SYSTEM AND METHOD FOR BILATERAL TRADES OF GREENHOUSE GASES AND ENVIRONMENTAL RIGHTS

TECHNICAL FIELD

[0001] The present disclosure generally relates to a system and method for the collection, monetization, validation, continuous updating, archiving of bilateral trading of greenhouse gases and environmental rights.

BACKGROUND

[0002] Carbon credits can be tradable certificates or permits representing the right to emit one tonne (one metric ton or 1,000 kilograms) of carbon dioxide or the equivalent amount of a different greenhouse gas. Carbon credits and carbon markets are a component of national and international attempts to mitigate the growth in concentrations of greenhouse gases (GHGs).

SUMMARY

[0003] It would be desirable to have a system and method for bilateral trades of greenhouse gases and environmental rights (GEARS) between a purchaser and seller, which allows a holder of the rights a contractual ability to monetize these rights through validation in a binding and secure manner and be able to trade or assist in the development of carbon offset credits on a specific parcel of land, prior to the registration of the carbon credit certification process, and wherein the system and method further verifies and updates the information rights referencing one or more parcels of land. The contractual rights to develop carbon offset credits needs to also comply with one or more conditions for development and entitlement to carbon offset

credits, GEARS deals with the rights prior to certification as an offset carbon credit. Such a system and method would desirably overcome or mitigate technological challenges, and significant costs of development and processing prior to registration as carbon credits and would allow land rights to be secured and monetized particularly with respect to authentication, verification, trading, and record keeping that can be relied upon.

[0004] In accordance with an aspect, a computer-implemented method is disclosed for bilateral trades of greenhouse gases and environmental rights, the method comprising: hosting, on a processing server, a listing of one or more parcels of land with contractual rights to develop carbon offset credits; receiving, by the processing server, metrics on the one or more parcels of land with the contractual rights to develop carbon offset credits; and verifying, on the processing server, that the one or more parcels of land with the contractual rights to develop carbon offset credits that comply with one or more conditions for development and potential entitlement to carbon offset credits based on at least the received metrics.

[0005] In accordance with another aspect, a system is disclosed for bilateral trades of these rights as they relate to greenhouse gases and environmental rights, the system comprising: a processing server configured to: host a listing of one or more parcels of land with contractual rights to develop carbon offset credits; receive metrics on the one or more parcels of land with the contractual rights to develop carbon offset credits; and verify that the one or more parcels of land with the contractual rights to develop carbon offset credits comply with one or more conditions for development and

potential entitlement to carbon offset credits based on at least the received metrics.

[0006] In accordance with a further aspect, a non-transitory computer readable medium storing computer readable program code that, when executed by a processor, causes the processor to provide an exchange for bilateral trades of greenhouse gases and environmental rights, the program code comprising instructions for: hosting a listing of one or more parcels of land with contractual rights to develop carbon offset credits; receiving metrics on the one or more parcels of land with the contractual rights to develop carbon offset credits; and verifying that the one or more parcels of land with the contractual rights to develop carbon offset credits comply with one or more conditions for development and potential entitlement to carbon offset credits based on at least the received metrics.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. 1 is an illustration of a system for bilateral trades of greenhouse gases and environmental rights (GEARS) in accordance with an exemplary embodiment.

[0008] FIGS. 2A and 2B are illustrations of a flowchart of a method for bilateral trades of greenhouse gases and environmental rights (GEARS) for development of a parcel of land for carbon offsets in accordance with an exemplary embodiment.

[0009] FIG. 3 is an illustration of a graphical user interface (GUI) and a mobile device for verifying a market participant to an exchange in accordance with an exemplary embodiment.

[0010] FIG. 4 is an illustration of a graphical user interface (GUI) of the bilateral trade portal with a plurality of exchange applications in accordance with an exemplary

embodiment.

[0011] FIG. 5 is a flowchart illustrating a method for bilateral trades of greenhouse gases and environmental rights (GEARS) in accordance with an exemplary embodiment.

[0012] FIG. 6 illustrates an exemplary hardware architecture for an embodiment of a computer system.

DETAILED DESCRIPTION

[0013] For simplicity and illustrative purposes, the principles of the embodiments are described by referring mainly to examples thereof. In the following description, numerous specific details are set forth in order to provide a thorough understanding of the embodiments. It will be apparent however, to one of ordinary skill in the art, that the embodiments may be practiced without limitation to these specific details. In some instances, well known methods and structures have not been described in detail so as not to unnecessarily obscure the embodiments.

[0014] As used herein, the term "seller" will be understood to be, as indicated by context, interchangeable with "owner", "offering party" or "user". The "seller" will be understood to mean a user with authority to offer a contract for sale, for example, for GEARS. The term "buyer" or “purchaser” will be understood to mean a user with authority to purchase the contract rights from the "seller". It is also contemplated that contracts may be bought and sold multiple times before delivery to an ultimate user, and thus a user who is a "buyer" in a first transaction offering instance may become a

"seller" in a second transaction offering instance. Further, both “seller” and/or “buyer” can be computers that are specifically programmed to be special purpose computers to buy and sell at certain events, thresholds in demand, availability, societal attitude and needs, environmental criteria, party identities, and other factors as programmed through software including machine learning programs and artificial intelligence (AI) programs.

[0015] FIG. 1 illustrates a diagram of a system for bilateral trades between a seller 122 and a purchaser or buyer 132 for GEARS, which allow the holder of the rights to the development a parcel of land (which as used herein includes any measure of land area) 140 for carbon offsets. As shown in FIG. 1, the system 100 can include the seller 122 and the buyer 132, and wherein the seller 122 and the buyer 132 having access to one or more computing devices (seller computer 120, buyer computer 130 as exemplary embodiments for illustration purposes). The computing devices 120, 130 being in communication, for example, with a processing server 110, which is configured as a marketplace or exchange for processing bilateral trades between sellers 122 and buyers 132 of the GEARS.

[0016] In accordance with an exemplary embodiment, the bilateral trade between the seller 122 and the buyer (or purchaser) 122 can be for GEARS, which can be a right that is granted separate from the underlying land rights of ownership of the piece of property 140. The GEARS allows the holder the contractual ability to develop carbon offset credits on that specific parcel of land 140. In addition, the GEARS can be, for example, a retail-oriented product that allow for greater participation and access to

carbon market investing and ownership once facilitated by the system and method disclosed herein.

[0017] As set forth above, a carbon offset is a certificate representing the reduction of one metric ton (2,205 lbs.) of carbon dioxide emissions. The carbon credit is a permit or certificate that allows the holder to emit carbon dioxide (CO2) or other greenhouse gases (GHG) into the atmosphere. For example, the holder of the carbon credit can be a developer of a project that reduces carbon dioxide emissions, and where every metric ton (tonne) of emissions reduced results in the creation of one carbon offset. The credits can be financial instruments that are generated by projects that reduce or avoid the release of greenhouse gases (GHGs). In accordance with an exemplary embodiment, the rights provided by the GEARS, for example, would allow the holder of the GEARS to be able to develop carbon credits on a specific piece land 140 for a stated period of time (for example, 20 years to 50 years). The GEARS rights are mutually exclusive to the formal subsequent process whereby the owner further processes or affords formal registration and development with a carbon credit registry to create credits and remain a tradeable asset class.

[0018] In accordance with an exemplary embodiment, the rights under GEARS can be purchased, for example, for an initial consideration and an additional return to the seller 122 in the form of a percentage of the amount of future carbon credit when and if the parcel of land is developed and the carbon credits are sold and/or used by the buyer (or purchaser) 132. The buyer (or purchaser) 132 of the GEARS, for example, a purchaser company would obtain transferable rights that could be resold or

fractionalized for further sales, for example, retail or institutional sales, and wherein the underlying value of the GEARS would allow for future development of carbon credits.

[0019] In accordance with an exemplary embodiment, a contractual right under GEARS could be to develop a specific parcel of land 140 for carbon credits without necessarily specifying the specific way the credits would be developed. In addition, the rights from the GEARS can attach to the land 140 specific to the commercialization or development, for example, of carbon credits only as well as individualize the remuneration of fee split and contributions of the parties.

[0020] Carbon offset registries track offset projects and issue offset credits for each unit of emission reduction or removal that is verified and certified using the presently disclosed system and method.

[0021] Registries are vital in creating a credible, fungible offset commodity by recording the ownership of existing issued carbon credits. Credits, for example, can be issued from any of the major registries for carbon standards (for example, Climate Action Reserve (CAR), Verified Carbon Standard (VCS), American Carbon Registry (ACR), the Gold Standard (GS)) and will have undergone a robust verification process by an International Organization for Standards (ISO) accredited third-party verifier. These credits are also all tracked by the registries to ensure emissions reductions are not double counted and the credit is taken out of the marketplace to warrant that it can only be claimed once (referred to as retirement of the credit). Once projects have been certified against one or more of the major registries rigorous set of rules and requirements, project developers can be issued tradable verified credits.

[0022] In accordance with an exemplary embodiment, the GEARS is not a registered or certified credit but merely the right of development of a piece of property, and more particularly, only pertains to a carbon credit development on the piece of property. In addition, GEARS is a precursor transferable right allowing the holder the ability to develop carbon credits regardless of whether such development of the piece of property and earning of carbon credits is performed over the life of the contract.

[0023] The buyer (or purchaser) 132, for example, a purchaser company would also allow for the verification of the credit as well as the retirement of the credit once created. In accordance with an exemplary embodiment, the verification of the credit can be different than that of registries and would take place regardless of whether the underlying rights were ever developed. In addition, verification of the credit over the life of GEARS, for example, could use a blockchain 112 recording methodology unique to carbon credit development for continuously updating, and verifying the information known about the GEARS, as well as all ancillary and trade information.

[0024] In accordance with an exemplary embodiment, a monitoring system 142 could be employed that record any changes in the status of the underlying land of the GEARS from a visual standpoint. In addition, data and metrics related thereto can be obtained for the one or more parcels of land 140 including one or more of area precipitation, area temperature, changes in land usage or morphability, publicly disseminated information, permitting, contractual, registration, zoning, and ownership changes affecting the area covered by the GEARS, as well as any specific documentation from any carbon standard verification organization if and when there is

development on a parcel of land (or a piece of property) 140. For example, in accordance with an exemplary embodiment, the monitoring system 142 can include photo sensors located on or near the one or more parcels of land 140, and/or an imaging system configured to obtain images of the one or more parcels of land 140 via, for example, a satellite imaging system, an aircraft, a drone, a balloon and/or a land vehicle depending on terrain using optics such as lidar. This data is then transmitted to the processing server 110 for verification and certification purposes, and can be stored on the blockchain along with data related to testing and measurement technic, entity information, date and time, parcel identification to avoid double counting, etc. In addition to images of the one or more parcels of land 140, the monitoring system 142 could be smart sensing technology that collects metrics about a state, for example, of the trees and/or crops on the one or more parcels of land 140, which are being developed of carbon offset credits. For example, the metrics could including temperature, humidity, and/or health indicators of the trees and/or crops on the one or more parcels of land 140. In some embodiments, testing can be done to determine the actual amount of carbon being taken out of the atmosphere by the parcel of land 140 by calculating the biomass of the parcel through estimation models based on various factors.

[0025] For example, for trees, factors such as tree size, wood density and species as physical attributes that are then related to carbon capture through allometric equations, for example. The total carbon captured by a tree over its lifetime or expected lifetime can be determined by its biomass and these factors, and then

through a simple ratio, the amount of atmospheric carbon that has be calculated can be derived through a ratio, e.g., carbon to CO_2 as 12.44. A sampling of trees in random selection can be used to estimate the carbon capture of a forest, as an example. The monitoring system 142 can automate data collecting by gathering information such as diameter at breast height, total tree height, crown size, and species through the monitoring system 142. These measurements are then used to estimate the total biomass in the plot using allometric equations. The biomass density of a whole forest can be estimated by taking the average of all the plots and using that average to make the calculation. This can be done in a time consuming and costly using manual field measurement by humans. By using the disclosed monitoring system 142, the system can be greatly reduce the cost, time and complexity of the process while decreasing error and inaccuracy. If the growth of the trees over time can be estimated, so can the amount of carbon capture each year.

[0026] In accordance with an exemplary embodiment, the verification process can also include outputting to one or more of the computing devices 110, 120, 130, for example, to the processing server 110 that the one or more parcels 140 is not in compliance with one or more conditions for development and entitlement to carbon offset credits based on at least one or more of the received metrics. In addition, if the verification result is a finding of non-compliance, an instruction can be sent to the monitoring system 142, for example, to the photo sensors, or a drone or balloon, to obtain additional photographs and re-verify the condition of the one or more parcels 140. In accordance with an exemplary embodiment, if the one or more parcels 140

are still non-compliant, the processing server 100, for example, can notify the seller 122 or the buyer 132 (e.g., parties to the contractual agreement) and/or a government entity that the one or more parcels 140 are not in compliance with the one or more conditions for development and entitlement to carbon offset credits.

[0027] In accordance with an exemplary embodiment, the verification of the GEARS and corresponding information obtained could be stored in a blockchain network 112 format to enhance the veracity of the information gathered and obtained via the monitoring system 142. In addition, the information gathered on the one or more parcels of land 140 would be accessible to sellers 122 and buyers 132 through the bilateral exchange portal hosted on the processing server 110 as disclosed herein. In addition, the information or metrics gathered on the one or more parcels of land 140 could be updated frequently, for example, on a weekly, monthly, and/or yearly. The information or metrics gathered would also be made accessible to both the seller 122 and the buyer or purchaser 132, for example, to verify that the GEARS are being properly utilized via the bilateral exchange portal.

[0028] In accordance with an exemplary embodiment, the blockchain network (or blockchain) 112 can be a public, permissioned or private ledger of all transactions of a blockchain-based network. One or more computing devices may comprise a blockchain network, which may be configured to process and record transactions as part of a block in the blockchain. Once a block is completed, the block is added to the blockchain and the transaction record thereby updated. In many instances, the blockchain may be a ledger of transactions in chronological order or may be presented

in any other order that may be suitable for use by the blockchain network. In some configurations, transactions recorded in the blockchain may include a destination address, such that the blockchain records provide updates to information that is being recorded on the blockchain for GEARS that have been sold or purchased by the seller 122 or buyer 132, along with information relating to the verification and certification of the amount of carbon capture (verification method, date, time, entity controlling the verification and certifying the results, etc.). In some instances, the transactions might include additional or different information, such as a source address, timestamp, etc. In some embodiments, a blockchain may also or alternatively include nearly any type of data as a form of transaction that is or needs to be placed in a distributed database that maintains a continuously growing list of data records hardened against tampering and revision, even by its operators, and may be confirmed and validated by the blockchain network through proof of work and/or any other suitable verification techniques associated therewith, thus providing an immutable record that can be relied upon for accuracy while being observable. In some cases, data regarding a given transaction may further include additional data that is not directly part of the transaction appended to transaction data. In some instances, the inclusion of such data in a blockchain may constitute a transaction.

[0029] In accordance with an exemplary embodiment, the blockchain 112 provides the seller 122 and the buyer (or purchaser) 132, for example, purchaser company of the GEARS, a way to organize, evaluate updated information, verify, retire, record, and syndicate or trade, the specific land usage rights granted to a purchaser on a

specific parcel of land 140 to commercialize, develop, exploit, and make full use and benefit of the carbon credits produced by the piece of property 140.

[0030] In addition, the GEARS can be different, for example, from Emission Reduction Purchase Agreements (or "ERPAs"), a commonly used purchasing option to contract between a landowner and a project developer for delivery of carbon offset credits as they are issued. For example, an ERPA is a legally binding contract that allows one party to deliver verified carbon credits to another. ERPAs are generally involve a government or business in a developing country selling carbon credits to the World Bank's trust funds. Certain conditions govern the exchange and activities, and prices are negotiated before an ERPA is signed, for example, all parties must agree on the volume of GHG emissions to be reduced during the contract period and by what means, the financing amount, and the results metric that triggers payments.

[0031] As set forth above, the GEARS is an agreement specific to a parcel of land 140 to which carbon credit could be developed or exploited from the parcel of land. For example, GEARS are not specific as to the amount of credits, financing, nor how the credits will be developed, nor if processing the rights through a carbon registry is even required. Noting that in the involuntary carbon credit market, simply the right to develop in the unprocessed or unregistered format are salable albeit at a lesser premium to registered carbon credits. The GEARS process allows for the monetization of the asset class in a lesser processed format and in accordance with an exemplary embodiment, the purchaser of the GEARS is the recipient of transferable rights to develop carbon credits on the parcel of land 140. GEARS involve a complete system

of verification, updating and validating rights on a continuous basis an ERPA is simply a unidimensional legal contract binding two parties and has no technology embedded within its existence

[0032] A valuation for the purchaser of GEARS, can represent initially an out-of-the money long term transferable option on ownership and the price of carbon credits. For example, within the inventory of purchasers there will be those purchasers of the GEARS that will have the immediate ability to develop and value the piece of property 140 and corresponding carbon credits. For example, crop land that indigo or mangroves could be planted, land that carbon sequestration technology can be applied, or simply solar or alternative renewable projects where cash flow is from the project and where the ability and cost to develop carbon credits is secondary to that mandate.

[0033] In addition, it would be desirable to have a system and method that provides access to these opportunities to generate carbon credits and which includes a verification of the GEARS including activities that may affect the parcel of land 140 and any information concerning development or impactful changes in the underlying land. For example, the buyer (or purchaser) 132 of the GEARS can be carried at their book value unless actual development would suffice to change the valuation but would trade based on the prevailing price of carbon credits with a premium more closely associated with the ability or likelihood of development, the ease of development, and if in fact development with a third party developer is in process. The buyer 132 (or purchaser) could purchase the GEARS on a parcel of land 140 that has little or no

current usage or is vacant from the landowner (or landowners) for a relatively small amount, and which could be purchased relatively quickly. For example, pricing for the GEARS could be variable with a higher royalty towards a tail end of the contractual rights, for example, the last years, for example, 5 years to 10 years of the GEARS when carbon offset credit markets are more fully developed and a more significant return is obtained from the carbon offset credits.

[0034] FIGS. 2A and 2B are illustrations of a flowchart of a method 200 for bilateral trades between a purchaser and seller for GEARS in accordance with an exemplary embodiment. As shown in FIGS. 2A and 2B, the process starts in step 210. In step 220, the method and system for bilateral trades of GEARS, can rely on a stream of verified information from the market participants, which can include sellers 220, buyers 222, and third parties 224. The stream of verified information from the market participants allows the GEARS to maintain their value. For example, it would be desirable to have a seamless, decentralized protocol and suite of applications to manage information flows in a way that is highly available and provably secure. For example, a digital identity system can be a collection of open source libraries and blockchain smart contracts that allows users to create and link private, self-custody digital identities and data stores. In addition, a set of tools and services hosted on a processing server 110 that allow organizations and individuals to leverage the digital identity system in a low-code/no-code environment, and includes a verifier 230, 232, 234, which issues credentials for accessing the bilateral trade portal. The verifier 230, 232, 234, can provide for identity and access management, a secure file and asset

storage system (for example, secure data storage system), signature system for digital agreements (or signature system), and a messenger (or communication system) for secure communications between the sellers 220, buyers 222, and third-parties 224 on the bilateral trade portal.

[0035] In accordance with an exemplary embodiment, the verifier (or verification system) 230, 232, 234 can be a decentralized identity and access management application for digital identity system. The market participants including the seller 220, the buyer 222, and the third-parties 224 (for example, identity owners) can use a combination of email, biometric, and user generated inputs to create a secure link between their natural person and their digital identity on their personal device, for example, a combination of computing system and mobile device. Credentials issued to this identity can be issued using, for example, World Wide Web Consortium (W3C) standards, which can be stored in the verifier's 230, 232, 234 credential wallet and authorizes access to integrated services. In accordance with an exemplary embodiment, the verifier 230, 232, 234 can use secure enclaves to ensure that only the natural person to whom the identity belongs can sign transactions and attestations, making the verifier 230, 232, 234, a relatively ultra-secure gateway to the rest of the integrated services provided by the processing server 110. The verification of the sellers, buyers, and the third party 220, 222, 224 using the verifier 230, 232, 234 can be the first step in the process and can being used by the sellers, buyers and third-party 220, 222, 224 in order for the user to create and maintain identity and access.

[0036] In accordance with an exemplary embodiment, each of the parties in the

GEARS system 100 would need to sign up for access via the verifier 230, 232, 234, which provides access to a console of modular applications 410, 412, 414, 416 (FIG. 4) of a bilateral trading portal 420 that is hosted on the processing server 110. In accordance with an exemplary embodiment, the processing server can be a cloud server. The modular applications 410, 412, 414, 416 can facilitate relatively secure and efficient transactions by providing institutional grade tools for managing user accounts, sharing data and executing transactions. In accordance with an exemplary embodiment, the system 100 can provide an identity and access management suite that focuses on user control (or verification), secure data storage, high security digital asset and data storage, and digital contract management (sign). The management suite, for example, can include modular components that can identity and access the management suite, for example, via the identity and access management system (or verifier application 230, 232, 234), which can be relatively easy to use with an identity management application, for example, based on an Android platform or iOS, for example, for an iPhone. The verifier application 230, 232, 234 can act as a control center empowering GEARS participants 220, 222, 224 with self-managed, institutional-grade identity and access management tools, which are critical to recognize the transaction cost savings achieved by concurrently lowering data compliance and security costs (through precision identity and access management) and lowering verification costs (by leveraging permissioned access to verifiable credentials).

[0037] In accordance with an exemplary embodiment, as shown in FIGS. 3-5, the verifier application 230, 232, 234 can leverage a secure enclave of a mobile device

320 to create a self-managed identity management and access system, that is relatively flexible, highly available and verifiably secure, for example, from attack, from example, device hacks. For example, the verifier application 230, 232, 234, can include an account management module in which users can create and manage identities and aliases. For example, a user or market participant in the form of a seller, buyer or third party 220, 222, 224 can have multiple aliases/identities that are tied to a single account, enabling both anonymity and accountability. The system 100 can also include an authentication module in which users 220, 222, 224 can manage passwords and private keys, and multi- factor authentication. In addition, the authorization module allows users 220, 222 to precisely manage third party 224 access to their identity and other data on a time-specific basis. For example, this precision access management can increase security for users 220, 222, 224 and can reduce transaction costs emanating from data compliance and data security costs from centralized proprietary databases. Examples of identity and related data include information such as birth date, passport details, licenses, certifications and other credentials that are stored in the verifier 230, 232, 234, and the secure data storage system which can act as a highly secure digital asset and data storage system. In addition, the identity and related information and corresponding approvals for transaction of the GEARS can include a blockchain based delegation smart contract with complete trust delegates and enforces access to the approved data for an approved (or set) amount of time.

[0038] In accordance with an exemplary embodiment, the verifier 230, 232,234 can

also include one or more verifier roles, which can include: (1) minter - mints and administers the GEARS (2) seller - original seller of the GEAR; (3) buyer - party buying the GEAR in a transaction; (4) holder - current holder of the GEAR; (5) third parties - ecosystem partners required to provide input information and/or attest to information; and (6) striker - party striking the GEAR option. In accordance with an exemplary embodiment, the verifier activity can verify each of the market participants so that the market participants can interact with one another. Thus, the verifier acts as the control center for the console, allowing users to receive and respond to push notifications for required actions including messages, data sharing approvals, and document/transaction signing.

[0039] The parcel of land 240 can include details for an area (for example, a parcel of land 140) covered by the GEARS data bank. For example, the data bank can include supporting documentation that can be compiled, verified and timestamped, with a proof committed to an accessible public blockchain 112. The data bank can also include data on the parcel of land 140 including area precipitation, area temperature, area land use/morphability, area permitting, area contractual, area registration, area zoning ownership, changes affecting area covered by the GEARS, attestation, and assurance documents.

[0040] In addition, the management suite can create the GEARS using a set of tools and services that allow organizations and individuals to leverage the verifier 230, 232, 234 in a low-code/no-code environment, and is comprised of the verifier 230, 232, 234 for identity and access management, a secure data storage system for secure file and

asset storage, digital signature module for signing digital agreements, and the communication system or messenger for secure communication.

[0041] In accordance with an exemplary embodiment, the secure data storage system in combination with the verifier 230, 232, 234, for example, to create private, secure cloud storage. For example, the owner of a “drive” within the secure data storage system can authorize access to their data, and all third parties, including data hosts and digital service providers, must request file access from that owner to see the data. For example, drive data can be stored using a decentralized infrastructure where every operation and event, including access requests, reads, and writes, are permanently logged, eliminating the risk that any third party corporate or state actor could secretly access or destroy data from the drive of an owner.

[0042] In accordance with an exemplary embodiment, activity within the drive can include that each of parties uploading relevant data to the drive. For example, through this method all data remains in the possession of the party. For example, the minter would request copies of all relevant documentation and access to the documentation would be shared with the minter and any relevant third party in an attestation or assurance role.

[0043] In accordance with an exemplary embodiment, the secure data storage system can also include a “vault”, which can leverage an additional layer of protocols to secure the most sensitive data a user wishes to retain including digital assets, private keys, and passwords. The multi-signature capability of the vault allows organizations to build and follow bespoke governance protocols to suit the needs of

the governance protocols when validating data and transferring assets.

[0044] In accordance with an exemplary embodiment, the vault can be a multi-cloud financial-data storage using encrypted content-addressing distributed file systems. For example, a digital-contract custody and digital bearer instrument creation and secure storage. In addition, the vault can be a highly secure data storage leveraging distributed ledger technology, requiring multi-signature authentication for any actions. The vault can be designed for security sensitive use cases such as digital-contract custody and digital bearer instrument storage.

[0045] In accordance with an exemplary embodiment, the digital signature module (or “sign”) for signing digital agreements can bring the capabilities of verifier application 230, 232, 234 to the execution and storage of legal documents. For example, with sign, parties can generate or upload legally binding agreements that are enforceable in a court of law, use verifier 230, 232, 234 to sign their agreements, and then securely store their agreements in their respective drive or vault, keeping their agreement terms confidential from digital service providers. In addition to privacy, sign can create a powerful bridge between legal agreements and digital assets, providing a secure link between tokens and the world of real value. The sign module and corresponding software can be used by sellers 220, in the creation of GEARS as well as buyers 222 and third parties 224 in the corresponding transactions between the market participants.

[0046] In accordance with an exemplary embodiment, the workflow/sign activity (or POST) 252 can include once the piece or land (or parcel) 140 has been verified by the

required signatures in the workflow/sign module, a hash/derivative/compilation of this documentation can be minted into, for example, a non-fungible token (NFT) that represents the GEARS. The GEARS digital asset can then be pushed to the vault for relatively highly secure storage. Once verified by the required signatures in the workflow/sign module, a hash/derivative/compilation of this documentation is minted into an NFT representing the updated GEARS upon an execution of a bilateral trade of the GEARS between the seller 220 and the buyer 222 in a transaction 260.

[0047] In accordance with an exemplary embodiment, the updated/new GEARS digital asset is then pushed to the vault for highly secure storage. For example, the seller 220 can be pinged (or requested) to update the corresponding documents in sign with the minter. Once verified by the required signatures in the workflow/sign module, a hash/derivative/compilation of this documentation is minted into a new NFT representing the record of the past GEARS, for example, to prevent future double spending or use of the rights. In accordance with an exemplary embodiment, the NFT will be programmed to last until the exercised current rights expire. For example, the updated/new rights digital asset can be pushed to the vault of a striker (or buyer) of the GEARS. While the previous GEARS, for example, can be retired by being sent to a one-way "burner" vault setup by the minter. The seller 220 can then be pinged or requested to update the document in sign with the minter, for example, as a condition for transaction execution and/or transfer of funds.

[0048] In accordance with an exemplary embodiment, the workflow for the creation of the GEARS can be a SSID-enabled (Service Set Identifier-enabled) electronic

document and smart contract signing. The management suite can also include a productivity tool suite and integrations for automating and securely signing documents with an immutable timestamp for proof of existence including secure creation, templating, routing, and signing of documents with an immutable timestamp for proof of existence.

[0049] In accordance with an exemplary embodiment, the communication system (or communication messenger) 270 can be a chat, voice, and video communications tool. For example, communications can be fully encrypted end-to-end and securely stored in a drive or vault. Data owners can choose to keep these records fully private or can rather easily attach them to legal agreements, transaction records, and digital assets for ease in managing audit and regulatory requirements. Users and organizations, for example, can get all the benefits of a Cloud-based digital service while eliminating the inherent counterparty risk of revealing sensitive data to a digital service provider.

[0050] In accordance with an exemplary embodiment, the communication messenger activity can include relevant users interacting at relevant times using the messenger application. For example, scheduled messages can be used in concert with workflow/sign to collect attestations or request updated documentation from the seller 220 and third parties 224.

[0051] In accordance with an exemplary embodiment, trading and transacting 280 of the GEARS can include a digital order book can also be provided for matching, settlement, or the formal process of transferring title and custody. For example, the digital order book can be recorded in the blockchain 112.

[0052] In addition, initially, the updating of information 290, for example on the parcel of land 140, can be done at set intervals and in regard to some data, for example, the updating of information could be done annually at a minimum with the source of the information, which can include updates of area precipitation, area temperature, area land use and morphability, area permitting, area contractual, area registration, area zoning ownership, changes affecting area covered by the GEARS, attestation/assurance documents. For example, the set intervals can be weekly, monthly, and/or yearly. In accordance with an exemplary embodiment, the final stage of an update can involve the verification of the updated information, and once the information has been verified, the data is added to the GEARS data bank.

[0053] FIG. 3 is an illustration of a graphical user interface (GUI) 312 of a computing device 310 and a mobile device 320 for verifying a market participant in accordance with an exemplary embodiment. As shown in FIG. 3, the market participant, for example, a seller 220, a buyer 222, and/or a third party 224 can access a bilateral trading portal (or exchange portal) hosted on the processing server 110 by retrieving the “sign in” page 314 of the trading portal. On the “Sign In” (or sign in) page 314, the market participant can retrieve a code 330, for example, a matrix code or two-dimensional code (e.g. QR code) displayed on the sign in page 314 with a smart device, for example, mobile device or smartphone 320. For example, the code 330 as shown on the sign in page 314 of the graphical user interface 312 can be scanned with the smart device, and if the market participant is authorized, the market participant can be automatically logged into the bilateral trading portal through, for example, a

combination of email, biometric, and user generated inputs and security features on the mobile device or smartphone 320 to create a secure link between the market participant and their digital identity on their mobile device or smartphone 320 based on the retrieved code 330.

[0054] As set forth above, credentials issued to this identity or market participant 220, 222, 224 can be issued using, for example, World Wide Web Consortium (W3C) standards, which can be stored in a credential wallet of the verifier 230, 232, 234 credential wallet and authorizes access to integrated services. In accordance with an exemplary embodiment, the verifier 230, 232, 234 can use secure enclaves to ensure that only the natural person to whom the identity belongs can sign transactions and attestations, making the verifier 230, 232, 234, a relatively ultra-secure gateway to the rest of the integrated services provided by the processing server 110. The verification of the sellers, buyers, and the third party 220, 222, 224 using the verifier 230, 232, 234 can be the first step in the process and is being used by the sellers, buyers and third party 220, 222, 224 in order for the user to create and maintain identity and access.

[0055] In accordance with an exemplary embodiment, once the market participant 220, 222, 224 has been granted access to the market portal or exchange portal 400, each of the market participants, for example, in the GEARS system would be able to access via the verifier 230, 232, 234, a plurality of applications 410, 412, 414, 416 as shown in FIG. 4 that facilitates secure and efficient transactions by providing institutional grade tools for managing user accounts, sharing data and executing transactions associated with the buying and selling of GEARS as disclosed above.

The one more applications 410, 412, 414, 416 can provide, for example, strategies for bilateral trades, exchange for related positions, trades, block trades, and tools to calculate and offset greenhouse gases (GHGs). In addition, the one or more applications 410, 412, 414, 416 can include tools for buyers and sellers to calculate carbon content, buyers and sellers can calculate the environmental impact of their and bundle the correct number of carbon offsets with their buying and selling of GEARS on the bilateral trade portal.

[0056] FIG. 5 is a flowchart illustrating a method for bilateral trades of GEARS 500 in accordance with an exemplary embodiment. As shown in FIG. 5, in step 510, a listing of one or more parcels of land with contractual rights to develop carbon offset credits is hosted on a processing server. In step 520, metrics on the one or more parcels of land with the contractual rights to develop carbon offset credits are received on the processing server. In step 530, the one or more parcels of land with the contractual rights to develop carbon offset credits are verified to comply with one or more conditions for acceptance as GEARS and with a reference to the protocols for development and potential entitlement to carbon offset credits based on at least the received metrics on the processing server.

[0057] In accordance with an exemplary embodiment, the method further includes documenting, on the processing server, publicly dissemination information on the one or more parcels of land with the contractual rights to develop carbon offset credits; and documenting, on the processing server, one or more of permitting, contractual, registration, zoning, and ownership of the one or more parcels of land with the

contractual rights to develop carbon offset credits. In addition, the metrics of the one or more parcels of land with the contractual rights to develop carbon offset credits can be received from an imaging system. For example, the imaging system can receive the image from one or more of a photo sensor, a satellite, an airplane, a drone, and a balloon.

[0058] In accordance with an exemplary embodiment, the method includes receiving, by the processing server, the metrics of the one or more parcels of land with the contractual rights to develop carbon offset credits from a smart sensing technology, the metrics received from the smart sensing technology including one or more of area precipitation, area temperature, and changes in land usage or morphability. The metrics of the one or more parcels of land with the contractual rights to develop carbon offset credits, for example, can be recorded on a blockchain associated with processing server.

[0059] In accordance with an exemplary embodiment, the publicly dissemination information on the one or more parcels of land with the contractual rights to develop carbon offset credits, and the one or more of permitting, contractual, registration, zoning, and ownership of the one or more parcels of land with the contractual rights to develop carbon offset credits can be recorded on a blockchain associated with the processing server. In addition, the method can include providing, on the processing server, a status of the one or more parcels of land with the contractual rights to develop carbon offset credits, the status including ownership of the one or more parcels of land with the contractual rights to develop carbon offset credits, ownership

of a contractual right to develop carbon offset credits of the one or more parcels of land with the contractual rights to develop carbon offset credits, and a status of the contractual right to develop the carbon offset credits of the one or more parcels of land with the contractual rights to develop carbon offset credits.

[0060] In accordance with an exemplary embodiment, the method includes registering, on the processing server, a plurality of market participants, the plurality of market participants participating in one or more of a sale, a purchase, or a third-party activity in a development of carbon offset credits of the one or more parcels of land with the contractual rights to develop carbon offset credits being hosted by the processing server; and granting, by the processing server, one or more of the plurality of market participants access to data on a bilateral exchange portal for the sale, the purchase, or the third-party activity in the development of the carbon offset credits for the one or more parcels of land with the contractual rights to develop carbon offset credits. In addition, the granting of the access to the bilateral exchange portal can further include granting, by the processing server, access to the bilateral exchange portal by the one or more market participants via a digital identity system, the digital identify system including a QR code on a sign in page of the bilateral exchange portal in combination with a biometric validation of the QR with a smartphone.

[0061] FIG. 6 illustrates a representative computer system 600 in which embodiments of the present disclosure, or portions thereof, may be implemented as computer-readable code executed on hardware. For example, the method and system for bilateral trades of greenhouse gases and environmental rights as disclosed herein

may be implemented in whole or in part by a computer system 600 using hardware, software executed on hardware, firmware, non-transitory computer readable media having instructions stored thereon, or a combination thereof and may be implemented in one or more computer systems or other processing systems. Hardware, software executed on hardware, or any combination thereof may embody modules and components used to implement the methods and steps of the presently described method and system.

[0062] If programmable logic is used, such logic may execute on a commercially available processing platform configured by executable software code to become a specific purpose computer or a special purpose device (for example, programmable logic array, application-specific integrated circuit, etc.). A person having ordinary skill in the art may appreciate that embodiments of the disclosed subject matter can be practiced with various computer system configurations, including multi-core multiprocessor systems, minicomputers, mainframe computers, computers linked or clustered with distributed functions, as well as pervasive or miniature computers that may be embedded into virtually any device. For instance, at least one processor device and a memory may be used to implement the above described embodiments.

[0063] A processor unit or device as discussed herein may be a single processor, a plurality of processors, or combinations thereof. Processor devices may have one or more processor “cores.” The terms “computer program medium,” “non-transitory computer readable medium,” and “computer usable medium” as discussed herein are used to generally refer to tangible media such as a removable storage unit 618, a

removable storage unit 622, and a hard disk installed in hard disk drive 612.

[0064] Various embodiments of the present disclosure are described in terms of this representative computer system 600. After reading this description, it will become apparent to a person skilled in the relevant art how to implement the present disclosure using other computer systems and/or computer architectures. Although operations may be described as a sequential process, some of the operations may in fact be performed in parallel, concurrently, and/or in a distributed environment, and with program code stored locally or remotely for access by single or multi-processor machines. In addition, in some embodiments the order of operations may be rearranged without departing from the spirit of the disclosed subject matter.

[0065] A processor device 604 may be processor device specifically configured to perform the functions discussed herein. The processor device 604 may be connected to a communications infrastructure 606, such as a bus, message queue, network, multi-core message-passing scheme, etc. The network may be any network suitable for performing the functions as disclosed herein and may include a local area network ("LAN"), a wide area network ("WAN"), a wireless network (e.g., "Wi-Fi"), a mobile communication network, a satellite network, the Internet, fiber optic, coaxial cable, infrared, radio frequency ("RF"), or any combination thereof. Other suitable network types and configurations will be apparent to persons having skill in the relevant art. The computer system 600 may also include a main memory 608 (e.g., random access memory, read-only memory, etc.), and may also include a secondary memory 610. The secondary memory 610 may include the hard disk drive 612 and a removable

storage drive 614, such as a floppy disk drive, a magnetic tape drive, an optical disk drive, a flash memory, etc.

[0066] The removable storage drive 614 may read from and/or write to the removable storage unit 618 in a well-known manner. The removable storage unit 618 may include a removable storage media that may be read by and written to by the removable storage drive 614. For example, if the removable storage drive 614 is a floppy disk drive or universal serial bus port, the removable storage unit 618 may be a floppy disk or portable flash drive, respectively. In one embodiment, the removable storage unit 618 may be non-transitory computer readable recording media.

[0067] In some embodiments, the secondary memory 610 may include alternative means for allowing computer programs or other instructions to be loaded into the computer system 600, for example, the removable storage unit 622 and an interface 620. Examples of such means may include a program cartridge and cartridge interface (e.g., as found in video game systems), a removable memory chip (e.g., EEPROM, PROM, etc.) and associated socket, and other removable storage units 622 and interfaces 620 as will be apparent to persons having skill in the relevant art.

[0068] Data stored in the computer system 600 (e.g., in the main memory 608 and/or the secondary memory 610) may be stored on any type of suitable computer readable media, such as optical storage (e.g., a compact disc, digital versatile disc, Blu-ray disc, etc.) or magnetic storage (e.g., a hard disk drive). The data may be configured in any type of suitable database configuration, such as a relational database, a structured query language (SQL) database, a distributed database, an object database, etc.

Suitable configurations and storage types will be apparent to persons having skill in the relevant art.

[0069] The computer system 600 may also include a communications interface 624. The communications interface 624 may be configured to allow software and data to be transferred between the computer system 600 and external devices. Exemplary communications interfaces 624 may include a modem, a network interface (e.g., an Ethernet card), a communications port, a PCMCIA slot and card, etc. Software and data transferred via the communications interface 624 may be in the form of signals, which may be electronic, electromagnetic, optical, or other signals as will be apparent to persons having skill in the relevant art. The signals may travel via a communications path 626, which may be configured to carry the signals and may be implemented using wire, cable, fiber optics, a phone line, a cellular phone link, a radio frequency link, etc.

[0070] The computer system 600 may further include a display interface 602. The display interface 602 may be configured to allow data to be transferred between the computer system 600 and external display 630. Exemplary display interfaces 602 may include high-definition multimedia interface (HDMI), digital visual interface (DVI), video graphics array (VGA), etc. The display 630 may be any suitable type of display for displaying data transmitted via the display interface 602 of the computer system 600, including a cathode ray tube (CRT) display, liquid crystal display (LCD), light-emitting diode (LED) display, capacitive touch display, thin-film transistor (TFT) display, etc. Computer program medium and computer usable medium may refer to memories,

such as the main memory 608 and secondary memory 610, which may be memory semiconductors (e.g., DRAMs, etc.). These computer program products may be means for providing software to the computer system 600. Computer programs (e.g., computer control logic) may be stored in the main memory 608 and/or the secondary memory 610. Computer programs may also be received via the communications interface 624. Such computer programs, when executed, may enable computer system 600 to implement the present methods as discussed herein. In particular, the computer programs, when executed, may enable processor device 604 to implement the methods illustrated by FIGS. 1-5, as discussed herein. Accordingly, such computer programs may represent controllers of the computer system 600. Where the present disclosure is implemented using software executed on hardware, the software may be stored in a computer program product and loaded into the computer system 600 using the removable storage drive 614, interface 620, and hard disk drive 612, or communications interface 624.

[0071] The processor device 604 may comprise one or more modules or engines configured to perform the functions of the computer system 600. Each of the modules or engines may be implemented using hardware and, in some instances, may also utilize software executed on hardware, such as corresponding to program code and/or programs stored in the main memory 608 or secondary memory 610. In such instances, program code may be compiled by the processor device 604 (e.g., by a compiling module or engine) prior to execution by the hardware of the computer system 600. For example, the program code may be source code written in a

programming language that is translated into a lower level language, such as assembly language or machine code, for execution by the processor device 604 and/or any additional hardware components of the computer system 600. The process of compiling may include the use of lexical analysis, preprocessing, parsing, semantic analysis, syntax- directed translation, code generation, code optimization, and any other techniques that may be suitable for translation of program code into a lower level language suitable for controlling the computer system 600 to perform the functions disclosed herein. It will be apparent to persons having skill in the relevant art that such processes result in the computer system 600 being a specially configured computer system 600 uniquely programmed to perform the functions discussed above.

[0072] Techniques consistent with the present disclosure provide, among other features, method and system for bilateral trades of greenhouse gases and environmental rights. While various exemplary embodiments of the disclosed system and method have been described above it should be understood that they have been presented for purposes of example only, not limitations. It is not exhaustive and does not limit the disclosure to the precise form disclosed. Modifications and variations are possible in light of the above teachings or may be acquired from practicing of the disclosure, without departing from the breadth or scope.

WHAT IS CLAIMED IS:

1. A computer-implemented method for management and transaction of greenhouse gases and environmental rights, the method comprising:

hosting, on a processing server, a portal for the sale, the purchase, or the third-party activity of contractual rights to develop greenhouse gases and environmental rights credits associated with one or more parcels of land, wherein the greenhouse gases and environmental rights credits are separate from the ownership of the associated one or more parcels of land;

granting, by the processing server, one or more market participants access to data on the portal;

receiving, by the processing server, metrics on the one or more parcels of land with the associated contractual rights to develop greenhouse gases and environmental rights credits;

storing, by the processing server, the metrics in a secure data storage;

verifying, on the processing server, that the one or more parcels of land associated with the contractual rights to develop greenhouse gases and environmental rights credits comply with one or more conditions for development and potential entitlement to greenhouse gases and environmental rights credits based on at least the received metrics;

in response to the verifying that at least one parcel of land of the associated one or more parcels of land is in compliance with the one or more conditions for development and potential entitlement to greenhouse gases and environmental rights credits, generating, by the processing server, a non-fungible token (NFT), the NFT representing the contractual rights to develop greenhouse gases and environmental rights credits for the at least one parcel of land of the associated one or more parcels of land, wherein generating the NFT includes hashing one or more of the received metrics;

recording, by the processing server, the NFT on a blockchain associated with the processing server;

recording, by the processing server, the metrics of the one or more parcels of land associated with the contractual rights to develop greenhouse gases and environmental rights credits and a verification result for each of the associated one or more parcels of land on the portal;

generating, by the processing server, a message, the message including the verification result for at least one of the associated one or more parcels of land; and

transmitting, by the processing server, the message to at least one of the one or more market participants.

2. The computer-implemented method according to claim 1, including:

receiving, by the processing server, updated metrics on at least one of the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits;

updating, by the processing server, the metrics stored in the secure data storage based on the received updated metrics for the at least one of the one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits;

updating, by the processing server, the NFT based on the updated metrics for the at least one of the one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits; and

recording, by the processing server, the updated NFT on the blockchain

3. The computer-implemented method according to claim 1, wherein the received metrics includes publicly disseminated information and one or more of permitting, contractual, registration, zoning, and ownership data of the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits, the method further comprising:

documenting, on the processing server, the publicly disseminated information on the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits; and

documenting, on the processing server, one or more of permitting, contractual, registration, zoning, and ownership data of the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits.

4. The computer-implemented method according to claim 1, further comprising:

receiving, by the processing server, the metrics of the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits from an imaging system, the imaging system receiving images from one or more of a photo sensor, a satellite, an airplane, a drone, and a balloon.

5. The computer-implemented method according to claim 1, further comprising:

receiving, by the processing server, the metrics of the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits from a smart sensing technology, the metrics received from the smart sensing technology including one or more of area precipitation, area temperature, and changes in land usage or morphability.

6. The computer-implemented method according to claim 1, further comprising:

recording, on the blockchain associated with the processing server, the metrics of the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits.

7. The computer-implemented method according to claim 3, further comprising:

recording, on the blockchain associated with the processing server, the publicly

disseminated information on the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits, and the one or more of permitting, contractual, registration, zoning, and ownership of the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits.

8. The computer-implemented method according to claim 1, further comprising:

providing, on the processing server, a status of the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits, the status including ownership of the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits, ownership of a contractual right to develop greenhouse gases and environmental rights credits of the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights ~~carbon offset~~ credits, and a status of the contractual right to develop the greenhouse gases and environmental rights credits of the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits.

9. The computer-implemented method according to claim 1, wherein the granting of the access to the portal further comprises:

granting, by the processing server, the access to the portal by the one or more market participants via a digital identity system, the digital identify system including a QR code on a sign in page of the portal in combination with a biometric validation of the QR with a smartphone.

10. A system for management and transaction of greenhouse gases and environmental rights, the system comprising:

a processing server configured to:

host a portal for the sale, the purchase, or the third-party activity of contractual rights to develop greenhouse gases and environmental rights credits associated with one or more parcels of land, wherein the greenhouse gases and environmental rights credits are separate from the ownership of the associated one or more parcels of land;

grant one or more market participants access to data on the portal for the sale;

receive metrics on the one or more parcels of land with the associated contractual rights to develop greenhouse gases and environmental rights credits;

store the metrics in a secure data storage;

verify that the one or more parcels of land associated with the contractual rights to develop greenhouse gases and environmental rights credits comply with one or more conditions for development and potential entitlement to greenhouse gases and environmental rights credits based on at least the received metrics;

in response to the verifying that at least one parcel of land of the associated one or more parcels of land is in compliance with the one or more conditions for development and potential entitlement to greenhouse gases and environmental rights credits, generate a non-fungible token (NFT), the NFT representing the contractual rights to develop greenhouse gases and environmental rights credits for the at least one parcel of land of the associated one or more parcels of land, wherein generating the NFT includes hashing one or more of the received metrics;

record the NFT on a blockchain associated with the processing server;

record the metrics of the one or more parcels of land associated with the contractual rights to develop greenhouse gases and environmental rights credits and a verification result for each of the associated one or more parcels of land on the portal;

generate a message, the message including the verification result for at

least one of the associated one or more parcels of land;

transmit the message to at least one of the one or more market participants.

11. The system according to claim 10, wherein the processing server is further configured to:

receive updated metrics on at least one of the one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits;

update the metrics stored in the secure data storage based on the received updated metrics for the at least one of the one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits;

update the NFT based on the updated metrics for the at least one of the one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits; and

record the updated NFT on the blockchain

12. The system according to claim 10, wherein the received metrics includes publicly disseminated information and one or more of permitting, contractual, registration, zoning, and ownership data of the one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits, wherein the processing server is further configured to:

document the publicly disseminated information on the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits; and

document one or more of permitting, contractual, registration, zoning, and ownership data of the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits.

13. The system according to claim 10, wherein the processing server is further configured to:

receive the metrics of the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits from an imaging system, the imaging system receiving images from one or more of a photo sensor, a satellite, an airplane, a drone, and a balloon.

14. The system according to claim 10, wherein the processing server is further configured to:

receive the metrics of the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits from a smart sensing technology, the metrics received from the smart sensing technology including one or more of area precipitation, area temperature, and changes in land usage or morphability.

15. The system according to claim 10, wherein the processing server is further configured to:

recording, on the blockchain associated with the processing server, the metrics of the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits.

16. The system according to claim 12, wherein the processing server is further configured to:

record on the blockchain associated with the processing server, the publicly disseminated information on the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits, and the one or more of permitting, contractual, registration, zoning, and ownership of the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights

credits.

17. The system according to claim 10, wherein the processing server is further configured to:

provide a status of the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits, the status including ownership of the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits, ownership of a contractual right to develop greenhouse gases and environmental rights credits of the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits, and a status of the contractual right to develop the greenhouse gases and environmental rights credits of the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits.

18. The system according to claim 10, wherein the processing server is further configured to grant the access to the portal by:

granting access to the portal by the one or more market participants via a digital identity system, the digital identify system including a QR code on a sign in page of the portal in combination with a biometric validation of the QR with a smartphone.

19. A non-transitory computer readable medium storing computer readable program code that, when executed by a processor, causes the processor to provide an exchange for management and transaction of greenhouse gases and environmental rights, the program code comprising instructions for:

hosting a portal for the sale, the purchase, or the third-party activity of contractual rights to develop greenhouse gases and environmental rights credits associated with one or more parcels of land, wherein the greenhouse

gases and environmental rights credits are separate from the ownership of the associated one or more parcels of land;

granting, by the processing server, one or more market participants access to data on the portal;

receiving metrics on the one or more parcels of land with the associated contractual rights to develop greenhouse gases and environmental rights credits;

storing, by the processing server, the metrics in a secure data storage;

verifying that the one or more parcels of land associated with the contractual rights to develop greenhouse gases and environmental rights credits comply with one or more conditions for development and potential entitlement to greenhouse gases and environmental rights credits based on at least the received metrics;

in response to the verifying that at least one parcel of land of the associated one or more parcels of land is in compliance with the one or more conditions for development and potential entitlement to greenhouse gases and environmental rights credits, generating, by the processing server, a non-fungible token (NFT), the NFT representing the contractual rights to develop greenhouse gases and environmental rights credits for the at least one parcel of land of the associated one or more parcels of land, wherein generating the NFT includes hashing one or more of the received metrics;

recording, by the processing server, the NFT on a blockchain associated with the processing server;

recording, by the processing server, the metrics of the one or more parcels of land associated with the contractual rights to develop greenhouse gases and environmental rights credits and a verification result for each of the associated one or more parcels of land on the portal;

generating, by the processing server, a message, the message including the verification result for at least one of the associated one or more parcels of land;

transmitting, by the processing server, the message to at least one of the one or more market participants.

20. The non-transitory computer readable medium according to claim 19, the instructions including:

receiving, by the processing server, updated metrics on at least one of the associated one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits;

updating, by the processing server, the metrics stored in the secure data storage based on the received updated metrics for the at least one of the one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits;

updating, by the processing server, the NFT based on the updated metrics for the at least one of the one or more parcels of land with the contractual rights to develop greenhouse gases and environmental rights credits; and

recording, by the processing server, the updated NFT on the blockchain.