An Introduction to Viridis

Viridis Network

November 23, 2023

Abstract

Climate change poses an unprecedented threat to our planet and there is an urgent need to mitigate the vast amounts of carbon emitted annually. This paper introduces Viridis, a network to integrate decentralized finance with the carbon credit industry, and hasten its global adoption. The paper discusses the motivation behind Viridis, its high-level mechanics, and the vision of a thriving ecosystem for carbon-driven DeFi.

Note: *This paper is a living document and will be adjusted accordingly as development continues.*

1 Introduction

Climate change is one of the urgent issues we face today. The United Nations has warned that global temperatures are consistently rising, with dire consequences for large swathes of the global population. Scientists stress the importance of limiting net carbon emissions to prevent harm to our planet.

Carbon credits play a role in addressing climate change by providing a means to track and incentivize the targeted offset of carbon emissions. However, the current state of the industry makes it difficult to trade carbon credits, which in turn fails to incentivize carbon capture projects. While blockchain-based carbon credits exist, there is still a need for a comprehensive and tokenized framework that fully harnesses the potential of decentralized finance (DeFi) in the carbon market.

According to recent estimates, to align with the target of limiting global warming to 1.5°C set by the Paris Agreement, the world needs to achieve a net-zero carbon footprint by 2050. This goal translates to offsetting billions of tons of CO2 emissions over the coming decades. The enormity of this task underscores the need for innovative solutions like Viridis, which can harness the power of DeFi to mobilize global carbon-offsetting efforts at an unprecedented scale. As carbon-offset grows in prominence and legitimacy, there are billions of dollars of investment that will look to tokenized carbon credits as a vehicle for diversification. We want to unlock it.

The aim of this paper is to introduce Viridis as a solution to this gap and provide an in-depth analysis of its motivation, mechanics and future objectives. Viridis serves as the core token for the Viridis Networks Layer 2, acting as a bridge between Ethereum's network and our dedicated low-gas blockchain. This initiative aims to offer users a platform for trading verified carbon credits while integrating sustainability and efficiency into blockchain transactions.

In further sections, we explore the current state of climate issues, highlight the importance of carbon sequestration and discuss how Viridis can completely reshape decentralized finance for carbon markets.

2 The Climate Problem

2.1 Global Overview

Climate change is a diverse problem that goes beyond borders and economic factors. The Intergovernmental Panel on Climate Change (IPCC) cautions about the rise in worldwide temperatures, which is mainly caused by human actions, like burning fossil fuels, deforestation and industrial activities [1].

We present a host of alarming statistics that underscore the urgency of our mission:

- **Rising Global Temperatures:** According to the Intergovernmental Panel on Climate Change (IPCC), the period from 2011 to 2020 marked the hottest decade on record. The average global temperatures during this time were 1.09°C higher than pre-industrial levels [2]. This rise in temperature has had far-reaching consequences for ecosystems worldwide.

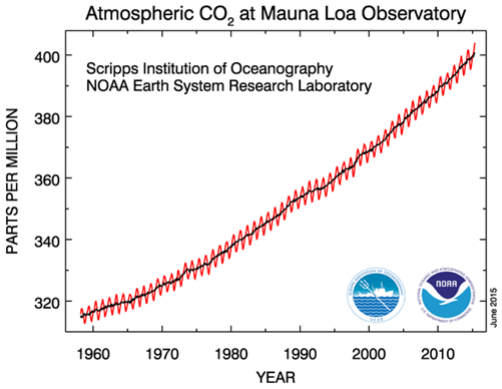
- **Accelerated Ice Melt and Sea-Level Rise:** According to NASA's National Snow and Ice Data Center there has been a decrease in Arctic sea ice at a rate of 13% per decade [3]. Moreover, global sea levels have risen by 8 inches since 1880 with the rate of increase doubling every two decades [4].

- **Increased Frequency of Extreme Weather Events:** Data from the World Meteorological Organization (WMO) shows a significant increase in the frequency and severity of extreme weather events [5]. This includes more intense hurricanes, floods, droughts, and heatwaves, adversely affecting millions of people globally.

- **Impact on Biodiversity:** The United Nations reports that around 1 million animal and plant species are threatened with extinction, many within decades, due to climate change and other human actions [6].

- **Economic Toll:** The cost of climate-related disasters is staggering. The National Oceanic and Atmospheric Administration (NOAA) estimated that the total cost of these disasters in the U.S. alone was approximately $95 billion in 2020 [7].

These statistics not only show a concerning outlook for our future but also emphasize the urgent need for immediate action. Viridis is committed to being part of the solution, leveraging blockchain technology to foster sustainable practices and help reverse these worrying trends.



2.2 Carbon Sequestration: A Key Climate Mitigation Strategy

Carbon sequestration refers to the process of capturing and containing carbon dioxide (CO_2) to prevent its release into the atmosphere. This helps mitigate the effects of climate change. Natural processes, like plant photosynthesis and the formation of soil matter play a role in carbon sequestration within ecosystems.

The significance of carbon sequestration lies in its ability to act as a strategy for addressing climate change. By taking CO_2 from the atmosphere and storing it in plants, soil or geological formations we can help offset the greenhouse gas emissions that contribute to warming. It also plays a role in maintaining healthy ecosystems preserving biodiversity and ensuring overall planetary well-being.

The concept of removing and containing carbon serves as the foundation for carbon credits. A tool, in global climate policy and a key component of ongoing efforts to reduce carbon emissions.

2.3 Carbon Credits

1 Carbon Credit = a digital certificate that proves that a company or an environmental project (forest conservation projects, reforestation of devastated areas, clean energy, biomass, etc.) prevented the emission (pollution) of 1 ton of CO2eq (carbon dioxide) in a given year.

Carbon credits are a key tool in the global effort

to reduce carbon emissions. A carbon credit can be used to conceptually offset an organization's own carbon emissions and allow them to present themselves as carbon neutral. These credits are generated through various carbon offset activities, such as reforestation projects, renewable energy development, or carbon capture and storage operations.

They take upon three main properties which Viridis should also incorporate into the network:

- *High credibility*
- *Eternal (until consumed)*
- *Digital and backed*

The concept behind carbon credits is to create a system that helps reduce greenhouse gas emissions. The carbon offsetting from the reduction or removal of carbon dioxide or other greenhouse gases compensates for the unavoidable emissions produced through personal or business activities. This approach, based on the market, establishes a limit on emissions while encouraging investments in sustainable practices.

Carbon trading markets exist worldwide in both voluntary forms. Mandatory markets are part of international commitments, such as those outlined in the Kyoto Protocol or the Paris Agreement [8]. Voluntary markets on the other hand are driven by organizations aiming to offset their emissions due to reasons like corporate responsibility or sustainability goals.

The effectiveness of carbon credits in tackling climate change depends on being able to verify and assess the environmental impact of the projects they support. Ensuring that these projects are legitimate as well as provide long-term benefits is crucial for maintaining the credibility and effectiveness of carbon credits as a tool in combating climate change.

3 Viridis as a solution

Viridis attempts to bridge the gap between Carbon Credits and Blockchain providing ease of accessibility to everyone. To further understand, we may split the network into two sections:

- Wrapped Carbon
- $VRD Token

3.1 General Mechanics of Wrapped Carbon

Wrapped Carbon acts as the main token and motivation for Viridis. We strictly follow the amount of carbon that needs to be reduced by 2050. This is done on a variable basis that sets the value of each block to a specific **offset**. External oracles are also required to consult the Intergovernmental Panel on Climate Change (IPCC) or similar authoritative bodies and monitor the equivalence of the real-world asset. Specific Dynamics of this are to be provided in a further paper. For now, we consider other main mechanics of Wrapped Carbon.

3.1.1 Security of the Redeeming Process

The redeeming process, wherein users exchange carbon credits for Wrapped Carbon, necessitates a secure and legally compliant framework. To achieve this, Viridis relies on establishing legal hubs around the world. These hubs play a crucial role in processing and verifying the legitimacy of carbon credits, ensuring a transparent and legally sound redemption process. The importance of legal hubs cannot be overstated, as they serve as the backbone of the Network's commitment to regulatory, compliance and environmental impact.

3.1.2 Proof of Carbon via Non-Fungible Tokens

To address the challenge of double counting in carbon offsetting, Viridis introduces a unique solution. When Wrapped Carbon is burned, the user receives a non-fungible token (NFT) that signifies ultimate responsibility for the associated carbon. This innovative approach not only provides a clear and verifiable chain of custody for carbon credits, but also prevents the risk of double counting, thereby enhancing the overall credibility of the Viridis ecosystem.

3.2 General Mechanics of the $VRD token

The VRD token presents itself as the native gas token of the chain, where the supply is bridged from Ethereum. We utilise this token to bring many features to the chain and customize it to the environment.

3.2.1 Governance

$VRD welcomes a governance system into the network. This way it allows our holders to have real freedom and empowerment to create something completely majestic. The holders decide the way forward and the way we run things.

3.2.2 Strategic External Partnerships

Viridis is committed to fostering strategic partnerships with carbon capture companies, aligning its mission of decentralized finance for carbon with the broader efforts to combat climate change. Through these partnerships, Viridis aims to actively contribute to carbon capture initiatives, provide funding, and support ongoing innovation in the carbon sequestration space. The utilisation of the $VRD token brings about revenue, which goes back into our carbon store and potential partnerships.

4 How Viridis mathematically defines the carbon credit system

Viridis uses a system of equations to realise the problem.

Let's start with a simplistic version.

$$\text{Carbon Credits} = \frac{\text{CO}_2 \text{ Emissions Reduced}}{\text{Emission Factor}}$$

This is a broad overview. As we approach further development we must consider larger factors such as:

- **Baseline Emissions:** Emissions that would have occurred without the project.
- **Additionality:** Demonstration that emissions reductions are a direct result of the project.
- **Leakage:** Accounting for emissions increases outside the project area.
- **Permanence:** Ensuring long-term carbon savings.
- **Verification and Monitoring:** Regular checks to ensure actual emissions reductions.

These equations greatly assist in the incorporation of the system into the chain.

For example, **baseline emissions** may be utilised as follows:

- E^i_{target} = Emission target for company i.
- E^i_{actual} = Actual emissions of company i.
- C^i = Net cost or benefit for company i from carbon credits.
- P = Price per carbon credit.
- CC^i_{bought} = Number of carbon credits bought by company i (if $E^i_{\text{actual}} > E^i_{\text{target}}$).
- CC^i_{sold} = Number of carbon credits sold by company i (if $E^i_{\text{actual}} < E^i_{\text{target}}$).

The system of equations for the carbon credit system is as follows:

1. For a company that exceeds its emission target:

$$E^i_{\text{actual}} - E^i_{\text{target}} = CC^i_{\text{bought}}$$
$$C^i = CC^i_{\text{bought}} \times P$$

2. For a company that emits less than its target:

$$E^i_{\text{target}} - E^i_{\text{actual}} = CC^i_{\text{sold}}$$
$$C^i = -CC^i_{\text{sold}} \times P$$

Generalisations may need to occur here and will require further work for this paper.

5 The Impact of Viridis

5.1 Addressing the Carbon Market Gap

The carbon market plays a role in addressing climate change. However, it encounters obstacles when it comes to accessibility and efficiency. The conventional methods of carbon credit often fall short in terms of transparency, accessibility and speed required for integration with decentralized finance (DeFi). Viridis strives to overcome these challenges by offering a platform that enables users to effortlessly participate in financial activities driven by carbon credits.

5.2 Gas Token for the Viridis Layer 2

$VRD serves as the gas token for its Layer 2 solution, creating a dedicated, low-gas chain. This infrastructure enhancement addresses one of the primary challenges faced by DeFi platforms on mainstream blockchains, namely high transaction fees and environmental concerns associated with excessive energy consumption. By providing a more sustainable and cost-effective ecosystem, Viridis facilitates a smoother experience for users engaging in carbon-related DeFi activities.

5.3 Incentivizing Environmental Responsibility

The network's mechanics involve a system that motivates users to actively engage in environmental responsibility. Through the exchange of carbon credits users can earn Wrapped Carbon incentivizing the adoption of sustainable practices. This approach not only supports global initiatives to fight climate change but also establishes a direct connection between financial rewards and environmental impact.

5.4 Expanding the Reach of Carbon-Driven DeFi

Viridis has a vision of a future where carbon-driven DeFi becomes seamlessly integrated into the financial realm. By offering an entry point for both individuals and institutions to get involved in carbon credits, Viridis actively contributes to the expansion of the carbon market. This growth not only invites new participants, but also enhances liquidity and trading volume resulting in a thriving and active sector within decentralized finance

5.5 Contributing to Global Climate Goals

Beyond the immediate impact on the DeFi landscape, Viridis aligns with global climate goals by bringing greater financial interest and volume to the carbon market. As users participate in carbon-driven DeFi activities, they contribute directly to carbon sequestration efforts and environmental conservation. The platform's overarching objective is to be a driving force in the ultimate reversal of climate change by integrating financial incentives with sustainable practices.

5.6 Catalyzing Innovation and Collaboration

Viridis' strategy for finance in relation to carbon introduces a framework that promotes creativity and cooperation. As the platform gains popularity, it has the potential to inspire the creation of financial products, resources and collaborations, within both the carbon market and DeFi industries. This influential impact can result in a vibrant and adaptable ecosystem encouraging ongoing enhancements that align with the changing requirements of users and our planet.

6 Conclusion

In conclusion, the Viridis emerges as a transformative force in reshaping decentralized finance for carbon by addressing market gaps with tokenized carbon credits. Our aim is to provide sustainable infrastructure, incentivize environmental responsibility, expand market reach, and contribute to global climate goals. We have addressed the problems within the sector and the current world climate and proposed solutions in the form of our network. The platform's potential impact extends beyond the immediate financial realm, influencing positive environmental outcomes and fostering a collaborative and innovative approach to sustainable finance.

7 References

[1] IPCC (2021). Climate Change widespread, rapid, and Intensifying. [online] The Intergovernmental Panel on Climate Change. Available at: https://www.ipcc.ch/2021/08/09/ar6-wg1-20210809-pr/.

[2] IPCC (2015). Chapter 1 — Global Warming of 1.5 oC. [online] Ipcc.ch. Available at: https://www.ipcc.ch/sr15/chapter/chapter-1/.

[3] National Snow and Ice Data Center. (n.d.). Sea Ice. [online] Available at: https://nsidc.org/learn/parts-cryosphere/sea-ice

[4] Environment. (2019). Sea level rise, facts and information.

[5] World Meteorological Organization (2021). Weather-related Disasters Increase over past 50 years, Causing More Damage but Fewer Deaths. [online] World Meteorological Organization. Available at: https://public.wmo.int/en/media/press-release/weather-related-disasters-increase-over-past-50-years-causing-more-damage-fewer.

[6] United Nations (2019). UN Report: Nature's Dangerous Decline 'Unprecedented'; Species Extinction Rates 'Accelerating' - United Nations Sustainable Development. [online] United Nations Sustainable Development.

[7] Smith, A.B. (2021). 2020 U.S. billion-dollar weather and climate disasters in historical context — NOAA Climate.gov. [online] www.climate.gov. Available at: https://www.climate.gov/disasters2020.

[8] Maizland, L. (2023). Global Climate Agreements: Successes and Failures. [online] Council on Foreign Relations. Available at: https://www.cfr.org/backgrounder/paris-global-climate-change-agreements.