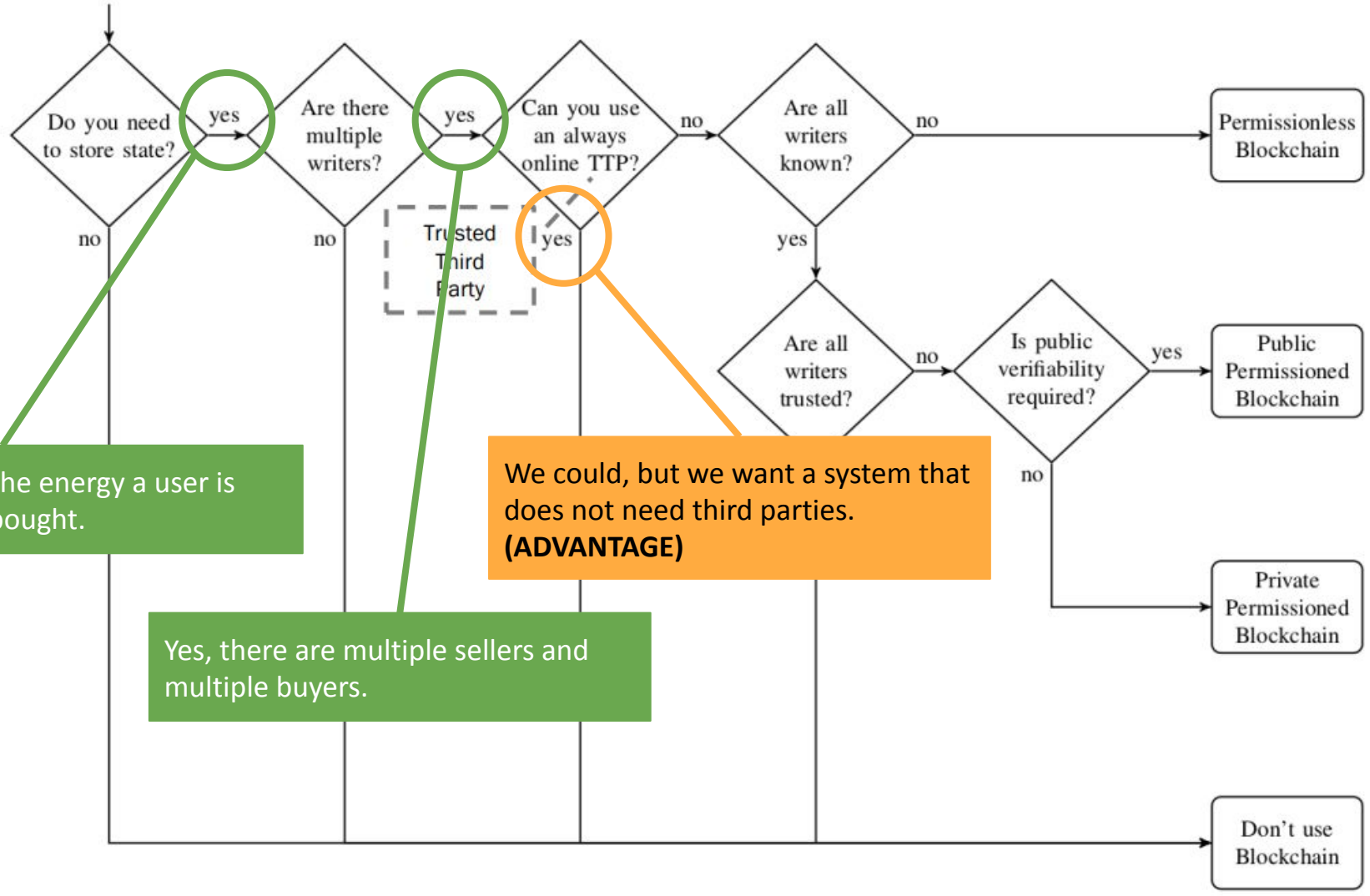

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We could, but we want a system that does not need third parties. **(ADVANTAGE)**

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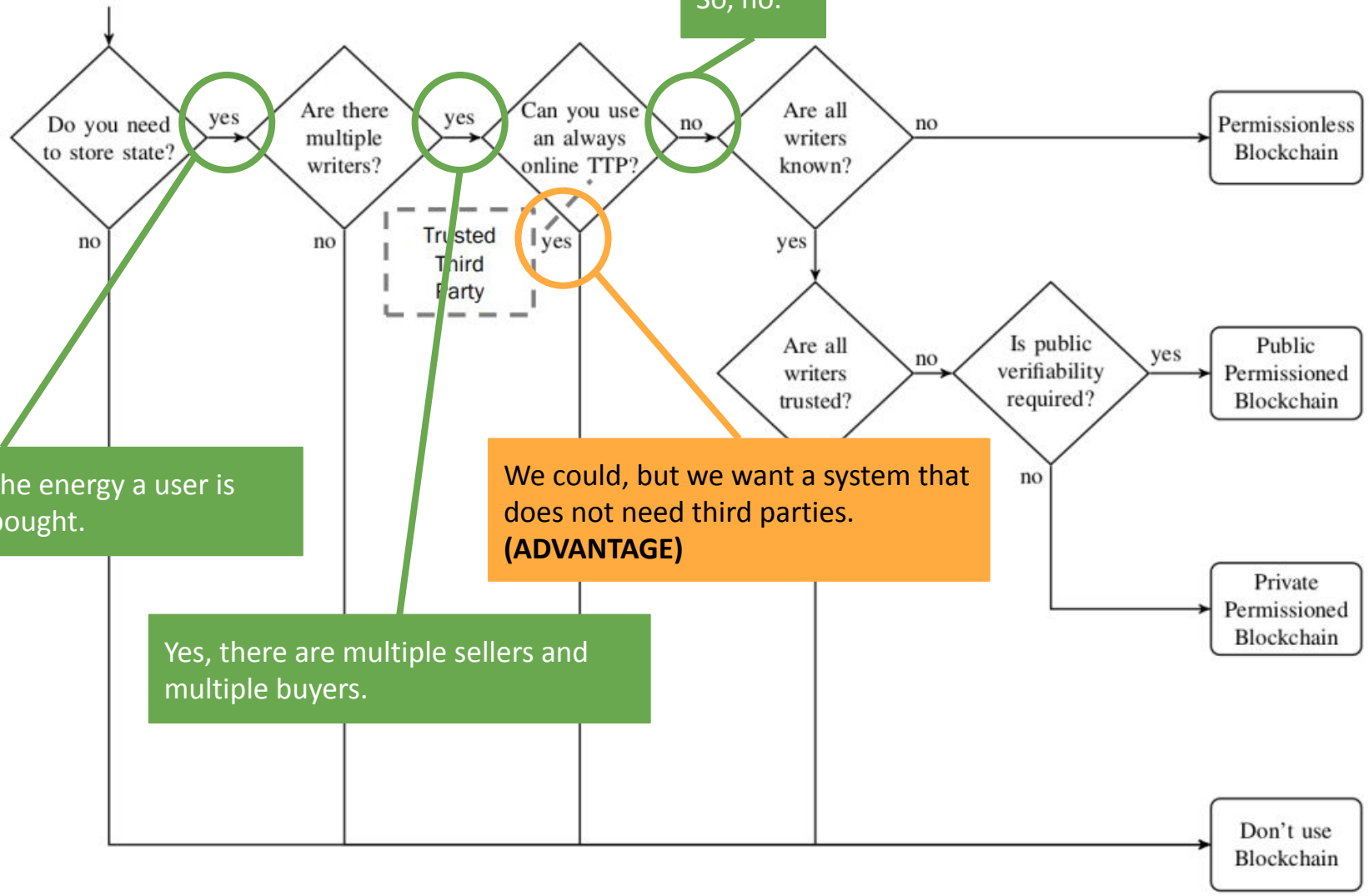

So, no.

Yes, we have to store the energy a user is selling and when it is bought.

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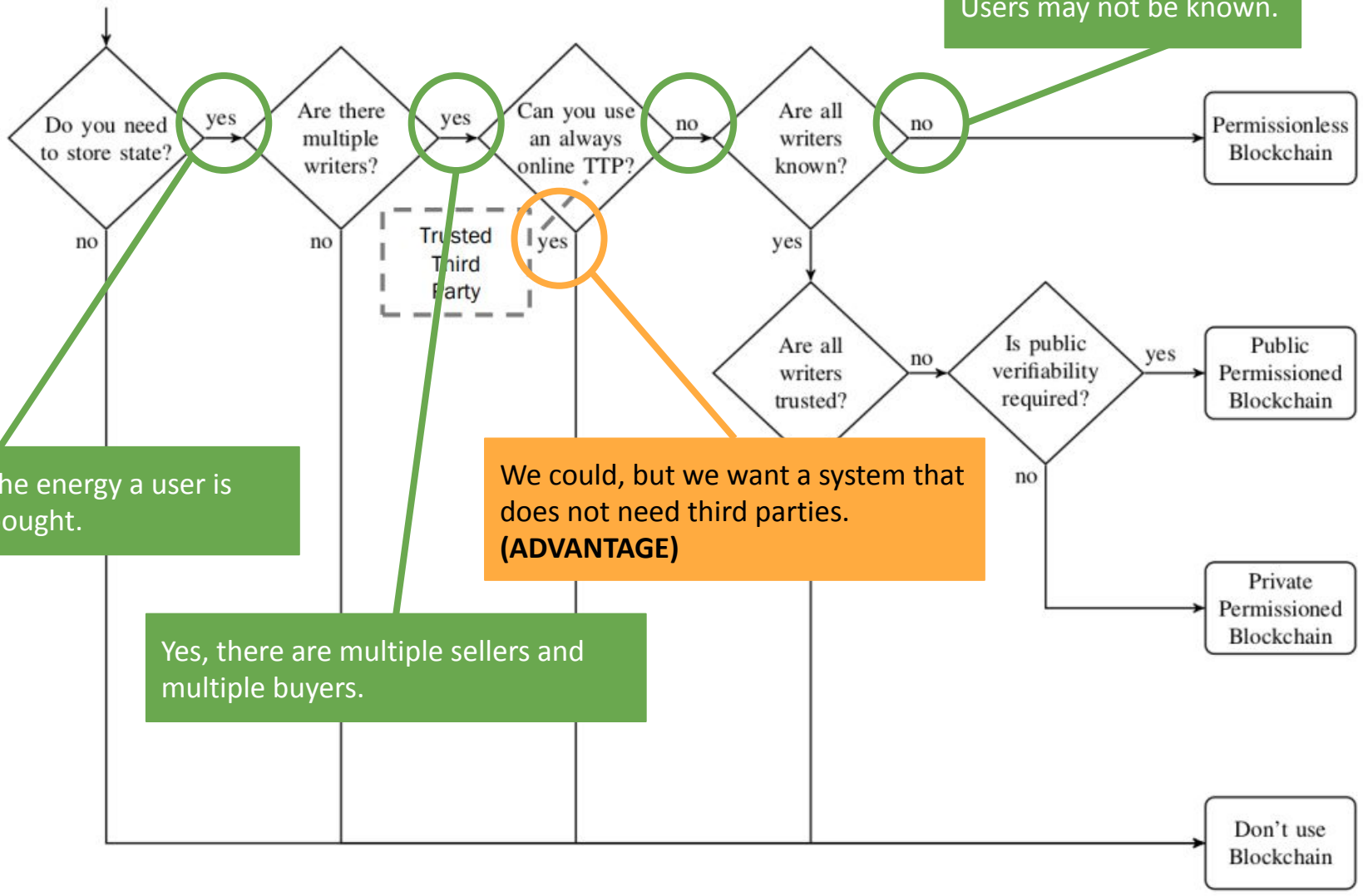


Users may not be known.

Yes, we have to store the energy a user is selling and when it is bought.

We could, but we want a system that does not need third parties. **(ADVANTAGE)**

Yes, there are multiple sellers and multiple buyers.

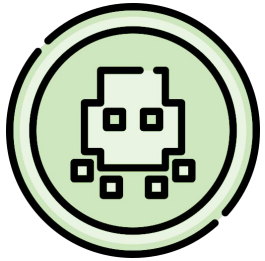
Entities - pt. 1

Consumer buys energy from producers with green tokens.

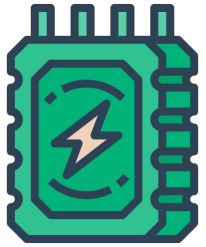
Producer sells energy.

We can have users that are both consumers and producers.

Entities - pt. 2



Green Token is the proprietary token of the energy heaven system, it is used to carry out energy trading.
(Fungible)



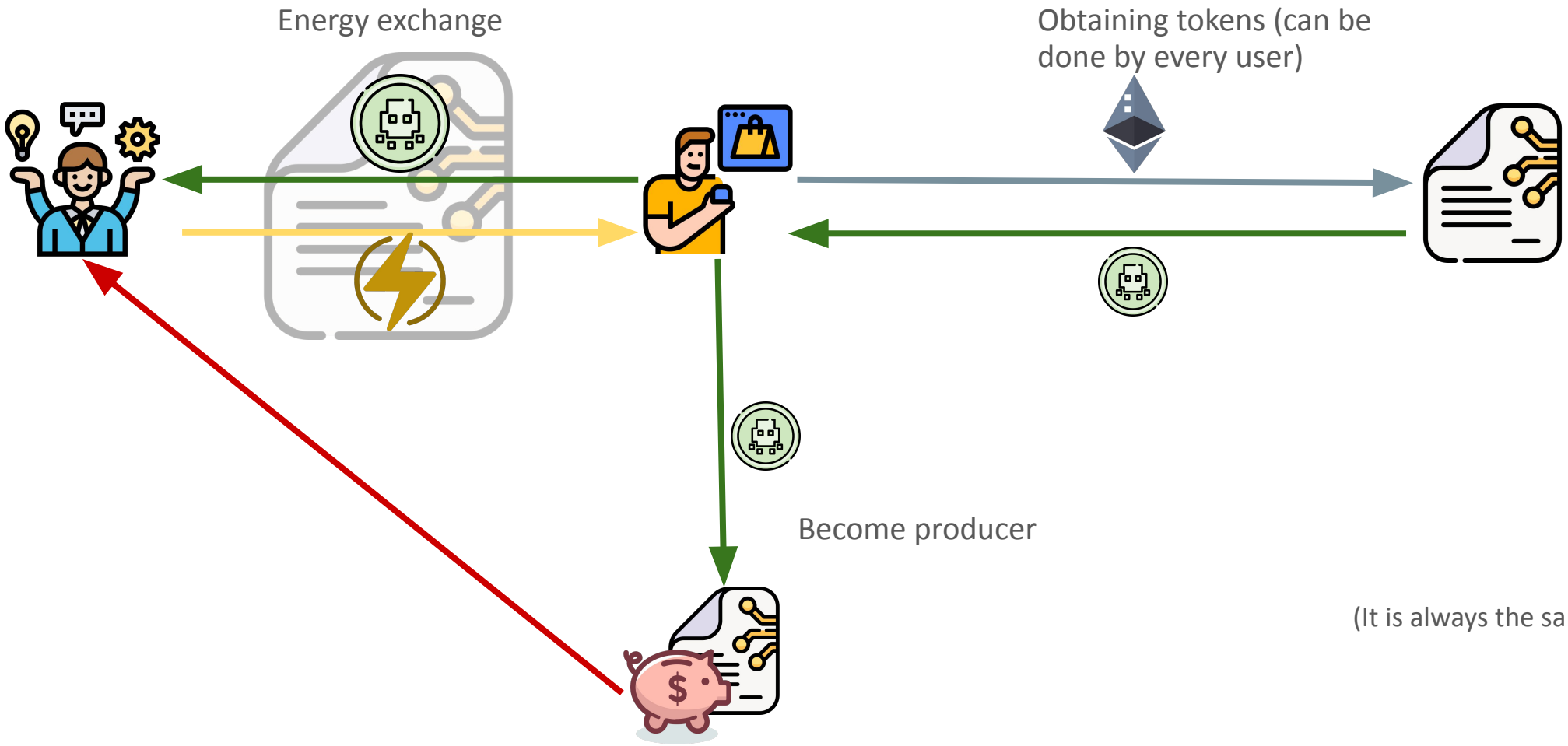
Inverter is the device that is used to buy and sell energy interacting both with the blockchain and with the power grid.
Users must have this device to join in the blockchain.

Entities - pt. 3

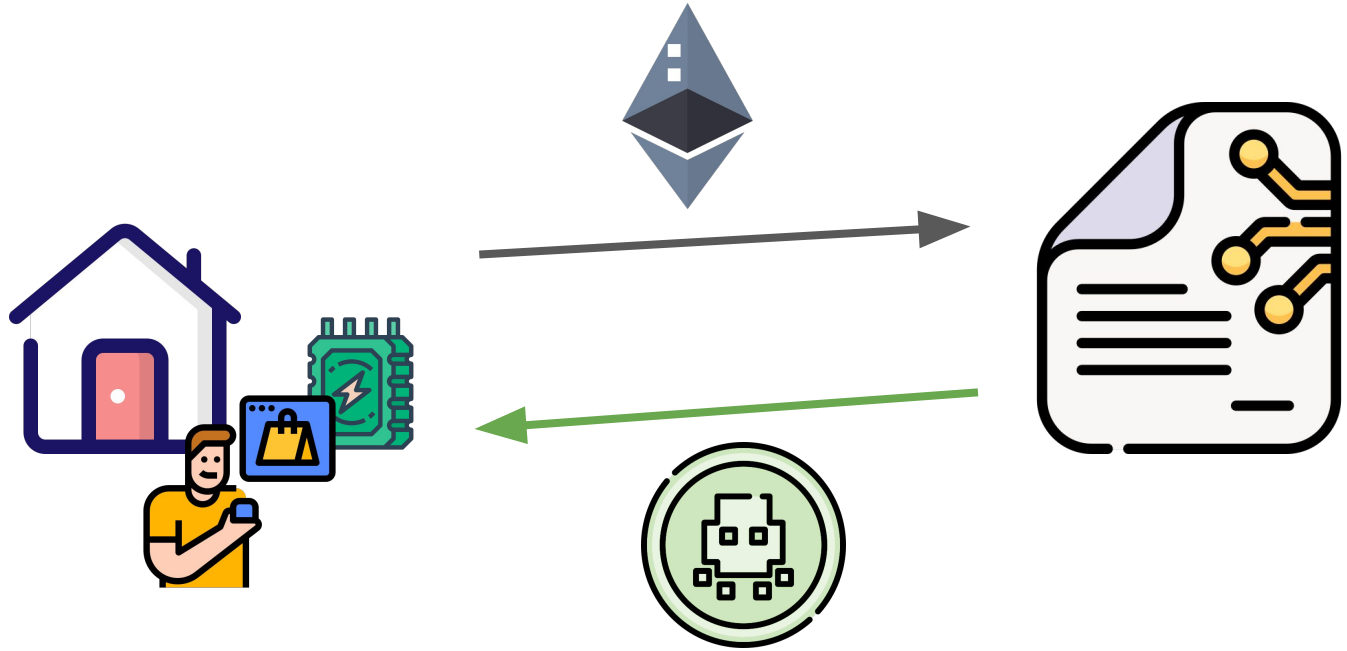
Contract is the piece of code that makes the whole system work, it allows the creation and dissemination of green tokens and the **exchange of energy** between producers and consumers. It also allows the conversion from **green tokens** to ETH, if a user want to leave our system. Moreover, it allows a consumer to become a producer.

Piggy bank keeps dues for becoming a producer. These are reused as **periodic production awards**.

Interaction between entities



ETH - Green Tokens Exchange



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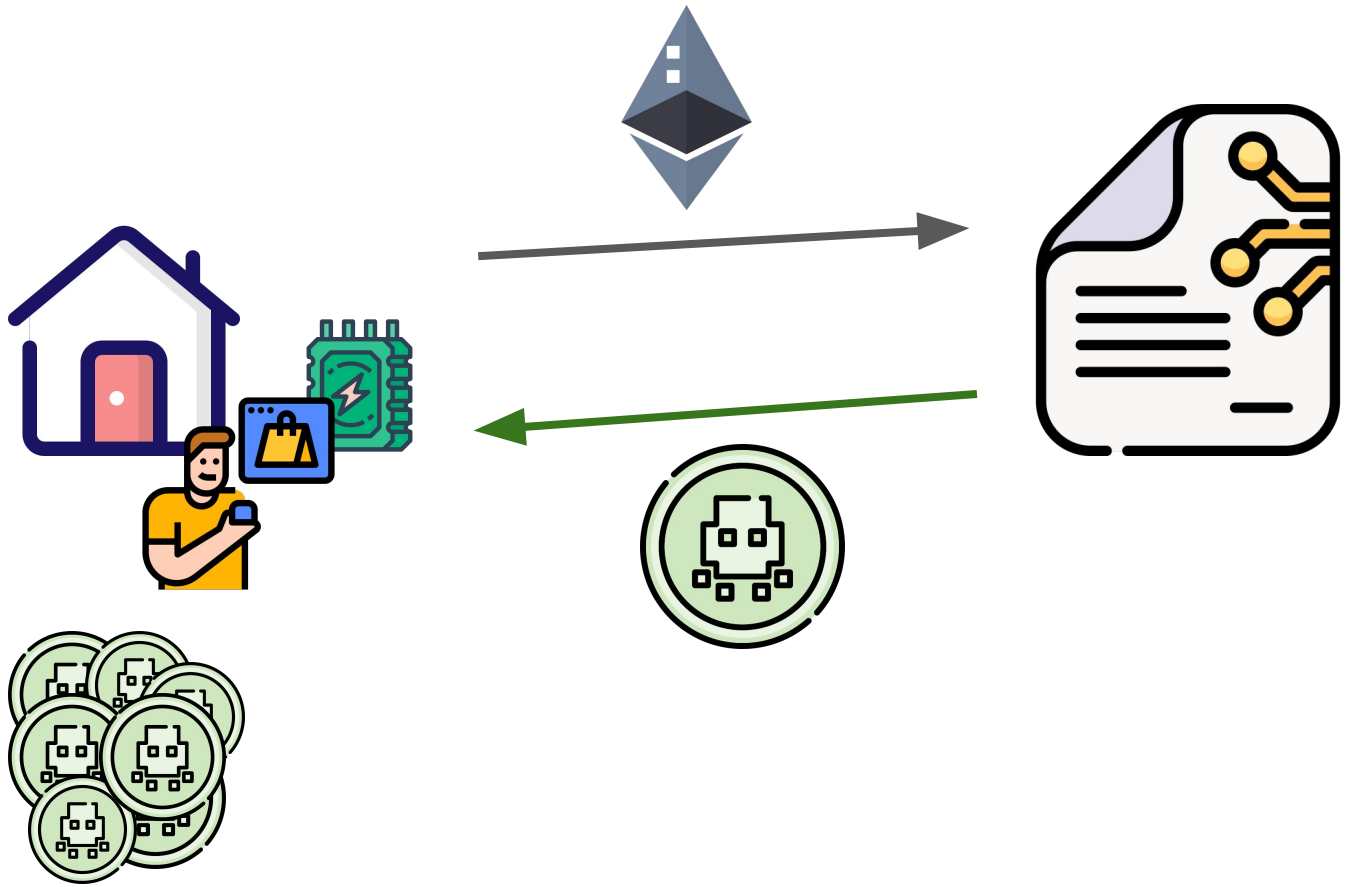
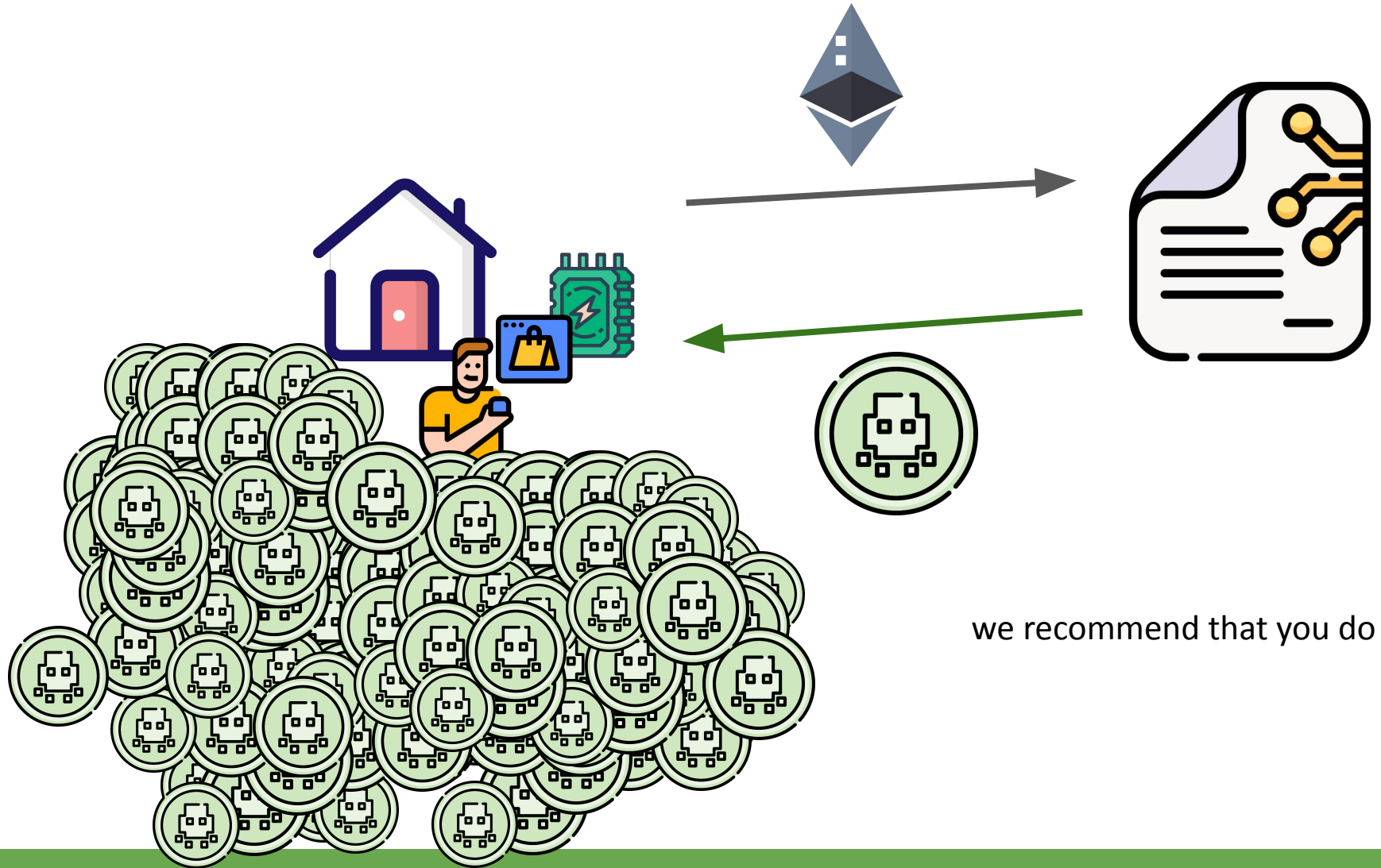
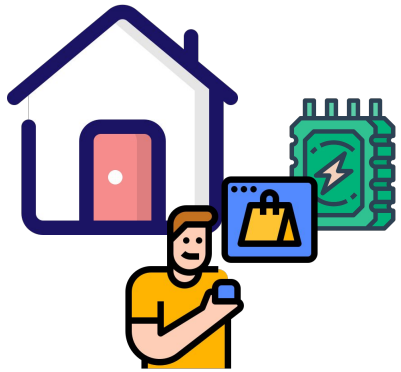


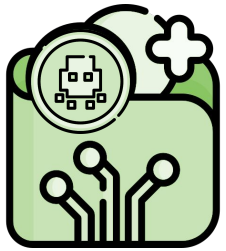
He wanted even more tokens



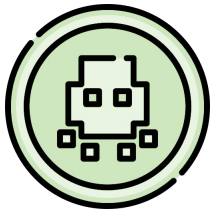
we recommend that you do the same!

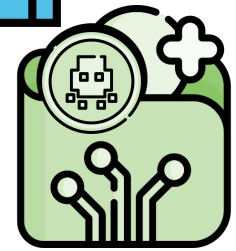
Joining the producers



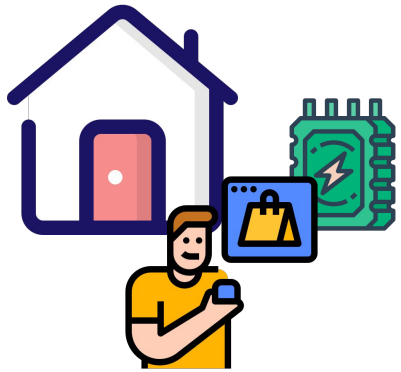


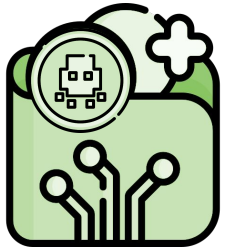
"Hey, I want to be a producer!"





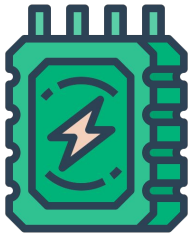
Selling energy



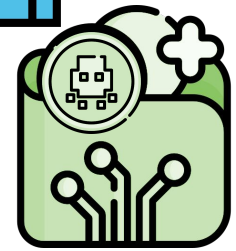


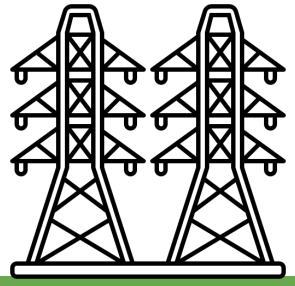
"Hey, I've just put this amount of power into the grid!"

"I want to sell it at this price"

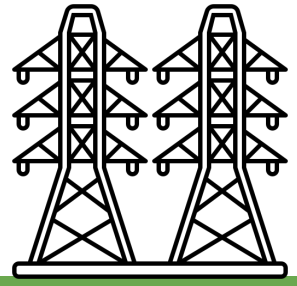


amount of power

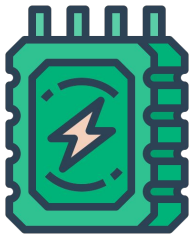




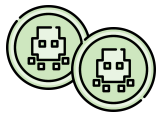
Power grid

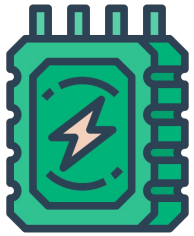


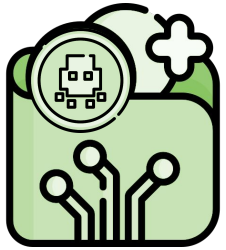
Buying energy

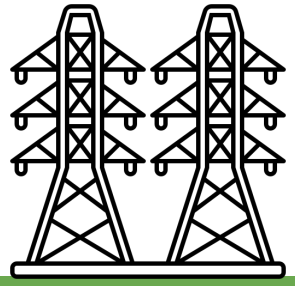


"I want to buy this amount of energy, at the lowest price."









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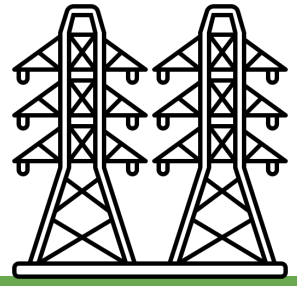

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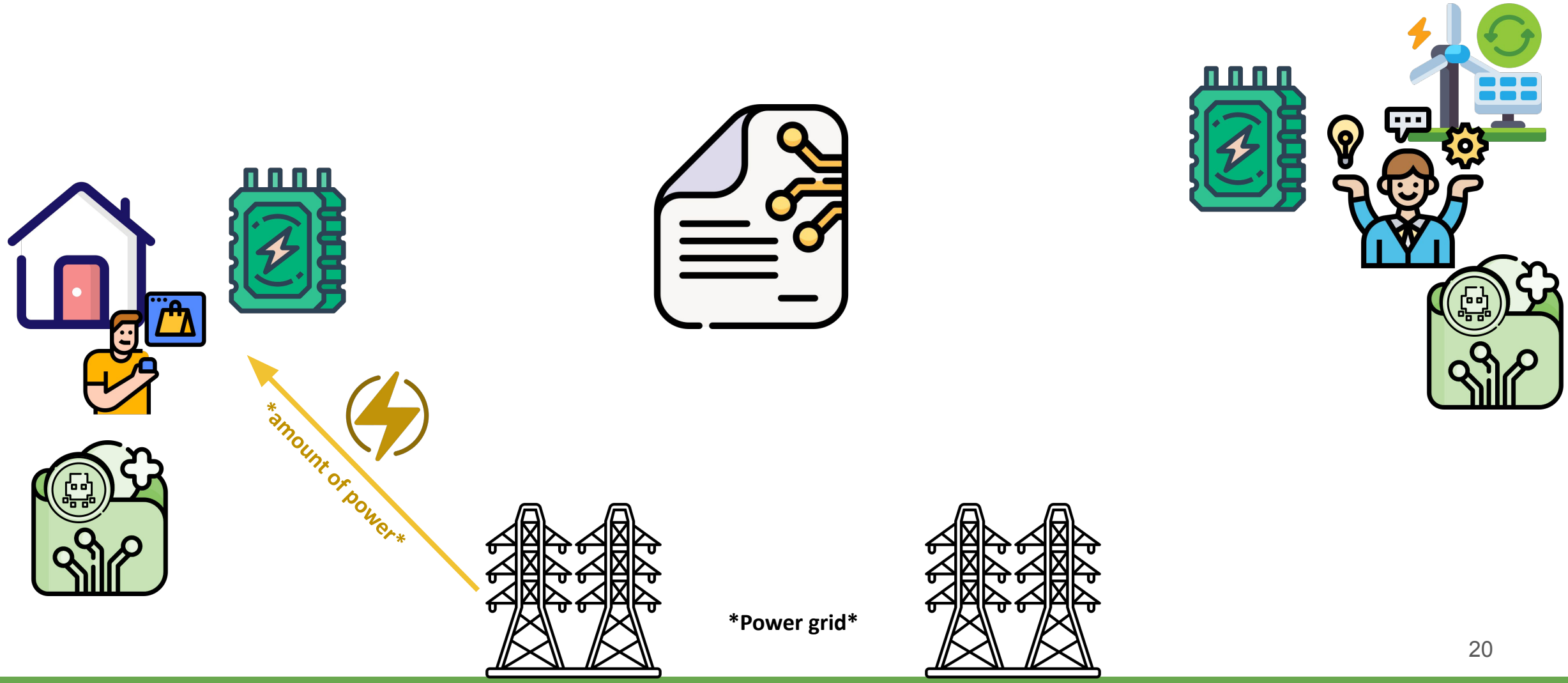
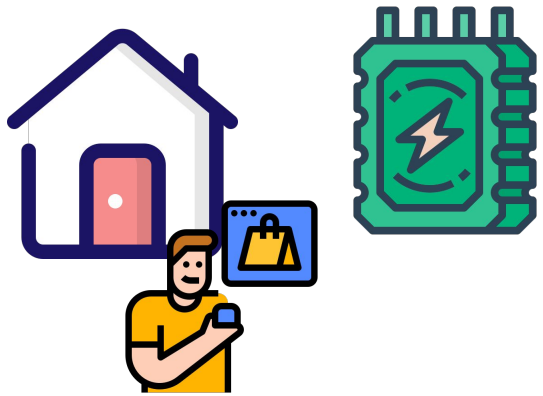
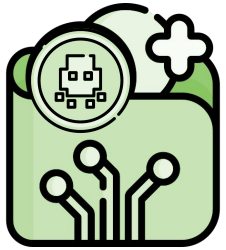
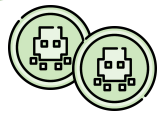


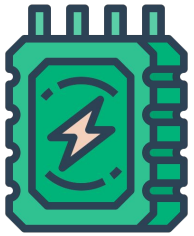
Earnings: Energy sold

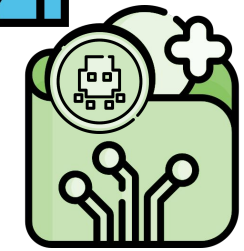


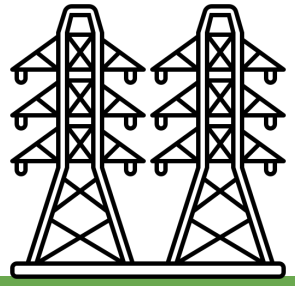


"Your energy has been sold"

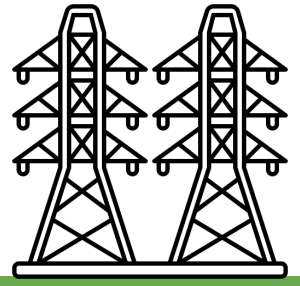






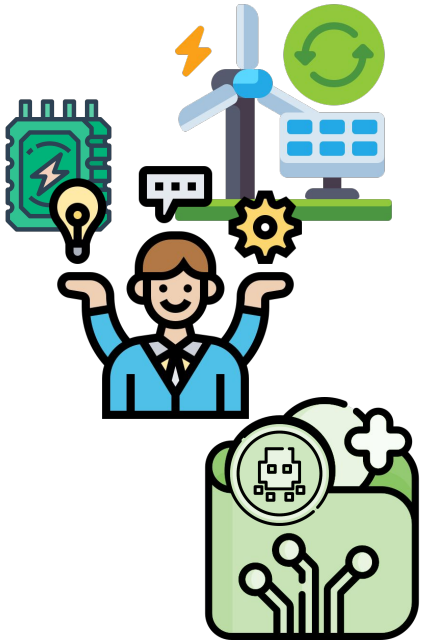


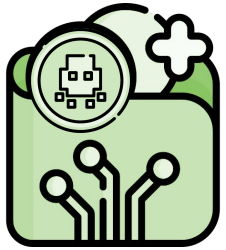
Power grid

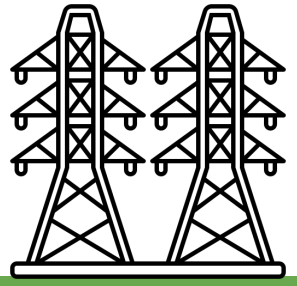


Earnings: Energy obtained

"Now I can turn on the light!"







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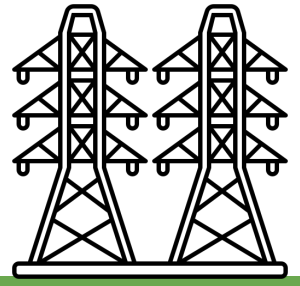
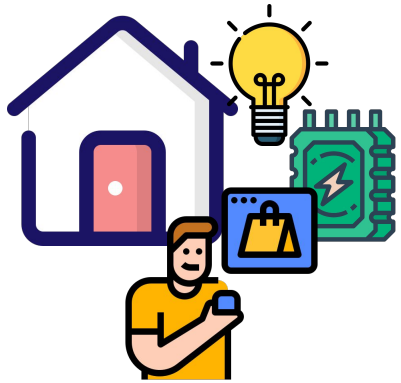
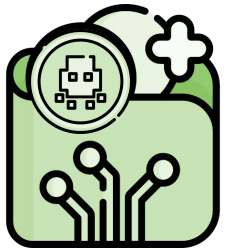
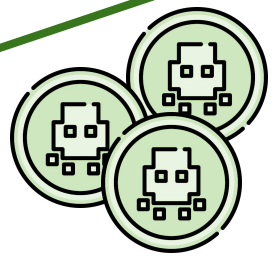


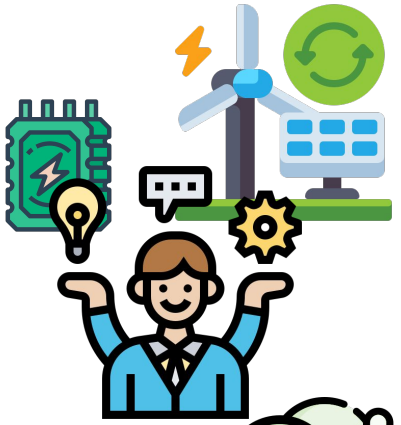
Earnings: Periodic productivity awards

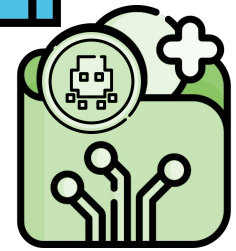




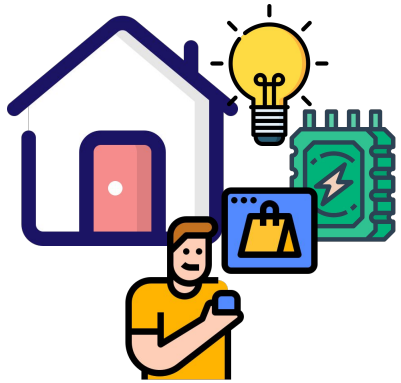
"You were the most productive producer of the last period! Here is your prize!"

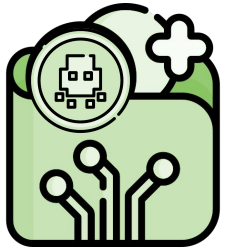




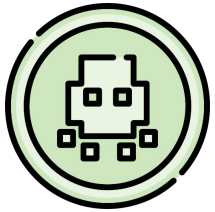


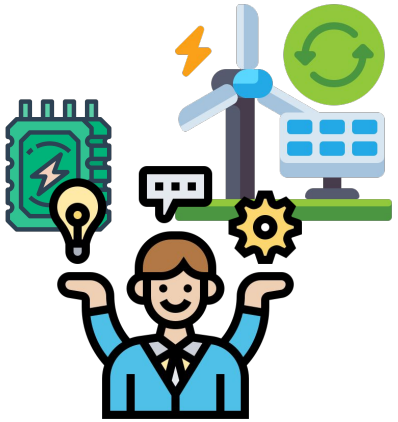
Earnings: Exchange token to eth

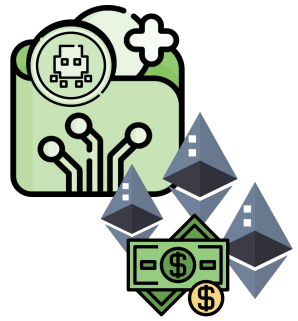




"Let's convert some tokens into eth!"

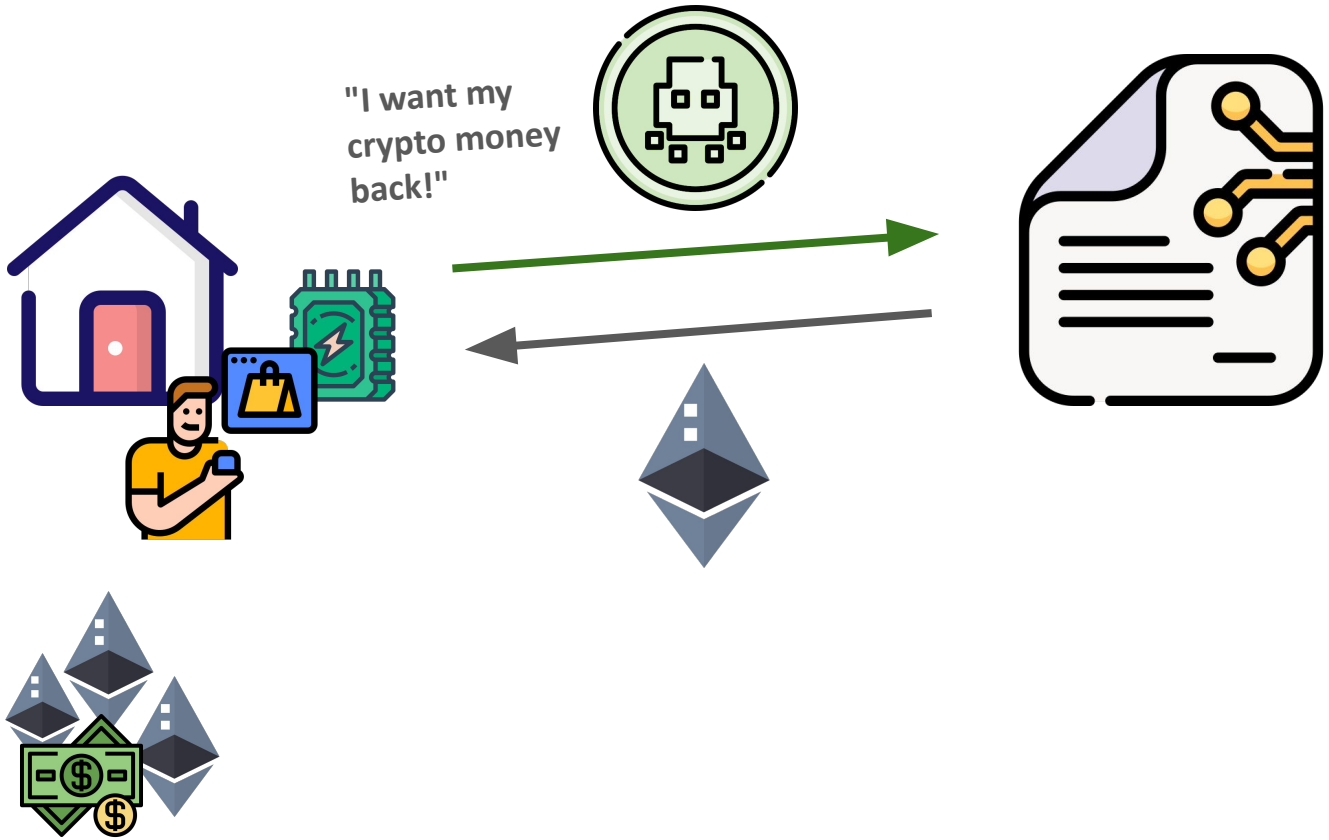


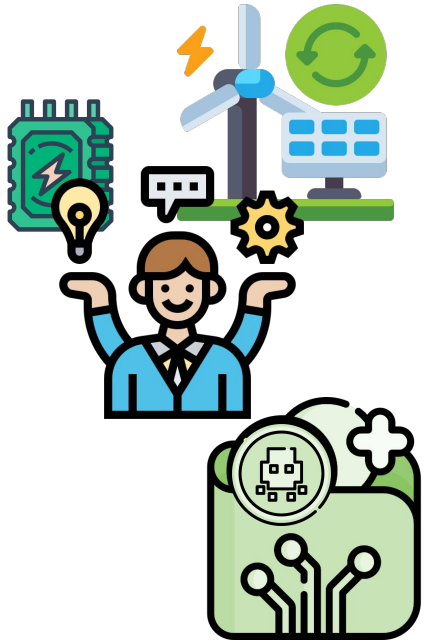




The contract will take an amount of ETH when the conversion happen

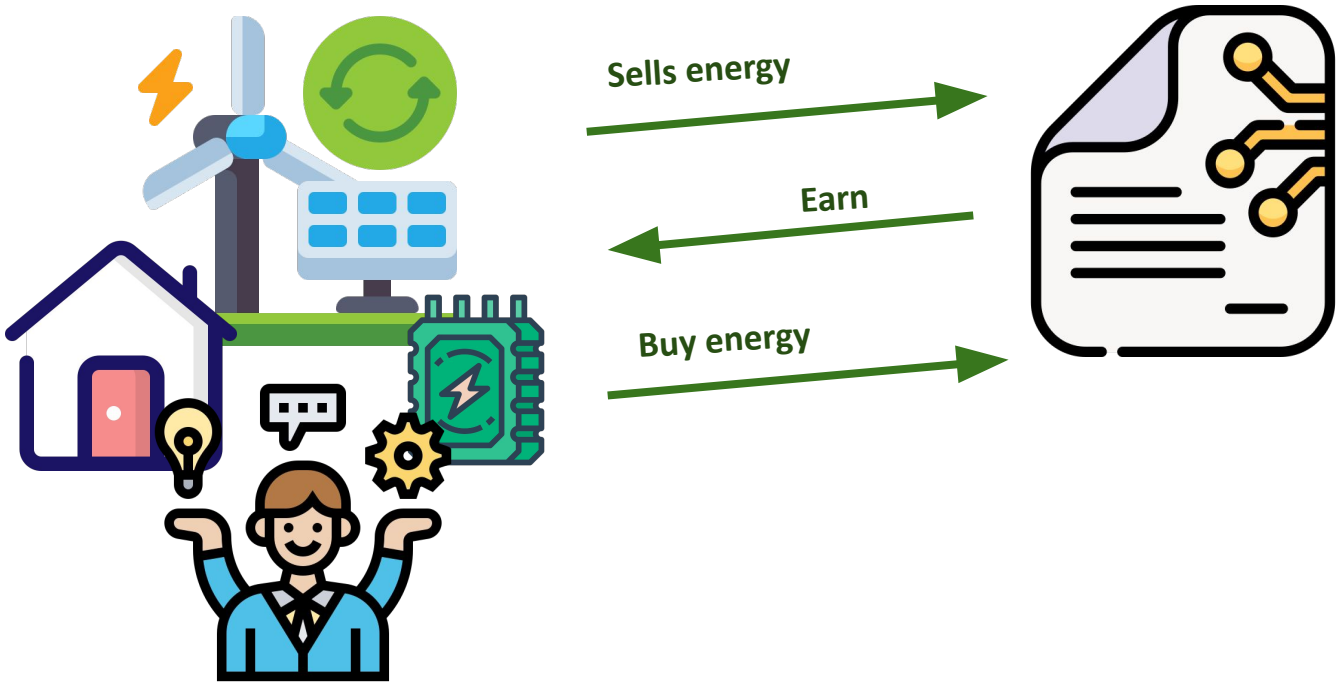
Guarantees



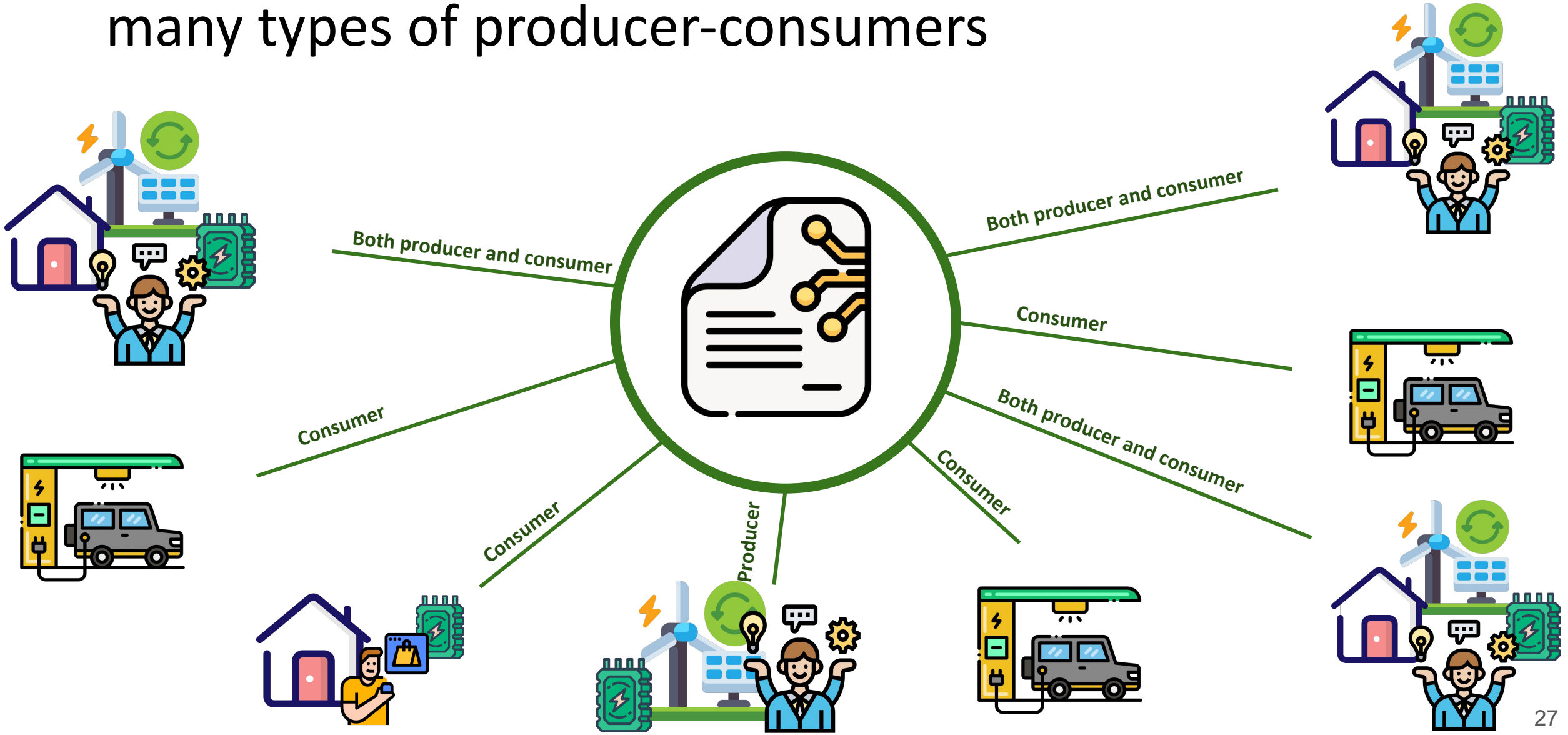


The contract will take an amount of ETH when the conversion happen

More generally:
a consumer can also be a producer



More generally:
many types of producer-consumers



Software architecture

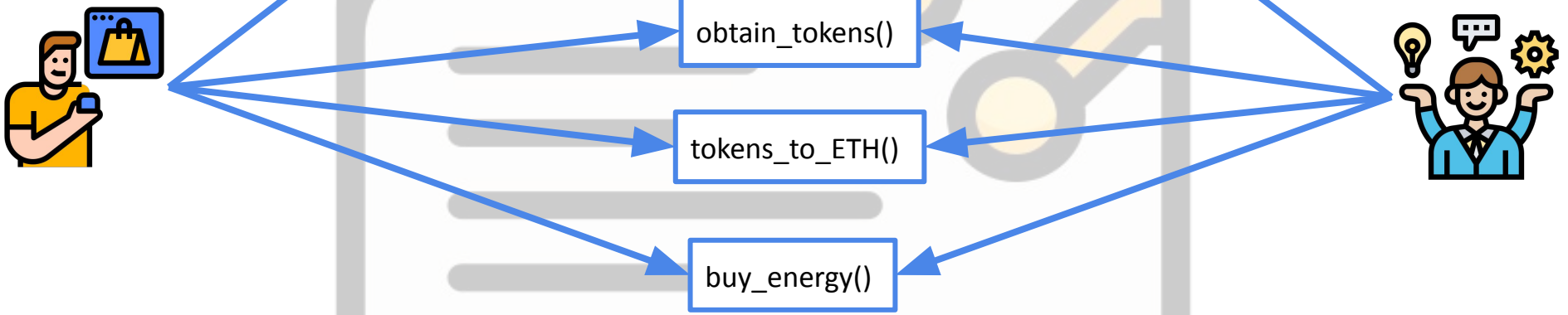
Functions

- **join_as_producer()**: allows, by drop a certain number of tokens, to become a producer and sell energy
- **obtain_tokens()**: converts ETH to green tokens
- **tokens_to_ETH()**: inverse operation of orbain_tokens(), converts green tokens to ETH
- **sell_energy()**: allows to sell energy for a certain price and obtain green tokens
- **buy_energy()**: allows to buy energy

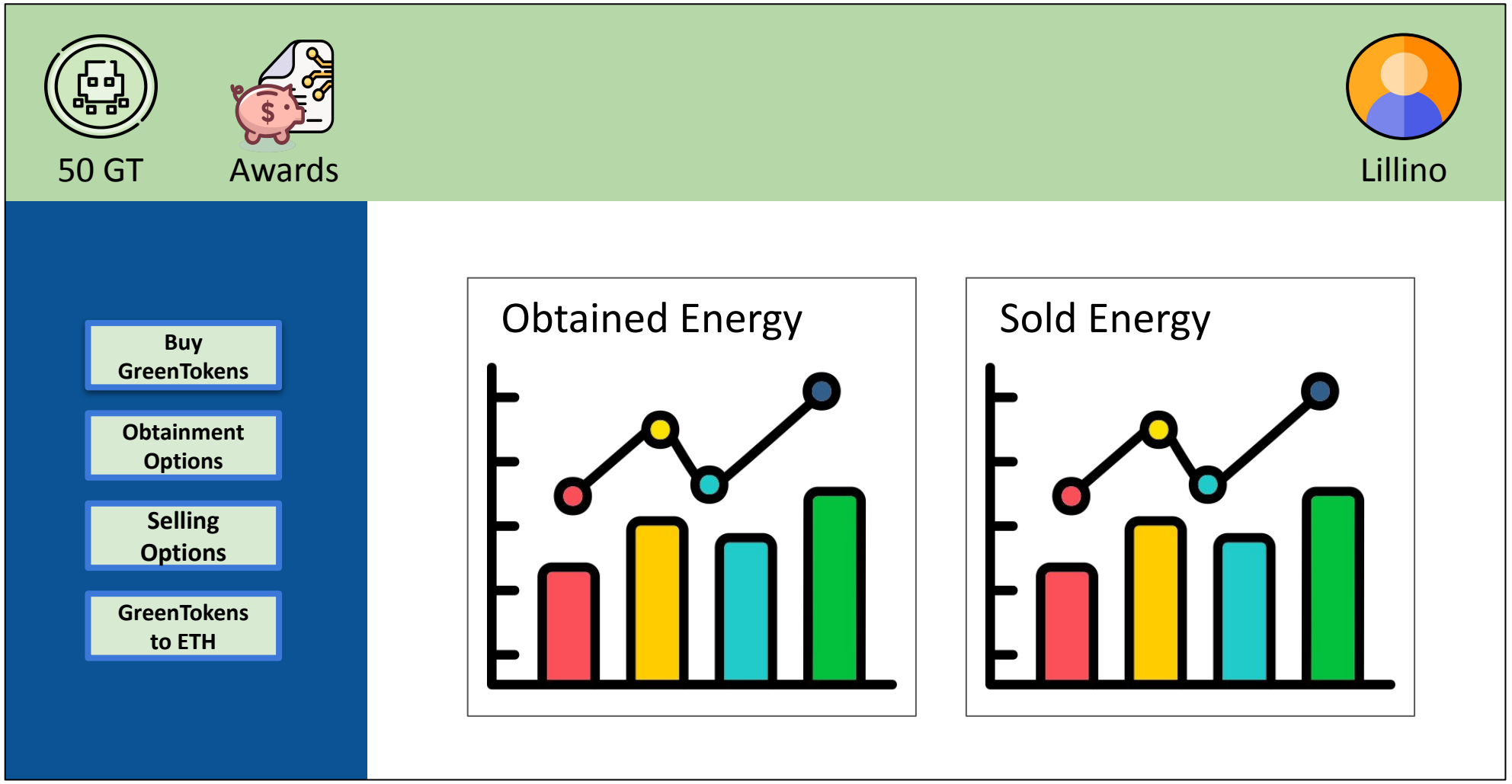
Variables

- **sales_list**: records containing seller, quantity, price
- **token_balance**
- **piggy_bank**: saves tokens entered in the 1st function in order to reassign them to users as a periodic productivity award
- **PRICE**: price value of green token's exchange
- **REVERSE_EXC_VALUE**: price value of ETH's exchange

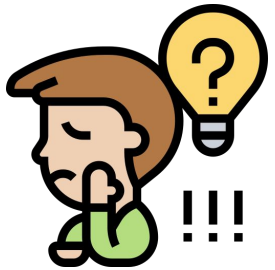
Sketchy drawing of software architecture



GUI sketchy drawing

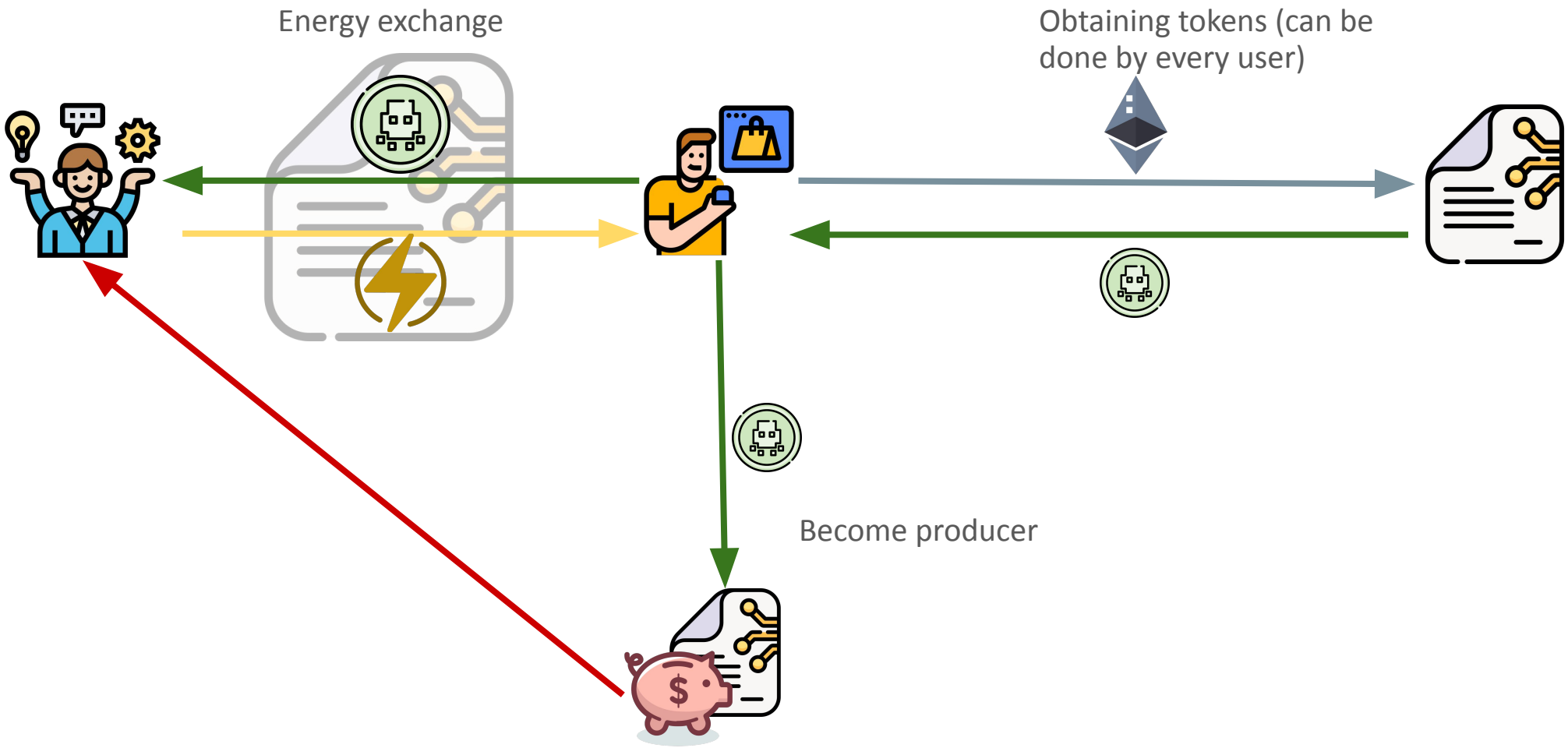


Known issues and limitations



- Byzantine devices
- 100% Consumers

Recap


Energy exchange
Obtaining tokens (can be done by every user)
Become producer

This can be the future.

Energy Heaven

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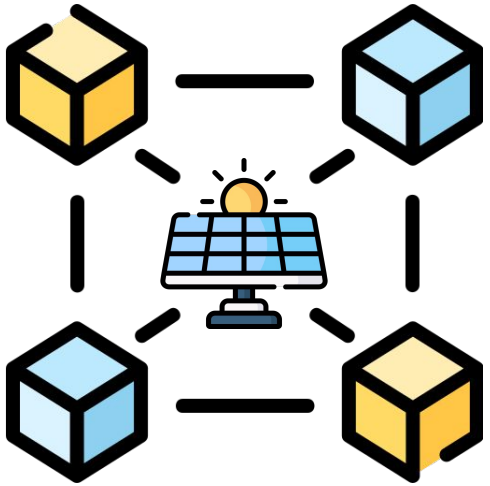

All icons are taken from flaticon.com