Energizium Coin

Improving energy distribution with blockchain

Energizium.com

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1 - What is Bitcoin

Bitcoin is a worldwide cryptocurrency and digital payment system called the first decentralized digital currency, as the system works without a central repository or single administrator. It was invented by an unknown person or group of people under the name Satoshi Nakamoto and released as open-source software in 2009. The system is peer-to-peer, and transactions take place between users directly, without an intermediary. These transactions are verified by network nodes and recorded in a public distributed ledger called a *blockchain*.

Bitcoins are created as a reward for a process known as *mining*. They can be exchanged for other currencies, products, and services.

2 - What is blockchain?

A **blockchain**– originally **block chain**] – is a continuously growing list of records, called *blocks*, which are linked and secured using cryptography. Each block typically contains a hash pointer as a link to a previous block a timestamp and transaction data By design, blockchains are inherently resistant to modification of the data. A blockchain can serve as an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way. For use as a distributed ledger, a blockchain is typically managed by a peer-to-peer network collectively adhering to a protocol for validating new blocks. Once recorded, the data in any given block cannot be altered retroactively without the alteration of all subsequent blocks, which needs a collusion of the network majority.

Blockchains are secure by design and are an example of a distributed computing system with high Byzantine fault tolerance. Decentralized consensus has therefore been achieved with a blockchain. This makes blockchains potentially suitable for the recording of events, medical records, and other records management activities, such as identity management, transaction processing, documenting provenance, or food traceability.

The first distributed blockchain was conceptualised by an anonymous person or group known as Satoshi Nakamoto, in 2008 and implemented the following year as a core component of the digital currency – bitcoin – where it serves as the public ledger for all transactions. The invention of the blockchain for bitcoin made it the first digital currency to solve the double spendingproblem without the use of a trusted authority or central server. The bitcoin design has been the inspiration for other applications.

By storing data across its network, the blockchain eliminates the risks that come with data being held centrally The decentralized blockchain may use ad-hoc message passing and distributed networking.

Its network lacks centralized points of vulnerability that computer crackers can exploit; likewise, it has no central point of failure. Blockchain security methods include the use of public-key cryptography. A *public key* (a long, random-looking string of numbers) is an address on the blockchain. Value tokens sent across the network are recorded as belonging to that address. A *private key* is like a password that gives its owner access to their digital assets or otherwise interact with the various capabilities that blockchains now support. Data stored on the blockchain is generally considered incorruptible.

This is where blockchain has its advantage. While centralized data is more controllable, information and data manipulation are common. By decentralizing it, blockchain makes data transparent to everyone involved.[42]

Every node or miner in a decentralized system has a copy of the blockchain. Data quality is maintained by massive database replication and computational trust. No centralized "official" copy exists and no user is "trusted" more than any other. Transactions are broadcast to the network using software. Messages are delivered on a best effort basis. Mining nodes validate transactions, add them to the block they are building, and then broadcast the completed block to other nodes. Blockchains use various time-stamping schemes, such as proof-of-work, to serialize changes. Alternate consensus methods include proof-of-stake and proof-of-burn. Growth of a decentralized blockchain is accompanied by the risk of node centralization because computer resources required to operate bigger data become more expensive.

Blockchain technology has a large potential to transform business operating models in the long term. Blockchain distributed ledger technology is more a foundational technology—with the potential to create new foundations for global economic and social systems—than a disruptive technology, which typically "attack a traditional business model with a lower-cost solution and overtake incumbent firms quickly. Even so, there are a few operational products maturing from proof of concept by late 2016. The use of blockchains promises to bring significant efficiencies to global supply chains, financial transactions, asset ledgers and decentralized social networking.

2.1 - How blockchain works

Each blockchain is essentially a so-called "DApp" (decentralised application) operating on the basis of a peer-to-peer protocol and coming with the special feature that it provides distributed storage functionality for storing transaction data.

DApps are open-source applications which represent a contract between a network and its users and which run on a distributed register (the so-called "ledger"), such as the Bitcoin or Ethereum blockchains. What makes this type of application special is that no single organisation controls these contracts or holds a legal claim over them, but that all decisions (e.g. on protocol adaptations) are taken by consensus between the users on the basis of computer code. In order for an application to qualify as a genuine decentralised application, both its protocol and data must be stored on a public, decentralised blockchain (to avoid a central point of failure) and validated using a decentralised verification mechanism (e.g. "proof of work"). Properly decentralised applications ensure that a reliable record can be kept of all transactions and business deals, even in the event that key websites and interfaces go offline. Also, no one can subsequently revise or erase the ledger.

DApps can be classified:

- Type 1: decentralised applications that have their own blockchain - Examples: Bitcoin, Altcoin, Litecoin
- Type 2: decentralised applications that use the blockchain of a type 1 DApp - Example: Omni Protocol (a software layer built on top of the Bitcoin blockchain) - Type 2 DApps are protocols and use their own tokens
- Type 3: decentralised applications that use the blockchain of a type 2 DApp - Example: the SAFE Network, which uses the Omni Protocol to issue "safecoin" tokens.

The proof-of-work and proof-of-stake concepts The purpose of the verification process is to achieve consensus on the content of the distributed ledger. Consensus-based verification is a decentralised (i.e. embedded on the blockchain itself) and automated process. The following two mechanisms are most commonly3 used to establish consensus: Proof of Work The proof-of-work concept is the consensus mechanism most frequently used in conjunction with blockchain technology, and relies on so-called "miners".

Each block is verified through mining before its information is stored. The data contained in each block is verified using algorithms which attach a unique hash4 to each block based on the information stored in it. These hashes can be either ordinary hashes or cryptographic hashes. The complexity of this task lies in finding a specific hash corresponding to the block's content. The level of complexity (difficulty) adjusts flexibly in response to the computing power available on the miners' network, so as to ensure that new blocks can be hashed at predefined intervals (Bitcoin: 10 minutes, Ethereum: 10 seconds). Even if only a single piece of information relating to any transaction is subsequently changed, for example if the amount of a transaction is altered as a result of tampering or due to transmission errors, the algorithm applied to the block will no longer produce the correct hash. The hashes computed for the same block, which was stored many times around the decentralised network as described above, are compared so that changed blocks can be identified and declared invalid. The verified, correct version of a block is identified by the majority of participating computers and added to the other blocks previously verified, thereby extending the blockchain. Once the block which contains the initial transaction is added to the blockchain and this addition has been stored by a sufficient number of network participants, the transaction is confirmed to both parties.

3 - What are tokens

The term “token” may refer to several things: a token can be used to grant users access to a (de-)centralised computer application, act as a key for the execution of digital transactions or represent a currency unit (e.g. bitcoins). DApp tokens must be generated and distributed according to a standard algorithm or set of criteria. Tokens constitute the basis for using an application, and are also a reward for contributions by users. Yet tokens do not represent any assets, nor do they give rights to dividends or equity shares. Although the value of a DApp token may increase or decrease over time, it would be a misconception to think of them as a type of security.

3.1 - What mechanisms are used to distribute tokens?

There are three general mechanisms DApps (e.g. Bitcoin, Ethereum) can use to distribute their tokens (e.g. bitcoins, ethers): mining, fundraising and development • Mining: tokens are distributed as a reward to those participants who solve certain verification operations most quickly (with consensus being established by proof of work). Bitcoin is one example of a DApp issuing its tokens through mining. • Fundraising: tokens are distributed to those who funded the initial development of the DApp. • Development: tokens are generated using a predefined mechanism and are available for the future development of the DApp (with consensus being established by proof of stake).

4 - Energizium model and motivation

4.1 - What is Energizium Coin

Energizium Coin is a crypto-based based on Bitcoin's core code and platform. The purpose of the company is to broaden the way that electricity can be traded or even distributed. Energizium enables large industries to negotiate (buy or sell) energy through a peer-to-peer network using the energizium blockchain. In this way, excess energy generated can be negotiated safely over the network in a few minutes.

With the Energizium blockchain merchants and power distribution leaders can communicate quickly and securely through a network of point-to-point transactions geared toward the electric power market. Energizium blockchain has already been tested in some parts of the United States successfully. Now, we want to take and make this network known throughout the world energy sector.

4.2 - Who are our customers

As Energizium Coin is focused on the energy market as a way of improving the sector, using blockchain, our potential customers for the moment are the major industries in the electric energy sector. However, our portfolio can be expanded according to the growth and acceptance of the Energizium network.

4.3 – What the purpose of the Energizium Coin

The main purpose of Energizium Coin is to promote the improvement of electric sector and energy distribution through a blockchain network for information exchange.

4.4 - What is a Energizium token

An Energizium Token (ENGZ token) is a digital transaction execution key that represents an Energizium Coin.

The Energizium token was created as a form of internal distribution on the platform before the official launch. Since the blockchain is not yet active, putting pre-sale ENGZ token was the way we found to raise funds in a safe and advantageous way for the user, who can collect their tokens, removing from the internal platform and selling the tokens for a price higher in the main exchanges.

4.5 - Motivation

There are possible uses of blockchain technology in the energy sector Besides being used to create a decentralised transaction model as outlined above, there are other areas in which blockchain technology could be applied in the energy sector. Blockchain technology could be used to build a simple, blockchain-based billing model and thereby help remove one of the largest barriers currently preventing users from adopting electric mobility on a large scale. Widespread use of electric vehicles (EV) can only become a reality if EV drivers can access charging stations everywhere. One issue we face today is how to simplify billing at charging stations, which may be located in public spaces where they can be used by anyone. Blockchain technology could be one option (besides other advanced payment models) on which to base a model under which EV drivers could park their cars, for example to go shopping, whilst the car autonomously logs on to a charging station and is recharged automatically (in the long run maybe even through induction). Once the driver leaves the parking lot, the charging station would automatically bill them for the electricity received, using blockchain technology. Another area of application that might become more important in the near future is the integration of blockchain technology in the area of smart devices. With smart devices communicating with each other as well as with other devices both inside and outside of homes and businesses in the future, a communications medium will be needed that is capable of transmitting and storing the related information and transactions. Using blockchains for this purpose could be a good option. Moreover, the blockchain's functioning as a distributed record of transaction data can be used to create a comprehensive archive of all electricity billing data. Following a smart meter rollout (which would be a prerequisite for this), blockchain technology could become a tool consumers can use for meter reading and billing purposes in connection with their digital electricity meters. The key here is the added control consumers would gain over their electricity supply contracts and consumption data. An important current development that will fundamentally shape the framework for the above applications is the German Act on the Digitisation of the Energy Transition (Gesetz zur Digitalisierung der Energiewende), which entered its final reading stage in the German federal parliament, the Bundestag, in June 2016 and is expected to enter into force in 2017. The primary focus of the act is to introduce an obligation to install intelligent measurement equipment for the purpose of metering and transmitting the energy demand of consumers and the energy output of producers. Aspects of electric mobility are also to be a part of the concept underlying the act. Both charging points for electric cars and their users are expressly defined as end users for the purposes of the act. Where charging points are to be fitted with intelligent measurement systems, the envisaged statutory provisions for their installation and operation thus apply. In principle, other related applications outside the electricity sector are also possible, for example when it comes to billing customers for the energy they use for heating space and water, an activity which is now mostly carried out by professional providers of meterreading services such as Brunata, ISTA or Techem. Suspected cases of overcharging and oligopolistic control are frequently reported for this market segment, where tenants in particular have few options at their disposal to challenge the fees they are charged. In a blockchain-based system, tenants could select their meter readers by picking a service provider that offers a good deal and using the blockchain to exchange their smart meter data with them in a transparent way.

5 - Regulatory challenges posed by blockchain applications in the energy sector

5.1. Current regulatory framework The current regulatory unbundling provisions require energy companies to separate their network activities (regulated business) from the supply of energy to customers (competitive activity). Customers have the right to freely choose their electricity supplier (or gas supplier) in a liberalised electricity market. In order to ensure that customers can smoothly transfer between suppliers, so-called balancing groups were introduced. This made it possible for each customer to be assigned to a supplier in a simple way. Another significant area of regulation is the so-called clearing process, which is run to reconcile planned consumption against customers' actual consumption as recorded by their meters. The difference between these is referred to as balancing energy and the costs incurred in relation to this are charged to each electricity supplier according to causation. A key prerequisite for the regulatory regime to function properly is that each customer is accounted for as part of a balancing group – by clearly assigning customers to balancing groups and their suppliers to the responsible balancing group managers (which may or may not be the same entity). The meter operators obtain readings of the verified meter data relevant for billing and transportation charging purposes and pass them on to the other players involved: • to the relevant electricity supplier for billing purposes • to the relevant transmission system operator (TSO) for clearing and settlement purposes. The TSO collects all data for each balancing group and aggregates it in order to determine the balancing energy costs to be allocated to the balancing group. • to the relevant distribution system operator (DSO) • to the relevant balancing group manager, who in turn charges the balancing energy (cost-generating) it has been allocated to the suppliers using its balancing group. The above shows clearly that a simple delivery of electricity entails complex settlement processes across the entire electricity market and that the corresponding meter readings are required for various purposes. In order for the market model to function properly, each customer must be clearly assigned to a balancing group. Balancing group managers are required to provide security in order to ensure that the costs incurred in relation to balancing energy can be recovered.

6 - Blockchain opportunities in the energy sector Lower energy bills for consumers

Blockchain models operate on the assumption that all providers transact directly with their customers. One consequence of this would be that the intermediaries previously operating in the market, among them trading platforms, traders, banks or energy companies, might no longer be needed at all but in any case they would be reduced to a considerably smaller role. This could lead to a significant decrease in system costs. The types of system costs that could be reduced or even completely eliminated include the following: • no or lower costs to account for the costs (including personnel and other operating costs, infrastructure etc.) and profit margins of the above companies that are currently active in the market but will have no or only a reduced role in the future system • no or lower operating costs for meter reading, billing etc. • no expenditure required for payment reminder and debt collection processes • no costs for bank payments (especially direct debits for payments by customers) • possibly lower transportation charges • no certification costs for renewable electricity The above cost reductions would lower the energy bills of consumers, whether directly or indirectly. On the other hand, there are the operating costs of blockchain systems, which include transaction fees for blockchain transactions. The required computing power and related energy use might also have to be factored in. The actual costs of blockchain applications cannot be projected today. It is becoming clear, though, that there will be differences in terms of cost between private and public blockchains. Private blockchains usually involve lower transaction costs and operate on the basis of simplified verification processes (for instance, proof-of-work verification uses up more energy than the proof-of-stake process), which decreases costs. All cost considerations must also factor in the investment required to make the electricity networks more flexible: blockchains can only be used effectively if the power grid is capable of coping with a larger number of individual energy producers and of managing greater flexibility, all of which is also essential to ensure supply security. The smart meter rollout planned to be launched in 2017 will provide favourable conditions for more flexible power markets. Another point to be considered is that maximum cost benefits can only be achieved if as many providers and customers as possible agree to use blockchain applications that are based on common standards and rules. This would prevent the parallel emergence of incompatible applications. Another factor enabling savings on energy bills is that energy consumers would also have considerably greater flexibility in choosing their supplier. In blockchain-based transaction systems customers almost constantly switch supplier, as they can find new transaction partners and contract with them within extremely short timescales (down to a few minutes). Transparency Use of blockchain technology would ensure greater transparency for consumers. It would allow consumers to track exactly where the electricity they purchase was produced. Direct transactions between energy providers and energy consumers would enable the parties to specify exactly the “contractual counterparty”, i.e. the wind or solar farm delivering the energy. This would make it possible to determine precisely the source of the electricity supplied, for example in terms of the percentage share of renewable energy. Every energy consumer would specify these aspects individually and to an unprecedented level of granularity. Accordingly, the entire transaction history stored on the blockchain (energy consumed and payments made) would also become transparent. The availability of a full transaction history and the possibility of running analyses on this basis would afford customers an as yet unrivalled level of clarity. Commercial and large customers who already have such data at their disposal today would be charged less for them, whilst probably having more details available on which they could base their analyses. A point to be critically reviewed in this context is what drawbacks this level of transparency would entail, as under the basic blockchain model all transactions are publicly accessible. The individual users would use aliases, but it is theoretically possible to “decrypt” a certain number of aliases without authorisation, which might pose a risk.

7 - Blockchain potential from a regulatory perspective

Our initial analysis of the regulatory issues to be addressed in connection with blockchain applications has also revealed the areas where the technology can potentially deliver its benefits: • Direct customer-to-customer transactions & financial settlement: Customers could take over the supply business themselves. This would facilitate community funding of energy assets, regional energy pools and regional energy self-sufficiency. The new technology could help implement this in a more efficient way whilst providing a verifiable record. It is already possible for citizens to participate in energy projects today, but this still requires the involvement of many other actors, such as banks and energy companies. Blockchain technology would allow them to realise concepts such as “From your region - for your region” on their own initiative and on their own terms. • Verification & certification: Figure 15 illustrates another strength of blockchain technology – the option to clearly verify the source of electricity. Thanks to its synchronicity (generation and consumption) and capability to provide clear and verifiable records, blockchain would be the first technology to make it possible for the source of electricity to be determined. Guarantees of origin could be issued with greater certainty. This would also make it easier to issue certificates for emission allowances and energyefficiency improvements, which would in turn simplify the complex systems currently used. • Clearing & settlement: It is not only prosumers who may stand to benefit, but also transmission system operators, as using blockchains would allow them to clearly attribute clearing data to individual market participants. The planned introduction of smart meters will only help to allocate consumption quantities to a balancing group and to the electricity suppliers using that balancing group. A blockchain-based system would make it possible for the energy consumed to be clearly traced back to the point where it was generated. Overall, this would lead to significant cost reductions, with end users directly benefiting from a more efficient system.