GreenPower

The Global Rewards Currency

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Version 1.1

Index

Abstract

Green is commonly used to represent growth, health and sustainability. GreenPower is a hybrid cryptocurrency that encompasses all of these qualities. GreenPower has been designed to reach mainstream levels of global growth, has been structured to maintain optimal systemic health and has been built to deliver long-term operational sustainability. The focus of GreenPower is on achieving unprecedented levels of utility, liquidity and efficiency within the realm of blockchain technology. GreenPower serves the global marketplace as the featured rewards currency in a universal customer loyalty program hosted by merchants throughout the world.

GreenPower was developed on world-class blockchain technology (Graphene) and features a unique hybrid consensus mechanism and a highly-efficient consortium-based network configuration. The resulting mutual distributed ledger system, known as the Powerchain, confirms transactions in just three seconds and has the capacity to process over 100,000 transactions per second. GreenPower has a fixed supply of coins that were fully distributed during the past two years to approximately 150,000 account holders in over 180 countries, all of whom received their coins only after having verifiably contributed time and considerable value to the system.

At its core, GreenPower is a hybrid cryptocurrency that combines the best qualities of decentralized systems with the strongest elements of centralized systems while eliminating their respective weaknesses. The unique structure of GreenPower gives it strategic advantages over its competitors that can deliver superior levels of utility, liquidity and efficiency.

Introduction

GreenPower has been designed to answer three important questions:

1) How will the global mainstream adopt blockchain technology?
2) How can a cryptocurrency achieve optimal levels of systemic health?
3) How to create a blockchain with enduring operational efficiency?

The starting point for developing answers to these questions was a digital currency that successfully delivered superior performance through greater operational efficiency, increased transaction capacity, wider distribution, better governance and enhanced regulatory compliances. GreenPower was created from a hard fork of that system (DasCoin 2.0), which in turn had been created from a hard fork of BitShares 2.0 using the Graphene Toolkit.

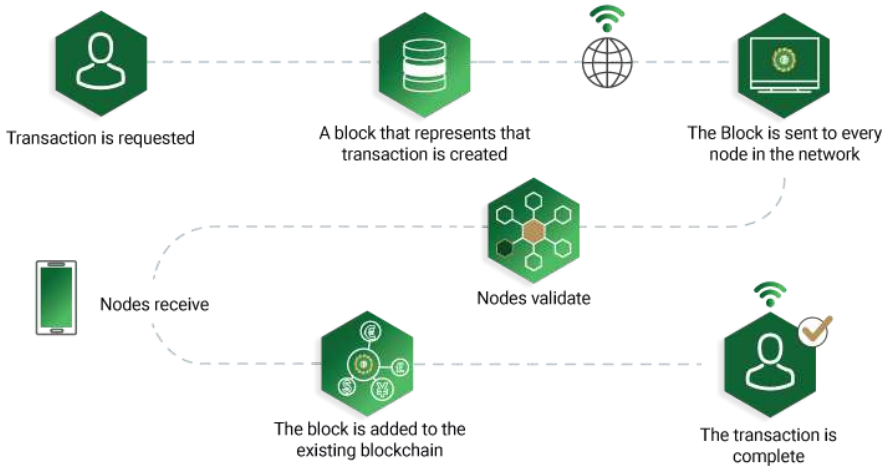
GreenPower is a convertible “store-of-value” unit at the center of a global digital asset system. This system was developed and launched without an initial coin offering (ICO) and without outside investment capital, and has been operating successfully for nearly three years.

GreenPower is at the center of an ecosystem of companies (the Green Ecosystem), each of which works synergistically to enhance the overall value of the system for its participants. The system seeks to redefine how incentives can be used in the emerging economy as well as improve the quality and efficiency of the exchange of value between individuals, businesses, financial institutions, cooperatives, and merchants. Propelled by the power of its hybrid structure and benefitting from its streamlined operational model, GreenPower is well positioned to become the world’s first mainstream digital currency.

Architecture

Blockchain

The foundational technology on which GreenPower has been created is called BitShares. The BitShares Blockchain makes use of a lesser-known consensus mechanism called Delegated Proof-of-Stake (DPoS) that was developed specifically to replace the wasteful “mining” process, increase throughput and reduce reaction times of the blockchain. It also offers tremendous reductions in the consumption of electricity.



Graphene is a software platform designed for deploying third-generation cryptographically-secure decentralized ledgers, also known as “blockchains”. Graphene is a toolkit for real-time blockchains. Graphene-based systems have orders-of-magnitude better performance than first-generation Bitcoin-derived systems or even the second-generation “Bitcoin 2.0” systems that constitute its current closest competitors. Graphene-based systems are ideally suited for transaction-intensive use cases and offer a broad range of built-in features and services distinguished by their transparency and intrinsic incorruptibility.

Graphene

Graphene is a prominent blockchain technology that works in a more effective way of transmitting blocks efficiently across the network. It uses bloom filters like compact blocks which consist transmitting transaction IDs of the selective blocks and all these emerging technologies are using bloom filters to perform a quick and rapid transaction. Bloom filter is a compact way of determining data for example, 'ABC' is a transaction having larger data but the requirement is of 'B' only then Mempool efficiently select 'B' and transmit it through the network. Graphene proficiently reduces the size of data transaction and is far superior for a thin block and the core's compact blocks as well. Delegated Proof-of-Stake (DPoS) is a known method that achieves the high transactions-per-second capacity by using short block time, and it is beneficial for those who make the block and have a smaller subset of block creator.

Consensus

Bitcoin and Ethereum are based on a Proof-of-Work (PoW) consensus mechanism, where all the nodes can participate in the competition of adding blocks to the blockchain. The PoW mechanism seems completely decentralized on paper, but in reality, with increasing load on the system – it outgrows the computational power needed to mine these blocks. At a certain point, it becomes nearly impossible for a person with a desktop computer to add any value to the system. In such scenarios, only huge mining rigs and pools are able to mine and add blocks.

PoW-based blockchains are facing a major backlash, due to the amount of power being used in the mining process. The Bitcoin network alone consumes more electricity than 159 individual countries. With these drawbacks, there was always a growing need for less power-hungry and more decentralized consensus mechanism. This is what led to the creation of DPoS.

Blockchain Elements

Reaching Consensus

Consensus mechanisms are protocols that make sure all nodes (servers in the network that maintain the blockchain and sometimes process transactions) are synchronized with each other and agree on which transactions are legitimate and should be added to the blockchain.

By providing the system with a reliable way to reach decisions, consensus mechanisms enable a blockchain to function properly. Multiple nodes can submit transactions to be added to the blockchain, so it's necessary that all transactions are constantly checked and that the blockchain is constantly audited and this is most efficiently accomplished by the nodes themselves. Without a solid consensus mechanism, the blockchains are at risk of various attacks.

Following are popular consensus mechanisms:

Proof-of-Work Consensus (PoW)

The Proof-of-Work process is known as mining and the nodes are known as miners. Miners solve complex mathematical puzzles which require a lot of computational power. The first one to solve the puzzle gets to create a block and receives a reward for creating a block. These mathematical puzzles have some interesting properties. This process ensures that in order to create a block, one will need a lot of computational power to solve the puzzle first.

Miners can mine blocks using a range of different hardware:

- CPU Mining: Using a normal computer's CPU to validate transactions in a proof of work consensus protocol.
- GPU Mining: This is not dissimilar to CPU mining however, in this case, a graphics card is used. Graphics cards are more powerful whilst relatively using less electricity.
- Mining Pools: To increase the likelihood of successfully mining a block miners pool together their resources and shares potential rewards depending on how much each miner contributes.
- Cloud Mining: Some miners rent out their processing power to other miners for an allotted period of time.

- FPGA Mining: Otherwise known as “Field Programmable Gate Array mining”, an FPGA is a circuit tailored for a specific computing task, making them several times faster at mining than normal processors.
- ASIC Mining: This refers to an “Application-Specific Integrated Circuit”, a circuit customized for a particular use. ASICs easily outperform CPUs, GPUs and FPGAs in both speed and efficiency, they are generally used for Bitcoin mining.

Limitation: There is a major drawback to this consensus mechanism. Proof-of-Work uses a lot of resources and is said to be unsustainable in the future, which is why some blockchains are moving to different consensus mechanisms.

Proof-of-Stake Consensus (PoS)

Proof-of-Stake is based on the premise that those who own the majority of coins in a network have a vested interest in keeping the network maintained and the value of its coins high. It is a randomized process used to determine who gets to produce the next block. Users can stake their tokens to become a validator (which enables them to produce blocks). In most PoS systems, this requires the user to lock their tokens up for a certain period of time. After doing so, they are eligible to produce blocks. The process that decides who gets to produce the next block takes a couple of factors into account, and what these factors depend on the design of the blockchain, but in general, the person with the largest stake has the highest chance to produce a block. Another factor that can influence the likelihood of producing the next block is the duration that the staked coins have been held.

Validators are also rewarded for their work, with the reward that validators receive for creating the next block depending on the design of the blockchain. Usually, they either receive all or part of the transaction fees of all the transactions in the block they created, or they receive a fixed amount of coins (generated through inflation).

Proof-of-Stake is not only much more energy efficient than Proof-of-Work systems, but it also has another major distinction. In a Proof-of-Work system, a miner may not own any of the coins they are mining, meaning they only seek to maximize their profits without actually improving the network. In a Proof-of-Stake system, validators have a much bigger incentive to maintain the network as they actually hold the coins of the blockchain on which they are validating.

Delegated Proof-of-Stake Consensus (DPoS)

The Graphene blockchain is based on the Delegated Proof-of-Stake (DPoS) consensus mechanism, where 'N' number of witnesses are selected via continuous voting by stakeholders to produce blocks. This 'N' is an odd number, only for those whose witnesses producing the blocks in their respective time slots until the next maintenance interval. After the maintenance interval, the algorithm chooses the next set of witnesses based on the voting results.

It is important to understand that:

- Only stakeholders can participate in the voting process.
- One stakeholder can only vote for one witness.

Apart from witnesses, the stakeholders also elect delegates who have the privilege of proposing changes to the network parameters. These changes range from something as simple as transaction fees – to the number of elected witnesses. A particular majority of delegates approve the proposed changes; post this, a two-week period is given to the stakeholders, during which, they may vote out the delegates and veto the proposed changes (note that these network changes aren't very likely to be proposed). Thus, under DPoS it is safe to assume that the administrative authority rests in the hands of the users, just like a democracy. But unlike witnesses, the delegates are not compensated for retaining their positions.

Proof-of-Authority Consensus (PoA)

Proof-of-Authority is a modified form of Proof-of-Stake where instead of stake with monetary value, a validator's identity performs the role of stake. In PoA-based networks, transactions and blocks are validated by approved nodes, usually known as validators. Validators run software allowing them to put transactions in blocks. The process is automated and does not require the validators to do active monitoring. However, it does require maintaining authority node(s) without interruption. PoA requires whitelisting for node communication from emerging nodes on an established network.

With PoA, individuals earn the right to become validators, so there is an incentive to retain the position that they have gained. By attaching a reputation to identity, validators are incentivized to uphold the transaction process, as they do not wish to have their identities attached to a negative

reputation. Some consider this consensus mechanism to be more robust for the following reasons:

- In PoS, the same size stake can be valued differently by different participants. While a stake between two parties may be equivalent, this does not take into account each party's total holdings, which means that the incentives can be unbalanced.
- Meanwhile, PoW uses an enormous amount of computing power, which, in itself lowers incentive. It is also vulnerable to attack, as a potential attacker would only need to have 51% of the mining resources (hash rate) to control a network, although this is not easy to achieve.

On the other hand, PoA only allows non-consecutive block approval from any one validator, meaning that the risk of serious damage is centralized to authority nodes.

PoA is suited for both private networks and public networks where trust is distributed. The PoA consensus algorithm leverages the value of identities, which means that block validators are not staking coins but their own reputation instead.

Hybrid Consensus Mechanism

Within Powerchain, the consensus is reached using a modified version of Proof-of-Authority (PoA) that is facilitated through the Delegated Proof-of-Stake (DPoS) mechanism that is native to Graphene. In the Powerchain model, the licensing of Master Nodes acts as the authority mechanism rather than the reputation of the validator. In the Powerchain consensus mechanism, an array of licensed Master Nodes serve as both block producers and validators. Each Master Node's IP address is white-listed within the system in order to enable it to communicate with the network and participate in the random rotation of block production. When not writing an individual block, Master Nodes validate each block produced. The entire block production process is reinforced by the second group of licensed nodes. These are called Ledger Nodes and they record each block produced, but do not write or validate individual blocks. Each Ledger Node contains a complete record of every transaction generated on the Powerchain.

Master Nodes and Ledger Nodes are operated by companies that are either part of the Green Ecosystem or are participating exchanges that list GreenPower and other digital assets derived from the Powerchain. The incentive to maintain these nodes is the enhancement of the associated core business models rather than participation in a systematic transaction fee (which seems to be the more common incentive model for node maintenance).

Initial Distribution

Distribution of initial units/coins is one of the most critical factors in setting the foundation for the ultimate value of a cryptocurrency. However too often within the blockchain industry, initial distribution has been either underanalyzed or overlooked. Problems have been created within many cryptocurrencies due to the dynamics of their initial distribution strategies. Even successful cryptocurrencies have had serious issues to contend within this realm. For example, it's well known that 20% of Ripple's XRP currency was distributed from the beginning to founders and developers. While this seems reasonable in the case of equity of a private startup company, when seen in the context of currencies, it seems misaligned and disproportionate that 20% of a global currency would be distributed from the start to insiders.

There are several basic but highly important questions to answer at the start of every new coin offering:

- Who is receiving units?
- How many units are they receiving?
- Why are they receiving those units?

Every currency and token must answer these questions from the start, though due to the self-interest of the controlling parties, rarely is this distribution dilemma talked about publicly.

As a hard fork of DasCoin 2.0 and the supported store-of-value currency within the Green Ecosystem, GreenPower inherited the initial coin distribution of DasCoin. This was a highly unique coin distribution method since it featured a time-intensive "minting" process as well as incorporated a factor of risk/reward. In this minting model, participants contributed value into the

system and received a certain number of Cycles (a utility token) based on their respective level of contribution.

Cycles were designed to serve two purposes:

- They could be exchanged within the system for blockchain services
- They could be converted into coins by submitting the Cycles into a "minting" process.

To initiate the second option, Cycles would be submitted to a minting queue (comprised of the submitted Cycles). Then every ten minutes, a certain number of Cycles were converted or "minted" into a certain number of new coins, and distributed directly to the vault of the party who submitted the Cycles. The exact conversion factor (which was called "Frequency") increased every two weeks based on the amount of value that had been collectively contributed to the system during the preceding two-week period. This conversion factor was designed to correlate with the changing dynamics of the inherent risk/reward relationship of the entire system. As more value was contributed to the system, there would be more resources to build out the ecosystem and its applications, and the overall risks were proportionately lowered, thereby reducing the potential reward, which in the system was represented by the issuance of "minting" of coins.

The conversion factor (Frequency) was the control mechanism within the minting process, and because it went up every two weeks, it took increasingly more Cycles (the value of which remained constant during this process) to mint an identical amount of coins. The resulting dynamic rewarded the high risk taken by the earliest adopters (when it took just 2.5 Cycles to mint one coin and there were very few people who had contributed value to the system) with proportionally more coins for the same amount of contributed value versus those who contributed value during the last stage of growth of the system (when 20 Cycles were required to mint one coin).

The minting process systematically introduced a risk/reward factor into initial coin distribution. It was a unique solution that proved to be an effective mechanism for initial coin distribution, as it resulted in the initial 3,294,166,501 coins being distributed to approximately 150,000 accounts in over 180 countries. Each of these accounts contributed a minimum of €100 of value (and as much as €25,000 in some cases) to the system. All coins in the system were created through this minting process, and therefore there were no coins

distributed for free to anyone (including the ecosystem company founders and the initial development team).

Company founders contributed value for their respective Cycles in the same manner as other minting participants (in many cases they did benefit from the lowest Frequency rate, though the risk at the time of their contributions was at its highest level). Members of the development team made their contributions in the form of the services they performed, and it's important to note that the value of those services was calibrated using the same scale as the contributions made by standard participants (not using a raw number of coins or a percentage of the entire coin base). This is a major difference when compared to virtually every other cryptocurrency and token project. There was no "percentage of coins" distributed to the founders and developers. There were no freebies, no air drops, and no gifts. Very simply stated, there were no free coins ever distributed within the system. All participants first contributed a standardized-calibrated amount of value to secure Cycles and then submitted those Cycles to the minting process, which generally took about three months from the date of submission to the minting of coins over the course of the two years that the minting process was in place.

After two soft forks (that occurred prior to the hard fork of DasCoin v2.0 that resulted in GreenPower), the minting process was permanently terminated. Consequently, the supply of GreenPower is fixed at 3,294,166,501 and all these coins have been distributed. Ecosystem company founders have set aside one vault address to fortify the long-term operation of the ecosystem. Apart from this address (1.2.27), which can be tracked on GRNexplorer.io and contains coins that are held in the trust for the ecosystem, all other GreenPower coins are in circulation.

System Elements

Transactions

When users want to interact with any blockchain, they construct so-called transactions and transmit to the network. These present messages contain instructions about what particular operation(s) a user wants to use. A common operation is the simple transfer operation that comes with transfer-specific instructions that provide the necessary information for this action (such as the sender, receiver, the amount to transfer as well as an optionally encrypted memo). To allow multiple operations to take place subsequently, multiple operations can be bundled into a single transaction. To identify within the system, transactions are cryptographically signed by the users. These signatures authenticate a user and provide authorization for the operations in the transaction.

Networking

A blockchain merely defines a means of storage and can be used in a non-distributed, single-participant fashion as well as in a distributed internet-based mesh network often referred to as Peer-2-Peer (P2P) network. In the latter case, multiple parties are connected with each other in a way that incoming transactions are forwarded to every other connected participant. A transaction ultimately reaches a so-called block producer. A block producer verifies incoming transactions against a hard-coded protocol and bundles them into a single block that is added to the existing blockchain. At this point, a transaction is considered confirmed and executed. The effects of an executed operation on the current state are defined in the blockchain protocol.

Performance and Scalability

The Powerchain is an extremely high-performance blockchain, confirming transactions within three seconds and having the capacity to process 100,000+ transactions per second on a distributed network. Even higher levels of performance achievable with relatively straightforward improvements to server configuration and communication protocols.

The following are key points for high performance reflected in the system:

- Keep everything in memory.
- Keep the core business logic in a single thread.

- Keep cryptographic operations (hashes and signatures) out of the core business logic.
- Divide validation into state-dependent and state-independent checks.
- Use an object-oriented data model.

Protocol

The Blockchain protocol is the most essential part of blockchain technologies. It defines the behavior of the entire system including consequences and side-effects when processing transactions. Users utilize particular features by crafting a transaction that contains a particular letter-of-interest.

Blockchain only stores incremental changes (e.g. transactions). The final balance of each account together with other information needs to be tracked separately in the so- called “current state.” It is important to note that the protocol is deterministic in the sense that the very same state is generated when applying the same sequence of operations. This makes blockchain technologies more secure and auditable.

System Principles

The Powerchain was developed with the following principles in mind:

Utility

The primary objective of the Powerchain system is utility. The system has been designed to facilitate mainstream levels of utility through various applications using the services of the system’s blockchain.

Rewards

Rather than compete solely as a direct payment solution, GreenPower can also be used as a reward for customer loyalty and as an incentive to encourage purchases at participating merchants. There are many problems with the existing customer loyalty solutions. These programs can be valuable but are scattered and lack standardization, making it very difficult for consumers to track their progress and manage their rewards. The rewards of one program are generally not honored by other programs, so it can be difficult to redeem rewards from certain programs. The lack of interoperability also makes it difficult to gauge the intrinsic value of the rewards. Consumers

also must contend with expirations and other control factors in the redemption process.

There are also considerable problems with customer loyalty programs when seen from the merchant perspective. First of all, it's a competitive marketplace and merchants must compete successfully for customer loyalty to thrive in today's market. This can make loyalty programs expensive and time-consuming to manage. The management and administration of these programs can present staff training challenges. For merchants who do not currently offer a rewards program, the learning curve can be significant. These programs are usually customized and require time and upfront investment before they can be deployed. Loyalty solutions in today's marketplace are generally not plug-and-play and not intended for cross-border collection or redemption.

GreenPower, the native store-of-value unit of the Powerchain, is designed to serve as a global rewards currency. It offers a number of advantages over other forms of rewards, including that it can be easily redeemed for goods and services, and converted/exchanged into other forms of digital or fiat value. Unlike most rewards, GreenPower is not pegged to a particular fiat currency. It is a free-trading store-of-value unit that can increase or decrease in value based on marketplace dynamics.

There are specific applications that further support this use case:

- **GreenRewards.com:** This is a universal customer loyalty program that uses GreenPower as its primary rewards currency. The participants in this program, who are either free or paid members, actively collect GreenPower as a rebate on purchases at a variety of online retailers.
- **Traveleum.com:** This is a discount travel membership that provides crypto-back rewards on various travel services, including hotels, flights, car rentals, condo stays, and cruises. Participants in this program, who are either free or paid members, collect crypto-back rewards and receive double rewards if they select to receive GreenPower.

Other Use Cases

The unique combination of hybridized features makes the Powerchain an ideal system for a number of additional use cases. The Powerchain enables the creation of new solutions that significantly enhance applications that had

previously used more centralized traditional formats. Several of these new applications are already in development, including:

Stable Coins & Tokenized Assets: The Powerchain is well suited for the operation of collateralized stable coins and tokenized assets (e.g., precious metals, real estate, artwork). Tokens that are collateralized or backed by commodities or other real assets inherently have centralized repositories where the underlying value is being held. Integrating the necessary control and security protocols to manage these arrangements on a blockchain makes the Powerchain a natural choice for these types of applications.

Real-Time Crypto Payments Gateway: Using the Powerchain's native exchange, a payment gateway can be created that would enable real-time conversion of digital assets from one variety to another. When applied to the realm of payments, this type of gateway would make it possible to use GreenPower as well as other cryptocurrencies (provided each has adequate liquidity) for payment mechanisms.

Mediated Crowdsourcing Platform: Since the development of a derivative token involves an inherent level of centralization, the management of various types of token offerings can take place on the Powerchain. Specialized formats of tokens, such as the premium token, which distributes value to token holders based on the achievement of agreed-upon Key Performance Indicators (KPIs), can be easily developed and managed using built-in features of the Powerchain.

Real-Time Crypto Payment By Debit Card: While there have been a number of debit cards that enable users to sweep over fiat currency proceeds from a previous sale of crypto assets for use in card purchases, a better solution involves the automated real-time conversion of a crypto asset at the time of the purchase decision. Over the past nine months, a proof-of-concept of this solution has been deployed to a test group of approximately 500 users that have successfully completed more than 5,000 transactions in 33 currencies and in over 50 countries.

Hybrid Escrow Service: Escrow services have historically always been highly centralized. With an inherent need for dispute resolution, which is nearly impossible to do within decentralized systems, the Powerchain offers compelling features that support the operation of various escrow services. A peer-to-peer escrow exchange is the first use case that will make use of the Powerchain's built-in escrow capabilities.

Security
Security is of paramount importance within the system. The system is protected through a combination of factors including the systemic defense of its unique consensus model which features peer-to-peer communication between nodes using white-listed IP addresses as well as a series of operational security protocols for use in the key management of critical elements of the system.

Convenience
Wherever possible, the system incorporates features that improve convenience and ease of use. Security and convenience are often diametrically opposed, but the system has been designed to optimize the balance of these two important characteristics.

Efficiency
The Powerchain was developed to operate efficiently, increase throughput and speed-up transactions. Bitshares is the core of the Powerchain's processing engine and benefits from the efficiencies of DPoS and Graphene toolkit elements to facilitate an extremely high transaction capacity.

Sustainability
A prime objective of the entire system has been long-term sustainability. The system was conceived to reliably and efficiently operate for decades into the future. Decisions were made in the architecture of the system that was in alignment with that goal.

Transparency
Data is available publicly and anyone can access it to check the balances and transactions on Powerchain's Block Explorer (www.grnexplorer.io) and this maintains the transparency and data integrity among the users.

Authenticity
The transaction and the flow of data are not held by any single entity and can be accessed by the participants of the Powerchain system. The actions performed by the participants within this network are verified by the nodes which maintain the authenticity of the system.

Privacy
The system was designed to preserve the privacy of individuals without the need for anonymity. Transparency is maintained, without any compromise to

either the system security or the preservation of the privacy of network participants.

Simplicity
An overarching goal is to keep the system as simple as possible, particularly related to all user interactions.

Trust
A prime objective is to use the infrastructure of a digital asset system to build an effective network of trust, enabling all participants and stakeholders to share a common goal of increasing the value of the network and cultivating its growth. The network will achieve this by granting trust to certain roles (such as the Board and chain authorities) to perform chain management and maximize the efficiency and utility of the network, programmatically ensuring that each trusted role is well defined and does not overstep the boundaries of its authority.

The system provides an inherent incentive to behave within the common interest of the network, and makes sure that any misbehaving authority is shut off from the network and liable to be punished for breaking the rules. The accuracy and level of operations of the blockchain are verified by qualified third parties, providing a high degree of transparency while also ensuring that the privacy of all participants of the system is well preserved.

System On-Boarding

Digital Wallet Partner
The Green Ecosystem has licensed a Singapore company to provide its native digital wallet service. The company also conducts Know Your Customer (KYC) information about each client, follows Anti-Money Laundering (AML) procedures, and provides a number of services in support of participants who choose to access GreenPower within the ecosystem's associated wallet system. This digital wallet system requires the use of a hardware device (either a branded Validator or a Ledger Nano S/X) to transact higher thresholds of activity.

Blockchain Exchange
The Powerchain incorporates a decentralized exchange that trades, settles and clears GreenPower over its blockchain autonomously.

Partner Exchanges
Additional access points for handling GreenPower and other digital assets derived from the Powerchain include several public cryptocurrency exchanges. Trading under the symbol of GRN, GreenPower can be purchased, sold and held in accounts through these exchanges, which include CoinBene, CoinFalcon, IDAX, BTC-Alpha and EUBX.

Network Elements

The node network supporting GreenPower has a permissioned structure which incorporates "chain authorities" and Board management to streamline control, enable better performance, assure sustainability, facilitate faster iterations and ultimately support more innovative applications.

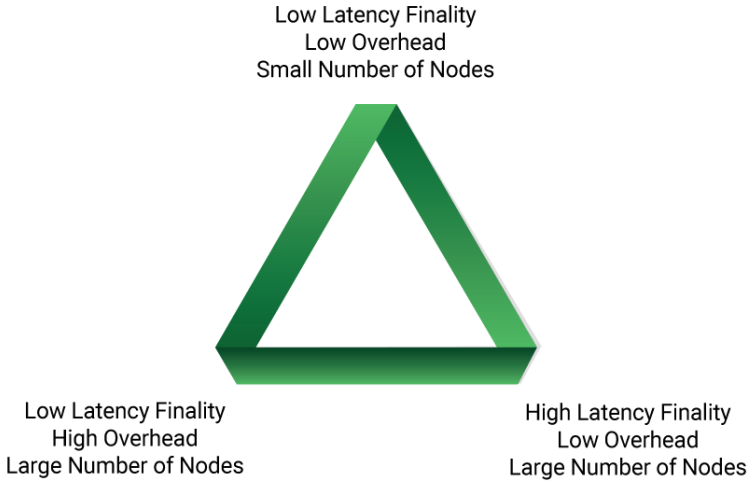
There are several unique elements to the network deployment of the Powerchain.

Master Nodes
The role of the Master Node is to aggregate transactions with the intention to produce Blocks. Only Master Nodes have the authority to write transactions into the Blockchain ledger history. Each Master Node is aware of the other and they must have been voted in by the governing system. Master Nodes are novel in that their authority is represented with cryptographic keys. This means that each Master Node must have registered its Public Key and will sign with its Private Key during the time of Block Production. Therefore, it is possible to hold any one particular Master Node accountable for its actions.

Ledger Nodes
Ledger Nodes are non-authoritative maintainers of the Powerchain. In other words, Ledger Nodes do not produce blocks, yet they aggregate transactions and pass them to the Master Nodes for Block inclusion. Ledger Nodes are able to verify transactions are therefore useful for both increasing the footprint of the GreenPower Consensus Network and permitting connectivity to reach farther without requiring the need to assign authority to the node. Transaction propagation is accelerated because of Ledger Nodes.

Consortium Structure
There are always trade-offs in configuring a blockchain system. No system can offer all the best aspects in one configuration. Certain factors must be balanced, as an increase in one leads to a decrease in another. Nonetheless,

while the consortium structure features a lower number of nodes and is less decentralized, it is able to deliver the high security of law latency finality, and the high scalability that accompanies reduced overhead. Overall, this consortium approach delivers what is arguably the best combination of characteristics.



Low latency finality provides high security. A large number of nodes provides high decentralization. A low overhead provides high scalability. You cannot obtain highs for all three, as there are tradeoffs to each metric.

Board of Directors

The Powerchain enables a governing board to regulate the parameters of the network. The Board is comprised of members nominated and appointed by the Chairman. Mr. Michael Mathias currently serves as the Chairman of the Board of Directors.

- The role of the Board is to propose and modify chain parameters, to support the normal functioning and growth of the network.
- The Chain Executive performs certain delegate actions to check the power of said executive with the ability to terminate their access to the network to avoid the risk probability.
- The Board itself has no control on the state of the database or the construction of the blockchain and is programmatically prevented from making any changes to it.
- The network itself manages and maintains the state of the transaction ledger, as it is the only way for making any undesired changes to

subvert the majority of Master Nodes without any interference of the Board.

- An Executive Director who works on the Board is responsible for ensuring all its decisions and initiatives that are enacted and enforced for completing the management of the network.

The Executive Director is responsible for directly overseeing all Chain Authorities and can attend all Board meetings but is not permitted to vote, unless during a crisis when an additional vote is required in order to satisfy the condition of three votes.

Chain Authorities

Chain authority roles exist to handle smooth inputs to the Powerchain of user data that exists outside of the system. The problem with fully decentralized systems is the fact that they cannot have reliable inputs, for example, Bitcoin is created internally in the Bitcoin blockchain and is merely transferred around. In order for a system to have reliable inputs, there must be the certainty that value has been contributed to the network. Value cannot exist without an independent observer and so the only way to verify that the user has submitted the value to the system is to maintain an impartial observer.

Each authority role is set up in such a way that:

- There is no way for the authority to make a meaningful unwanted impact on the state of the network as the network can fall back to a failsafe state.
- The actions of the authority are checked by a separate authentication authority and there are programmed measures to assure there is minimal chance of collusion.
- There are incentives to perform in the best interest of the network.
- Any malicious action by the chain authority is transparent and will lead to that account being marked as untrustworthy, shut off from the network and penalized.

Chain Operations

The Board sets the procedures and ensures the proper execution of the following:

- The authorization of Master Nodes and Ledger Nodes within the Powerchain network infrastructure.

- Intervention at times of crisis,
- Execution of all Board Parameters

The Executive Director oversees the performance of all chain authorities, manages the flow of proposals for the Board to consider, and facilitates referendums. Provided proper procedures have been followed and necessary thresholds have been surpassed, the Executive Director is responsible for enforcing all Board initiatives and decisions, and is fully accountable to the Board for all operations within the system.

Overall System Efficiency

The Powerchain system relies on a shared chain state in the memory database of stateful objects related to user data such as account balances of GreenPower (and other digital assets). Blockchain state is fully reproducible by applying the transactions in order. The blockchain nodes form the state by applying transactions from the previous blocks, however, the state consensus is reached by following the longest chain of blocks that node can see.

One of the main goals of the Powerchain is a high capacity of fast transactions. Because each node stores the shared state in memory, transactions can be quickly validated across the network. This significantly increases the number of transactions that can be included in a block and thereby increases the overall throughput of the network. There is no demanding Proof-of-Work required to sign a block, each witness can quickly collect and verify transactions against the global state to form a block of valid transactions, or sign them with their block signing key and transmit the signed block to the rest of the network. Nodes can also quickly roll back transactions in case of consensus failure, both in case the block being rejected (due to being on a shorter fork during fork resolution) or due to the transaction expiring without being included in any blocks.

Long-Term Sustainability

There are inherent efficiencies to the Proof-of-Authority and Delegated Proof-of-Stake consensus models. Rather than incur the financial burden of protecting an openly-configured network of peer-to-peer servers, these methods of reaching consensus employ significantly more efficient means for reaching consensus.

By balancing aspects of centralization with elements of decentralization, the system is capable of managing itself through a sufficiently randomized but highly-efficient consensus method. By incorporating closed-system architecture in the operation of its consortium of network nodes, while preserving open-system dynamics in other aspects of the system, the Powerchain is able to benefit from the advantages of blockchain protocol without the burden of the inefficiencies associated with decentralized open-system architecture and with reduced security challenges versus those associated with centralized systems. Together, these dynamics create a blockchain system that features high security, high scalability and is extremely sustainable over the long term.

Growth Dynamics of the Ecosystem

The ecosystem is a vital part of the growth strategy that leads to mainstream adoption of GreenPower. The different components of the ecosystem work together to build grow the scale of the overall system and increase utility and liquidity.

Stage 1 - Foundation: The first stage of the ecosystem involved establishing the fundamental components of the ecosystem, including the blockchain, the network, the digital wallet system and the initial distribution of the store-of-value units, as well as connecting to a number of exchanges. This period lasted 3 years from June 2016 to May 2019. There is now a fixed number of GreenPower units and all have been distributed.

Stage 2 - Momentum: With all units of GreenPower fully distributed, the focus is now on increasing the utility of the coins. GreenPower is meant to be used by merchants as an incentive for purchase and a reward for loyalty. GreenRewards is the universal reward program that enables any merchant in the world to quickly and easily offer customers a world-class customer loyalty program. Traveleum is a prime example that shows how a company can integrate GreenPower into its business. Traveleum offers GRN as “crypto-back” rewards on the purchase of travel services and also pays its affiliate marketers in GRN each time a VIP membership is sold.

As a reward and incentive for customers, GreenPower needs to be easily redeemable for a wide range of products and services. The range of

redemption possibilities can be significantly increased through GRN-enabled payment solutions (e.g., GreenRewards card, AlliancePay cards and the next-generation closed-loop payment system) and the proliferation of our proprietary payment gateway (which enables GRN to be integrated into many existing payment systems).

As a universal unit of reward for customer loyalty, GreenPower must be easily collectible at a wide spectrum of merchants, both online and offline, in countries throughout the world. Merchants will be added by professional affiliates who stand to gain long-term residual streams of rewards for each merchant added to the system. These affiliates receive ongoing rewards through the wallet's affiliate program as compensation for connecting both consumers and merchants to the wallet solutions.

The affiliates offer merchants an innovative closed-loop payment system that offers savings, automated rewards and added security for in-system transfers (where both consumer and merchant are part of the digital wallet system) of a variety of fiat and cryptocurrencies. The system also facilitates payments from the full spectrum of traditional providers, such as Mastercard, Visa, and PayPal. It also offers the merchant a way to offer a customized loyalty program for their customer base that rewards and incentivizes with GreenPower.

The wallet is the heart of the ecosystem. Many of the benefits of the ecosystem are accessed directly through the wallet, including access to exchanges, marketplace, and payment products. The wallet is the center for the consumer as well as for the merchant. As more and more consumers collects rewards through the wallet, and as more and more merchants reward their customers through the wallet, there will be increasing demand for GreenPower. Since GreenPower is of a fixed quantity and is already fully distributed, the added demand is likely to increase the price of GreenPower. The greater the growth of users (collecting and rewarding), the stronger the demand will be on the limited supply of GreenPower. If this happens on a global basis in a strong enough manner, GreenPower can establish itself as the definitive rewards currency for the world.

Ecosystem Roadmap

The following is a roadmap of upcoming product launches and new releases scheduled for the second half of 2019:

July 3	New digital wallet launch
July 5	OREAO beta website launch
July 6	Traveleum beta website launch
July 15	AlliancePay white paper to be released
July 22	GreenRewards beta website launch
July 31	DasMarket beta launch
Aug 14	Automated marketing system launch
Aug 21	Wallet affiliate program launch
Aug 28	First GreenRewards cards to be released
Sep 18	New Das33 Project
Sep 25	First AlliancePay cards to be released
Sep 30	Closed-loop payment system launch
Oct 30	First asset-backed tokens to be released
Nov 15	Trade finance service launch
Dec 6	Blockchain services company launch

Conclusion

The strength of GreenPower is its global utility, the structure of the Powerchain and the alliance of companies, known as the Green Ecosystem, that supports it.

Mainstream Utility: GreenPower has been designed to address the issues that have prevented digital currencies from being adopted by mainstream users. Rather than compete with fiat currencies as a primary payment mechanism, GreenPower is instead positioned to serve as a global rewards currency that can be offered as an incentive by merchants, collected easily by consumers and effortlessly redeemed for a wide range of goods and services. This system of digitally-stored value is capable of solving many of the problems associated with traditional customer loyalty programs. As the rewards currency for one of the world's first universal customer loyalty programs, GreenPower is well positioned to attract a critical mass of mainstream users throughout the world.

Optimal Liquidity: The health of any asset can be defined by the difference between the "buy" price and the "sell" price. The lower the spread, the healthier the market environment, and the stronger the asset. The quality of the fundamentals of the asset combined with the awareness of the market determines the level of the spread. The fundamentals of any cryptocurrency begin with its structure and are heavily influenced by the quality of the initial distribution, its utility, performance, capacity, ability to scale and the ability for the system to sustain itself. GreenPower's fundamentals are extremely strong, starting with the quality of its initial distribution, building on the potential impact of its primary use case and its many additional use cases, and finishing with the soundness of its network architecture and the long-term viability of its operations model. All of these factors can work together to enhance the quality of GreenPower's liquidity. Consequently, as the market better understands the strength of GreenPower's fundamentals, its liquidity is likely to increasingly approach optimal levels.

Enduring Efficiency: In the past, there wasn't enough emphasis on the infrastructure requirements of blockchain deployments, specifically the elements that relate to reliability, availability, scalability and maintainability. These are crucial factors to ensuring that the blockchain can play a viable role in the financial lives of mainstream users. An entire level of quality assurance has been omitted from the realm of blockchain technology mainly due to the

inherent limitations of the decentralized nature of most blockchain technology. The Powerchain provides this missing element through its “hybrid” structure, combining the strongest elements of decentralized systems with certain advantages of more centralized systems. The Powerchain’s structure enables the network supporting GreenPower to deliver world-class performance, seamless scalability and long-term efficiency.

By adapting trust to the digital paradigm, the Green Ecosystem is uniquely structured to provide its participants with the benefits of mainstream utility, optimal liquidity and enduring efficiency. By fulfilling its immense potential, GreenPower is positioned to unlock unprecedented levels of prosperity throughout the world.

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