



GreenPower Whitepaper

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Abstract

Green is commonly used to represent growth, health and sustainability. GreenPower is a cryptocurrency that encompasses all of these qualities. From the start, GreenPower was designed to reach mainstream levels of global growth, while maintaining optimal systemic health and delivering long-term operational sustainability. By leveraging state-of-the-art advancements in web3 technology, GreenPower will serve as the anchor currency in a set of next-generation marketplace incentives.

GreenPower has a fixed supply of coins that were fully distributed during the past three 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. 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, has operating continuously since March 31st, 2017. It has produced nearly 30 million individual blocks (each confirmed in just three seconds) and capable of processing over 100,000 transactions per second.

Now the Powerchain will focus on bringing blockchain-based loyalty points to the global marketplace using its highly efficient blockchain architecture. Consequently, GreenPower has recently migrated from the Graphene-based mainnet (Powerchain) to the Ethereum network via an ERC-20 smart contract. As part of its ongoing growth and development, GreenPower will now leverage the strengths of the Ethereum network bring the power of decentralized finance to mainstream consumers. The move enables GreenPower to better serve as the anchor currency in a decentralized system of marketplace incentives.

Introduction

GreenPower is the anchor currency in a decentralized system of next-generation marketplace incentives. Designed to bring the benefits of decentralized finance (DeFi) to the mainstream, GreenPower serves as the core asset in this innovative set of marketplace solutions.

GreenPower is the membership currency of a global marketplace network, called the GreenAlliance, which is comprised of business members and consumer members. As its base level of utility, GreenPower performs as a decentralized discounting mechanism, enabling businesses to discreetly offer discounts to targeted valuable consumer members of the marketplace network.

The primary levels of GreenPower's utility are discoverable once the holders deposit GRN into a non-custodial smart contract, known as a vault. Vaulted GRN give the holder access to these additional member benefits:

Benefits Staking: Vaulted GRN levels are reported by a dedicated GRN oracle, enabling accounts holding certain thresholds of GRN to access exclusive discounts and other special opportunities. Member businesses in the GreenAlliance are incentivized to use this mechanism to make attractive offers to consumer members. The greater the level of GRN held in the vault contract, the more value that can be unlocked using this discounting mechanism.

Community Governance: A decentralized autonomous organization designed for community governance of GreenPower is being set up, called the PowerDAO. A governance token, called the PDAO, is received upon depositing GRN in the vault contract.

Token Bonding: The PDAO can then be used as collateral for borrowing a stable value token, which can be used on other platforms for yield aggregation.

In addition, there is a range of supplementary utility from holders choosing to access other DeFi opportunities in the marketplace. These opportunities involve yield farming and liquidity mining on platforms such as Uniswap, Balancer and Compound.

The project originally began in 2016. At the start, the objective was to bring the benefits and innovations of blockchain and cryptocurrency to the mainstream by creating a digital currency that successfully delivered superior performance through greater operational efficiency, increased transaction capacity, wider distribution, better governance and enhanced regulatory compliance. GreenPower was created from a hard fork of the previous system (DasCoin 2.0), which in turn had been created from a hard fork of BitShares 2.0 using the Graphene Toolkit. The currency was originally intended to be a convertible "store-of-value" unit at the center of a global digital asset system. The system was developed and launched without an initial coin

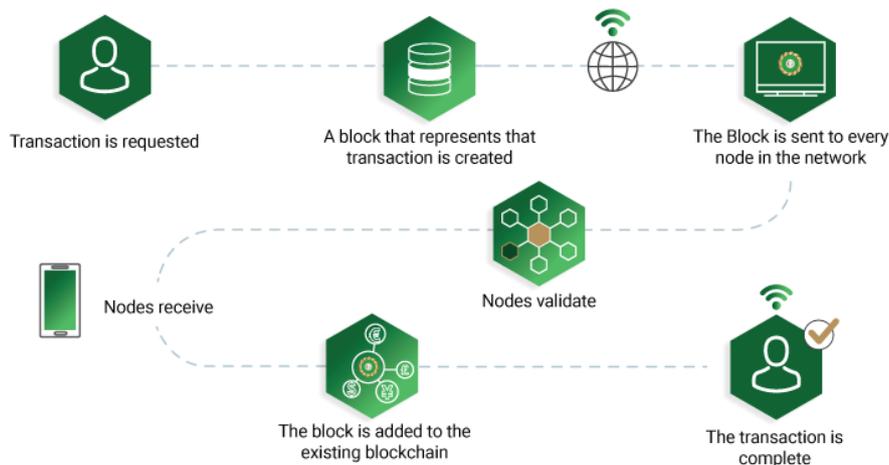
offering (ICO) and without outside investment capital. The currency has been operating continuously for over three years.

GreenPower has been the core 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 global economy as well as improve the quality and efficiency of the exchange of value between individuals, businesses, financial institutions, cooperatives, and merchants. Now able to leverage the network security and development community of Ethereum, GreenPower is well positioned to serve as the anchor currency in a multi-currency system designed to bring next-generation crypto-based rewards to the global mainstream.

Original 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 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 thought to be unsustainable in the future without significant modifications, which is why some blockchains are moving to different consensus mechanisms and those interested in pursuing PoW are designing elements to improve efficiencies.

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.

Powerchain's Consensus Mechanism

Throughout its history, consensus within the Powerchain was 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. 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).

Transition to Ethereum

The Powerchain's Graphene-based blockchain infrastructure has been an excellent foundation on which to build GreenPower during the past four years. It is fast, efficient and has enormous transactional capacity. Nonetheless, as the Powerchain shifts its focus to serve as a blockchain-based loyalty points platform, the decision was made to move GreenPower to the Ethereum network. This has been done via an ERC-20 token, the industry standard for non-native blockchain tokens.

Industry Dominance & Momentum

Because Ethereum's ERC-20 protocol is so well-recognized and well-understood, virtually all of the major participants (e.g., exchanges, wallets) within the blockchain industry can readily accept a token that is compliant with the ERC-20 standard. In addition, the security of the underlying protocol has now been time-tested and confirmed to be among the highest levels within the industry. Consequently, listing an ERC-20 token is a relatively straight-forward and streamlined process and yet provides a tremendous array of capabilities and potential.

Ethereum has benefitted from the strength of its blockchain developer community, which is currently the largest in the world. A high level of developer activity also implies that the underlying blockchain regularly undergoes improvements. Ethereum also benefits from the "first mover" effect in the area of smart contract blockchains.

Modularity & Interoperability

Ethereum is a powerful addition to assist the development of the GreenEcosystem. In the words of its founder, Vitalik Buterin, "The killerness of the (Ethereum) ecosystem is not the nodes, it's the links. Every single application that gets built is not just an application in its own right, it's also a component that every future thing in the Ethereum ecosystem can benefit from." Similar benefits apply to the GreenEcosystem now that Ethereum is officially a part of it.

Ethereum provides the base security layer for the world's largest blockchain ecosystem. The entire Ethereum system is based on the use of tokens, which can be bought, sold or traded. ERC-20 is a smart contract on Ethereum that has become the technical standard for token implementation. ERC-20 tokens have many of the same attribute as native blockchain assets. However, the one key difference is that instead of running on their own blockchain, ERC-20 tokens are issued on the Ethereum network.

There are currently nearly 300,000 different ERC-20 tokens on Ethereum's main network. The ERC-20 protocol defines a common set of rules to which all Ethereum tokens must adhere, including how transactions are approved, how users can access data about a token, and the total supply of tokens.

New GRN Blockchain Explorer: Etherscan.io

Complete information about the smart contract underlying each ERC-20 token is available on Etherscan.io. The official contract for GreenPower on the Ethereum network can be found on Etherscan.io at the following address:

GRN Ethereum Contract: `0xca7ac1dd35876a0dabec1ab1b37129c37b78a20f`

New Ecosystem Elements

To set the foundation for increased utility, the GreenEcosystem is adding a number of new elements.

LoyaltyPower – Blockchain-Based Loyalty Points Exchange

Distributed ledger technology is poised to revolutionize loyalty points. Infused with the blockchain, loyalty points become “power points”. Consequently, the existing Graphene-based Powerchain blockchain is being transformed to be serve the LoyaltyPower, an exchange platform focused solely on blockchain-based loyalty points. To accomplish this, the platform will only feature digital assets that are non-denominated. Loyalty points from a wide range of businesses will be added to the platform. The Powerchain will increase the transparency and trust of these systems while also enabling the points to be more redeemable as well as exchangeable. It is intended that the Powerchain will become the new global standard for loyalty points. Its multi-asset, 3-second block, high transaction capacity and low operating costs make it an ideal blockchain platform to serve the global loyalty industry.

GreenVolt – Universal Loyalty Point

The new native token of the Powerchain will be the GreenVolt. This is a universal loyalty point against which each of the other loyalty points on the LoyaltyPower platform will trade. Essentially, the GreenVolt, trading under the symbol VOLT, will act as the universal currency for loyalty points. All blockchain-based points will actively trade against the “volt”. Since these are non-denominated, there are no markets where points are traded directly against fiat currency. Units of GreenVolt are only available as part of a license system designed to enable businesses to convert their existing loyalty points systems to blockchain-based points.

SmartLicense – Loyalty Points Management System

A license system is available for easy management of blockchain-based loyalty points. A business is required to acquire a license in order to convert its existing loyalty points onto the LoyaltyPower platform. The license addresses the onboarding of existing loyalty points as well as the management of the new blockchain-based loyalty points. It also includes a number of GreenVolt, the universal loyalty point of the platform. Independent business consultants will be incentivized to introduce the SmartLicense system to businesses of all sizes throughout the world. SmartLicense offers a suite of world-class loyalty program management tools, as well as other Web3-based marketplace solutions.

GreenAmp – Universal Rebate Currency

Volts are convertible to a stable marketplace currency, called GreenAmp. The main purpose of GreenAmp is to serve as a universal rebate currency, enabling companies to transfer and store stable marketplace value between themselves and their customers. This currency can also be considered a universal “gift card” currency, since this it holds and transfers stable value in a

similar way to how gift cards work. However, instead of a siloed gift card redeemable at just one business, GreenAmp will be accepted at every business that is a member of the GreenAlliance marketplace network. To reinforce this wide acceptance, all companies participating on the LoyaltyPower platform will be incentivized to accept GreenAmp as a payment option (as well as to offer it as a rebate currency). GreenAmp will be listed on multiple exchanges and will trade against multiple currencies. The most intriguing dimension of GreenAmp is that it is only created through a minting process in which units of GreenVolt are converted into GreenAmp based on a combination of a resistance factor (known as Ohm) and the number of GRN held in a vault contract (as authenticated by the vault's oracle at the time of the conversion).

GreenAlliance – Global Marketplace Network

The GreenAlliance is a network comprised of businesses offering next-generation marketplace incentives and consumers collecting those incentives. A suite of Web3-based business tools is offered to businesses around the world as part of the SmartLicense system. The member businesses are incentivized to offer consumer members special discounts and exclusive opportunities in exchange for reduced pricing on their SmartLicense. The GreenAlliance is a global marketplace network designed to create new levels of cooperation between businesses and consumers through its unique incentive system built on a foundation of Web3 technology.

PowerDAO – Community Governance Organization

The PowerDAO is a decentralized autonomous organization set up to facilitate community governance of the GreenPower currency. Modeled after a leading community governance system within the DeFi industry, the PowerDAO enables holders of the organization's governance token to vote on proposals designed to increase the value of GRN.

New Utility for GreenPower

With GreenPower now on the Ethereum network and positioned as a membership currency, there are new forms of utility available to holders of GRN.

Decentralized Discounting Mechanism

Representing the base level of utility for GreenPower, units of GRN can be used as a decentralized discounting mechanism. Each business member of the marketplace network will be incentivized to offer a signature deal to holders of GreenPower. These offers will be expressed in GRN and will only be redeemable with GRN. All of these signature deals will be offered at a discount versus the retail price or offer an exclusive opportunity accessible only with GRN. This becomes a discreet discount available only to those in possession of the network's membership currency, GRN. For the convenience of members, a website is planned that will aggregate all of these signature deals.

Benefits Staking

In addition to the signature deals for GRN directly, the business members of the marketplace network will also be incentivized to offer discounts and special opportunities based on a consumer member's level of GRN held in a vault contract. An oracle will query the member's vaulted GRN balance at the time of execution in order to confirm qualification for the selected benefit. Benefits staking is designed to generate additional consumer discounts from the business members of the marketplace network through reduced pricing of the licensing system. Member businesses provide discreet discounting to consumer members, who benefit from that offers superb value of these member incentives. And because the offers increase in value as the level of vaulted GRN increases, benefits staking also reinforces the main thrust of the platform: the greater the amount of GRN held in the vault system, the greater the amount of value that can be unlocked. In the marketplace.

Community Governance

For each unit of GRN transferred to a non-custodial vault contract, the holder receives a governance token to the PowerDAO. This token is a type of receipt for having transferred GRN to a vault contract. The governance token is called a PDAO, and enables the holder to vote on proposal submitted within the community governance organization (the PowerDAO). One PDAO = one vote. The PDAO, which is also an ERC-20 token, can be held, sold, exchanged or used as collateral. By holding a level of PDAOs that exceeds a certain threshold, the holder can also submit proposals for the community to vote on. The system of community governance that will be used for the PowerDAO has quickly become the standard for community governance protocol within the industry. The community will decide on how the proceeds of the treasury held by the DAO will be used to increase the value of the GRN system. Likely proposals will include adding new functionality, changing certain system parameters and collaborations on other projects with other communities.

Token Bonding

The PDAO can be conveniently used as collateral and borrowed against. Within the vault system, a holder can “bond” the PDAO to a smart contract to mint a unit of stable value. These stable value tokens will not be on the Ethereum network, in order to reduce their cost of transfer.

These tokens can be used on a wide variety of platforms. One of the most exciting opportunities available to holders of these units of stable value are vault strategies. These are algorithmically-managed strategies that actively search for the highest reward aggregation among a wide range of liquidity pools in accordance with stated parameters.

Other Decentralized Finance (DeFi) Opportunities

In addition to the base and prime levels of utility of GRN, there is also a supplementary level of utility available to every holder of GRN. These include the ancillary opportunities found in the fast-evolving world of decentralized finance (DeFi), many of which are now accessible thanks to GRN holders thanks to the token’s status as part of the Ethereum network. Yield farming opportunities for holders of GRN are expected to emerge on DeFi platforms such as Uniswap, Balancer and Compound. The new GRN ERC-20 token is fully compatible with the dominant DeFi opportunities within the industry, so GRN can be loaned to liquidity pools for automated market making or used as collateral and borrowed against.

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 under-analyzed 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 (and that the company owns 60 billion of the 100 billion units of XRP that were created). 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 into circulation. All recipients of minted coins 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 units have been distributed.

To fortify the long-term operation of the ecosystem, company founders from the original ecosystem companies arranged for an amount of coins to be held in trust, totaling 62,467,141 GRN and representing less than 2% of the total amount of GRN minted. While these coins have been held in the trust since their minting, as part of the migration process to Ethereum, a strategic decision was made for the collective benefit of the community to release these units of GRN into circulation. They will be transferred via the token bridge and used to ensure adequate token supplies are available to the operating markets during the 13-week swap period. Consequently, as of the date of the official implementation of the Ethereum ERC-20 contract for GRN, all GreenPower tokens (a total of 3,294,166,501) are officially in circulation.

Ecosystem Roadmap

The following are some of the upcoming ecosystem developments related to GreenPower:

2020

Sept 29 Announcement of GRN Token Bridge to Ethereum
 First Exchange Listing of ERC-20 Token (Bithumb Global)

Dec 26 Final Day of Token Bridge to GRN ERC-20 Token

Dec 30 Final Distributions of Swapped Tokens

2021

February SmartLicense System launches
 GRN Vault Contract launches

March GreenVolt Currency launches
 Vaulted GRN Oracle launches

May GreenAmp Currency launches

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 membership currency for a marketplace network in which a range of next-generation incentives can be offered by merchants, collected easily by consumers and effortlessly redeemed for a wide range of goods and services. This system of blockchain-based digitally-stored value is capable of solving many of the problems associated with traditional customer loyalty programs. As the anchor currency for the world's most technologically-advanced customer loyalty system, 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 the Ethereum network architecture and the continuous innovations of its developer community. 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. Leveraging the strengths of the Ethereum network, GreenPower integrates the benefits of world-class performance, seamless scalability and long-term efficiency.

By adapting trust to the digital paradigm, the Green Ecosystem can 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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Appendix

A. Powerchain System Summary

- a. System Elements
- b. System Principles
- c. Network Elements
- d. Overall System Efficiency

B. GRN Token Bridge to Ethereum – Swap Process

Powerchain System Summary

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.

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.

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

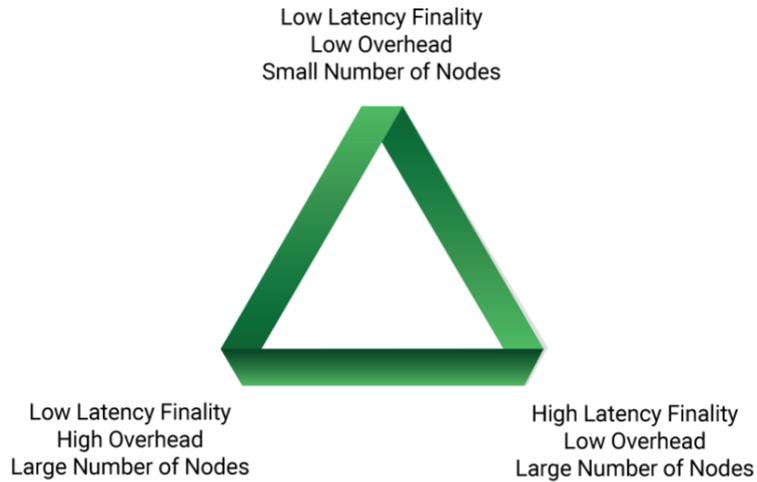
The role of the Master Node is to aggregate transactions with the intention to produce Blocks. Only Master Nodes have the authority to write transactions into the Blockchain ledger history. Each Master Node is aware of the other and they must have been voted in by the governing system. Master Nodes are 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.

GRN Bridge to Ethereum – Swap Process

To complete the transition to the new ERC-20 token, all GRN holders can request to swap their Graphene-based coins for the new tokens on the GreenPower website at: swap.grnpower.io.

Token Bridge

To facilitate the swap, a Token Bridge has been set up to connect the two blockchain systems. The mechanics of the bridge are as follows: Graphene-based coins are deposited into a swap deposit address on the Powerchain; once received, new ERC-20 tokens are transferred to the receiving (Ethereum ERC-20) address designated by the swapping party. Each side of the swap process is recorded in the appropriate blockchain system, and the token bridge system manages the entire information flow generated by all swap events.

Swap Period

The Swap Period started on September 26th and runs until December 26th at midnight GMT.

Sept 26 – Dec 26 at midnight GMT

Swap Fee

A swap fee is charged to the swapping party in the form of ERC-20 GRN. This fee goes to cover the transaction cost (i.e., gas fee) incurred on the Ethereum network. The swap fee is 500 GRN during the first ten weeks of the Swap Period, and is then reduced to 5 GRN during the last three weeks.

500 GRN from Sep 26 – Dec 5

5 GRN from Dec 6 – Dec 26

Bridge Toll

There is also a token bridge toll during the first ten weeks of the Swap Period. The toll starts at 50% and gradually reduces to 30% in the tenth week. The proceeds from the toll will be transferred to the treasury address of the PowerDAO, a community governance organization. The swapping party sacrifices these tokens (for the benefit of the collective community) in order to access their new GRN tokens sooner than after December 5th, when there will no longer be a toll.

Token Bridge Schedule

The schedule for the transferred tokens and the toll during the Token Bridge is as follows:

Sept 26 – Oct 3:	2:1 Swap (50% new tokens, 50% to PowerDAO*)
Oct 4 – Oct 10:	1.9:1 Swap (52.6% new tokens, 47.4% to PowerDAO)
Oct 11 – Oct 17:	1.8:1 Swap (55.6% new tokens, 44.4% to PowerDAO)

Oct 17 – Oct 24:	1.7:1 Swap (58.8% new tokens, 41.2% to PowerDAO)
Oct 25 – Oct 31:	1.6:1 Swap (62.5% new tokens, 37.5% to PowerDAO)
Nov 1 – Nov 7:	1.5:1 Swap (66.7% new tokens, 33.3% to PowerDAO)
Nov 8 – Nov 14:	1.45:1 Swap (68.9% new tokens, 31.1% to PowerDAO)
Nov 15 – Nov 21:	1.4:1 Swap (71.4% new tokens, 28.6% to PowerDAO)
Nov 22 – Nov 28:	1.35:1 Swap (74.1% new tokens, 25.9% to PowerDAO)
Nov 29 – Dec 5:	1.25:1 Swap (80% new tokens, 20% to PowerDAO)
Dec 6 – Dec 26:	1:1 Swap (100% new tokens)

*PowerDAO is a decentralized autonomous organization that will provide community-based governance for GreenPower. The tokens contributed to the PowerDAO during the Token Bridge will be deposited into an Ethereum address allocated for use by the PowerDAO based on voting on submitted proposals by its members (holders of GRN staked in vault contracts). These sacrificed tokens are a donation from the swapping party (to gain earlier access to the new GRN tokens) and become the property of the PowerDAO.

Final Swap Period: Final Swap Period will last for 3 weeks and will be a 1:1 swap (100% new tokens for the GRN submitted). Anyone who submits coins to be swapped during the Final Swap Period will not receive their new tokens shortly after their deposit of Graphene-based GRN (as will occur in swaps during the previous weeks), but instead will receive their new tokens on December 30th.

Swap Deadline December 26th at 12:00 midnight GMT

Final Distribution December 30th

Final Burn Following the expiration of the Swap Period on December 26th at midnight GMT and the subsequent distribution of new tokens to all of the 1:1 swappers on December 30th, any unswapped tokens remaining in the Circulation Addresses are scheduled to be burned on December 31st.

Swap Process – Step-by-Step

The basic operation of the swap process is simple: once an old GRN coin is received at the swap deposit address, a new GRN token is transferred to the Ethereum address designated by the swapping party. Here's how it works:

- Go to **swap.grnpower.io**. and scroll down to the “GRN Token Bridge”.
- Proceed with **Step 1** by selecting the location of your GRN coins on the dropdown menu, entering the email address associated with that account, and inserting the OTP (one-time password) once received via email. You will then enter the address of the Ethereum ERC-20 address to which you want the new tokens transferred. Be sure to check that this address is accurate before submitting.
- On **Step 2**, you will receive an email message with the deposit address of where to send your old coins as well as a very important memo. This memo is in the form of a unique string of numbers that will link the deposit to your old coins to the Ethereum address you provided to receive your new tokens. Be sure to include this memo when transferring your old coins to the swap deposit address.
- On **Step 3**, which is your third and final step, you will go to where your old GRN coins are and transfer a withdrawal to the swap deposit address. Again, be certain to insert the memo into the appropriate field of the withdrawal process.
- You will receive a third email message confirming that your coins were received at the swap deposit address. Your new GRN tokens should then arrive at your designated Ethereum address within 24 hours.