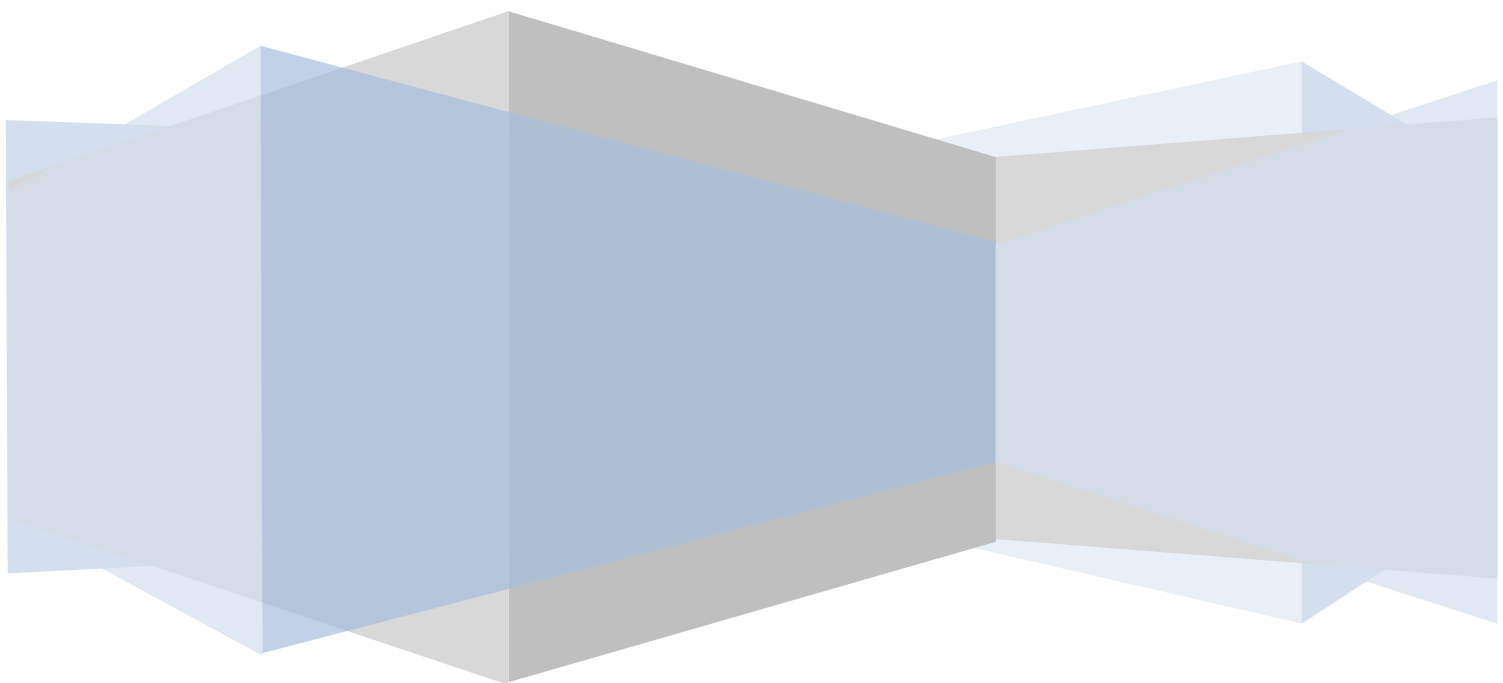


GEC WHITE PAPER

THINK GREEN BE GREEN

VERSION 2.0



1. Abstract

Electric vehicles of different forms first appeared contemporaneously with gasoline powered vehicles, but it wasn't until the mid-2000 that the technological advancement of electric cars and their commercialization began to gain momentum. With the global community becoming increasingly concerned with environment issues, most notably Global Warming, many nations have introduced policies to increase the supply of electric cars and improve their market viability. However, this has consequently seen power consumption due to electric car charging increase 2 to 3 times per year and as this trend continues it will be necessary for power suppliers to be able to anticipate supply and demand for this market.

Experts predict that for every 100 electric cars on the road there will need to be 55 charging points but various difficulties have arisen in the process of installing new charging facilities as land owners and stakeholders clash over issues such as location and supply. These problems pose a practical challenge in transitioning from the usage of combustion engine based cars to electric cars.

The two main alternatives for electric car charging points are private-use and public-use. Private-use charging points offer low accessibility to the general public due to their location on private property which will lead to them being under-utilized. Public-use charging points in comparison, likely to be present in parking lots or at gas stations, can be difficult to manage as non-electric vehicles may obstruct them by parking in the spaces designated for charging, or alternatively owners may leave their vehicles charging for longer than necessary.

In addition, there are certain locations, such as apartment complexes, large hotels, and office buildings, which function as both private and public spaces. Installing charging points in these locations will enable shared access for owners, residents, visitors and other permitted users. By taking advantage of such spaces the needs of electric car users in busy city centers can be met. Over time, as the adoption of electric cars spreads from inner city dwellers to people living in the outer suburbs a gradual expansion of charging points to these areas will naturally coincide.

Currently, the various operators of charging points have adopted different methods of providing their services, in many cases inconveniently requiring users to register as members. Operators also face their own inconveniences, being required to install a wide range of new equipment for various purposes such as payment processing and communication, with set-up, operating and upkeep costs combining to increase prices. Due to this, investment and operation costs are steadily increasing and recharging costs are rising in unison.

To date the various manufacturers of electric car charging technology have developed their own operating systems for their products, meaning that different providers are becoming familiar with competing systems. To solve this potential obstacle, manufacturers and service providers are seeking to develop an industry standard utilizing Open ChargePoint Protocol (OCPP).

However, the present reality is that countries and providers differ from each other in the use of various features such as processing payment and additional charges, and this

complication cannot be easily overcome. More specifically, with a wide range of providers to choose from, an electric car user, when encountering an incompatible system, may first need to determine the specific technology that is used at the charging point they are at, then register with that service. Frequently dealing with this kind of cumbersome system is a huge inconvenience to the customer. Eventually, in the interests of increased expansion of the electric car industry, improving the ease of use for people who choose these environmentally friendly vehicles needs to be compulsory. To achieve this, the main focus for charging point businesses is ensuring that customers who register for electric car charging can access all providers through the single registration.

This would require the adoption of a “roaming service”. A roaming service platform needs to be simple enough to be easily adopted by all providers while optimizing the current infrastructure to allow smooth and precise exchange of user data.

Another issue with electric cars is the continuing debate about whether it is reasonable to truly label them as environmentally-friendly emission-free vehicles. This controversy stems from the fact that the manufacturing and powering of these vehicles utilizes nuclear and fossil fuel. Accordingly, there are some limitations in being able to position these cars as eco-friendly “green vehicles”. To overcome this, the market needs to increase the importance of producing energy from clean sources, such as solar, wind and geothermal power. With the inherent difficulty of controlling the supply of clean energy, it is important to find ways to ensure that the supply can always meet demand. One potential solution is the storage of excess energy during times when supply is greater than demand.

Electric cars can be considered as both means of transportation and storage batteries. Their engines are suitable to function as power storage systems, so through using them in this form we can create a virtuous cycle where building more electric cars encourages the further generation of green energy which then demands manufacturing more electric cars to store the increased supply of energy.

To solve the variety of problems mentioned previously and to help quickly establish ecofriendly electric cars as mainstream, we propose the usage of blockchain technology to create a linked system. In the following section we will discuss 4 visions of the application of the GEC Platform (“GEC Platform”) and the GEC coin.

The first vision is a solution to the shortage of charging points in the community. Expansion of charging facilities will be encouraged through the application of the GEC Platform to transform private-use charging points into public-use points. At the same time, we will develop low-cost public-use charging points modeled on the private-use charging points.

Once both of these steps are fulfilled, anyone can easily install and operate their own Charging Points, encouraging the growth of voluntary sharing economy.

The second vision proposes a way to prevent anti-competitive behavior or users abusing the system through occupying charging points for excessive periods. This can be achieved through developing a token economy which disperses financial rewards or penalties to incentivize positive participation in the ecosystem.

The third vision entails developing a platform that enables businesses to provide roaming services for the customers that use their charging services. To achieve this it is necessary to ensure that various businesses synchronize their systems as close as possible to increase accessibility.

The fourth vision involves the alternative use of electric vehicles as storage batteries to both use energy more efficiently and promote the use of clean energy. Being able to function as both energy chargers and dischargers, the batteries can be fully charged prior to peak times and then transmit their energy back into the grid to reduce the load during times of high energy usage.

In conclusion, increasing the utilization of existing infrastructure by enabling the sharing of private-use charging facilities (such as home-based chargers) is the core focus of the GEC project. Through this, problems caused by incorrect usage of the charging stations, such as occupying the space for excessive time periods, can be solved with verification systems and penalties. By reducing such abuses, the convenience of users can be improved.

Users can also be encouraged to use green energy and to avoid accessing the power grid at times of high electricity usage.

Through these policies, the value of choosing this eco-friendly form of transportation increases, while at the same time emissions are decreased, directly contributing to the maintenance of the environment.

2. Background of Project

Current Situation

Electric Vehicles – Present and Future

According to the market data, there will be a market of 1.9 million battery electric vehicles (BEV), including plug-in hybrid electric vehicles (PHEV), globally by 2022. The Governments are targeting a total of 3 million of these vehicles by 2030, as they plan to push ahead with policies regarding energy measures and reduction of fine dust.

According to the market data when comparing BEVs available in the market in 2017 to the first phase of electric vehicles available in 2021, battery capacity had more than doubled and mileage per charge had increased 1.7 times. As battery technology continues to develop, battery capacity is expected to increase by 72% from 2016-2022. Electric power consumption per electric car is about 2,500kWh for one year, about 2,000kWh for private charging place and about 500kWh for public charging place

With such an increase, the yearly electricity consumption by electric vehicles in 2022 is predicted to reach 867GW. Average consumption per car equals about 2500kWh per year, with 2000kWh recharged at private-use points, and the remaining 500kWh supplied by public-use points.

2.1.2. Perspective of the Charging Station Industry

Electrically propelled motion and the energy storage battery count amongst the core features of electric vehicles. Particularly now that the powerful lithium ion battery is installed in most vehicles, with its high energy efficiency and high performance relative to price, storage capacity has increased significantly. With the maximum total range from a full charge also advancing greatly in proportion to the increase in energy storage capacity, researchers are now considering how to balance the battery capacity to weight ratio of engines to get the optimal value out of the vehicle.

These developments are having an effect on the development of charging technology as well, which has also changed the charging habits of users. With the rise of “fast charge” technology (50kWh or higher), time taken to recharge vehicles fully has decreased significantly, and standard charging speeds now range from 100kWh to 350kWh.

Through the convenience of fast charge many people are recharging much more frequently than before which is subsequently leading to an increase in the amount of electricity used. This trend may cause a gradual increase in the demand for power, to the point where power shortages could occur.

Therefore, in the interest of maintaining a stable energy supply, an increase in the use of fossil fuels may follow. Given that a reduction in carbon emissions was one of the original goals of establishing electric vehicles as a preferred mode of transportation, this could potentially lead to an outcome opposite to what was intended.

To combat this unwanted side effect and consolidate protection of the environment, it may be necessary to modify the pace of expansion of charging point locations. At the same time, political backing should be sought to help improve user awareness of their power usage.

Recognizing Problems and Solution Pathways

Charging Point Shortage Problem

As the number of electric vehicles in existence grows, the supply of charging stations also increases at a faster and faster pace. Despite this mutual expansion, the constant mobility of vehicles makes it unlikely that charging stations can always be available at any time or in any place. To provide charging stations in sufficient quantity to avoid this reality would prove inefficient.

Paradoxically the success and failure of charging point operators will depend on the location where they are able to set up their equipment, and the potential to expand the facilities to meet supply and demand. Charging points will be most in demand in places which have adequate parking spaces for potential customers but must also be able to provide a constant supply of electricity. There are difficulties in meeting both of these essential requirements; physical limitations of available land and the economic restraints of constructing and installing required charging facilities

Chargers that are installed in locations such as apartment complexes and large buildings where they could easily be used as public-use chargers. Presently, most people are concentrated in large cities. As a result, most charging stations are in the

main districts and downtown areas of these cities. With a focus on major cities and centralization there is a limited spread of charging stations to the wider regions of the nation. To overcome this, rather than trying to hurry the construction of new sites, it is more important that existing facilities are optimized to be used as efficiently as possible, while at the same time building more charging stations at a manageable pace.

In certain areas where power supplies are limited existing resources must be maximized to be used as efficiently as possible, so that customers can access charging points whenever and wherever they wish. Focusing on such solutions will form the groundwork for overcoming the previously mentioned problems. Minimizing inconvenience and discomfort for owners of electric vehicles is a priority as the market grows. In their daily lives, drivers will mainly travel between home, work and local shopping districts, and within this range it is reasonable to expect that they will want access to charging stations in all of the mentioned locations to meet their changing needs.

It may be impossible to remove all the inconveniences faced presently by electric vehicle users but, it is possible to improve certain aspects through changing perspectives. One change to aim for is encouraging many private-use (household) charging points to be shared by their owners for public-use. To facilitate this, any burdens that may be placed on private owners such as requiring them to change operating systems or spend money, must be minimized. Indeed, inducing them to participate by simplifying the process and using their existing systems is the most rational way to succeed. Furthermore, private users who share their charging points need to be provided with personal compensation to ensure that a healthy sharing ecosystem arises.

To ensure users are not inconvenienced when using public-use charging stations it is necessary to provide a roaming service. Another essential is tiered pricing based on frequency of charging and time-usage per charge. These incentives are designed to increase the dispersion of charging points throughout the country.

Misuse of Space Problem

Inconvenience and annoyance can arise for electric vehicle users when they are prevented from charging their vehicles due to charging point inaccessibility. This can be caused by regular, non-electric vehicles using the space as a parking spot or by electric vehicles remaining in the space long after the time required to recharge. As the number of electric vehicles increases, this issue is also occurring more frequently. Several countries, including Korea, have decided to impose fines for misusing the space in this way. While such measures are expected to quickly reduce the incidence of regular vehicles using the space, it will be harder to recognize when electric vehicle users are infringing. Therefore, charging point operators may need to implement fees based not only on quantity of electricity recharged but also on how long the vehicle occupies the space to recharge. Electric vehicle users must be made aware of the need to move their vehicles as quickly as possible once they've completed recharging; by levying them with additional fees users will quickly modify their behavior and charging stations will become more accessible. By changing the fee-paying structure of electric vehicle charging stations from a recharge based system to one that charges based on usage of space, the GEC Platform will be able to solve several different challenges related to the misuse of space around the charging points.

The Complexity of the Charging Platform

A wide variety of shapes and types exist amongst the private-use and public-use charging points in Korea. Owners of electric vehicles generally find household chargers to have simple designs for straightforward usage and are comparatively much cheaper to use than public-use ones. On the contrary, public-use charging points tend to be equipped with much more features that make them bulkier and harder to operate. These additional features also contribute to the additional costs involved in using these charging points, as do management, maintenance and other administration expenses. If we also consider that customers will need to pay fees for roaming services, public-use charging points could become an expensive burden to electric vehicle users.

Presently many businesses have complex billing processes that employ third parties, which make them waste energy on administration and paperwork. To try and simplify their own operations, these businesses may develop their own systems. This could cause many charging stations to no longer be compatible with roaming services and could lead to higher costs for development, operation and billing. Ultimately, this will all lead to increasing fees for the customers.

The GEC Platform will be able to lessen the financial burden by transforming private-use chargers into public-use chargers and reducing the costs of establishing new infrastructure. Also, through the use of GEC coins, the GEC Platform's cryptocurrency, charging station operators can forego roaming services and instead process payments through blockchain. This would lead to a ground-breaking reduction in the costs of processing and billing expenses.

Lack of Incentive to Use Alternative Energy

In the 21st century one of the most important challenges faced globally is how to balance high energy demand with the need to generate cleaner energy. Despite this, many people remain ambivalent about the need to use alternative and renewable energy. In order to shift society's energy reliance towards natural sources such as solar, wind and geothermal power, we must reduce the dependence on fossil fuels and nuclear power to provide the bulk of our energy needs. Green energies need to offer a constant supply to convince the population, but unfortunately this is not something that can be controlled easily through human will alone. Though output is irregular, there are times where natural energy sources can produce electricity in abundance and by finding ways to store this power for later use, we can begin to reduce dependence on nuclear and carbon energy. When supply exceeds demand, power grids can no longer store energy, but the battery housed within electric vehicles can provide a storage alternative to avoid this power being wasted. Storing excess energy in electric vehicle batteries can ensure there are still sources of energy at times of power grid instability. Once stored in the battery, the power can be fed back into the grid at times of peak demand through Vehicle to Grid (V2G) technology. This system will help increase the use of alternative energy sources and society will benefit as this form of power management becomes standard. Users participating in this kind of system should be offered rewards and incentives.

Currently, the commercialization of V2G technology has yet to be fully realized, but with the implementation of On Board Charger (OBC) technology it is possible to discharge from the battery through a charging device which can be connected to the power grid. What

kind of features and fees need to be included in the V2G service has yet to be determined. From a functionality perspective, the technology and process of transmitting electricity in either direction between grid and battery is virtually the same, so it should be easy to include this as a standard in electric vehicles.

As demand for electric vehicle charging increases so does the demand for electricity. While the number of charging points is presently insufficient, there will also be a shortage of electric vehicles that will be equipped to store and discharge energy through these points. The GEC Platform, by analyzing big data, will be able to predict the supply and demand curve and advise to people possessing electric vehicles with discharging capability when and what quantity they should supply back to the grid. The platform will also provide locating and reservation services to allow users to arrive somewhere where they can discharge to the grid. The convenience of this service will help maximize the economic efficiency of participating.

3. Blockchain-based GEC Platform

The Necessity of Block chain

Block chain is a technology where data is decentralized and recorded in chains of data blocks, which helps prevent forgery and alteration of private data. While the technology is easily accessible to anyone, it is not easy to modify so clarity and security are its key characteristics. Block chain has also led to the emergence of the token economy, where users who create and verify new blocks can be rewarded with crypto currency.

The “smart contract” concept, delivered through the distributed ledger, provides a transparent contract process and allows contracts to be processed easily and securely while payment and remittance and a variety of other growing features can be offered.

Based on these features there are several trials occurring to use this technology in several current and future settings. New technologies like the GEC project will continue to alter the paradigm of the motor industry and its relationship with the environment and energy market. Block chain is a central part of the 4th industrial revolution, and its application will lead to the emerging electric vehicle industry to be more transparent and accessible.

There are two main reasons for the central importance of block chain in the GEC project. The first is sharing. With more than 100 years of development, electric vehicles had mostly vanished before their sudden resurgence in recent years. The growing consciousness that the future of infrastructure will require sharing has seen the market growing daily, but electric vehicle charging infrastructure is lacking and compatibility between services is poor.

Governments have tried to solve this problem by constructing more infrastructures, but with so many private use charging points already in existence it is clear that the most efficient way to solve the problem is by getting the private owners to share their infrastructure. This is one of the primary goals of the GEC project. These owners must be enthusiastically encouraged to share their privately-owned infrastructure, with compensation and other incentives offered so they volunteer to participate.

To successfully allow all owners to share their infrastructure, GEC will use BLE module

and block chain technology to connect the entire charging point infrastructure to create a form of roaming service. With this technology, GEC can guarantee security and transparency while providing a reliable billing system for people sharing their charging points to process payment.

Additionally, using block chain, participants who share their private-use charging points will be able to earn compensation in the form of a crypto currency, GEC coin, which will allow global integration.

The second is dispersal. Block chain technology is based on transparency and gives all participants authority and benefits. This system will decentralize all the processes, giving any user the potential to profit from taking part.

The GEC team will work on expanding the platform but will not actively participate or interrupt the ecosystem, allowing participants to independently choose what role they would like to play on the platform, be it business operator, service user, or developer for example. GEC coin, the platform's crypto currency, will be used to promote a transparent sharing economy. Penalties and incentives in the platform will be determined based on circumstances, but it is anticipated that any illegal behavior or misuse of GEC coin will lead to punishment.

GEC Platform

The GEC Platform is designed to make sharing electric vehicle infrastructure easy while solving shortage issues. GEC will pioneer a new market where electric vehicle users can easily be matched with unused private-use charging stations for the mutual benefit of user and provider. The GEC module can operate without any network connections, as a user can simply use a smart device to process payment and manage recharging through an application.

Charging stations must be set up to exclusively use the GEC Platform. Pre-existing charging stations can easily be converted by removing the RFID card and installing the GEC module. BLE-based IoT technology allows users to connect wirelessly to process payment via Bluetooth 4.0 or higher.

The GEC Platform's unprecedented networking system for electric vehicle chargers provides a wide range of conveniences to users:

- Charging Market:

Allows private owners to profit from sharing their facilities. Groups or individuals who wish to participate can easily enroll and enjoy the open market system without paying monthly connection fees or management costs.

- Charging Location:

Any form of charging point, be it fixed format or even a simple power socket, can be networked to the GEC Platform, meaning that minimal investment is required to rapidly expand and provide the service in unlimited locations.

- Openness: Billing problems, theft of electricity or people charging handheld devices from charging points are all problems that people face in the electric vehicle ecosystem. GEC Platform will be able to integrate roaming service infrastructure and brand exclusive private networks to help combat these problems.

Platform Drive Model

The GEC Platform can be connected to many forms of charging infrastructure. From the charging technology of leading companies such as Hyundai, BMW and GM to standard power outlets and Bluetooth modules. Owners and users will utilize GEC coin to support an active economy integrating these various technologies.

With “unity” being a keyword of the 4th industrial revolution, the GEC Platform will serve to represent that ideal by unifying blockchain with the developing businesses that are currently being nurtured by Governments to advance electric vehicle technology. Once introduced to GEC, it is hoped businesses will begin using GEC points for payment and billing and GEC coins for purchasing a wider range of services.

Cryptocurrency is increasingly becoming an asset that can be used to purchase a variety of services and be used in daily life, and the eco-friendly vehicle market can now be part of this. Blockchain can help introduce new concepts such as recycling and decentralization to the related fields of energy, electricity and networking and will allow business, government and p2p transactions to occur more easily. The possibilities for cryptocurrency will continue to advance in unexpected ways.

The GEC offers a straightforward charging process as follows:

1. Check charging point information.
2. Request Payment.
3. Transfer GEC coins.
4. Begin charging as soon as coin payment is processed.
5. User receives electricity and provider receives coins.

By installing the blockchain optimized GEC module, Bluetooth module, OPT encrypter, and GEC coin validation device as well as removing the RFID card reader, the charging point is ready to connect to the smart device application where it can access the blockchain wallet, encrypted through OTP. This setup requires very few investment fees for private owners who wish to connect to the GEC Platform and operate an electric vehicle charging business.

With the GEC Platform, the owner can set their own fees and receive payment through GEC coin (excluding certain minor service charges). As GEC coins can then be used with various participating businesses it makes it easier to attract potential users who are already registered with this system. If this business model can help successfully transition the 20,000 or more domestic private-use electric vehicle charger into a fleet of eco-friendly government-approved public-use ones it will surely have a positive flow-on effect for the international shortage problem.

As cryptocurrency transactions are not limited by borders there are no limits to expanding this system internationally. In the future the technology can be utilized to provide various services, such as car pooling and sharing, and track car usage and carbon-reduction data.

GEC Platform Network

The GEC Platform network must be implemented based on the guidelines of the domestic

Environment Ministry as well as following the development of international blockchain technology that uses standard protocol OCPP. According to these requirements, the structure of the GEC Platform can be divided as described below:

1. Communication system available through an application that offers lowest level of service to any users.
2. An application for services and communication for A group users.
3. An application that allows A group members to network with B,C,D group users and provide connected services, basically functioning like a roaming service.
4. An application for businesses and infrastructure providers that connects them to all other users to provide their services.

The users group will be able to utilize the DApp (wallet app) through their smartphone and can search for charging locations, and process payment all through the encrypted GEC Platform.

The user's data will be saved securely through blockchain's distributed storage. Using API and SDK, in the event of the GEC module malfunctioning they can wirelessly record the data in the infrastructure layer.

The business group represents a wide variety of providers, from genuine business operators to private owners, but this system will act as a unification network that connects all these providers, effectively offering a roaming service.

The application of blockchain allows a more reliable service with high data transfer that can be transmitted without risk of data being lost, damaged or leaked. Data is stored safely in the blockchain and users can easily recall or renew data that they need to access.

For infrastructure-related businesses, a single network can connect all charging points and make their services compatible for smooth operation.

Using the Json type encrypted transfer any data transfers in the system are conducted with a security certificate and this process is made transparent to reassure users. The blockchain technology ensures all charging points connected to the GEC Platform operate accurately and securely.

GEC Platform Data System

In the current environment, there is no unified charging system, which is very inefficient for both businesses and users. To create an ecosystem that operates efficiently the GEC Platform must be adopted. It will allow real-time tracking of all charging points, including dormant chargers and ones optimized to be dischargers as well. While Blockchain technology will ensure security, it will also allow data tracking that can assist in finding solutions to future problems.

There will be two kinds of data in the GEC Platform. The first type of data is charging and payment data. This is publicly shared data that anyone can access, because it is inscribed on the blockchain. The second data type is personal data, which cannot be stored on the

blockchain as it is private, it will be securely stored on a distributed database. Only the references that connect the data can be added to the blockchain. These references simplify the connection between data recorded on the blockchain and data spread through the separated file system solution and allow efficient recall. Important data should be recorded on the blockchain with related data in the separate data base.

Ultimately the GEC Platform functions as a series of blocks of data connecting together in an organic structure. This helps to create an integrated P2P platform system.

GEC Coin Blockchain Architecture

The IoT security platform employed by the GEC module will ensure encrypted payment processing. When connecting to charging points with the GEC Platform, users will be able to exchange data without any risk of leakage. In real life, users will connect with their smart phone or other device to the GEC network, check the status of the charging point and once making payment through an encryption system, begin to charge their vehicles. The blockchain-based encryption system allows transactions to be processed with GEC points and GEC coins. GEC coins are one of the core features of the GEC Platform made possible by the blockchain architecture.

GEC Coin Layer Structure

Service Layer

The service layer is the GEC Platform's end point, that can be accessed by users or external systems. Users can find charging services and can process payments. They can use services made available through the infrastructure or blockchain and can access their wallets, which can also be accessed as a separate standalone feature. This layer has security features that prevent data breaches.

Infrastructure Layer

The infrastructure layer manages and processes all requests from the service layer. It connects the platform with Ethereum, and records all transactions between the GEC Platform and the Ethereum node. It supports the payment service, roaming service and data security and ensures all data is recorded securely to the database and blockchain.

Engine Layer

The engine layer operates the core functions of the GEC Platform. It stores all payment and reward information on the blockchain, as well as managing smart contracts and access to user's personal data, as well as securing private and sensitive data in the data-base using the encryption system. It verifies all stored data in the database and blockchain. It also manages various charging and payment processes.

4. GEC Ecosystem

Players in the Ecosystem

GEC coins are the currency distributed for making purchases and transactions on the GEC Platform. Various players will participate in the ecosystem of the GEC Platform. These will include both purchasers of electric charging and sellers of surplus electricity, electric vehicle retailers, charging point operators, and other local players, as well as independent power producers.

GEC Team

The GEC team will be in charge of establishing the GEC Platform, and will operate GEC points and GEC coins and manage expansion of the platform according to the budget. The team will also oversee the transparent involvement of charging point operators and users and their use of GEC coins as well as managing the exchange rate.

Charging Point Operators (CPO)

The number of participants on the GEC Platform who possess private-use charging points and wish to share their facilities with other users is expected to increase gradually. Any private owner can use an application to easily register as a business and start earning money from their system, which will effectively help reduce the shortage of infrastructure. CPOs using the GEC Platform have the flexibility to choose their own operating hours, us-age costs, and when to run "coin-time" (a period where purchases can only be made through coins). The times that private operators choose to open their services will exert a direct influence on recharging and power distribution. Platform participants will be able to convert their coins into currency whenever they wish or can hold on to them if they expect the value to continue to rise.

- Method to convert private owners into CPOs

To continue expanding the GEC Platform, many more charging points than are available now will be required. While this expansion will likely be related to an increase in sales, it will also depend on the investment costs required for start-ups and the avail-ability of land to construct new infrastructure.

Due to these issues, Europe and the USA have different systems to what is currently used in Korea. Domestically, the GEC team will introduce a franchise concept to help minimize the issue of increasing investment fees for potential new CPOS. This model

will involve renting equipment and offering a membership system.

- Expansion of CPOs through rental

There are several different forms of CPOs that need to exist in the GEC ecosystem. These include users of electric vehicles who simply wish to convert into CPOs as a way of sharing their charging point, and business operators who want to attract more customers by offering differentiated services. The GEC Platform will seek to proactively respond to the needs of the different CPO niches by promoting the rental concept through the following policies.

- Electricity Supply Contribution-based Membership System

Even after attracting many CPOs to the GEC Platform, participants need motivation to continue actively sharing their services, and a membership system will help to incentivize this. Members will be able to earn additional GEC coins based on the amount of electricity they supply to customers. There will be three membership levels, with the incentive percentage rising along with their level.

Charging Point Users

On the GEC Platform, GEC points or GEC coins must be used to pay for charging. GEC points can be purchased from various exchanges, while GEC coins can be earned through using GEC points or as rewards for participating in several activities on the GEC Platform. GEC coins have special characteristics that will allow users to access priority charging during busy times or use the “Coin Night Time” product, which lets users combine electric charging and overnight parking fees in one purchase.

VPP (Virtual Power Plant)-based Independent Power Producers

Renewable and alternative energy sources, such as solar, geothermal and wind power, have been growing in prevalence, but these sources are limited in being able to always provide the appropriate supply to meet demand. Controversy also surrounds the extent to which electric vehicles can be considered to be environmentally-friendly given the use of fossil fuels in their production. Given these issues, the importance of delivering reliable green energy is growing, and one way to help achieve this is through providing a means to store renewable energy when it is available at levels exceeding demand.

The battery housed within electric vehicles is the perfect storage solution to facilitate this. VPP-based independent power producers, who generate their own alternative or renewable energy, can store their excess production in the battery and in times of insufficient electricity supply sell it for a profit. Power producers can receive GEC points and coins for selling their power and as they gain more coins they can use them to get priority for selling more of their power.

International and Local Players

As the global electric vehicle market is expected to grow, global car manufacturers are aggressively investing in electric vehicle businesses. Many nations are introducing clean energy policies and offering varying levels of subsidies, and with the expansion in

investment both from companies and generous governments the industry can expect to grow substantially. Due to this, collaborations between international companies and local car and charging point operators can be expected.

In Europe, renowned car manufacturing companies have already introduced a single card that offers a roaming platform to access 70 different charging point operators that have received investment. It is expected that GEC will cooperate with all providers, both local and international, to ensure that customers are able to use or transfer points to access all charging services.

Consumer's Perspective

A user who uses an electric vehicle but lives in an apartment building with a shortage of parking spaces, so it is not practical to have a private-use charging point. He has installed the GEC app, seeking an easy way to charge his vehicle and through using the app he is able to confirm that an GEC charging point is only 5 minutes away.

He is able to check the price and operating hours on the app, and travels to the charging point location on his way home from work. Once he arrives at the location, he uses the GEC app to gain permission to use the charging point, and then confirms the owner's pricing (1 GEC point per hour at 7kWh) and time allowance (From 11pm – 12am, total 1 hour) before beginning charging.

He locks in a one hour time period on his phone and then pays the 1 GEC point from his blockchain wallet connected to the GEC app. Once the time reaches 12am, he unplugs his vehicle from the charging point and quickly departs. He is careful to leave on time to avoid the occupation fee, which costs double the normal price and is charged to vehicles that fail to leave after their time limit has expired.

Charging Point Owner's Perspective:

A Businessmanj owns a private-use charging point as a way to recharge his personal electric vehicle. He drives less than 1000km a month per average and only spends about \$20 per month inoperating his charging point. He wants to use it more efficiently so enrolls with the GEC Platform. After spending \$120 to order an GEC module he refers to a Youtube video to learn the installation method and sets it up himself.

He installs the GEC app on his phone and registers as a HOST, then posts his operating hours, usage costs and coin time period. His operating hours are 8am – 9pm, and since he lives in nearby a Department Store, and parking fees are expensive in his neighborhood, he sets 12pm-4pm as his coin time. His charging point charges at 7kWh which costs him \$0.30 per hour and he wants to earn a \$0.4 profit as well as covering commission fee. So he decides to charge \$1 per hour.

For one week he shares his charging point for 10 hours and earns \$10. After GEC deducts a commission he decides that he will get more value out of receiving GEC coin than cash so he requests GEC coin as payment. He can exchange his GEC coin into cash but because he knows that use of electric vehicles is expanding he decides that it is better value to keep his coins as he expects their worth to increase.

5. Token Distribution

The total supply of GEC coins will be distributed as follows:

- 35% of the total supply of GEC coins will be offered for sale during a token sale, out of which, 33% will be sold privately to investors and other organizations and 2% will be sold to the public. The proceeds from these sales will be set aside to generate the initial fund.
- 20% of the total supply of GEC coins will be set aside for the market and advisors. Such GEC coins shall be subject to a lock-up period of three years as described below.
- 15% of the total supply of GEC coins will be set aside by GEC Foundation Ltd. for use at its discretion. Such GEC coins shall be subject to a lock-up period of three years as described below.
- 15% of the total supply of GEC coins will be kept in reserve for emergency situations.
- 10% of the total supply of GEC coins will be set aside for the GEC team. Such GEC coins shall be subject to a lock-up period of 30 months as described below.
- 5% of the total supply of GEC coins will be made available in the ecosystem.

Notes: The above token distribution and distribution of proceeds are subject to change without notice.

- Details of the lock-up period:
 - (i) The GEC coins that are set aside for the market, the advisors and GEC Foundation Ltd. shall be subject to a lock-up period of three years. During such lock-up period, such GEC coins shall be unlocked in tranches: the first tranche of such GEC coins shall be unlocked on the first anniversary of the date of which GEC coins are first listed on an exchange ("**First Listing Date**") and thereafter, the remaining tranches of such GEC coins shall be un-locked every month up to the last day of the lock-up period.
 - (ii) The GEC coins that are set aside for the GEC team shall be subject to a lock-up period of 30 months. During such lock-up period, such GEC coins shall be unlocked in two tranches: the first tranche of such GEC coins shall be un-locked 18 months from the First Listing Date and thereafter, the second tranche of such GEC coins shall be unlocked 30 months from the First Listing Date.

- Policy of Coin Burning

If a business fails to properly manage an electric vehicle charger that was installed, the GEC coin that was staked by the business will be burned.

Recently the management of electric vehicle charger has fallen into neglect, and the system does not run smoothly. In the event that, even after securing many charging point operators to participate, the system does not run normally, the GEC Platform can lose

credibility. In order to prevent these kinds of problems any businesses that participate in the platform and deal with their coins in an unsatisfactory way will have their staked coins burned.

Any parties that cause damage to a charging point will have a 168 hour (7 days) grace period to rectify the problem, after which every 12 hours a certain amount of staked coin will be burned and after all staked coins are exhausted, they will be banned from the GEC ecosystem.

- Securing an Incentive Pool:

In the interest of signing up businesses to the platform, GEC offers their products as rentals. Businesses can pay off their infrastructure installation fees in installments. To provide further incentive, the GEC team will place 10% of profits from rentals into an incentive pool.

IMPORTANT NOTICE

PLEASE READ THE ENTIRETY OF THIS "IMPORTANT NOTICE" SECTION CAREFULLY.

WE RECOMMEND YOU CONSULT A LEGAL, FINANCIAL, TAX OR OTHER PROFESSIONAL ADVISOR(S) OR EXPERTS FOR FURTHER GUIDANCE PRIOR TO PARTICIPATING IN THE GEC ECOSYSTEM TOKEN SALE OUTLINED IN THIS WHITEPAPER.

THIS WHITEPAPER MAY NOT BE DISTRIBUTED, DISSEMINATED OR OTHERWISE TRANSMITTED TO ANY COUNTRY WHERE SUCH DISTRIBUTION, DISSEMINATION OR TRANSMISSION MAY BE PROHIBITED.

1. Legal Statement

- (a) This whitepaper ("**Whitepaper**"), in its current form, is issued by GEC Foundation Ltd. This Whitepaper is circulated for general information purposes in relation to the GEC blockchain project as presently conceived and is not legally binding on GEC Foundation or any other parties.
- (b) The information in this Whitepaper is current only as of the date on the cover hereof and is subject to review and revision. GEC Foundation reserves the sole and absolute discretion to revise any part of this Whitepaper from time to time by posting the revised Whitepaper on <https://www.gecoin.today> ("**Website**"). Such updated Whitepaper shall become effective immediately from the time of posting.
- (c) No person is bound to enter into any contract or binding legal commitment in relation to the sale and purchase of the GEC coin and no payment is to be accepted on the basis of this Whitepaper. Any sale and purchase of the GEC coin will be governed by a legally binding agreement, the details of which will be made available separately from this Whitepaper. In the event of any inconsistencies between the above mentioned agreement and this Whitepaper, the former shall prevail.

- (d) This Whitepaper does not constitute or form part of any opinion on any advice to sell, or any solicitation of any offer by the issuer/distributor/vendor of the GEC coin to purchase any GEC coin nor shall it or any part of it nor the fact of its presentation form the basis of, or be relied upon in connection with, any contract or investment decision.
- (e) The GEC coins are not intended to constitute securities, units in a business trust, or units in a collective investment scheme, or any other types of capital markets products. This Whitepaper does not, and is not intended to, constitute a prospectus, profile statement, or offer document of any sort, and should not be construed as an offer of, or a solicitation for investment in, capital markets products, securities or any other financial or investment instrument in any jurisdiction.
- (f) No GEC coin should be construed, interpreted, classified or treated as enabling, or according any opportunity to, purchasers to participate in or receive profits, income, or other payments or returns arising from or in connection with the GEC Ecosystem, GEC coins, or products, or to receive sums paid out of such profits, income, or other payments or returns.
- (g) No regulatory authority has reviewed, examined or approved of any of the information set out in this Whitepaper. No such action has been or will be taken in any jurisdiction.
- (h) Where you wish to purchase any GEC coin, please note that such coin is not to be construed, interpreted, classified or treated as: (a) any kind of currency other than cryptocurrency; (b) debentures, stocks or shares issued by any entity; (c) rights, options or derivatives in respect of such debentures, stocks or shares; (d) rights under a contract for differences or under any other contract with the purpose or pretended purpose to secure a profit or avoid a loss; or (e) units or derivatives in a collective investment scheme or business trust, or any other type of securities.

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4. Cautionary Note on Forward-Looking Statements

- (a) Certain information set forth in this Whitepaper includes forward-looking information regarding the future of the project, future events and projections. These statements are not statements of historical fact and may be identified by but not limited to words and phrases such as "will", "estimate", "believe", "expect", "project", "anticipate", or words of similar meaning. Such forward-looking statements are also included in other publicly available materials such as presentations, interviews, videos etc. information contained in this Whitepaper constitutes forward-looking statements including but not limited to future results, performance, or achievements of GEC Foundation or its Affiliates.
- (b) The forward-looking statements involve a variety of risks and uncertainties. These statements are not guarantees of future performance and no undue reliance should be placed on them. Should any of these risks or uncertainties materialize the actual performance and progress of GEC Foundation or its Affiliates might differ from expectations set by the forward-looking statements. GEC Foundation or its Affiliates undertake no obligation to update forward-looking statements should there be any change in circumstances. By acting upon forward-looking information received from this Whitepaper, GEC Foundation or its Affiliates' website and other materials produced by GEC Foundation or its Affiliates, you personally bear full responsibility in the event where the forward-looking statements do not materialize.

- (c) As of the date of this White Paper, the GEC Platform has not been completed and is not fully operational. Any description pertaining to and regarding the GEC Platform is made on the basis that the GEC Platform will be completed and be fully operational. However, this paragraph shall in no way be construed as providing any form of guarantee or assurance that the GEC Platform will eventually be completed or be fully operational.