Energy Coin: A peer to peer distributed energy generation, transfer, and transaction system

AZEEM HUSSEIN
(e-mail: azeemhussein@protonmail.com)

ABSTRACT Using a proof of energy blockchain, a purely peer-to-peer version of metered electricity would allow direct payments or transfers of energy to be sent directly from one party to another without going through a financial institution. Using a cryptographically secured energy meter, if one has an electric vehicle and solar or other renewable electric generation tools, as well as a grid connection, we can simply say charge X kilowatt hours to their energy storage/battery balance—the logical equivalent of a bitcoin wallet. I.e., if an EV driver were to move far from home they could simply charge at a friend's place and the grid would transfer the energy based on a cryptographically secured transaction. People can also add value to earn energy for services rendered, and directly trade or value objects based on the amount of energy required. Since $E = mc^2$ we can incentivize energy to mass and mass to energy conversion efficiency. This would also incentivize overall energy efficiency, since cost will directly correspond to energy output.

INDEX TERMS Cryptography, Distributed Co-generation, Decentralized Grid, Energy Economics, Renewable Energy, Smart Cities

I. INTRODUCTION

Our goal is to present a practical solution for decentralized energy infrastructures required for humanity to continue building inclusive civilizations via universal design principles, with incentives for positive actions such as providing renewable energy production.

Indeed, should this project succeed, it may have the same impact on renewable energy generation technology that Bitcoin and Ethereum mining had on graphics cards.

By providing a way for people to instantly monetize renewable energy generation we may be able to avert some of the disastrous results of climate change, and in doing so, provide a way for future generations to do the same.

Finally, as the cost of energy decreases, quality of life increases, thereby creating a feedback loop for the community to use to create abundance.

A. WHO?

Everyone uses energy, so while some other projects may be limited in scope, this program is intended to be universal, to be accessible by all sentience.

B. WHAT?

Energy Coin adoption and implementation results in self-meshing distributed co-generation grids, providing economic incentive for developing and deploying the most efficient methods of energy storage and energy transfer.

C. WHERE?

Any house, business, warehouse, solar farm, wind farm, water turbine, hydroelectric dam, or other new means of generating energy. Non renewable means such as a fuel generator may also work however their higher cost of operation will cause them to always be less profitable, thereby rendering non-renewable or inefficient means of generating electricity as obsolete.

D. WHEN?

The time is Now. The climate clock is running down. (We need to stop climate change which will lead to coastal communities being permanently flooded)

E. WHY?

Humanity needs to move to renewable energy infrastructure. Imperial foreign policy in various governments around the world, has led to many wars for oil and resources. We need to stop the ice cap melting and ocean levels from rising – IPCC reports show that we are facing an at least 8 foot rise in sea level, which would devastate and flood many coastal communities around the world.

F. HOW?

By connecting energy meters to web 3 (requires a small device for analogue meters), we can use Proof of Energy to provide a token on the network that corresponds to 1 Kilowatt hour of electricity. The tokens will be accrued by sending responses from the meter to said small device, which in turn communicates via web 3 internet protocol. Energy Coin allows people to directly use and monetize energy, while also preserving a free, open market wherein individuals can trade energy for tokens, currency, services, etc.

II. MINTING AN ENERGYCOIN

Users with a power meter connected to the blockchain generate a token for each kilowatt hour of energy they produce.

There are a multitude of ways to connect to various energy meters, many of which are supported by Arduino and other single board computers (SBCs):

1) An example of how to connect an arduino to an old analogue, rotary power meter. (https://create.arduino.cc/projecthub/jassak/sigfox-kwh-meter-d53f2c).
2) An example of reading values from a smart energy meter with a simple Arduino board. (https://create.arduino.cc/projecthub/hwhardsoft/how-to-read-out-an-electricity-meter-via-arduino-cb8585)

When the meter detects more energy being produced than being used the onboard device begins to issue Tokens corresponding to the amount of energy generated, with 1 token for every kilowatt hour.

III. BUYING AN ENERGYCOIN

Users can purchase energy from other users, and account for it with Energycoin. Power companies can provide localized fulfillment where users can redeem an Energycoin for 1 kW hour. Furthermore, Electric Vehicle Pilots, Drivers, and Owners can use the energy directly from the provider or at charging station businesses, which will quickly become Energy Hubs.

IV. TRANSFERRING ENERGYCOIN

Since the user now has a token that verifies they have generated 1 kW hour of energy for the grid, the token would allow them to redeem the same amount of energy at another location on the grid.

In doing so, energy becomes portable and highly fungible. National Grids benefit because distributed cogeneration makes the system more robust, and load balanced.

An example would be of an EV driver, quite far from home they could simply charge at a friend's place, or a charging station, and the grid would transfer or route energy as needed, based on a cryptographically secured transaction.

Behind the scenes, one would expect to see something akin to a secret-santa combined with nearest node algorithm, since all the coins are highly fungible, to route the amount of energy needed with the least amount of transmission loss.

V. SECURITY

A. GRID RESILIENCE

Distributed Co-Generation builds a power grid network that is more resilient in the face of natural disasters, enemy attacks, or other disruptions. By providing more than one point of generation, the network is harder to take down. Bad actors would have to target more generator points, Natural disasters would have a less devastating impact, and even EMP attacks would have lower impact, helping to avoid loss of power should any conflict arise...

B. PROOF OF ENERGY

Why Proof of Energy? The only thing we cannot 'hack' is the universe. Matter and Energy are conserved.

Humans cannot create anything we literally transform it from one state of matter and energy to another. The closest we ever get to creation is making patterns. Music, Paintings, Art etc. This is why literally any method of generating energy can be used, with this cryptographically verified meter system.

Quantum Computing threatens to break Bitcoin and other blockchain security. Any blockchain will be susceptible to attack once quantum computing launches, however by that time, Energy Coin will have been able to update to quantum entanglement based encryption, and underlying blockchain encryption will have shifted to quantum resistant methods.

C. POSSIBLE VULNERABILITIES

Outside of acts of war, there are few vulnerabilities to Energy Coin. Due to the laws of physics, energy is conserved, and is therefore practically impossible to spoof. Any attack would come in the form of disruption, EMP, Grid Connection Attack/Maintenance Sabotage, or perhaps social engineering.

D. A FOUNDATION FOR INCLUSIVE SMART CITIES

For developing countries, Energy Coin would allow the development of Smart Distributed Co-Generation Grids, which allow developing cities to easily run off of abundant renewable energy sources.

Well developed countries will also find that this system is already compatible with the devices and infrastructure they already have.

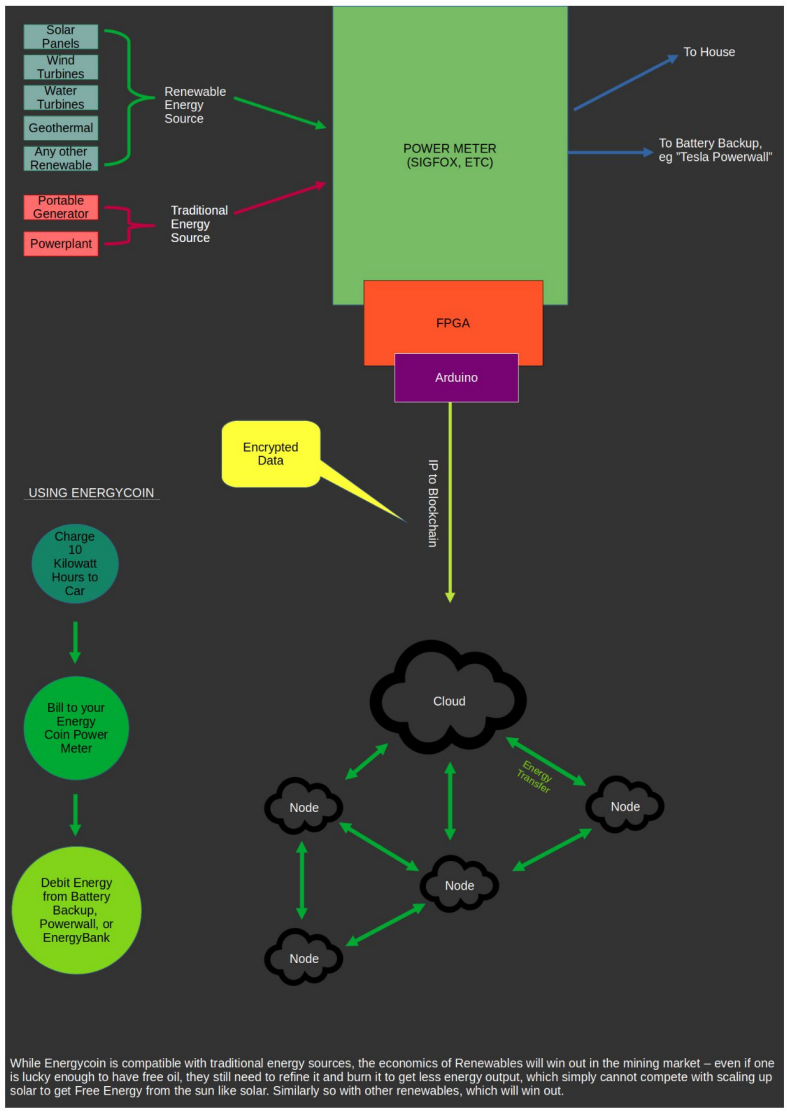


FIGURE 1. Energy Coin Overview

VI. CONCLUSION

Using a proof of energy blockchain, a purely peer-to-peer version of metered electricity would allow direct payments or transfers of energy to be sent directly from one party to another without requiring a centralized authority, making the entire energy sector fully decentralized in a trustless manner, with all data publically logged on the blockchain...

Using web 3 integration on the entire energy grid/distribution infrastructure, by simply plugging into an energy meter, we can distribute tokens that are equivalent to 1 kilowatt hour of energy. Tokens would be issued and expire as energy is produced and consumed.

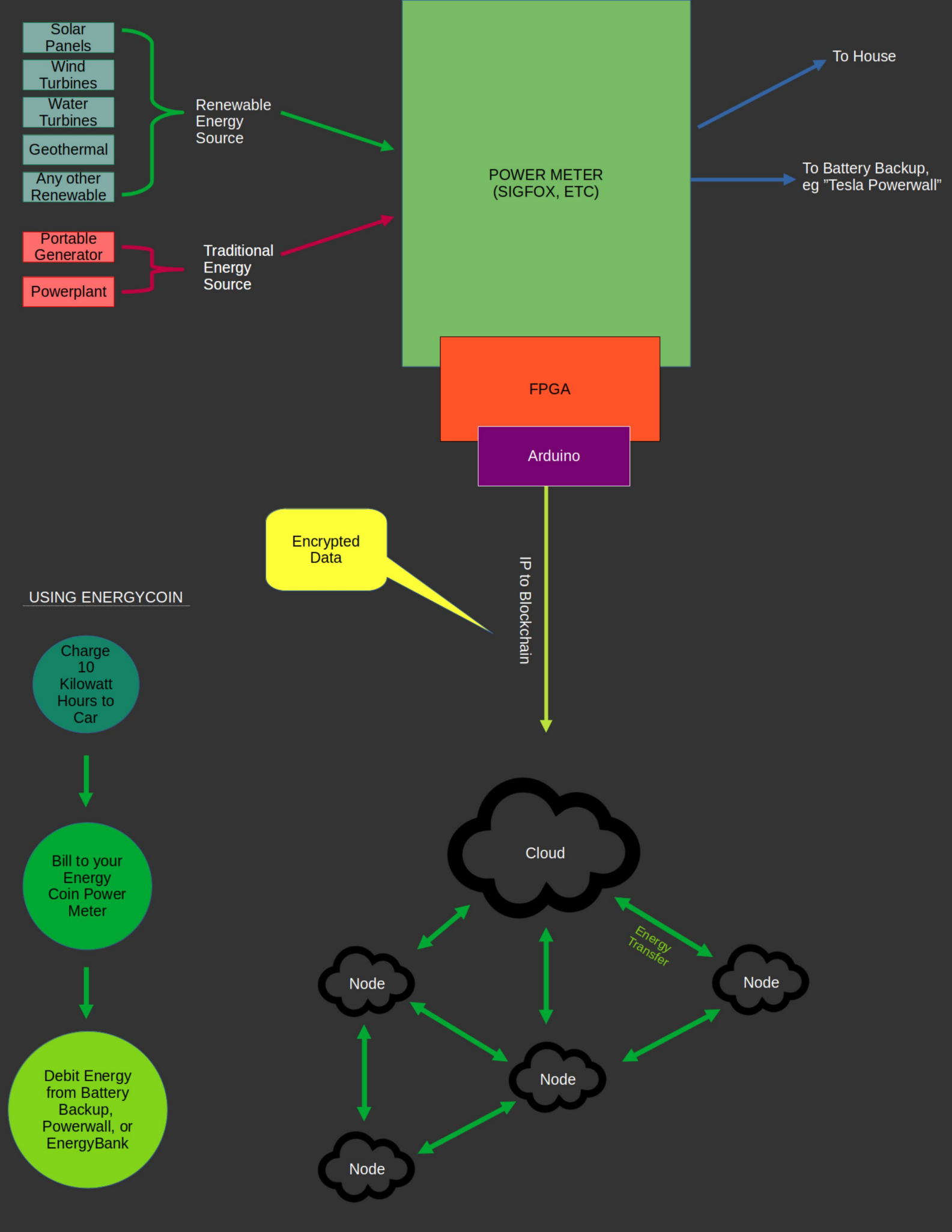
"Wallets" would combine web3 interactivity with energy storage technology (such as supercapacitors, battery bank systems).

Energy is what powers all things and it has a stable value, thus Energycoin's tokenomics should be stable as well, finding itself in minimal flux between energy market rates, instead of being determined by speculative market activity.

Energy Coin would create a deFi, trustless, balancer system for our current energy system architectures, and provide a seamless way to build future civilizations inclusively, and renewably, in developing countries.

AUTHOR ACKNOWLEDGMENT

I would like to thank my family, friends, and those who helped to inspire me, encourage me, or ever help me in any way. Special thanks to Drayton for consulting as an electrician, Satoshi for inspiring us all with Bitcoin, and the Open Source Ecology Movement.


Solar Panels
Wind Turbines
Water Turbines
Geothermal
Any other Renewable
Renewable Energy Source
Portable Generator
Powerplant
Traditional Energy Source
POWER METER (SIGFOX, ETC)
To House
To Battery Backup, eg "Tesla Powerwall"
FPGA
Arduino
Encrypted Data
IP to Blockchain
USING ENERGYCOIN
Charge 10 Kilowatt Hours to Car
Bill to your Energy Coin Power Meter
Debit Energy from Battery Backup, Powerwall, or EnergyBank
Cloud
Node
Node
Node
Node
Energy Transfer