

Regeneration Credit: A Peer-to-Peer Nature Regeneration System

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Abstract

The Regeneration Credit is a (P2P) funding system designed to incentivize the regeneration of ecosystems. Humanity has been destroying Nature for centuries, and our survival depends on bringing life back to Earth. The problem is that people currently have more economic incentives to deforest an area and exploit its natural resources than to regenerate it. The project aims to create an additional income for people who are regenerating ecosystems, so they can sell the digital representation of their impact in exchange for new tokens after going through a peer-to-peer certification method. This paper outlines the fundamental problems with existing systems, presents our proposed solution, and provides a detailed technical specification of the core smart contracts.

1 Purpose

The process of deforestation and desertification of the territory is frightening. How is it going to be in the future if we keep up the pace of destruction? How much biodiversity will be lost? How much CO_2 will be emitted into the atmosphere? Can we run out of food and water? Will there be life on Earth if we continue at this pace? Can we be extinct?

Humans are destroying Nature: Depleting soils, polluting water, extinguishing biodiversity, emitting many greenhouse gases. Unfortunately, we are on the path of economic and socio-environmental collapse. It is such a big problem that it affects all living beings that live here and also all future generations. The need for change is urgent, and we need to change before it is too late. The level of environmental degradation is currently enormous. And the level of regeneration and restoration of ecosystems is still very low. When we invert this scenario and begin to regenerate a larger area than we degrade, we will be on the way to solve environmental problems, climate change, and resource scarcity by the cause, and not by treating the symptoms of this serious disease of the Planet. The project mission is to incentivize people to bring life back to terrestrial ecosystems and regenerate the Earth.

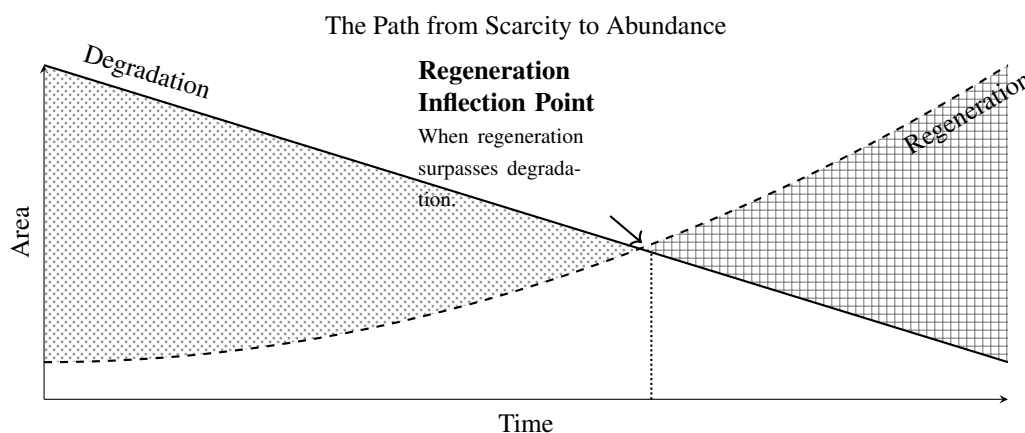


Figure 1: A conceptual model comparing the planetary area under degradation (solid line) versus the area undergoing regeneration (dashed line) over time. The 'Regeneration Inflection Point' marks the future event where regenerative activities surpass degenerative ones.

2 The Problem

The fundamental problem addressed is a deeply embedded market failure within our current global economic system: the systemic mispricing of natural capital and the critical ecosystem services it provides. Dominant civilization has built a paradigm where the economic incentives are overwhelmingly skewed towards the degradation of our Planet, not its regeneration.

In the prevailing economic model, extractive industries generate significant and immediate profits by treating ecosystems not as finite, vital assets, but as low-cost inputs. The liquidation of a forest for timber, the clearing of land for monoculture agriculture, or the pollution of a river for industrial production yields quantifiable financial returns. In contrast, the long-term catastrophic costs associated with these actions, such as soil erosion, loss of biodiversity, disruption of local climate, and depletion of water resources, are shared among all. These costs are unpriced by the market and are instead borne by society and disproportionately by future generations.

Healthy ecosystems provide continuous, life-sustaining services: the purification of air and water, the pollination of crops, the formation of fertile soil, and the regulation of our climate. Despite their incalculable value to human survival and prosperity, these services lack a market mechanism for valuation and exchange. As a result, there is no direct, scalable economic incentive for an individual, a family, a community, or a group to actively provide the service of regenerating a degraded ecosystem.

This creates a perilous incentive misalignment: it is vastly more profitable to degrade an ecosystem than to restore one. This systemic flaw drives a global-scale problem, leading to accelerating ecological collapse and posing an existential risk to long-term human viability. The core challenge, therefore, is not a lack of scientific understanding or a desire for a healthier Planet, but the absence of a robust economic engine that makes regeneration a financially superior choice to short-term, extractive exploitation.

3 Proposed Solution

We propose a P2P protocol designed to directly finance the ecosystem service of planetary regeneration, creating a transparent and globally accessible market for this vital work. The native token of the protocol, the Regeneration Credit, is distributed based on ecological services. Using blockchain technology and autonomous smart contracts, the architecture offers a fundamentally new paradigm for climate action and proposes a foundational reimaging of how environmental value is certified, financed, and transacted.

3.1 Core Principles and Key Differentiators

Autonomous and Decentralized Governance. Unlike conventional carbon markets, which are managed by centralized intermediaries, this protocol operates as a public utility in a peer-to-peer network. There is no central company, board of directors, or single authority that can unilaterally alter rules or censor participants. All governance, rule enforcement, and value distribution are executed by open-source smart contracts, ensuring that the system remains neutral, permissionless, and aligned with the interests of its community.

Inclusive Access and Social Impact. The protocol is engineered to be radically inclusive. While traditional certification mechanisms often involve prohibitive costs that favor large landowners and monoculture plantations, the system is optimized for the small-scale regenerator, the family farm, and local communities. By enabling these smaller actors to directly monetize their ecosystem services, the protocol is not only an environmental tool but also a powerful driver of social impact and economic empowerment for historically underserved rural populations.

Radical Disintermediation and Economic Efficiency. Payments for verified environmental services are executed directly from the protocol's smart contracts to the wallet addresses of the service providers. Furthermore, the protocol facilitates a direct, peer-to-peer market where users who receive the primary offer of new Regeneration Credits can sell them directly to the *supporters*. This radical disintermediation ensures that the maximum possible value flows to the individuals and communities performing the regenerative work. Consequently, the cost of participation is dramatically reduced from the hundreds of thousands of dollars often required for traditional carbon project certification to the negligible cost of a few blockchain transactions required to register and validate a project.

Unconditional Transparency and Open-Source. Every action within the protocol, including all user registration, inspection report, offset and token transaction, is immutably recorded on a public blockchain. This creates a permanent, universally accessible audit trail that stands in stark contrast to the proprietary, restricted-access databases of incumbent certification bodies. The entire codebase, including all smart contracts, is open-source.

4 Technological Foundations

The protocol's promises of decentralization, transparency, and autonomous governance are possible by a specific stack of technologies. Understanding these core components is essential to grasping how the Regeneration Credit system operates without a central authority. The architecture rests on three fundamental pillars: a distributed blockchain, self-executing smart contracts, and user-controlled wallets.

4.1 Pillar 1: Blockchain and Distributed Storage

At its core, the protocol operates on a blockchain. A blockchain can be understood by contrasting it with a traditional database, which is like a single ledger kept in a central, guarded location. Any change must go through the central guardian. A blockchain, however, is a distributed ledger. Instead of one central book, every participant (or "node") in the network holds an identical, synchronized copy of the entire ledger. When a new transaction occurs, it is broadcast to the entire network, verified by its participants, and then added as a new "block" to the chain of existing blocks.

The protocol is designed to operate on the *Sintrop Impact Blockchain*[1], a public infrastructure specifically designed for hosting the Regeneration Credit and other high-impact socio-environmental projects.

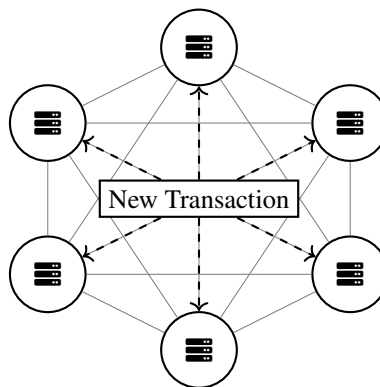


Figure 2: A distributed network of nodes. Each node holds a copy of the ledger, and new transactions are validated and stored across the entire network simultaneously.

4.2 Pillar 2: Smart Contracts as Autonomous Law

A smart contract is a computer program stored directly on the blockchain. Once deployed, its code cannot be changed and it will run exactly as programmed, without the need for any human intermediary. These contracts are the engine of the Regeneration Credit protocol. They define the rules for everything: how a Regenerator can register an area, how an Inspector's data is processed, how tokens are distributed as rewards, and how offsets are recorded. They are the autonomous and transparent engine that manages the entire ecosystem. The complete protocol is a sophisticated system composed of 22 interconnected smart contracts.

4.3 Pillar 3: Wallets as the Gateway to the Network

The final pillar connects the human user to the decentralized protocol. This connection is made through a cryptographic wallet. A wallet is a digital tool—often a browser extension or a mobile application—that allows an individual to store their digital assets and interact with the blockchain and its smart contracts. Crucially, the protocol is "wallet-agnostic." We do not provide a proprietary wallet, granting users the freedom to choose from a variety of well-established, open-source options available on the market. Developers can build new wallet integrations overtime.

It is vital to understand that this empowerment comes with responsibility. Each user has sole custody of their own wallet and the secret keys that control it. Nobody has the ability to access, freeze, or recover a user's funds or identity. This principle of self-custody is the foundation of digital ownership within the decentralized web. The user interacts with the blockchain protocol through a self-custodial digital wallet on their personal device.

5 Tokenomics

The tokenomics is based on three core pillars: a fixed total supply with a defined allocation, a predictable emission schedule inspired by Bitcoin[2] halving model, and a deflationary mechanism tied to the core utility of the system.

5.1 Token Distribution and Allocation

The protocol has a fixed total supply of 1 310 000 000 tokens, ensuring no more tokens can ever be created. This supply is allocated to specific pools, each with a distinct purpose aimed at fostering a productive ecosystem by rewarding participants for the environmental service provided. The initial allocation is detailed in Table 1.

Table 1: Initial Token Allocation

Pool / Allocation	Quantity	% of Total Supply
Regenerator Pool	750 000 000	57.25%
Inspector Pool	230 000 000	17.56%
Researcher Pool	40 000 000	3.05%
Developer Pool	40 000 000	3.05%
Contributor Pool	40 000 000	3.05%
Activist Pool	40 000 000	3.05%
Validation Pool	10 000 000	0.76%
<i>Prelaunch contributors</i>	<i>160000000</i>	<i>12.23%</i>
Total Supply	1310000000	100.00%

5.2 Emission Schedule: Epochs and Halving

The distribution of tokens from the pools follows a predetermined emission schedule. The system's timeline is structured into *Eras* and *Epochs*, where an Epoch consists of 12 Eras and each Era consists of 1 152 000 blocks. With the average block time estimated at 13 seconds, each Era tends to be approximately six months long, and an Epoch approximately six years. After each Epoch, the token rewards emitted per Era are reduced by 50%. For instance, the *Regenerator Pool* begins by emitting 31 250 000 tokens per Era during the first Epoch. This amount is halved in each subsequent Epoch, as a decaying emission schedule, illustrated in Figure 3. This principle applies proportionally to all pools.

5.3 Offset Mechanism and Path to Deflation

The primary utility of the native token is to serve as the instrument for environmental compensation. This is executed using a burn function, which permanently removes the burned tokens from circulation. As the halving mechanism reduces token emissions and platform adoption increases the burn rate, the number of tokens burned can exceed the number of new tokens being emitted. This transition is conceptualized in Figure 3.

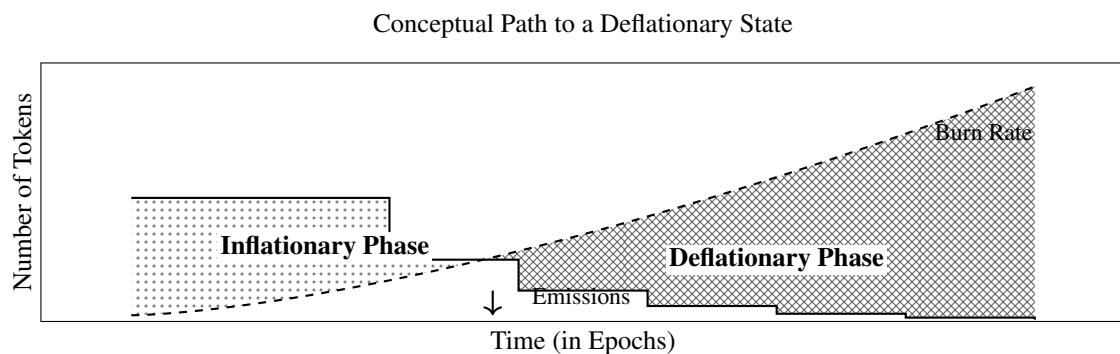


Figure 3: The relationship between the decaying emission schedule (solid line) and the adoption-driven burn rate (dashed line).

6 Reward for Environmental Services

The system is a dynamic ecosystem where participants voluntarily take specific actions to contribute value and, in turn, enhance their level to claim rewards. For each user, a specific action increases a level, and these levels are used to calculate the token distribution. *Inspectors* increase their level after each realized inspection, *Researchers* after publishing a research, *Contributors* and *Developers* after publishing reports, *Activists* when their invited users complete three inspections and *Regenerators* with the result of trees and species of the received inspections.

To determine the distribution, the protocol calculates the sum of all levels of a given type in a given Era. An individual user's reward is then calculated as their percentage share of this total level pool, multiplied by the total tokens available for that pool in that Era.

This proportional distribution can be expressed by the following formula:

Let:

- $R_{u,t,e}$ be the token reward for a specific user u of type t in Era e .
- $L_{u,t,e}$ be the Level of user u of type t at the conclusion of Era e .
- $P_{t,e}$ be the total token reward pool available for user type t in Era e .
- $\sum L_{t,e}$ be the sum of levels of all active users of type t at the conclusion of Era e .

The reward for user u is calculated as:

$$R_{u,t,e} = \left(\frac{L_{u,t,e}}{\sum L_{t,e}} \right) \times P_{t,e}$$

This mechanism creates a direct, transparent, and algorithmically enforced link between a user's long-term, value-additive actions (which increase their level) and their economic return, incentivizing high-quality and sustained participation in the ecosystem.

7 Methodology

The protocol's methodology is designed to overcome the systemic flaws of centralized environmental certification systems. It achieves this through a novel framework for peer-to-peer data collection, verification, and impact measurement. This framework is intentionally simplified for on-chain feasibility and prioritizes transparent, directionally accurate progress over opaque and often misleading precision.

7.1 A Paradigm Shift: Direction Over Precision

Contemporary environmental asset markets, particularly in the voluntary carbon space, are often criticized for their opacity, high intermediation costs, and questionable credit integrity[4]. Many attempts to solve these issues focus on developing increasingly complex and data-intensive methodologies to achieve higher precision in, for example, quantifying carbon sequestration. However, this pursuit of precision often fails to address the underlying systemic problems of trust and transparency.

The protocol proposes a paradigm shift. We posit that for a decentralized system to function effectively, the most critical element is not the absolute precision of its outputs, but the verifiable integrity and positive vector of its processes. The core objective is to incentivize the *process of ecological succession and regeneration*, a goal for which perfect measurement is not only impractical but also secondary to the primary goal of catalyzing tangible, positive action. The protocol deliberately trade a degree of methodological granularity for radical transparency, verifiability, and accessibility. It prioritizes verifiable trust and transparency through a directionally accurate model, whereas existing systems often prioritize a veneer of precision while suffering from low trust.

7.2 The Process of Natural Succession and Core Indicators

The methodology is grounded in the ecological principle of natural succession: the process by which a disturbed or degraded ecosystem evolves towards a more complex, stable state[5]. The protocol does not reward the static state of a preserved area; it rewards the active service of accelerating this natural successional pathway.

The core indicators, *Trees Count* and *Species Diversity*, are simple, universally understandable proxies for ecosystem health. While they do not capture the full complexity of an ecosystem, they provide a robust and verifiable signal that the process of natural succession is being actively supported.

7.3 The Inspection Lifecycle

The protocol operates through a system of peer-to-peer data collection and verification. The inspection lifecycle ensures that every inspection is requested, accepted, and realized according to a clear and transparent set of rules, which are the same for all users.

The process is initiated by a registered *Regenerator*, the provider of the environmental service, who formally requests an on-site audit of their area, being able to request only one inspection at a time. A Regenerator’s work must be validated through a mandatory consensus mechanism requiring a minimum of three successful inspections performed by three distinct *Inspectors*. After this initial validation phase, subsequent inspections are permitted once per Era, up to a lifetime maximum of six, to track long-term progress.

Once an inspection is requested, it enters a pool of open requests. Inspectors can accept a request only if they do not have another inspection currently active and need to wait 6000 blocks between consecutive ones. To prevent collusion, an *Inspector* is prohibited from ever inspecting the same *Regenerator* more than once. Furthermore, the system imposes several time-based safeguards, including a delay after a request is made before it can be accepted, and a lock-out period near the end of an Era to ensure all accepted inspections can be completed and reviewed by the community before finalization.

After accepting a request, the assigned *Inspector* is responsible for performing the on-site audit and submitting their findings before the inspection’s on-chain expiration deadline. The submission is a transaction that includes the two core quantitative metrics—the *trees count* and the *biodiversity count*—both of which are subject to protocol-defined maximums values. The *Inspector* must also submit qualitative evidence, including a detailed *justification report* and cryptographic hashes of *proof photos*, which serve as verifiable evidence for community review. Upon successful submission, the inspection is marked as complete, its data is used to calculate a *RegenerationScore*. In addition, the inspector must complete it in 50 000 blocks. If not realized during this time, a give up is given to the inspector, and with 4 of them, the user is blocked from the system.

7.4 The Regeneration Index Scoring Mechanism

To standardize the evaluation, the protocol employs a smart contract, the *RegenerationIndexRules.sol*, which converts raw data from inspections into a single, quantifiable score. This contract serves as an immutable, on-chain rulebook that defines the official scoring criteria. The index is built upon two core, verifiable indicators: the quantity of trees and the level of biodiversity.

Trees This indicator measures the total quantity of trees, palm trees, and other significant plants (defined as being over 1 meter in height and 3 centimeters in diameter) within the designated regeneration area. It serves as a direct proxy for biomass accumulation and the physical structure of the recovering ecosystem.

Biodiversity This indicator measures the number of distinct species among the qualifying plants described above. It acts as a proxy for the ecological richness and resilience of the area, rewarding diversity over monoculture plantations.

For each of the two categories, the raw number reported by the Inspector is mapped to one of seven “Regeneration Index Levels.” Each level has a name and a corresponding point value. The specific thresholds required to achieve each level are defined in the contract and presented in Table 2 and Table 3.

Table 2: Scoring Thresholds for the **Trees** Category

Required Tree Count	Assigned Level	Points Awarded
$\geq 50,000$	REGENERATIVE 6	32
$25,000 \leq \text{count} < 50,000$	REGENERATIVE 5	16
$12,500 \leq \text{count} < 25,000$	REGENERATIVE 4	8
$6,250 \leq \text{count} < 12,500$	REGENERATIVE 3	4
$3,125 \leq \text{count} < 6,250$	REGENERATIVE 2	2
$20 \leq \text{count} < 3,125$	REGENERATIVE 1	1
< 20	NEUTRO	0

The final *RegenerationScore* for a given inspection is calculated as the sum of the points awarded for each of the two categories.

$$\text{RegenerationScore} = \text{Points}_{\text{Trees}} + \text{Points}_{\text{Biodiversity}}$$

Table 3: Scoring Thresholds for the **Biodiversity** Category

Required Species Count	Assigned Level	Points Awarded
≥ 160	REGENERATIVE 6	32
$80 \leq \text{count} < 160$	REGENERATIVE 5	16
$40 \leq \text{count} < 80$	REGENERATIVE 4	8
$20 \leq \text{count} < 40$	REGENERATIVE 3	4
$10 \leq \text{count} < 20$	REGENERATIVE 2	2
$5 \leq \text{count} < 10$	REGENERATIVE 1	1
< 5	NEUTRO	0

This resulting score serves as a key input for the protocol’s reward distribution mechanisms, creating a direct link between verifiable ecological outcomes and the economic incentives for the Regenerator. As a result of the index, to increase rewards, a Regenerator should provide services guiding the area into the direction of becoming an extreme dense biodiverse forest.

7.5 Off-chain Evaluation Methods

To bridge the gap between complex real-world analysis and the simplified on-chain indicators, the protocol allows for the integration of off-chain evaluation methods. These are tools and methodologies, proposed and registered on-chain by *Researchers*, designed to assist *Inspectors* in their data collection work.

These methods can range from simple applications—such as a mobile app that facilitates tree count estimation via statistical sampling—to more advanced systems leveraging technologies like satellite or drone imagery analysis. A critical requirement for any registered method is that it must produce a detailed and transparent report containing the raw data collected, the calculations performed, and a clear justification for the final numbers. This report is then submitted by the *Inspector* as evidence for their on-chain transaction.

The protocol does not enforce a single method; instead, it fosters an open marketplace of tools. This allows *Inspectors* the autonomy to choose the most suitable registered method for the specific conditions of each area they audit, encouraging continuous innovation in data collection techniques.

7.6 The Token’s Ecological Backing

The protocol is designed to translate the distributed actions of its participants into a unified, transparent measure of collective achievement. The following on-chain metrics are aggregated from all validated data to represent the total ecological value generated by the network. This aggregated impact serves as the intrinsic, verifiable ecological backing for the native token. The core metrics are summarized in Table 4. They are divided into two categories: total network-wide impact and the normalized impact per token, which represents the intrinsic value of each individual unit.

The calculation for estimated carbon sequestration is intentionally simplified to ensure on-chain feasibility and low computational cost.

The Carbon Sequestration Constant

$$\text{CARBON_PER_TREE} = 100,000 \text{ [grams]}$$

This constant represents a deliberate, gross approximation of 100kg of CO₂ sequestered per qualifying tree over its initial growth period. While the actual value varies immensely by species, biome, and other factors, this standardization is a necessary trade-off to enable a functioning, low-cost, decentralized certification mechanism. The focus remains on rewarding the verifiable act of regeneration, with the carbon value being a directionally correct derivative metric.

In the context of the derived metrics, the Effective Token Supply (S_{eff}) is defined as the total number of tokens that have been distributed, including both the circulating supply and any tokens that have been burned. The ultimate goal of the protocol’s economic cycle is to ensure that these “per token” metrics increase over time, making each token progressively more valuable in terms of its real-world, ecological impact.

Table 4: On-Chain Regeneration Metrics

Metric	Description and Derivation
<i>Total Network Impact Metrics</i>	
Total Regenerating Area (A_{total})	The cumulative sum of the registered areas of all valid Regenerators in the system.
Total System Trees (T_{total})	This metric is the average trees count from all past valid inspections multiplied by the amount of Regenerators that received them.
Total System Biodiversity (B_{total})	This metric is the average species count from all past valid inspections multiplied by the amount of Regenerators that received them.
Total Carbon Sequestered (Est.) (C_{total})	An estimation derived from the Total System Trees (T_{total}) using a protocol-defined constant.
<i>Derived Per-Token Impact Metrics</i>	
AreaPerToken	The share of the total regenerating area backing each token, calculated as A_{total}/S_{eff} .
TreesPerToken	The share of the total system trees backing each token, calculated as T_{total}/S_{eff} .
BiodiversityPerToken	The share of the total system biodiversity backing each token, calculated as B_{total}/S_{eff} .
CarbonPerToken	The share of the total sequestered carbon backing each token, calculated as C_{total}/S_{eff} .

7.7 Radical Transparency

A foundational principle of this methodology is unwavering transparency. All data submitted by *Inspectors* and the results are permanently recorded on the blockchain. This allows anyone to audit the entirety of the network's claimed impact, fostering a level of trust that is unattainable in centralized, closed-database systems.

8 The Offset Mechanism

While the Tokenomics section describes how this value is distributed as tokens, this section details how that value is ultimately realized and claimed. The bridge between value creation and value realization is the act of offsetting, burning tokens in exchange of a compensation certificate.

8.1 Impact Certificate

Any holder of the protocol's native token can choose to permanently remove their tokens from circulation. This irreversible action is referred to interchangeably as *burning*, *retiring*, or *offsetting*. By executing a 'burn' transaction, a user effectively claims the underlying ecological value represented by those tokens.

This action is more than a simple transaction; it is a public declaration of support for planetary regeneration, permanently recorded on the blockchain. As proof of this contribution, the protocol generates an on-chain record that can be rendered as a public impact certificate. The impact values on the certificate are calculated by multiplying the quantity of tokens burned by the "Impact per Token" metrics. This certificate serves as an immutable testament to the holder's contribution.

8.2 The Impact Calculator

Designed for *Supporters*, the protocol features an Impact Calculator. This tool is populated by *Researchers*, who can publish "impact items" based on scientific literature. For example, a *Researcher* might add an entry for "Gasoline," detailing its carbon impact (e.g., 2,700g of CO₂ per liter) and citing the supporting thesis.

A supporter can publicly declare their intention to reduce consumption of specific items from the calculator. This commitment is displayed on their public profile, adding a layer of social accountability.

Beyond a generic 'burn', the open, unrestricted function with no minimum tokens to compensate, a *Supporter* can execute a targeted 'offset' transaction linked to a specific calculator item. To offset a specific item, a minimum

of one token is required. Optionally, the user can add a message to the offset publication, such as their annual sustainability report, what they are doing to reduce the impact of their habits and processes, or a message to the community. This allows them to state, for example, "I am burning these 10 tokens specifically to offset my calculated gasoline consumption this month".

A Supporter's public profile features a "Level," which is directly tied to the total number of tokens they have burned. By making commitments and executing targeted offsets, they not only increase their level but also build a more detailed and compelling public certificate of their contributions.

8.3 The Vision: A Virtuous Cycle for a Regenerative Economy

The ultimate goal of this mechanism is to create a self-reinforcing, positive feedback loop—a virtuous cycle that drives a regenerative economy. This cycle, illustrated in Figure 4, connects all participants and aligns their incentives toward a common goal.

The engine of this cycle is consumer demand. As consumers and investors increasingly favor businesses that can verifiably prove their positive environmental impact, the demand for the protocol's immutable certificate of impact grows. This drives businesses and individuals (Supporters) to purchase tokens directly from *Regenerators* and other community members. These tokens are then burned to generate the certificates and verifiable seals that can be used in their products and reports.

This market demand directly finances the expansion of regeneration projects, which in turn increases the total ecological impact backing the entire system. As the total impact grows against a fixed emission schedule, the "Impact per Token" metric increases, making each offset more powerful and creating a compelling reason for new participants to join the regenerative economy. The intended outcome is a paradigm shift where ecological responsibility becomes a new standard for a greener, more transparent form of capitalism.

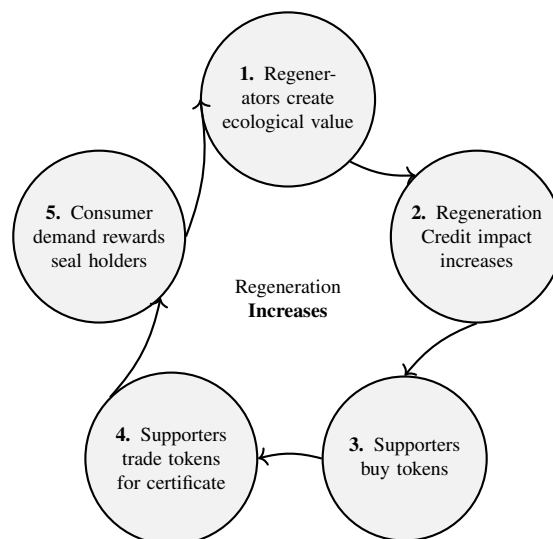


Figure 4: The Virtuous Cycle of the Regenerative Economy.

9 Community Architecture

The protocol is a framework for a living, human-social system. Its long-term success depends on a well-defined architecture of roles, responsibilities, and governance mechanisms that align incentives and empower the community to self-regulate. As proof of identity, users, with the exception of the supporter, must provide the hash of a proof photo at the time of registration, which will be used as identification and identity proof.

9.1 Users and Roles

Regenerators The Regenerator is at the heart of the protocol's value creation. Their journey is focused on registering their work on-chain and having it verifiably recognized by the community. To begin, a prospective Regenerator must be invited by an Activist. Upon accepting, they submit the geographic coordinates of their regeneration area to the protocol. For the area, a minimum of 2500m² and a maximum of 1 000 000m² or 100ha is required. The

protocol requires a minimum of three valid inspections for the Regenerator to achieve "Validated" status. Once validated, they become eligible to claim tokens, based on their average `RegenerationScore`. A validated Regenerator can then request one new inspection per Era to track their progress overtime, limited to six to conclude the certification process.

Inspectors The Inspector's role is to collect the data that underpins the entire protocol. After being invited by an Activist, an Inspector's first goal is to become fully validated. To achieve this and become eligible for rewards, they must first successfully complete three inspections. Thereafter, they can perform successive inspections on new areas, with a mandatory block delay between each action. Each successfully validated inspection contributes one level to their on-chain level. A fundamental rule to prevent collusion is that an Inspector can only perform an inspection for any given Regenerator once.

Researchers Researchers enhance the scientific foundation of the protocol. Their level increases with each peer-reviewed research publication they add to the system. They are also responsible for populating the Impact Calculator with new items. Furthermore, each Researcher is permitted to propose one unique off-chain evaluation method to assist Inspectors, fostering innovation in data collection. Additionally, they are part of the protocol's governance layer, with voting rights.

Activists Activists are the catalysts for community growth. Their function is to invite new Regenerators and Inspectors, subject to a time delay between invitations. The Activist's incentives are directly aligned with the success of their invitees: an Activist gains one level each time one of their invited users becomes fully validated, by completing their first three inspections.

Developers This role support the protocol's technical development. Their main on-chain action is to publish development reports. These reports should document the off-chain work they have performed, such as code updates, bug fixes, technical support, and applications development. Additionally, they are part of the protocol's governance layer, with voting rights.

Contributors The Contributor can perform general contribution service. Their main on-chain action is to publish contribution reports. These reports should document the off-chain work they have performed, such as community management, creating documentation, translation, and any other service that can help the protocol. Additionally, they are part of the protocol's governance layer, with voting rights.

Supporters The Supporter's journey is unique as it is open and permissionless. Their primary role is to provide the economic fuel for the ecosystem by purchasing tokens from other users and burning them to finance regeneration. Supporters have a referral mechanism, in which registered supporters can invite new users to the system and receive a fixed five percent commission on the tokens their invitees compensate through the *offset* function.

9.2 Community Limit

To ensure a sustainable operation, the protocol establishes maximum user limits for key roles. These limits, detailed in Table 5, ensure that the network's governance and operational layers have a maximum value to limit their growth. For the governance layer, new slots are released only as malicious or inactive users are invalidated. For the *Regenerators*, new slots are also released when existing users complete the certification process. So there is an unlimited total number for them, but capped by a maximum number of users currently on certification.

Table 5: User Limits

Role	Maximum Number
Regenerator	500,000
Activist	16,000
Researcher	16,000
Developer	16,000
Contributor	16,000

9.3 Invitation System

The protocol employs a sophisticated, multi-layered gated onboarding model. With the exception of the *Supporter* role, whose registration is permissionless to encourage broad financial participation, all other functional roles require a valid, on-chain invitation to join the network.

The invitation system itself is role-specific to ensure controlled growth. The *Activist* role is uniquely empowered to invite the core operational participants: new *Regenerators*, *Inspectors*, and other *Activists*. In contrast, specialized roles such as *Developer*, *Contributor*, and *Researcher* are self-propagating, meaning existing members are responsible for inviting new peers of the same type.

Traceability and Penalties. Every invitation is an on-chain transaction that permanently links the inviter to the invitee, creating a transparent "genealogical tree" of the entire community. This traceability is necessary for investigations and potential invalidation of malicious branches. If an invited user is later invalidated by the community for malicious behavior, the original inviter automatically receives a penalty point. Upon accumulating five penalties, a user's right to issue new invitations is suspended, ensuring that participants are held accountable for the quality of the members they bring into the network.

The Level Requirement. The right to invite is not a default permission but an earned privilege. A user is only permitted to issue a new invitation if their own "Level" is above the current average level of all users of their same type. This rule is a powerful defense against recursive Sybil attacks.

Time-Locked Invitations. To prevent rapid, large-scale onboarding attempts, a mandatory time delay is enforced between a user's invitations. The protocol requires a user to wait for a predetermined number of 'blocksToInvite', (specifically 100,000) before they can issue a subsequent invitation. This mechanism acts as a simple rate limit on network growth. For an *Activist* inviting a *Regenerator* or *Inspector*, this is a much shorter 3000 blocks to facilitate network growth.

Proportionality Rules. The number of non-supporter roles is algorithmically tied to the number of active *Regenerators*, the primary value creators. For governance-centric roles (*Activist*, *Developer*, *Contributor*, *Researcher*), one new vacancy is created for every 10 new validated *Regenerators*. For the *Inspector* role, a different ratio applies: 20 *Inspector* vacancies are allowed for each validated *Regenerator*. This ensures that the governance and verification layers of the protocol scale in direct proportion to its productive base.

Invalid invitations. When a user is invalidated, or when a user reaches the maximum allowed inviter penalties, all invitations issued by that user become invalid and therefore invitees can no longer register with the protocol.

10 Validation System and Governance

The protocol incorporates a community-driven immune system to self-police and maintain network integrity. A specific set of user roles—*Developer*, *Researcher* and *Contributor*—form the "Voter Class." These participants are empowered to vote to invalidate users, inspections and users resources. A successful vote, requiring a specific threshold based on the total number of active voters, can result in a user being moved to the *Denied* state. Similar to the invitation logic, the right to invalidate is an earned privilege, granted to users with 'Level' above the current average level of users of their same type.

The governance process is not continuous but operates with cyclical time periods known as Eras. Each Era functions as a self-contained round for resource creation, community review, and finalization. This creates a dynamic similar to "clearing a level" in a game, where actions within a level are resolved before progressing to the next. This cyclical mechanism is illustrated in Figure 5.

Maximum penalties. Each invalidated resource generates a penalty for its creator. With three penalties, the user is blocked from the system.

Time-Bound Review. Any resource created within a given Era can only be challenged and subjected to an invalidation vote within that same Era. Once an Era concludes, all resources from that period that were not successfully invalidated are considered final and immutable. Their associated rewards are then securely claimable by the participants.

Review Safeguard Period. To ensure the community has adequate time to review submissions, a "safeguard period" consisting of a set number of blocks is enforced at the end of each Era. During this final window, new

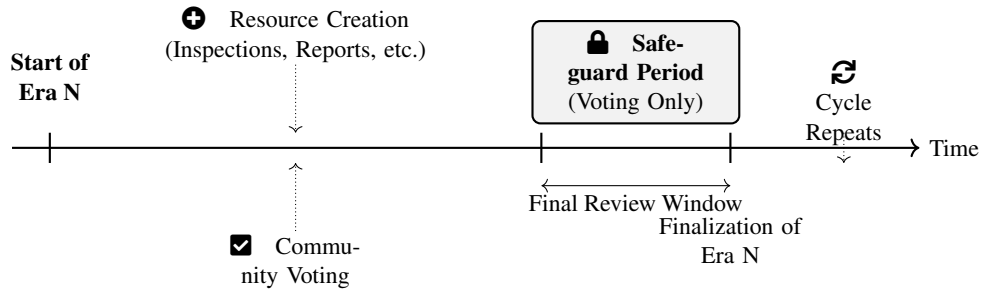


Figure 5: The lifecycle of an Era, illustrating the distinct phases of creation, review, and finalization of the validation process.

resources cannot be submitted, preventing last-minute entries from evading community reviewing process.

Vote Reset. The invalidation for users are reset at the beginning of each new Era, ensuring that each period starts with a clean slate.

10.1 Validation Pool

While members of the Voter Class possess an intrinsic interest in maintaining network integrity to preserve the token's value, the Validation Pool is designed to provide an additional layer of economic incentive for their governance activities. This remuneration for the vital service of system maintenance is distributed through two primary mechanisms.

The Hunter Mechanism. The first method rewards the proactive identification of malicious users. The first voter to initiate an invalidation process against a user within a given Era is designated as the *Hunter*. If the community vote successfully invalidates the target user, the Hunter is rewarded with one level in the Validation Pool. This role incentivizes participants to conduct investigative work, identify protocol violations, and build a case against actors operating contrary to the community's interests. The Hunter is thus encouraged not only to cast the initial vote but also to campaign for the invalidation by presenting their findings to other voters, which can be done publicly through the delation mechanism.

Validation Points. The second method rewards consistent participation in governance. For every vote cast—either on a user or a resource—a participant receives one Validation Point. These points are cumulative. Upon amassing 50 points, a voter can call the `exchangePointsForLevel()` function to exchange them for one level in the Validation Pool. This establishes a direct conversion rate where 50 votes is equal to one level, rewarding active and continuous engagement in the validation process.

11 Conclusion

We have presented a design for a peer-to-peer network to collectively incentivize the regeneration of ecosystems. The fundamental problem addressed is a systemic mispricing of natural capital and the critical ecosystem services it provides. The architecture offers a fundamentally new paradigm for climate action and proposes a foundational reimagining of how environmental value is certified, financed, and transacted.

It is an invitation to build a world in which regeneration becomes the standard of life. We stand at a pivotal moment where we must choose between a future of scarcity driven by degradation or one of abundance driven by regeneration.

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12 Legal disclaimer

The Regeneration Credit is a utility token designed exclusively to function within the Regeneration Credit protocol. Its purpose is to serve as an instrument for the on-chain verification and compensation of environmental impact, as described in this document. The protocol is highly experimental. It introduces a new concept with a smart contracts design never live tested before. Before participating in the protocol, it is essential to understand the inherent risks due to the experimental nature of the project.