



# **PHYKEN**

NETWORK

**Decentralised Finance  
for Green RWAs.**



# TABLE OF CONTENTS

<b>INTRODUCTION.....</b>	<b>4</b>
<b>EXECUTIVE SUMMARY.....</b>	<b>5</b>
<b>THE NEED FOR GREEN RWAs TO REDUCE FOSSIL FUEL CONSUMPTION.....</b>	<b>6</b>
The Importance of Green Real World Assets (GRWAs).....	6
Impact of Renewable Energy – Problem of Fossil Fuels and Lack of Adoption.....	6
<b>GROWING MARKET FOR GREEN REAL WORLD ASSETS (GRWAs).....</b>	<b>7</b>
Global RWA Market : .....	7
Green RWA Market:.....	7
<b>WHY NOW IS THE RIGHT TIME?.....</b>	<b>7</b>
Environmental Urgency.....	7
Growing Interest.....	8
Social Awareness and Demand.....	8
Regulatory Support.....	8
Enhanced Liquidity.....	8
Risk Mitigation.....	8
Technological Advancements.....	9
<b>TYPES OF GREEN &amp; RENEWABLE ASSETS.....</b>	<b>9</b>
Solar Energy Assets.....	9
Wind Energy Assets.....	9
Hydroelectric Power Assets.....	10
Biomass Energy Assets.....	10
Geothermal Energy Assets.....	10
Tidal and Wave Energy Assets.....	10
Energy Storage Systems.....	10
Supporting Infrastructure.....	11
<b>ADDRESSING THE CONSTRAINTS SLOWING GRWA GROWTH.....</b>	<b>11</b>



Policy and Regulatory Uncertainty.....	11
Financing Challenges.....	11
Technological Innovation Barriers.....	12
<b>Deep Dive into challenges for GRWA financing.....</b>	<b>12</b>
High Initial Costs.....	12
Uncertain Returns on Investment.....	12
Lack of Access to Capital.....	12
Financing Structure Complexity.....	13
Limited Project Finance Expertise.....	13
Policy and Regulatory Risks.....	13
Perceived Technology Risks.....	13
Force Majeure.....	14
<b>GREEN RWAs NEEDS TO BE FRACTIONALISED.....</b>	<b>14</b>
Power Purchase Agreements (PPAs).....	14
Energy Performance Contracts (EPCs).....	14
Green Bonds.....	14
<b>BENEFITS FOR ASSET OWNERS.....</b>	<b>15</b>
Enhanced Liquidity.....	15
Broader Investor Base.....	15
Increased Valuation.....	15
Flexible Asset Management.....	15
<b>BENEFITS FOR INVESTORS.....</b>	<b>15</b>
Accessibility.....	15
Portfolio Diversification.....	16
Stable Returns.....	16
Alignment with Sustainability Goals.....	16
Potential for Appreciation.....	16
Reduced Risk.....	16
Learning and Engagement.....	17
<b>INTRODUCING PHYKEN NETWORK.....</b>	<b>17</b>
Why do we need to build our own application specific blockchain ?.....	17



PHYKEN BLOCKCHAIN.....	18
PHYKEN MIDDLEWARE/INFRASTRUCTURE.....	19
PHYKEN DECENTRALISED APPLICATION LAYER.....	19
<b>DEEP DIVE INTO EACH MODULE.....</b>	<b>19</b>
Phyken ID.....	19
Attester Infrastructure.....	20
AI-based compliance engine.....	20
Permissionless Audit Infrastructure.....	20
<b>INTEGRATED FLOW JOURNEY.....</b>	<b>21</b>
Onboarding the Asset Owner.....	21
Tokenization (Ledgerisation) of the Asset.....	22
Fractionalisation of the Solar Asset.....	22
Yields from the Green RWA Fractional Tokens.....	24
Trading the Fractional Tokens on Phyken DEX.....	24
Workflow.....	25
<b>ROADMAP.....</b>	<b>25</b>
<b>TOKENOMICS.....</b>	<b>26</b>
\$KEN Tokenomics.....	26
Network Participants and Roles.....	26
<b>RISK FACTORS.....</b>	<b>28</b>
<b>ANNEXURES.....</b>	<b>29</b>
<b>Annexure A.....</b>	<b>29</b>
Fractionalising Green RWA SPVs.....	29
<b>Annexure B.....</b>	<b>30</b>
HARMONISED POOL.....	30
<b>Annexure C.....</b>	<b>32</b>
TCR, Challenge Based Response Mechanism, Reputation Scoring Algorithm.....	32
Base TCR.....	32
Qualified Attester List (QAL).....	32
Methodology to calculate Reputation Score.....	32
Different Bands of Qualified Attester.....	32



## **INTRODUCTION**

**Phyken Network Ecosystem** is an application specific blockchain that brings green and renewable energy assets on-chain, fractionalises them and makes them accessible to the millions of people who want to invest in green RWAs but don't have the access to the investment opportunities.

In our core, we are Green RWA asset fractionalisation network building tools and products to support our vision to provide - Global access to legitimate investment opportunities is a fundamental right. In fostering a sustainable future, borderless access to green energies and the integration of blockchain technology is essential to a more sustainable planet.

## **EXECUTIVE SUMMARY**

Asset fractionalisation has the potential to unlock liquidity and investment opportunities for the underserved market of users. Nonetheless this unlocks newer forms of liquidity options for otherwise potentially illiquid asset classes.

Web 2.0 based solutions fail in solving the problems which are associated with asset fractionalisation. It is of paramount importance that all transactions are immutable and easily verifiable while the system remains robust and secure.

There are few properties which any asset fractionalisation application should cover:

- Identity of individuals/entities and assets
- Authentication and Validation mechanisms
- Custody and Immutability
- Interoperability
- Regulatory Compliance



RWA tokenization means bringing real world assets on-chain and converting them into blockchain native assets. We are tokenizing the renewable energy assets

**Tokenization and fractionalization**, serve different purposes in real world assets. Tokenization converts an asset's rights into a digital token on a blockchain, often without dividing the asset.

On the other hand, fractionalization, breaks down an asset into smaller, affordable units thereby broadening investor access. In green energy, fractionalization is transformative and enables retail investors to fund projects typically reserved for large investors. This democratizes investment, diversifies capital influx and participation in sustainable projects. Its key impact lies in making high-value green energy assets accessible to a wider audience as well as fostering growth and innovation in the sector.

## **THE NEED FOR GREEN RWAs TO REDUCE FOSSIL FUEL CONSUMPTION**

### **The Importance of Green Real World Assets (GRWAs)**

Green Renewable Energy Assets (GRWAs) are increasingly crucial in the global shift towards sustainable energy solutions. Unlike traditional energy sources, REAs such as solar panels, wind turbines, and hydroelectric power, offer a clean, inexhaustible supply of energy. They are instrumental in reducing global carbon emissions and combating climate change. Additionally, REAs contribute significantly to energy security and reduce dependence on finite and often geopolitically sensitive fossil fuel sources. As the world recognizes the urgency of transitioning to cleaner energy, the value and importance of REAs in the energy market continues to rise, marking them as not only environmentally crucial but also economically strategic assets.



## **Impact of Renewable Energy – Problem of Fossil Fuels and Lack of Adoption**

The global reliance on fossil fuels has led to critical environmental and health issues, including air pollution and climate change. The slow adoption of Renewable Energy Assets (REAs) exacerbates these problems. Fossil fuels are finite and their extraction and use results in significant greenhouse gas emissions, contributing to global warming. The reluctance to transition to REAs stems from factors like high investment costs and a lack of infrastructure. However, the long-term benefits of REAs, such as lower operational costs and minimal environmental impact, offer a compelling argument for rapid adoption. Increasing awareness and technological advancements have made REAs more accessible and efficient. Nonetheless, the pace of adoption needs to accelerate to mitigate the environmental damage caused by fossil fuels effectively.

## **GROWING MARKET FOR GREEN REAL WORLD ASSETS (GRWAs)**

The market opportunity for tokenizing Renewable Assets (RWA tokens) represents an exciting and rapidly growing segment within the renewable energy sector. As global interest in sustainable energy sources continues to rise, the potential for RWA tokenization is substantial. Here's a brief analysis of the RWA tokenization market:

### **Global RWA Market :**

The global RWA market is currently at **USD \$5 billion in TVL**. However, with the unprecedented growth trajectory, it's expected to grow to **USD \$16 TN** by 2030.

### **Green RWA Market:**

The market for Green RWA tokenization in renewable asset classes encompasses the entire renewable energy industry's financial ecosystem. This includes wind farms, solar installations, hydroelectric projects, and other sustainable energy sources. As governments worldwide commit to reducing carbon emissions and achieving renewable energy goals, the market for RWA tokenization is expansive. It is expected



to reach **USD \$2.2 TN** by 2030, reflecting the potential for blockchain-based tokens to disrupt traditional financing and investment in renewable assets. This market is expected to drive growth at a **CAGR of 8.5%** from 2023 to 2032

## **WHY NOW IS THE RIGHT TIME?**

### **Environmental Urgency**

The catastrophic impacts of climate change, such as extreme weather events, rising sea levels, and loss of biodiversity, necessitates the immediate need for investment in sustainable and renewable energy sources. RWA tokenization aligns perfectly with this urgency by facilitating funding and developing green projects.

### **Growing Interest**

The interest in renewable energy and the urgency to tackle the challenges of climate change create a conducive environment for RWA tokenization. Investors are seeking sustainable and socially responsible investment opportunities.

### **Social Awareness and Demand**

There is a growing social consciousness about the importance of addressing climate change. The public, especially the younger generation, is conscious and supportive of green initiatives. Tokenization of renewable assets resonates with this demographic, potentially expanding investor bases and public support.

### **Regulatory Support**

As governments and financial regulators develop frameworks to facilitate the tokenization of assets, the path for RWA tokenization becomes clearer. This includes





legal definitions, security token regulations, and blockchain-based securities frameworks.

## **Enhanced Liquidity**

RWA tokenization can make traditionally illiquid renewable assets more liquid thereby attracting a broader range of investors which include retail investors and reducing the barriers to entry for renewable projects.

## **Risk Mitigation**

Tokenization can enable fractional ownership, allowing investors to diversify their renewable energy portfolios easily. This mitigates risks associated with the renewable energy sector, such as project-specific challenges and market fluctuations.

## **Technological Advancements**

The blockchain technology supporting RWA tokenization continues to evolve, becoming more secure and efficient. Smart contracts can automate revenue distribution, enhancing transparency and trust among investors.

## **TYPES OF GREEN & RENEWABLE ASSETS**

What kind of assets are we talking about when we say **Green And Renewable Energy Asset Class**? Green energy assets encompass a wide range of technologies and infrastructure projects that support renewable and sustainable energy. These assets are key to reducing dependence on fossil fuels and mitigating climate change. Here's an overview of the major types of green energy assets:



## Solar Energy Assets

- **Photovoltaic (PV) Solar Farms:** Large-scale installations of solar panels that convert sunlight into electricity.
- **Concentrated Solar Power (CSP) Plants:** Use mirrors or lenses to concentrate sunlight to heat a fluid, which then produces steam to drive a turbine for electricity generation.
- **Rooftop Solar Panels:** Installed on residential or commercial buildings, providing power directly to the property or feeding into the grid.

## Wind Energy Assets

- **Onshore Wind Farms:** Wind turbines located on land, used to generate electricity.
- **Offshore Wind Farms:** Wind turbines situated in bodies of water, typically seas or oceans, where wind speeds are higher and more consistent

## Hydroelectric Power Assets

- **Large-scale Hydroelectric Dams:** Utilize flowing water to drive turbines, generating electricity on a large scale.
- **Small-scale Hydro Projects:** Smaller installations in rivers and streams, suitable for local power generation.
- **Pumped-Storage Hydroelectricity:** Systems that store energy by pumping water uphill to a reservoir, releasing it to generate electricity when needed.

## Biomass Energy Assets

- **Biomass Power Plants:** Facilities that burn organic materials like wood, agricultural waste, or biogas to produce electricity.
- **Biofuel Production Facilities:** Produce biofuels such as ethanol or biodiesel from organic materials, used as renewable alternatives to fossil fuels.



## Geothermal Energy Assets

- **Geothermal Power Plants:** Utilize heat from the Earth's core to generate electricity. These can range from large-scale power plants to small-scale installations for heating and cooling.

## Tidal and Wave Energy Assets

- **Tidal Power Stations:** Harness the energy of tidal flows to generate electricity.
- **Wave Energy Converters:** Capture the energy of surface waves or the pressure fluctuations beneath the surface to produce power.

## Energy Storage Systems

- **Battery Storage Facilities:** Store excess energy, especially important for intermittent energy sources like solar and wind.
- **Thermal Energy Storage:** Stores heat or cold for later use in power generation or climate control.

## Supporting Infrastructure

- **Green Hydrogen Production Facilities:** Use renewable energy to produce hydrogen, a clean fuel.
- **Transmission Lines and Grid Infrastructure:** Essential for transporting renewable energy from production sites to consumers.
- **Electric Vehicle Charging Stations:** Infrastructure supporting the transition to electric vehicles.

## **ADDRESSING THE CONSTRAINTS SLOWING GRWA GROWTH**

### **What are the constraints slowing renewable energy asset growth?**

Several constraints can impede the progress of renewable energy assets. These constraints vary across different regions and can include:



## **Policy and Regulatory Uncertainty**

Inconsistent or unclear government policies and regulations can create uncertainty for investors in renewable energy projects. A stable and supportive regulatory environment is essential for fostering investment and encouraging the growth of renewable energy assets.

## **Financing Challenges**

Securing financing for renewable energy projects can be challenging, especially for smaller projects or in regions with less-developed financial markets. Reducing financial barriers and providing incentives for investment are crucial for overcoming this constraint.

## **Technological Innovation Barriers**

The renewable energy sector relies on continuous technological innovation. Delays in research and development, as well as the adoption of new technologies, can impede the growth of renewable energy assets.

## **Deep Dive into challenges for GRWA financing**

Financing challenges are a significant barrier to the growth of renewable energy assets. These challenges can be attributed to several factors, and understanding them is crucial for finding solutions and promoting the transition to a more sustainable energy landscape. Here are some key aspects of financing challenges in the renewable energy sector:

### **High Initial Costs**

The upfront capital costs associated with establishing renewable energy projects, such as building solar or wind farms, can be substantial. Investors may be hesitant to commit to these projects due to the perception of high financial risk, especially when compared to more established and conventional energy sources.



## **Uncertain Returns on Investment**

The returns on investment in renewable energy projects can be uncertain, particularly when considering factors such as energy market volatility, regulatory changes, and variations in energy prices. Investors often seek stable and predictable returns, and the perceived risks associated with renewable energy projects can hinder financing.

## **Lack of Access to Capital**

Small and medium-sized renewable energy projects, especially in developing regions, may face difficulties in accessing financing.

Financial institutions may be reluctant to invest in projects with limited track records or in areas where the regulatory environment is less supportive.

## **Financing Structure Complexity**

The complexity of structuring financing for renewable energy projects, including navigating various incentives, subsidies, and tax credits, can be a barrier. This complexity can be overwhelming for investors and may result in delays in project development.

## **Limited Project Finance Expertise**

Many financial institutions and investors may lack expertise in evaluating and financing renewable energy projects. Understanding the technical, regulatory, and environmental aspects of these projects is essential for accurate risk assessment and financial modeling.

## **Policy and Regulatory Risks**

Changes in government policies and regulations can have a significant impact on the profitability of renewable energy projects. The lack of long-term, stable policies



can create uncertainty for investors, making them hesitant to commit to projects with extended payback periods.

### **Perceived Technology Risks**

Investors may perceive renewable energy technologies as relatively new and unproven, leading to concerns about technological risks and uncertainties. Overcoming this perception requires building confidence through successful project implementations and demonstrating the reliability of renewable energy systems.

### **Force Majeure**

Events such as severe weather conditions, natural disasters, or other uncontrollable circumstances pose significant risks to Green RWA operations. These events can lead to physical damage to solar panels or infrastructure, disrupt energy production, and impact financial performance. Given the reliance of Green RWAs on environmental conditions, these risks are particularly pertinent. It's crucial to have strategies in place to mitigate these risks, including insurance coverage, robust infrastructure design, and contingency plans for operation and maintenance

## **GREEN RWAs NEED TO BE FRACTIONALISED**

We can specifically implement fractionalisation, *inter alia*, into the following financial products in the Green RWA space:

### **Power Purchase Agreements (PPAs)**

PPAs involve a contract between an energy producer and a consumer, typically a business or utility. The consumer agrees to purchase the electricity generated by a renewable energy project at a predetermined price over a specified period.



## **Energy Performance Contracts (EPCs)**

EPCs involve an agreement between a service provider and a customer to implement energy efficiency or renewable energy measures. The service provider finances and install the equipment, and the customer repays the investment through the resulting energy savings.

## **Green Bonds**

Green bonds are debt securities specifically earmarked to finance environmentally friendly projects, including renewable energy. Investors purchase these bonds, and the proceeds are used to fund eligible green projects.

## **BENEFITS FOR ASSET OWNERS**

### **Enhanced Liquidity**

Fractionalization allows asset owners to convert a portion of their assets into liquid capital without having to sell the entire asset. This liquidity can be crucial for funding new projects, maintenance, or expansion, without losing ownership or control over their existing assets.

### **Broader Investor Base**

By breaking down large assets into smaller, more affordable fractions, owners can attract a wider range of investors. This diversification can lead to a more stable and resilient funding base.

### **Increased Valuation**

As more investors get an opportunity to invest in these assets, the overall market for green energy assets expands. This increased demand can lead to a higher valuation of the assets, benefiting the owners.



## **Flexible Asset Management**

Fractional ownership allows for more dynamic asset management strategies. Owners can retain a majority stake in their assets while selling off fractions to manage risk or fund specific initiatives.

## **BENEFITS FOR INVESTORS**

### **Accessibility**

Fractionalization lowers the entry barrier for investors, especially those who might not have the capital to invest in green energy assets outright. This democratizes the investment process, allowing more people to participate in green energy investments.

### **Portfolio Diversification**

Investors can diversify their portfolios by adding green energy assets, which are often seen as stable and sustainable investments. This diversification can reduce risk and improve long-term investment returns.

### **Stable Returns**

Green energy assets, such as solar or wind farms, can provide stable and predictable returns, derived from long-term power purchase agreements or government incentives. This stability is attractive for investors seeking consistent income.

### **Alignment with Sustainability Goals**

For investors looking to align their portfolios with environmental values, investing in fractional green energy assets offers a direct path. This aligns with a growing trend of socially responsible investing.





## **Potential for Appreciation**

As the demand for renewable energy grows globally, these assets have the potential for appreciation. Investors can benefit from the increasing value of their fractional shares over time.

## **Reduced Risk**

Fractional ownership means investors are not fully exposed to the risks associated with full asset ownership, such as operational or environmental risks.

## **Learning and Engagement**

Smaller investors get an opportunity to learn about the green energy market and engage directly with sustainable initiatives, enhancing their understanding and commitment to renewable energy.

## **INTRODUCING PHYKEN NETWORK**

**Phyken Network** is an **app-chain for green real-world asset (Green RWA) fractionalisation**. Our primary focus is to bring green and renewable energy assets on-chain, fractionalise them, and make them accessible for millions of people to invest and own a portion of the green RWAs.

## **Why do we need to build our own application-specific blockchain?**

Our experience with general-purpose blockchains has helped us understand that there are certain functional constraints that, if not addressed, would create significant security and performance issues for all the network participants and ergo affect the overarching adoption and acceptance of the system at scale.

A few constraints and limitations of generic purpose blockchain that exist are as follows (not an exhaustive list) :



- **Identity** of individuals and entities in the general purpose blockchains do not have verification, since they were principally designed for pseudonymity and anonymity.
- **Permissioned chains** need different architectural standards for on-chain data management from permissionless chains like Ethereum. For instance existing blockchains, the transactions are anonymized and hence the network is unable to leverage the insight from historical transactions.
- **Different asset classes** require different validation rules and thus our system (which is not focused on any single asset class) needs to have a sufficient level of flexibility to achieve widespread adoption and deployment.
- There are multiple **legal and compliance** parameters that need to be addressed at an infrastructure level, such as deviations caused by applicable governing laws, OFAC (sanction lists), etc.
- In **generic purpose blockchains**, governance presents significant risk and complexity to issuers due to hard forks during upgrades.
- In the existing blockchains, the validators are random nodes that are not geared towards validating complex real-world asset transfers. Thus quality of validation is not ensured, which in turn degrades the overall quality of the transactions on the network.

Quality is ensured by creating **Asset Specific Attesters (ASA)** who are audited through Phyken Token Curated Registries defined in later Annexures..

## **KEY MODULES OF THE PHYKEN ECOSYSTEM**



**Phyken Ecosystem** is the umbrella term for all the products and services that will be required to build or partner with to solve the problem of RWAs.

## **PHYKEN BLOCKCHAIN**

- **Phyken Core Blockchain** - This is our core application-specific blockchain.
- **Tundra Blockchain** - Our testnet that is geared towards primary developers who want to build RWA applications on top of our blockchain and infrastructure.

## **PHYKEN MIDDLEWARE/INFRASTRUCTURE**

- **Phyken ID** - Ensuring asset authenticity and traceability using decentralized identities and verified credentials
- **Attester Infrastructure** - Regulated professionals and entities to ensure the authenticity of the assets
- **AI-based compliance engine** - AI-powered rule enforcement engine to ensure regulatory compliance
- **Permissionless Party Audit framework** - 3rd party audit framework to ensure transparency in custody of assets
- **Fractionalisation** - Fractionalisation enables further tokenization of tokenized RWA's ensuring liquidity and traceability
- **Harmonization** - Risk mitigation by creating harmonized pools of asset classes, in which different RWAs are bundled up together.

## **PHYKEN DECENTRALISED APPLICATION LAYER**

- Phyken DeFi Equity Protocol
- Phyken DEX
- Phyken Fi - Our lending DeFi Protocol



## **DEEP DIVE INTO EACH MODULE**

### **Phyken ID**

Phyken ID is a decentralized identity (DID) solution implemented by Phyken Network, an app-chain and DeFi protocol. It utilizes a novel KYC mechanism through decentralized identities (self-sovereign identities) and institutional-grade verifiable credentials to verify asset authenticity and ownership. This solution is designed to provide authenticity and traceability for real-world assets. It aims to enable legally binding interactions certified by asset-verifiers who are regulated, thus acting as a game-changer in the field of decentralized finance and green asset investments.

### **Attester Infrastructure**

Attester Infrastructure is a crucial component of the Phyken Network. Attesters in our network are typically regulated entities and bodies such as governmental institutions, lawyers, accountants, registered valuers, etc.

The infrastructure primarily comprises the following components:

- a) Middleware to handle requests from network participants (like Tokenization Requests, Fractionalisation Requests, etc.)
- b) Application Layer Interface for all communications related to all processes including the verification and attestation of asset originators, investors, and the Green RWAs.

### **AI-based compliance engine**

We are going to build localized LLM trained on geo and regulatory-specific data points for building a regulatory framework that makes the applications regulatory compliant from the ground up. The Attestors use this infrastructure to better ascertain the authenticity and correctness of a particular request/transaction.



## Permissionless Audit Infrastructure

To be able to prove to an external audit company that everything was following the legal requirements we need to have an immutable log of actions for all interactions with verified assets or their derived tokens.

Since Phyken is a permissioned network, the external audit company may not rely on the log data from the main blockchain itself.

To achieve this every event related to the verified assets needs to be mirrored on a permissionless third-party DLT. These events are written to the third-party DLT.

## Harmonization

Fractionalisation of different Green RWAs does provide access to a larger pool of financiers and investors for the real-world asset holders in different industries. However, the specificity associated with each Green RWA that is fractionalised (subject to the various parameters such as credit risk, ancillary market conditions, independent legal risk assessments, *inter alia*) would make it less attractive for external investors to invest in them.

This is where Phyken Network can provide a solution using the process of **harmonisation**. The mathematical model for this has been delineated in Annexure B.

## INTEGRATED FLOW JOURNEY

The entire process is driven by Attester Infrastructure. Every Green RWA asset is onboarded, tokenized and fractionalised after proper identification and verification mechanism by specific attesters. For reference, attesters on our network are regulated professionals and entities who are competent to evaluate and verify the authenticity of identity and value of the all assets that are onboarded on our network.

To ensure the Green RWA is properly onboarded, tokenized, fractionalised and traded/collateralized, we are implementing the following processes:



## Onboarding the Asset Owner

1. The asset owner begins by completing Know Your Customer (KYC) and Know Your Business (KYB) procedures to secure a Decentralised Identifier (DID) and a KYC credential from an external attester.

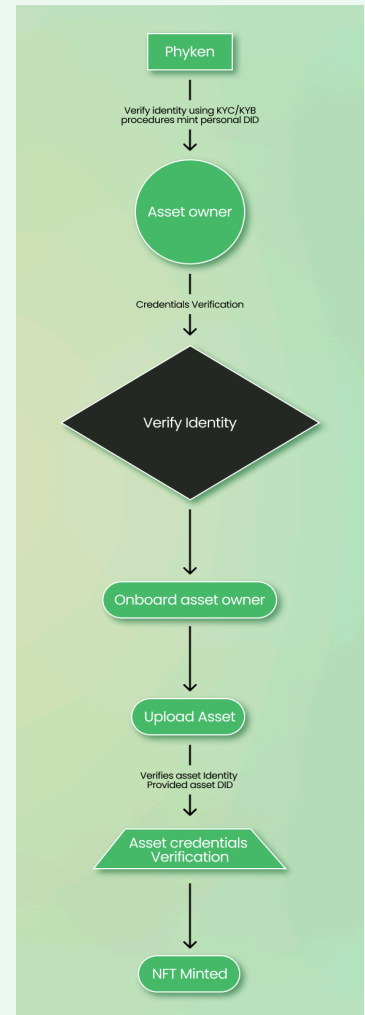
2. The asset owner’s onboarding continues with the verification of their credentials and identity.

## Tokenization (Ledgerisation) of the Asset

1. With their identity confirmed, the asset owner uploads public information about the asset along with a “NFT Mint Request” to an Attester blockchain. This request is accompanied by a DID signature to ascertain its authenticity off-chain. For all requests, the selection of the attester is dependent on the Proof of Reputation model delineated in Annexure C.

2. The attester makes an independent assessment of the authenticity of the asset based on the information provided in relation to its validity and title.

3. Once all verifications are satisfactory, the attester mints the NFT and transfers it to the asset owner. They also create an Asset DID and issue a public credential in relation to the relationship between the asset owner and the corresponding, affirming that all necessary checks are complete and that the NFT accurately represents a tangible asset, without disclosing any personal data of the owner.





## Fractionalisation of the Solar Asset

Post onboarding the Green RWA on the chain, we will fractionalise the asset to make available the relatively smaller ticket size opportunities for DeFi Equities/Lending to our investors. However, as a step fractionalisation is an irrevocable step and an extremely complex step to undo, there is an escrow mechanism to ensure minimum liquidity for carrying out the process.

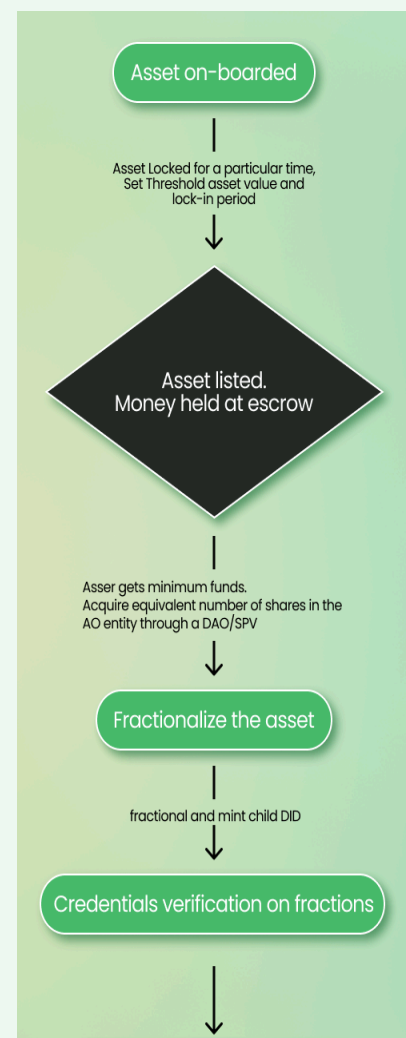
The process of bringing solar assets onto the blockchain and fractionalizing them can be described as follows:

1. The owner of a solar asset initiates the process by initiating a **“Fractionalization-Request”** to the Attester. The request includes the details of the base solar asset and the desired parameters for fractionalization, including the owner's DID signature for off-chain verification purposes. To reiterate, the selection of the attester is dependent on the Proof of Reputation model delineated in Annexure C.

2. After the Attester successfully verifies the authenticity of the request, the asset is then locked for a specified time. This step ensures that the asset remains stable and meets the criteria for fractionalization.

3. The opportunity is made available to the prospective investors on the investor dashboard for raising the minimum funding threshold. All amounts that are being raised prior to the meeting of the minimum threshold amounts are locked in escrow.

4. Once the listing meets the minimum funding requirements, the fractionalisation request is approved. The equivalent legal processes to ensure off-chain custody is also initiated out simultaneously.





5. The Green RWA is then listed, with all funds collected and held in escrow until the listing duration ends. Post the ending of the listing duration, the fractional tokens are minted by Attester in lieu of the tokenized Green RWA. The Attester also mints the corresponding Child DIDs for the fractional tokens and the respective public credentials are created as well. Post this, the fractional tokens are transferred to the investors and the respective investment amounts are closed.

6. For each investor, a corresponding public credential is created (by the Attester) with the reference to the relevant Child DIDs to create the proof of partial ownership.

### **Yields from the Green RWA Fractional Tokens**

1. The fractional token owners shall have the pro-rata right to the yields from the Green RWA. A specific instance of PPAs where the yields are calculated post operational cost deduction in manner and form more specifically described in Annexure B.

2. Post the successful sale of the fractional tokens, a payment cycle is fixed for the fractional asset owners, which is mapped by the offchain worker to ascertain the actual pro-rata proceeds from the Green RWA within a specific period of time, which is payable to the new fractional token owner.

3. The Child DIDs have the functionality to have a time bound attribute which records the current payment status in relation to the yields to the fractional tokens (which is updated in line with the payment cycle associated with the specific Green RWA).

### **Trading the Fractional Tokens on Phyken DEX**

Buying fractional ownership into a commissioned Green RWA allows an average investor access to large Green RWAs, with small cost of entry, while still returning them the following benefits:

1. Access to Green RWA

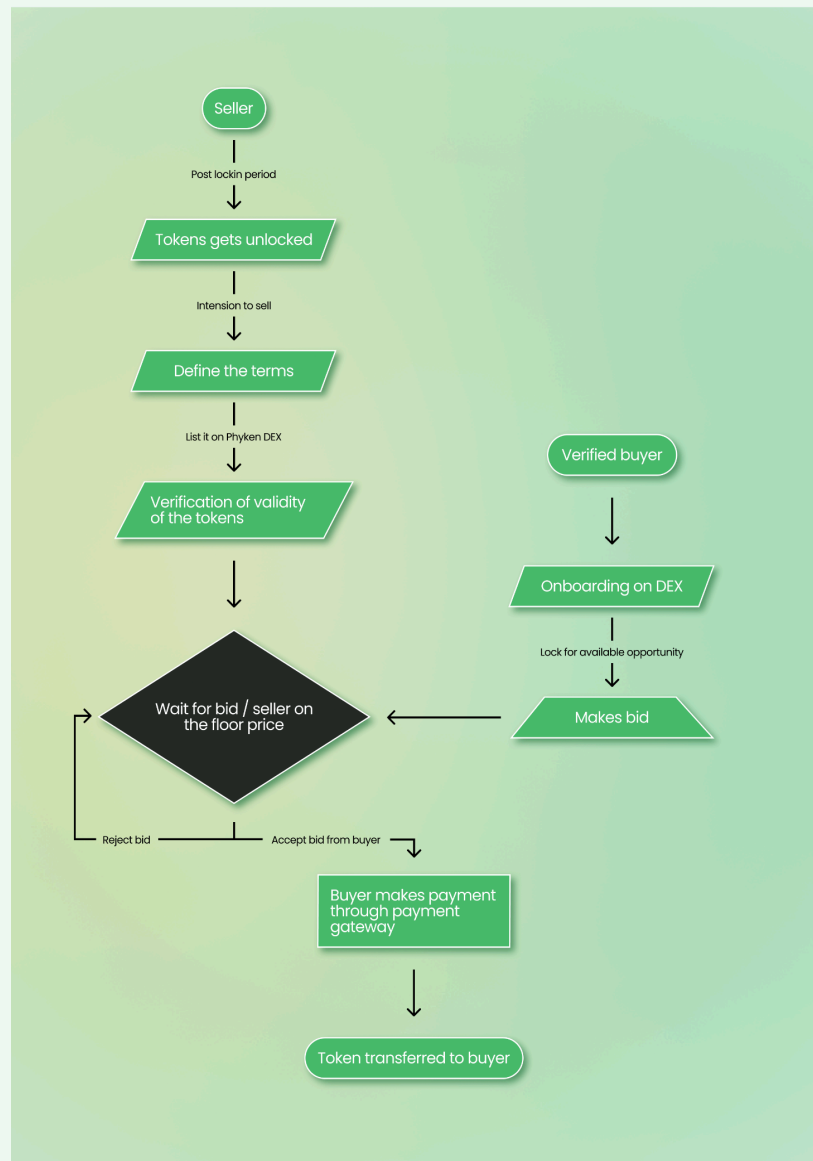




2. Commissioned projects do not require further capital to complete or operate, and
3. As a result they generally yield sizable FCF (free cash flow) and CAFD (cash available for distribution).
4. While allowing them flexibility to buy or sell in fractions on the DEX.

## Workflow

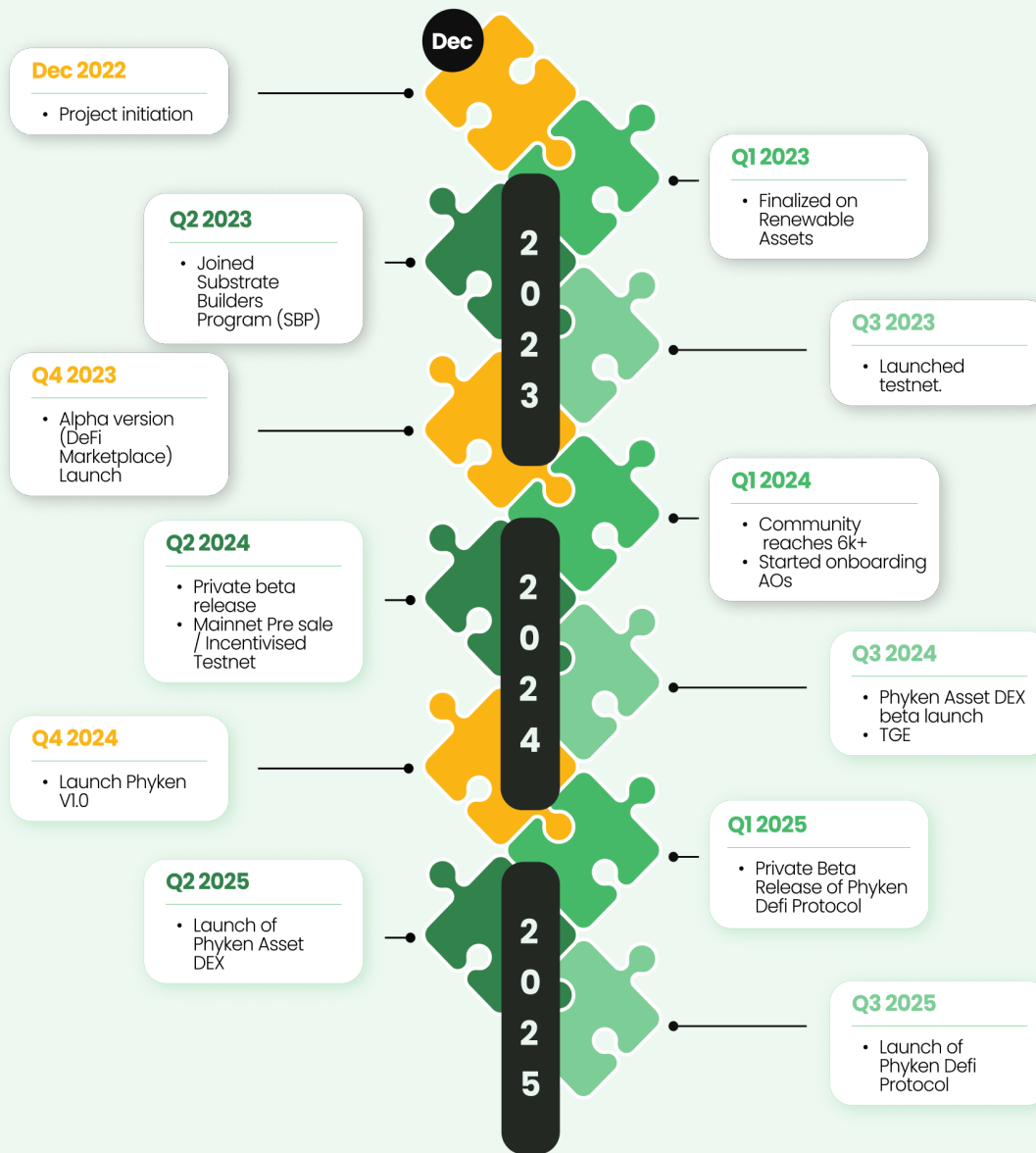
1. If the fractional token owner intends to sell all or part of their holdings, they would raise a DEX Listing Request which will be verified and authenticated by an Attestor.
2. Once the DEX Listing Request is approved the fractional tokens are listed on the DEX
3. The fractional tokens are mapped with the requisite amounts of stablecoins for creating the liquidity pool reserve (to ensure minimal price deviation on the DEX). There shall be curated stable coin-paired liquidity pools for each Green RWA listed on the DEX.





4. Post that the buyers on the DEX are able to initiate and complete the purchase of the RWA tokens from the DEX.
5. On the corresponding Child DID front, the existing public credential about the previous owner is revoked and a new credential is created about the new owner.

## Roadmap





## TOKENOMICS

As a dedicated app-specific blockchain, the Phyken Network is poised to revolutionize how green assets are integrated into the blockchain. Our network design and tokenomics are tailored to incentivize and support the various stakeholders within our ecosystem.

### **\$KEN Tokenomics**

Our native token, \$KEN, is designed to facilitate network operations, reward participants, and ensure a sustainable economic model.

- **Total Supply:** With an initial supply of **2 billion tokens**, \$KEN ensures a wide distribution to incentivize network participation and growth.
- **Mild Inflationary Model:** \$KEN operates on a mild inflationary model of 3-5% per diem, ensuring long-term economic viability and reward distribution for network participants.

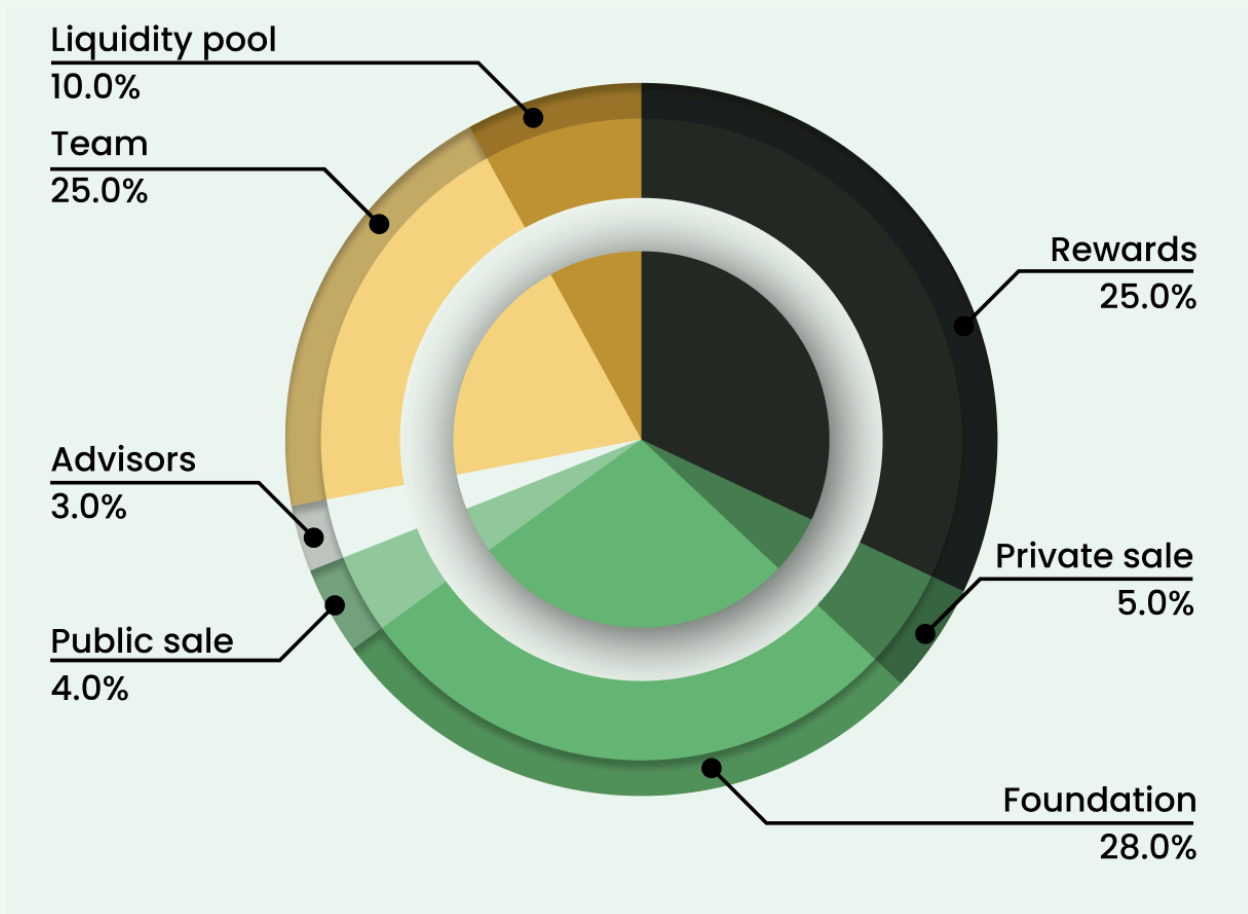
### **Network Participants and Roles**

Various participants support our network's robust architecture, each contributing to the seamless operation of the platform:

- **Full Node Operators:** Maintain the network's consensus and security by hosting a full copy of the blockchain and participating in consensus mechanisms.
- **Attestors:** Specialized roles within the Phyken Network, attestors are responsible for validating the details and the authenticity of solar assets, ensuring that the assets represented on-chain reflect their real-world counterparts.



- Early Bird Investors: Their early support helps to bootstrap the network and provides the initial capital necessary for the network's growth and development.





## **RISK FACTORS**

- Technology products in this space are rapidly evolving. There's a risk that the technology might become obsolete, or more efficient and cost-effective alternatives may emerge, impacting the asset's profitability.
- The profitability of green energy assets often depends on energy prices, which can fluctuate due to various factors, including changes in supply and demand, geopolitical events, and policy changes
- Green energy projects must comply with local, national, and sometimes international environmental regulations including government subsidies and tax incentives which may evolve to adversely affect the returns or feasibility of the Green RWAs.
- Our business and financial performance could suffer if we are unable to effectively manage and control the growing asset portfolio and also the potential for non performing assets on our platform.
- We may be profitable and yet find ourselves in a cash deficit position due to the continued investments required over the initial years to strengthen and scale this business.
- Customers of the PPA contracts of Green RWAs may seek revisions to the terms of their existing PPAs. A downward revision in the tariffs could negatively affect the recurrent yields from the fractional tokens.
- As we are predominantly working with completed projects, most of the Green RWAs will have existing financial liabilities associated with them which may cause unforeseen financial downsides and liquidations.
- We may onboard Green RWAs belonging to a holding company (and a holding company may own several ring-fenced Green RWAs), who may have a negative financial issue (or any other issue), and that could result in a negative halo effect on the Green RWAs on our network.



## ANNEXURES

### Annexure A

#### Fractionalising Green RWA SPVs

$$\text{Green RWA SPV EBITDA} = [(U \times R (p) + I - \text{Opex})] \times (1-r)$$

$$\text{Green RWA SPV FCF} = ([\text{Green RWA SPV EBITDA}] - \text{DS} - \text{ETR})$$

$$\text{Indicative Value of the Green RWA SPV} = \{([\text{Green RWA SPV EBITDA}] - \text{DS} - \text{ETR}) / 0.09 + \text{TV} + (\text{Risk Adjustment } +/-)\}$$

$$\text{Indicative Value of the Fractional Green RWA SPV} = [\text{Indicative Value of the Green RWA SPV}] / \text{Fractional Units}$$

The SPV (special purpose vehicles) usually hold the (REA) renewable energy assets such that the primary economics of the SPV entity remains within, and cannot be easily blended with other lines of businesses to protect the interest of the stakeholders including lenders and equity participants. Further, the PPA (Power Purchase Agreement) with the purchasers and Energy DISCOMS usually defines benefits to the SPVs as listed:

- a) **Term:** The PPA agreements usually run between 20 to 25 years, spanning 85% to 90% of the Green RWA life, and thereby significantly mitigates the risk to revenue.
- b) **Units and Rates:** The PPA agreements also define the predominant revenue line item in these SPVs, by clearly articulating the output expected to be purchased and the rates at which they will be purchased now and in the future with an inflation adjustment factor, unless, of course, the Green RWA developer has opted for a float with market mechanism.
- c) **Predictability:** Having said that, the PPA agreement establishes a base rate in line with the market and accounts for projected inflation. While this rate varies



by period and time, geography, country, regions, local demand, and supply inefficiencies; once set the material portion of revenue and cash inflows become predictable for the SPV.

- d) **Incentives:** There are many available incentives for investments in Green RWA which should be factored in the valuation of the Green RWA SPV.
- e) **Opex:** The operating costs of the Green RWA SPVs are offsets to the revenue, but given the capital intensity of these projects, such operating costs (for PM & OM, project management, security, analytics, reporting, and accounting) are typically low (expect <10% of revenues) of course dependant on the size of the project.

## Annexure B

### **HARMONISED POOL**

Harmonization is a process by which different Green RWA's SPVs are brought inside a unique closed Harmonized Pool (*Hp*). This *Hp* will generate its own unique harmonized tokens (*Ht*), with its collective assets, performance, and valuation. By nature, any broad-based *Hp* should benefit from fewer spikes and/or dips in performance, lower average risk, and a centering of the standard deviations vs. a typical standalone Green RWA SPV.

The harmonized token (*Ht*) value will be the total value of all the Green RWAs composed in the closed harmonized pool + a harmonization benefit - administrative charges, over the number of harmonized tokens *Ht* issued.

$$\text{Indicative Value of the Green RWA SPV} = \{[(\text{Green RWA SPV EBITDA}) - \text{DS} - \text{ETR}] / 0.09 + \text{TV} + (\text{Risk Adjustment } +/-)\}$$



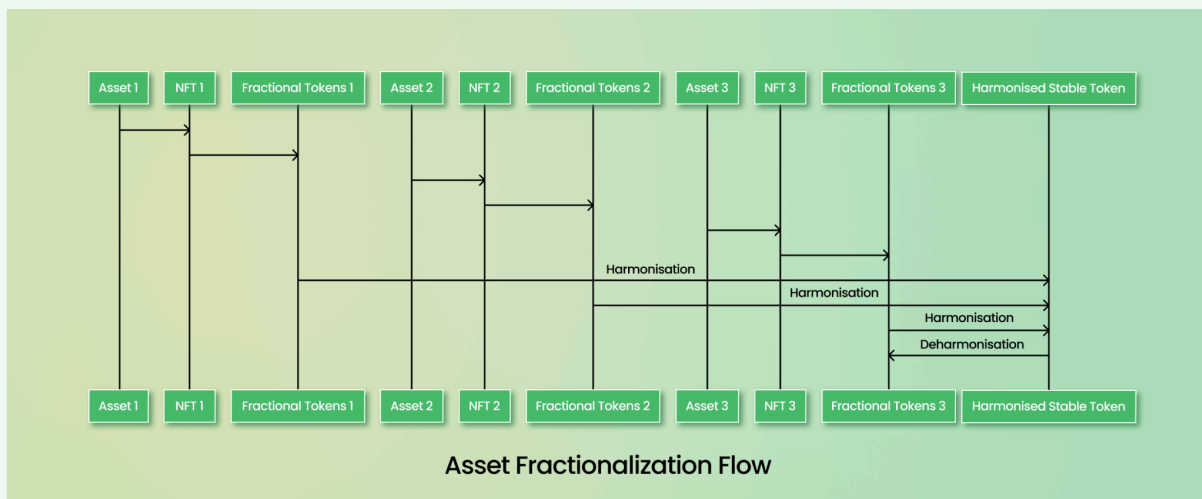
**Indicative Value of an Hp with "3" Green RWA SPVs =**

$$\begin{aligned}
 & [(\{\text{Green RWA SPV(a)} \text{ EBITDA}\} - \text{DS} - \text{ETR}) / 0.09 + \text{TV} + (\text{Risk Adjustment } +/-)] \\
 & + [(\{\text{Green RWA SPV(b)} \text{ EBITDA}\} - \text{DS} - \text{ETR}) / 0.09 + \text{TV} + (\text{Risk Adjustment } +/-)] \\
 & + [(\{\text{Green RWA SPV(c)} \text{ EBITDA}\} - \text{DS} - \text{ETR}) / 0.09 + \text{TV} + (\text{Risk Adjustment } +/-)]
 \end{aligned}$$

**+Hp Benefits**

**- Hp Administration**

**Indicative Value of the Fractional Hp** = [Indicative Value of an Hp with "3" Green RWA SPVs] / Total Fractional Units issued in the closed Hp.







## **Annexure C**

### **TCR, Challenge Based Response Mechanism, Reputation Scoring Algorithm**

We are implementing a Proof of Reputation (POR) model for maintaining the quality standard of the attestors, who will be allocated a particular reputation score (RS) as defined hereunder.

We are implementing the principles of Proof of Stake-based Token Curation Registries to enforce a Minimum Reputation Threshold (MRT) Score for each attestor node to be eligible to stay on the network.

To implement this we are implementing a layered token curated registry design:

#### **Base TCR**

We have a primary pool of prospective attestors (known as Base TCR). All users can join this primary pool by staking a specified minimum amount of tokens.

#### **Qualified Attestor List (QAL)**

We are going to open specific slots for attestors (Qualified Attestor List) on our network progressively as it grows. Users in the Base TCR may apply to join in lieu of additional staking. The standard practice is to approve applications unless a challenge is raised within the given time. Each attestor joining the QAL will have the MRT Score required for eligibility to remain as a network participant.

#### **Methodology to Calculate Reputation Score**

The RS of any particular attestor shall be positively affected by :  
The number of correct decisions along with the liveness of the attestor over time.



Going forward, the reputation Score will be a direct function of the Liveness Score (LS), the number of correct decisions (h), and the total number of incorrect decisions (w).

Thus:

$$RS = \text{Base Value} * (LS + h - w)$$

Simultaneously, as the RS of any particular attester increases, their corresponding staking requirement also goes up.

### **Different Bands of Qualified Attester**

There will be multiple bands of the Qualified Attester List depending on the RS. The attestors with a high RS would be assigned the most critical and high-value transactions on the network.

### **Challenge-Based Response Mechanism**

The entire principle of token curation is based on the model of challenging the RS of a new or existing attester that intends/is already a part of the QAL. The challenger has to be a member of the Base TCR.

However, the challenger has to stake an equivalent amount to that of the specified attester (which is dependent on the RS Score).

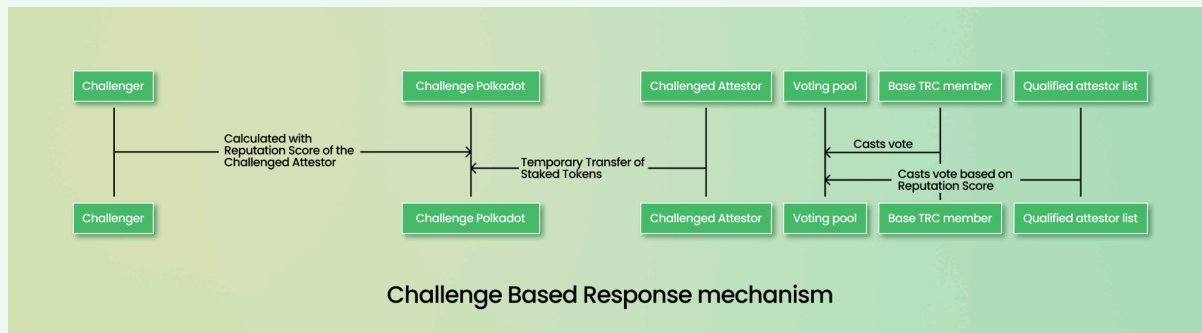
As soon as the challenge is initiated, all members of the base TCR will be allowed to vote on it within a specific duration of time.

The success or failure of a challenge is defined by a simple majority vote (based on their respective staking) of all members of the QAL and the Base TCR. When the challenge is successful, the attester loses their entire stake to the challenger as well



as all the network participants that voted correctly, and the spoils are shared in a pro-rata manner. The corollary earn-out happens if the challenge is unsuccessful, i.e., the challenger loses the tokens in favor of the attester who has survived the challenge, along with all the network participants who voted correctly.

Thus this entire model is dependent on arriving at the Pareto-optimal Nash Equilibrium, at which point any future challenge on an attester will become commercially unfeasible, until the quality of the validator network comes down to trigger another challenge, thus maintaining a constant network participant-driven audit mechanism in real time.



For arriving at the payoff dominant equilibrium point, the sufficiency condition to be met for the challenge to occur is:

$$V_r/V_o < 1 + (D*d/t),$$

Where

$V_o$  = The value of the token pre-challenge

$V_r$  = The value of the token post-challenge

$D$  = total number of tokens owned by the challenger pre-challenge

$D$  = total number of additional tokens the challenger if the token challenge is successful and

$T$  = total tokens staked by the challenger

Going forward, we can also introduce curated qualified attester profiles for different regulated entities