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Publication Date

2023

Peer reviewed|Thesis/dissertation

UNIVERSITY OF CALIFORNIA

Santa Barbara

The Future of Climate Finance: Analysis of the Regenerative Finance Community at the

Intersection of Web3 and Climate

A Thesis submitted in partial satisfaction of the

requirements for the degree Master of Arts

in Global Studies

by

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December 2023

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December 2023

ACKNOWLEDGEMENTS

ABSTRACT

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by

Maya Zaynetdinova Dentzel

The intersection of climate finance and technology has grappled with persistent

inefficiencies, lack of accountability, and an uneven distribution of resource ownership and

decision-making power, often favoring solutions in the Global North. To address these

pressing issues of current climate finance approaches, namely carbon markets, blockchain

and Web3 technologies have emerged as potential remedies, sparking the growth of a nascent

subsector called Regenerative Finance, or ReFi. On top of technological promise of Web3,

this ReFi community promotes the ambitious ideals of regenerative economics and aspires

for a systemic change. This research delves into the growing community of ReFi consisting

of climate-focused organizations and individuals utilizing Web3 technologies 'for good'. To

explore this landscape, I employ a combination of literature review, digital ethnography, and

interview analysis. The research questions guiding this inquiry are: a) How does the

emerging Regenerative Finance (ReFi) community define itself and envision the future of

climate finance? b) How is the ReFi community getting institutionalized?

By analyzing ReFi's conceptualization and institutionalization, I find that even

though this community believes that Web3 technologies could enhance climate finance in

meaningful ways, the members of the ReFi community have differing views on what the concept of 'ReFi' means. Some, who favor conceptual and ideological approaches based on regenerative economics, envision ReFi as a cultural activist movement. Others, who see ReFi as a technological tool for carbon market efficiency, define ReFi as a new iteration of climate tech and impact finance. This clash suggests that the ReFi community has not achieved a cohesive level of institutionalization across regulatory, normative, cultural-cognitive pillars. Nevertheless, there are several empirical top-down and bottom-up indicators of partial institutionalization in the normative and cultural-cognitive systems. The ReFi community is also getting institutionalized as an organizing vision around Web3 as a technological artifact. The community faces a number of challenges, such as public perception problem due to shared framing with Web3 and 'crypto', market centrism, lack of clear regulation resulting in lack of legitimacy, as well as gaps in representation and diversity in institutional construction. Overall, this analysis provides broader implications of the role of new digital technologies in climate finance institutions and raises questions about practical application of regenerative systems in the current neoliberal economy.

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Introduction

The erosion of trust in traditional financial institutions, catalyzed by the 2008 crisis, prompted a quest for alternative ways for societal organizations to ensure financial stability (Greenfield, 2017). The escalating inequality and heightened political polarization observed in recent years can be attributed to the systemic crises stemming from neoliberalism, a dominant economic system and political ideology based on free-market capitalism, limited government intervention, deregulation, and the privatization of public services (Harvey, 2005). Such a system, Harvey warned, has led to the exacerbation of structural inequalities and caused a significant shift towards financialization and commodification. These intertwined economic crises have, in turn, propelled a surge in interest toward cryptocurrencies—digital assets stored on blockchain technology (Posner & Weyl, 2018).

The rise of Bitcoin, the inaugural major cryptocurrency, triggered an explosion in the cryptocurrency landscape, with over 8 thousand distinct types in existence as of November 2023[1]. Yet from the start cryptocurrencies have been entangled in a series of hacking scandals and bankruptcy cases, experiencing tumultuous cycles of 'crypto booms' followed by 'crypto winters' marked by what Golumbia calls "extreme boom-and-bust cycles" (2016, p. 58). Public perceptions of cryptocurrencies remain divided, with some viewing them as vehicles for financial liberation while others regard them as speculative gambling instruments. The latter opinion has, in part, contributed to blockchain's reputation as a resource-intensive and potentially destructive technology (Golumbia, 2016).

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[1] https://coinmarketcap.com/

Despite these challenges, blockchain technology continues to expand its range of applications, transitioning from financial instruments to encompass political and environmental domains. The convergence of blockchain and climate change has become a topic of intense debate. It raises questions of whether blockchain technology can regain public trust and whether it can prove itself to be useful to applications beyond cryptocurrencies. This thesis explores this question by examining the efforts of entrepreneurs, climate activists and investors to disassociate blockchain from this troubled beginning. They believe the technology can transform climate finance which suffers from lack of transparency, liquidity, and scale. However, putting this into practice is hard work. In this research I look at the ways blockchain advocates envision the future of climate finance. United by connecting Web3 technology to regenerative economics, these advocates constitute a community called Regenerative Finance (ReFi).

Chapter 1 focuses on ReFi's conceptualizations, while Chapter 2 examines what institutionalization for this community means and what it might look like across three institutionalization pillars: regulative, normative, and cultural. By analyzing ReFi's conceptualization and institutionalization, I find that even though this community believes that Web3 technologies could enhance climate finance in meaningful ways, the members of the ReFi community have differing views on what the concept of 'ReFi' means. Some favor conceptual and ideological approaches based on regenerative economics, while others see ReFi as a technological tool for market efficiency. This clash suggests that the ReFi community has not achieved a level of social cohesion necessary to be considered a stable institution. Nevertheless, there is a number of empirical indicators of community's institutionalization. Moreover, I find that a major challenge for ReFi's institutionalization is

its inevitable link to Web3 as an organizing vision. There cannot be a ReFi community without Web3 technologically but also conceptually, and this poses various problems for the community's efforts to institutionalize.

The next section defines key technologies discussed throughout this thesis. Then it discusses the problem and research question followed by the conceptual framework. The introduction ends with the description of methods.

Blockchain, Decentralized Finance, Crypto and Web3

The key technologies discussed in the thesis are Web3 and blockchain. These technologies are the foundation for such applications as cryptocurrencies and decentralized finance (DeFi). Given their novelty and technological complexity, these terms are often conflated and misunderstood. This section details unique properties, functionality, and distinctions of these technologies.

Web3 is a cumulative term which refers to a third iteration of the development of the Internet[2]. According to this historical approach, Web1 emerged in early 90s with the World Wide Web which was static and very limited in functionality; Web2 marked the beginning of Internet platforms (e.g. Google and Facebook) that allowed for more interactive content; Web3 is seen as a logical next step where, unlike centralized ownership by tech giants, users can own their own data thanks to blockchain applications, metaverse and other technological innovations. Therefore, Web3 is an umbrella term that refers to the emerging decentralized and blockchain-based technologies and applications, most notable of which are self-

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[2] https://ethereum.org/en/web3/

executing smart contracts, NFTs (non-fungible tokens), and decentralized autonomous organizations (DAOs). There are varying perspectives on the distinction between the terms Web3 and blockchain. In this context, I use these terms interchangeably, but some prefer a more nuanced distinction. My rationale for this loose terminology is that my project primarily examines social and political trends rather than delving into technical intricacies.

Blockchain technology is often described as a digital peer-to-peer database or a public ledger designed to record and verify specific states of affairs agreed upon by a network (Pazaitis et al., 2017, p. 109). This agreement is achieved through the use of consensus protocols, which are technological mechanisms that ensure all network participants share a single source of truth. Notably, there exist various types of consensus protocols, with 'proof of work' being the most notorious, notably used by Bitcoin due to its significant energy consumption, while alternatives like 'proof of stake' are more energy-efficient (Truby, 2018).

In essence, blockchain serves as a digital platform for tracking a wide array of value exchanges among individuals (Raworth, 2017). Blockchain operates by storing data across a network of personal computers, rendering it both decentralized and distributed. To secure transactions, blockchains utilize cryptography, and these transactions are organized into blocks linked together through digital signatures. Proponents of blockchain highlight its unique attributes, including immutability, accessibility, transparency, and security. This security is possible because there is "no single point of authority to make mistakes and collapse the system" (Howson, 2021, p. 6). Additionally, blockchain is often referred to as distributed ledger technology (DLT) and is conceptualized as an institutional and governance infrastructure (Howson, 2021).

Blockchain networks are much more than a software program, they arguably represent a new paradigm in social production and organizational models (Kostakis et al., 2016). They seek to establish innovative organizational structures, with some referring to these organizations as "blockracies" in academic discourse. A blockracy is described as "a coherent, distinctive, and novel organizational form bound by a collective ledger and a cryptocurrency" (Kavanagh, Ennis, 2020). In the technology realm, these blockracies are better known as "Decentralized Autonomous Organizations" or DAOs. DAOs are futuristic concepts in the realm of blockchain-based organizations. In theory, they function through code and are governed by predefined rules and self-executing smart contracts, eliminating the need for central authorities or traditional management structures.

Cryptocurrencies, often referred to as 'crypto,' are commonly understood as financial applications built on blockchain technology. They are essentially digital currencies that exist on the blockchain ledger. The term 'crypto' has frequently received negative attention, particularly due to increased number of hacking attacks and cryptocurrency exchange collapses[3]. On the other hand, DeFi, or decentralized finance, serves as an umbrella term encompassing various financial applications within the cryptocurrency space. These applications extend beyond simple currency transactions and involve more intricate financial functions such as loans, insurance, crowdfunding, derivatives, staking, and more. The first and most prominent cryptocurrency, Bitcoin, initially gained notoriety with support from right-wing libertarians and anarchists. However, the concept of 'crypto' is evolving beyond its monetary aspect to achieve more ambitious goals of reconfiguring power dynamics in

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[3] https://web3isgoinggreat.com/?theme=hack

society through a decentralized technological infrastructure. This broader movement to reshape the Internet came to be known as Web3.

Blockchain's value proposition for climate & regenerative finance

How blockchain could re-shape climate change is far from obvious. Yet, because blockchain allows to store information in a secure and decentralized way, it can be a useful emissions accounting tool. As a form of General-Purpose Technology (GPT), blockchain spans across industries and supports the development of complementary technologies built on top of it (Mulligan et al., 2023). For example, blockchain allows for tokenization, that is, transforming a tangible asset from the physical world into a digital token enriched with comprehensive metadata (Franke et al., 2023). Since tokenization enables digital ownership that is verified on the blockchain, it allows for a better way of tracking climate data, such as carbon emissions and climate funding.

Because of these capabilities blockchain could significantly impact climate action efforts in several ways. First, it could realign economic incentives by tokenizing ecological value (e.g. the creation of nature-backed currencies). These digital tokens are supposed to incentivize environmentally friendly actions and provide a novel approach to fostering ecological stewardship. Furthermore, blockchain could streamline climate finance and carbon markets, making them more accessible and efficient. By facilitating the transparent and secure flow of funds and assets, it could enhance the effectiveness of climate finance mechanisms. Moreover, blockchain's transparency and accountability features offer significant benefits in climate action. For example, it could add transparency to emission

tracking and Environmental, Social, and Governance (ESG) reporting, creating a tamper-resistant and auditable record of climate-related data. Increasing transparency in these ways could engender trust in the accuracy of climate information. Practically, blockchain could revolutionize the Measurement, Reporting, and Verification (MRV) processes, particularly in aggregating Nationally Determined Contributions (NDCs) from different countries. The technology could allow digitizing and decentralizing MRVs (dMRV), replacing manual processes with automated, secure, and accessible systems. Leveraging technologies such as satellite imagery, machine learning, and remote sensing would provide a robust foundation for MRV processes (Oberhauser 2019).

On a broader scale, blockchain could congregate a global network of climate activists by popularization of regenerative ideals via the ReFi movement, who could then undertake more direct and coordinated climate actions. By facilitating decentralized and peer-to-peer interactions, it could empower individuals and organizations to collaborate on climate initiatives on a global scale (WEF, 2023). Beyond these functionalities, proponents of Web3 technologies believe that blockchain might advance the principles of regenerative economics. Regenerative finance (ReFi) emerged as a technological "ecosystem" whose members believe in the power of Web3 tools to turn the current hegemonic and extractive economic system into an inclusive and regenerative one (WEF, 2023; Hartley & Rennie, 2022). For proponents, ReFi is about transforming the existing extractive economic system into an inclusive and regenerative one. This transformation would advance through the creation of enhanced data commons, which leverage decentralized and transparent data to support novel financing and governance models. Additionally, through tokenization and democratization of assets, blockchain could broaden access to financing, specifically by enabling fractional

ownership and transferability. This could enhance liquidity and reduce barriers for investors. Lastly, blockchain could enable transparent and decentralized governance structures, fostering more equitable decision-making processes to improve coordination for climate action (Scheltz et al., 2023).

In short, blockchain technology could serve as a tool for improving climate finance and on a larger scale could embody a deeper structural transformation through regenerative finance. Blockchain holds the promise of reshaping climate action efforts, offering innovative solutions to incentivize environmentally responsible behavior, enhance transparency, and contribute to the creation of a more inclusive and sustainable economic system. This promise serves as a catalyst for the proliferation of Web3 and blockchain applications within the climate sector and calls for closer academic investigation.

The problem and research question

ReFi is a multilayered and understudied community that combines elements from climate technology, sustainable development, climate finance, regenerative economics, impact investment and climate justice to redesign the economic system so it may have a positive impact on the environment (WEF, 2023). That said, ReFi is still taking shape and evolving, resulting in a lack of consensus regarding its meaning and legitimacy. Much like the Web3 space, some industry actors use 'ReFi' to refer to any organization employing blockchain for climate positive goals, while others disagree as not all such organizations implement regenerative practices. In my research, I focus on this difference of opinion and examine parts of this debate about ReFi's practices and potential. A particularly large number

of actors and stakeholders are attempting to define what regenerative finance means from WEF to scholars to digital spaces (e.g. online chat rooms). My research endeavors to examine the imperative for redefining these instruments and the evolving processes of institutionalizing this sector.

Regenerative Finance is a relatively new term and has yet to receive extensive scholarly attention. This research attempts to add more clarity to the concept and trace the efforts by major organizations of defining and thereby shaping this emerging sector. This study asks: a) How does the emerging Regenerative Finance (ReFi) community define itself and envision the future of climate finance? b) How is the ReFi community getting institutionalized?

This project provides insights into the intersection of emerging technologies of blockchain and climate finance. The findings from this study could be useful to members of the ReFi community who are seeking to gain more legitimacy and to policymakers grappling with the speed of climate innovation and the role of Web3 in climate finance. Through an in-depth exploration of the evolving landscape of Regenerative Finance, this research aims to contribute to a more comprehensive understanding of the opportunities and challenges presented by blockchain technology within the context of climate finance. This research also offers valuable insights about institutionalization of new digital technologies in a decentralized context. Namely, it suggests that top-down and bottom-up approaches to institutionalization yield varying outcomes. The latter allows for faster diffusion of cultural institutionalization in the digital context via proliferation of buzzwords and frames that strengthen organizing visions behind a new technology.

The section below details the research methodology and looks at key literatures and theories on digital technology and its role in climate finance in the context of neoliberal economic system. Chapter 1 focuses on the individual agency of the people envisioning the ReFi sector and the future of climate finance, key narratives and concepts. It offers an overview of persistent problems with carbon markets and highlights proposed solutions by the ReFi community. Chapter 2 looks at the institutional theory and empirical evidence of ReFi's institutionalization. The paper ends with a conclusion summarizing key findings, limitations, and avenues for further research.

Methodology

This study employs a mixed methods approach comprising three key approaches. Firstly, an extensive literature review serves as the foundational step to establish the theoretical and contextual framework for the research. Secondly, the thesis follows a semi-structured interview approach, inspired by Spradley's (2016) framework, to engage with ReFi organizations affiliated with the World Economic Forum (WEF). Thirdly, digital ethnography and digital participant observation are employed as the research platform to analyze the emergence of narratives and conceptual frameworks within the ReFi ecosystem. This analysis is conducted through the examination of discourse on platforms such as X (formerly Twitter), Telegram, Notion and Discord. Digital ethnography was also conducted by attending Zoom calls and other online events organized by ReFi community members not interviewed by as part of the WEF working group. By combining these three approaches, this

research aims to provide a comprehensive understanding of the evolving landscape of the Regenerative Finance community.

The bulk of empirical work for this study was gathered during my six-month fellowship at the World Economic Forum with a primary objective to gain insights into the ReFi sector and understand its objectives and the level of maturity. Employing an emic research approach, our research group prioritized capturing the perspectives of informants regarding regenerative finance. To facilitate this, we created a structured interview protocol with distinct subcategories, including inquiries pertaining to background information, company and project specifics, the measurement, reporting, and verification (MRV) of climate impact, views on regulation, considerations of equity and decision-making in community impact, definitions of key terms, and perceived challenges. Utilizing Zoom as a platform, our research group conducted a total of 23 in-depth interviews, each lasting approximately an hour. These interviews were subsequently transcribed using the Otter.AI software resulting in over 320 pages of fieldnotes. The findings from this extensive research endeavor were then published in a whitepaper by the World Economic Forum (2023) that focuses on the usage of blockchain technology to scale climate action efforts.

In this thesis, I expand on the analysis of these interviews. I focus on ReFi organizations that joined the World Economic Forum (WEF) Crypto Sustainability Coalition framework for the following reasons. These organizations were selected to participate in the interview process due to their well-established status within the ReFi community, and their prominent work to attain legitimacy and recognition of the sector. Moreover, their affiliation with the WEF lends an additional layer of credibility, as they were vetted as trustworthy and legitimate entities. This was a critical consideration as the Web3 industry is notorious for

proliferation of scam projects. Yet, it is essential to underscore that the focus of WEF vetted interviews does not diminish the contributions of numerous other ReFi organizations and ReFi advocates. Their contributions and views are taken into account via digital participant observation discussed above.

However, it is imperative to acknowledge a limitation associated with this interview sample. The WEF Crypto Sustainability Coalition, which served as the primary source of interviewees, operated on an invitation-based model, primarily funded by select Layer 1 blockchains (powerful digital infrastructure providers). This structure introduced certain bureaucratic layers and influenced the selection of participants, which, in turn, may have affected the nature of the responses received. Moreover, the interview sample primarily comprises organizations that have achieved a degree of institutionalization and maturity within the ReFi space, often with extensive connections in the traditional business sector. This paper attempts to mitigate this limitation by bringing in the voices from the broader community expressed in digital forums and social media (X, Discord, Telegram). Despite these constraints, the sample remains robust for the purpose of this study and provides valuable insights into the direction of the ReFi community as a whole.

Profiles of interviewees

This section reports on the analysis of the interviewees to identify their key characteristics and four "profiles" which are useful in the analysis of debates that follows. Based on the close analysis of WEF interviews, it focuses on the demographics and trends of various stakeholders in the Regenerative Finance industry envisioning the future of climate

finance. The people behind ReFi constitute a peculiar combination of New York bankers, Colorado-based climate activists, nomadic crypto evangelists and traditional carbon market executives. As pointed in the methodology section, the empirical basis of this study is the analysis of the interviews conducted by the WEF Crypto Sustainability Coalition. Before delving into the content of their responses, it is crucial to discuss social trends emerging from looking at the respondents' backgrounds. The demographics of the regenerative finance community point to a few notable dynamics across generations, genders, geographical locations, educational and professional experiences.

Among 23 interviewees, 18 identify as men and five as women, which suggests a predominantly male perspective on the sector development. In terms of age range, only six people are from generation X (ages between 41 and 56). The majority, fifteen interviewees, are millennials (25-40 years old) and only one person is a baby boomer and one falls under Gen Z. Such age distribution coincides with the historical explosion of digital technologies at the turn of the century and reflects the rise in interest in technological solutions to climate problems among millennials.

The geographical range of the respondents' origins covers all major world regions. Eight people come from the United States, two from Canada, eight from Europe, three from Central and Latin America, and two from Asia. That said, as for their current location, interviewees reside mostly in Europe (Switzerland, Lisbon, Italy, France, Spain, Ukraine) and the US (New York, Pennsylvania, California, Colorado, Massachusetts). A few are based in Brazil, Hong Kong, Canada, Mexico and one lives nomadically. With a few exceptions, this suggests that a majority reflects the views from Global North.

Educational backgrounds range from the humanities to hard sciences to no university degree or formal training at all. The majority come from a privileged socioeconomic situation, with college and advanced university degrees. Specifically, the interviewees hold degrees in a variety of disciplines ranging from political science, English and Spanish to environmental science, government and law. A couple of respondents hold PhD degrees in psychology and theoretical physics, while a few others have masters in geopolitics, hydrology, software engineering, and sustainability management. Notably, there are some exceptions to such a rigorous academic background with a few respondents identifying as college dropouts. Overall, the academic background of the interview participants is heterogeneous which is reflected in the profile selections below.

In terms of previous industry experience, before getting involved in the ReFi community, the majority of respondents come from technological and business backgrounds. Most interviewees have professional backgrounds with a finance focus in areas such as commodity trading, venture capital, AI, software development and startup investing. However, quite a few interlocutors have experience in industries related to public policy and climate change such as impact entrepreneurship, agriculture, environment consulting, government, climate nonprofits, and agriculture. Such varied experiences suggest a rather multidisciplinary nature of the ReFi community and can also imply a division in perspectives on how to address such a multilayered issue as climate change.

This snapshot of the early advocates and entrepreneurs in the ReFi sector points to a diverse mix of backgrounds. While the interview sample consists of a community of mostly well-off and privileged people, there are important vectors of diversity illustrated by four

profiles which are useful in the analysis that follows. Based on their biographies, I grouped the interviewees into four categories:

1 - 'Traditional Business' profile: this group includes a handful of people with prestigious education in finance, business economics and law and extensive work experience in industries related to data science, banking, Silicon Valley startups, and venture capital. This group includes males and females from European and Asian American backgrounds.

2 - 'Climate Science' profile: this group represents a counter profile of people with some degree of environmental training and understanding of climate science. The people in this group have experience in environmental ethics and policy, carbon markets, regenerative agriculture, energy sector and environmental consulting. Notably, they all come from white European backgrounds.

3 - 'Early Entrepreneurs' profile: this group includes college dropouts who became young startup founders and have been involved in the entrepreneurial culture since an early age, usually 18 years old. They have experience in building crypto protocols, FinTech, and entertainment. They all are white males.

4 - 'Global South' profile: this group includes perspectives from the developing world. While their professional and academic backgrounds revolve around technology and economics, their work focuses on uplifting the Global South region. This profile includes male and female voices from Latin America and is the smallest in size.

To respect anonymity of the interviewees, I will refer to these profiles when referencing a particular quote or point of view. Though these profiles do not have statistical validity nor are they representative of any individual or collective, they nevertheless provide a useful way to analyze the debates that follow. They represent the voices of the early blockchain for climate advocates and highlight the initial frames and discourses among the ReFi community. Further research should expand on these discussions by conducting more interviews to see how well the views hold up.

Conceptual framework

The three paradigms that help understand the scope of and lay theoretical and contextual foundations for this research are: Neo-Polanyian political economy, techno-boosterist ideology, and green capitalism as response to the climate crisis.

Neo-Polanyian approach

Emerging from the social and economic repercussions of market-driven capitalism in the 19th and early 20th centuries, neoliberalism has been scrutinized by prominent theorists and critics like David Harvey. He characterizes neoliberalism as a "theory of political economic practices" that advocates for enhancing human well-being by promoting individual entrepreneurial freedoms and skills. This ideology operates within an institutional framework

defined by robust private property rights, free markets, and open trade (Harvey, 2005).

Harvey also sheds light on the inherent tensions and contradictions within the neoliberal

state. These include the concentration of monopoly power, instances of market failure

marked by the externalization of costs leading to environmental degradation, an assumption

of equal access to information without acknowledging power asymmetries, and a belief in the

possibility of technological solutions for every problem (Harvey, 2005). Harvey underscores

what he terms "the paradox of intense state interventions and government by elites and

'experts';" within an economic thought that rejects such state involvement in theory but

implements it in practice to protect the market (p. 69). Overall, the core principles of

neoliberalism encompass the commodification of labor and the environment, facilitated by

deregulation of financial markets, practices of "accumulation by dispossession,"

privatization, and the growing influence of financialization (Harvey, 2005). Harvey's critique

of neoliberalism echoes contemporary interpretations of Karl Polanyi's theory around the

role of state and the idea that the economy is embedded within social and cultural contexts.

From the politico-economic perspective, this thesis adopts a neo-Polanyian approach,

building on the ideas by Karl Polanyi, to conceptualize the state and capital's relationship to

Web3 technology. According to this theory, economic processes are not isolated from social

and cultural contexts but are deeply intertwined with them and thus require state regulation

for capitalism to operate (Polanyi, 1944; Block, 2015). This framework is most useful for this

research because blockchain powered cryptocurrencies are dependent on market dynamics

and therefore rely on state intervention. The dialectical relationship (Polanyi's concept of

double movement) between markets and state intervention are visible in the blockchain

space: the recent collapses of large crypto exchanges, such as FTX and Celsius[4], have led to state intervention in the form of calls for stricter regulation of the industry.

While Web3 solutions for climate finance stive to be a progressive development outside of the financial applications of crypto, Regenerative Finance (ReFi) projects are largely dependent on the broader dynamics of crypto markets. Therefore, the state creates the conditions necessary for these markets to stay alive. Thus, governance institutions are critical in managing the ReFi community. Moreover, tokenization echoes the process of commodification of more and more aspects of social life and environment. This leads to 'disembeddedness' or removing social and cultural context and reducing complex processes, such as climate action, to economic activity. Blockchain organizations are embedded within networks of participants, communities, and protocols, where social norms, trust, and reputation play important roles in governing interactions. The process of turning real-world assets into tradable tokens can lead to the disembedding of economic transactions from their physical contexts. Following Polanyi's theorization, cryptocurrencies and tokenized carbon can be considered fictitious commodities which helps to draw a link between blockchain and state regulation. This paper discusses the neo-Polanyian approach to carbon offsetting in later sections.

Techno-boosterism

It is impossible to understand the role of blockchain technology in climate finance without reviewing the history of techno-boosterism: an optimistic and often uncritical view

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[4] https://www.theverge.com/2022/11/10/23450169/crypto-winter-ftx-binance-celsius-bitcoin

of technology's potential to solve societal problems. Techno-boosterism refers to an enthusiastic and often uncritical promotion or advocacy of technological solutions as panaceas for various societal, economic, or environmental challenges. It typically involves a strong belief in the transformative power of technology to bring about positive change and solve complex problems. However, critics argue that techno-boosterism can sometimes overlook potential drawbacks, risks, or unintended consequences associated with the rapid adoption of new technologies.

Historically, techno-boosterism has evolved in tandem with significant technological advancements. This trend spans from the era of the Industrial Revolution in the 18th and 19th centuries to the period of 20th Century Technological Optimism, which gained momentum after World War II and continued through the Dot-Com Bubble of the late 1990s coinciding with the spread of neoliberalism as one of its main characteristics. It also extends into more recent times with the spread of blockchain, cryptocurrencies and Web3 in the 2010s and 2020s. Throughout this historical trajectory, techno-boosterism, characterized by optimistic beliefs in technology's capacity to address societal challenges, has been intertwined with both genuine technological progress and phases marked by excessive enthusiasm followed by disillusionment. Also referred to as techno-utopianism, such a view of technology has been fueling the tech sector with optimistic visions of the future driven by the potential of technology to radically improve human life.

The history of digital technology has been driven by various forms of optimistic view of technology's role in society from cyberlibertarianism to solutionism to planetary improvement logic. These three concepts are critical in understanding the relationship between technology and society. The rise of computation and financialization led to the

increased popularity of cyberlibertarian ideology, a view of the Internet as a liberating

technology that transcends government regulation and empowers individual autonomy.

Langdon Winner, a prominent critical theorist of technology, explores the broader societal

implications of technological choices and warns that computation of culture may have

unintended consequences. He defines cyberlibertarianism as "a collection of ideas that links

ecstatic enthusiasm for electronically mediated forms of living with radical, right wing

libertarian ideas about the proper definition of freedom, social life, economics, and politics in

the years to come" (Winner 1997, p. 14). Cyberlibertarianism is rooted in neoliberal

conservative ideas with "the combined emphasis upon radical individualism, enthusiasm for

free market economy, disdain for the role of government, and enthusiasm for the power of

business firms" (p. 16). Winner provides a critical account of the spread of these ideas as

they become institutionalized and have serious political consequences by centering

technology as the ultimate solution.

Such solutionist thinking is another techno-boosterist logic with political significance.

It simplifies complex social problems and limits human agency and collective action,

reducing them to a technological fix and centering for-profit technology companies as sole

changemakers. Evgeny Morozov, a prominent critic of solutionism, argues that the Internet

and social media are not inherently liberating, as they are often portrayed in the media, but

can also be used as tools for control and oppression (2011). He argues that "cyber-utopia" is

a myth because authoritarian regimes can use digital technology to monitor and control

citizens and spread propaganda (Morozov 2011). Morozov criticizes the idea of

'technological fixes' as they at most cure symptoms rather than the root cause: "reframing

social problems as a series of technological problems distracts policymakers from tackling

problems that are nontechnological in nature and cannot be reframed" (p. 305). He calls for cyber-realism — not generalizing the Internet as a silver bullet but using it for specific policy objectives (2010). Solutionist thinking overlooks the root causes of social problems and neglects the need for human engagement thereby affecting the democratic process. Thus, blind reliance on "computable solutions" poses a risk of unforeseen consequences such as human rights, ethical and environmental concerns.

The latter is the focus of Jesse Goldstein, prominent environmental sociologist, who in his book *Planetary improvement: Cleantech Entrepreneurship and the Contradictions of Green Capitalism* looks at techno-boosterism in the cleantech sector from the Marxist perspective. Goldstein provides a critique of "green spirit of capitalism" which in his view "mobilizes a seemingly radical, anti-systemic critique of capitalism in order to provide moral legitimacy for proposals to create a better, greener version of the modern industrial economy" (2018). Goldstein argues that such market solutions do not change the underlying structural causes of environmental degradation and that blurring the lines between investment and environmental protection logics further exacerbates the climate emergency. Planetary improvement logic, in his view, aims to save the planet not from but *with* capitalism thereby maintaining the status quo (Goldstein 2018). The key argument is that the focus on emissions misses a more important root cause of climate change — the fossil fuel industry (Buck 2021). Therefore, Goldstein argues that to challenge this logic of planetary improvement instead of investing in new iterations of cleantech, we need a culture change to end consumerism justified by neoliberalism (2021).

Following the planetary improvement logic, the ReFi community can be theorized as, what Goldstein calls, "nondisruptive disruptions" (2018) for two reasons. First, such

innovation continues the status quo of market solutions and tends to conflate profit with the cause, where "such technologies will save the world by making money, which is both a sign and mechanism of success" (Johnson et al. 2020). Second, the planetary improvement logic also points out that cleantech employs 'temporal separation' in which a climate positive outcome is a promise in the future rather than material outcome in the present. Such delaying techniques resemble the 'potential' discourse of Web3 and climate in which the emphasis is put on the promises of the technology instead of proven results. This logic is closely related to the frame of enterprising nature, the idea of assigning a monetary value to the environment (Dempsey, 2016). Dempsey's points to tensions in ecological accounting that are "conceptually dominant, but substantively marginal" (p. 234). Such conceptualization of financialization of nature is "an attempt to manage the excesses of capitalism that are degrading life on this planet" instead of providing a structural change (p. 11). Although ReFi as an idea represents potential for alternative transformative technologies, it is suppressed to meet the market logic. Just as other forms of cleantech, it is in "its own form of denialism. It accepts that climate change exists, but denies that big change is necessary, clinging to capitalism as a solution" (Johnson et al., 2020).

What techno-boosters tend to miss out is the political and social context in which technology is developed as "ultimately, the development and the design of technologies are political matters" (MacKenzie, 2014, p.26). The social construction of technology (SCOT) approach by Bijker (1995) stresses that technology is shaped by social, political, and economic factors. According to this approach, power and control are embedded in technology development and, thus, human agencies and social interests behind the development of technological projects are important aspects that constitute a politics of

technology (Bijker, 1995; Latour ,1996; MacKenzie, 2014). Any technical change is followed by "production of psychological, social, and political conditions" that ultimately lead to social change (Winner, 1986, p. 17). Therefore, social power structures are inevitably connected to technological innovation: "what matters is not technology itself, but the social or economic system in which it is embedded" (p. 20). While techno-boosterism can be rooted in genuine enthusiasm and hope for technological progress, it can also lead to overlooking potential downsides and challenges associated with technology. A balanced approach to understanding technology's impact on society takes into consideration both its potential benefits and its ethical, social, and environmental implications: "technologies have certain material and institutional orders that transcend the particularities of the contexts in which they are used" (Leonardi et al., 2013, p. 26).

To fully understand such socioeconomic contexts in which the ReFi community is emerging, it is necessary to look at the spread of green capitalism as a driving force behind techno-utopian logic.

Green capitalism

Capitalism combined with techno-utopian ideals arguably presents even a bigger threat for climate change than capitalism on its own. Economic growth accelerated by the spread of digital technology leads to further exploitation of natural resources; "because the network-powered economy relentlessly scans the planet for opportunities to make money, there is a process of accelerated exploitation of natural resources, as well as of environmentally damaging economic growth" (Castells, 2001, p.279). Yet, this framework of

economic growth is justified by reframing capitalism as 'green' making the reliance on the market mechanisms and private sector sound as climate positive and even necessary. The danger of such green capitalist thinking is the illusion that economic growth can be sustained indefinitely with the invention of new technology.

Many scholars voice concerns about this danger as the current landscape is focused on economic growth and private sector involvement in climate action that is "rooted in market-oriented neoclassical economics" (Oberhauser, 2019). They argue that the 'green framing' creates the illusion of system change while maintaining the status quo: "The economic growth paradigm of the last decades has been substituted with the green-growth, win-win rhetoric that the world can outgrow its dependence on fossil fuel and over-consumption with a few minor policy adjustments. Private sector voluntarism has been invoked for the last two decades, yet it has never amounted to measurable shifts away from business-as-usual" (Clemeçon, 2016, p. 6). Moreover, such market-rationality does not factor in environmental justice, nor does it resolve "how economic trade-off decisions between short-term private and long-term public objectives are made" (p. 2). As a result, short-term private solutions, such as carbon trading, dominate the debate.

This combination of market-based mechanisms to climate is often referred to as a 'new carbon economy' (Boyd et al., 2012). Lane & Stephan (2014) criticize the reliance on the mechanisms of market because in such approach "emissions trading and offsetting are taken for granted as 'naturally' the optimal tools for regulating GHG emissions given the 'laws of the social world' that prescribe these as efficient and effective and proscribe other non-market forms of governance" (p. 5). This perspective emphasizes that carbon trading favors climate complacency as the adoption of emission trading and carbon offsetting

policies can be understood as an attempt by the 'climate-accommodating carboniferous block' to stabilize its position (Matt, Okereke, 2014). Even the principles of sustainable development have a hidden economic growth agenda as they are "embedded in a neo-liberal market rationality and politically promoted under the eco-modernity label" which creates a bias toward economic development (Clémençon, 2021, p.3). Howson (2021) supports this frame as he sees the 'green economy logic' as "the illusion that a system of global perpetual economic growth can be decoupled from environmental decline" (p.1). He argues that "growth is a hegemonic ideology that obscures more ecologically friendly and egalitarian alternatives" (Howson, 2021, p.1). Instead, addressing the climate crisis requires building a mass movement that can challenge the power of the fossil fuel industry and the capitalist system (2022).

Ultimately, green capitalism favors climate complacency and leads to commodification of nature favoring creative entrepreneurial ideas over proactive climate policy: "The seductive popularity of incentive based approaches to environmental governance has emerged in opposition to rigid, antagonistic and hierarchical environmental policy in favour of creative tailor-made solutions centred on flexibility, faith in the self-interest of the rational actor, and magnifying the entrepreneurial spirit of land-users' optimizing behaviour" (Kolinjivadi et al., 2019, p. 4). Such behavior is often termed as commodity fetishism and 'a neoliberal performative' where "the 'market' becomes the ultimate performative space through which human-nature relations are (re)constructed, irrespective of failures in the performative act to ideally materialize markets in practice" (p. 5).

The critiques of green capitalism and the evident market failures in achieving sustainable development spurred the emergence of aspirational ideas centered around regenerative systems. It is crucial to acknowledge that relying solely on private market solutions cannot be the ultimate solution for addressing the pressing issue of climate change. What we truly need is a profound systemic shift in our approach. However, in the meantime, taking incremental steps towards decarbonization is a far more preferable course of action than inaction. It is essential to recognize that while private market solutions are not the best or final answer, they represent a significant step forward in the right direction since international regulatory approaches to climate change have, up to this point, proven to be rather ineffective. As Clemençon (2023) points out, "the momentum has shifted" away from international negotiation towards national policies and market-driven solutions. This shift highlights the practical reality that the private sector and carbon markets, while not without their imperfections, are some of the most practical and accessible options for funding environmental decarbonization at the moment. This is a crucial step as we continue to work towards the aspirational goals of regenerative systems in the future.

The chapter that follows discuss the mechanics of carbon markets as mechanisms of climate finance and some of the challenges that resulted in the emergence of the Regenerative Finance (ReFi) community. The analysis, based on the accounts by the interview profiles, explores the ways in which ReFi is envisioned as the technological solution to these market inefficiencies and as a mindset beyond the market.

Chapter 1 – Climate Finance Meets Regenerative Finance

The climate emergency is the ultimate challenge of our time. On March 19th, IPCC released a new report as a 'final warning' of the adverse effects of climate change from extreme weather events to "related losses and damages to nature and people" (IPCC, 2023) and August 2023 was officially earth's hottest on record, according to the National Oceanic and Atmospheric Administration[5].

To meet the IPCC's target of limiting global temperature rise to 1.5 degrees Celsius, there is a critical need for substantial financial investment in decarbonization projects (as outlined by the World Economic Forum, 2023). However, securing the necessary financing for climate action is a complex endeavor. Within the context of neoliberal, market-driven approaches to addressing climate change (as explained in the conceptual framework), the carbon market landscape is marked by significant challenges and fragmentation. Namely, the carbon market suffers from market failures, double counting, and criticisms that it is "opaque, flawed, and ineffective" (Miltenberger et al. 2021).

This chapter provides an overview of the basics of carbon markets as mechanisms for financing climate initiatives. It first examines existing climate finance, organized primarily around carbon markets, and then analyzes the ReFi critique and proposals. In doing so, it looks for tensions, contradictions, and differences within ReFi. It also analyzes the specific

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[5] https://www.noaa.gov/news/world-just-sweltered-through-its-hottest-august-on-record - :~:text=For the fifth-consecutive month,month in NOAA%27s climate record

frames the interviewees used in defining the term 'ReFi'. The goal of this chapter is to

understand how the ReFi community conceives of itself through these frames as a response

to the problems of the existing carbon markets as well as aspires to move beyond market

centrism and offer a greater vision for a regenerative economy. Whether their aspirations

remain just that – hopes and dreams – or translate into action and new practices remains to be

seen.

Carbon markets as the foundation of climate finance

Carbon markets receive a lot of criticism, nevertheless, they are central to climate

finance. In the absence of public funding for reducing carbon emissions, following the

neoliberal logic, markets were imposed by the US government as a mechanism for diverting

funding to emission reduction projects. The lack of decisive political action on

decarbonization opened up a business opportunity for private approaches to fill the vacuum

through emerging technology. In a context where market-based solutions to the climate crisis

dominate, carbon markets play a crucial role in global efforts to unlock new climate

financing streams and achieve net zero pledges by providing a framework for the trade of

carbon credits and emissions allowances. In carbon markets, organizations and individuals

can purchase carbon credits, often referred to as carbon offsets, to compensate for their own

greenhouse gas emissions. These offsets represent a reduction in emissions or an equivalent

removal of carbon dioxide from the atmosphere. Carbon dioxide removal (CDR) activities

can generate carbon credits that are tradable on the carbon market. Carbon markets are

instrumental in channeling financial resources towards projects and initiatives that reduce

greenhouse gas emissions, thereby contributing to the mitigation of climate change impacts. For example, carbon markets provide a way for companies to offset their emissions and support decarbonization projects on the ground, such as reforestation or conservation initiatives. Understanding the role of carbon markets (compliance and voluntary) is essential in the context of climate financing mechanisms.

The history of carbon markets is fairly new. Emissions trading as a climate mitigation and financing mechanism emerged in the early 2000s with the establishment of the Clean Development Mechanism (CDM) as part of the Kyoto Protocol, Article 12 (UNFCCC[6]). Emissions trading scheme is "the idea that countries would be able to purchase emissions rights from other countries or get offset credits by financing projects in developing countries that reduce emissions" (Clemeçon 2016, p. 4). CDM was seen as "the ultimate neo-liberal market concession to the climate process" largely due to the pressure by the United States' ideology that pushed for market solutions over policy prescriptions (p. 4). Consequently, the emission trading, also known as the cap-and-trade system, emerged as the dominant framework for achieving emissions reduction targets. Such a system creates allowances for how much greenhouse gases can be emitted by a country. The EU Emissions Trading System (ETS), established in 2005, stands as the largest greenhouse gas emissions trading scheme globally.

However, carbon trading is not limited to the regulated cap-and-trade systems as there are two major kinds of carbon markets – compliance and voluntary. The EU ETS is an example of a compliance carbon market, or a market that is sanctioned by government policy. By contrast, Voluntary Carbon Markets (VCM) allows companies and individuals to

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[6] https://unfccc.int/process-and-meetings/the-kyoto-protocol/mechanisms-under-the-kyoto-protocol/the-clean-development-mechanism#

invest in decarbonization projects by buying carbon credits without an explicit government mandate. Carbon credits created in VCM can be useful for accelerating climate action because they "direct private financing to climate projects that would not otherwise get off the ground, and they support investment into innovation required to lower the cost of emerging climate technologies" (McKinsey Sustainability, 2021). Thus, VCM is the primary corporate mechanism for achieving corporate net zero emission pledges and channeling funding towards decarbonization projects thereby serving as a climate finance mechanism.

The mechanics of carbon markets are quite complex as they attempt to quantify something so abstract as carbon into a rigid set of numbers to make it tradable. Measurement, reporting and verification (MRV) are absolutely necessary for the proper functioning of carbon markets. MRV is arguably one of the most important aspects of the emission trading mechanism and is also the cause for most criticism as the technicalities of quantifying ecological benefit into tradable numbers requires robust technological and scientific approaches. MRV is essentially a process of controlling the actual removal of carbon out of the atmosphere and is the basis for issuing a carbon credit. Because there is a myriad of ways to decarbonize (reforestation, regenerative agriculture, land conservation and more), there are many ways to measure the carbon outcomes of these diverse processes. To make these measurements robust, carbon registries (e.g. Verra and Gold Standard) emerged as the bodies that set rigorous standards for MRVs. They act as guarantors of MRV mechanisms to create trust in the associated tradable offsets.

However, this VCM system has faced a lot of criticism as carbon registries have been accused of acting as gatekeepers to carbon markets and causing reporting bottlenecks, bureaucracy, and delays. Moreover, their MRV approaches, and integrity recently came

under increased scrutiny as more investigations came to question the robustness of existing MRV mechanisms.[7] Due to the lack of transparency and carbon market fragmentation, the carbon market system is accused of creating 'zombie credits' and is referred to as 'zombie neoliberalism' as increasingly there have been doubts about whether there is actual carbon removal on the ground and not just on paper. Zombie credits create an illusion of a climate positive activity in the absence of actual carbon removal. The proliferation of such credits is dangerous as it leads to greenwashing.

Zombie credits are an example of carbon abstraction: "The tonne of carbon is first invented and abstracted, secondly it is monetised into something sellable, and thirdly it is financialised, transformed into a financial standardised product" (Descheneau, 2012, p. 604). Such abstraction highlights "the burgeoning social meaning of carbon as money" (p. 617) which makes VCM a profit-making business and thus raises questions about the true incentives behind them. Huff (2021) follows "a neo-Polanyian" theoretical approach and uses abstraction of carbon framework to argue that "a central fiction at the heart of the VCM – that one ton of CO2e – is always considered (1) commensurate, or equivalent and (2) fungible, or substitutable, with another no matter how or where in the world it is sequestered or emitted" (p. 3). Therefore, the process of abstraction creates the illusion that carbon offsets are always commensurable and fungible. This fiction is maintained "through techniques, devices, policy instruments and accounting and management tools" (Huff, 2021, p.3). The carbon economy also creates a moral illusion. Paterson and Stripple (2014) use the concept of 'virtuous carbon' as a framework for carbon governmentality. They combine the virtuality (abstraction) and virtue of carbon (the technological and the ethical) in the construction of

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[7] https://www.theguardian.com/environment/2023/jan/18/revealed-forest-carbon-offsets-biggest-provider-worthless-verra-aoe

carbon markets. They argue that this moral quality of carbon is used to reduce public resistance: "The carbon economy thus becomes 'the right thing', a divine being endowed with natural virtue that limits the space for critical engagement" (Paterson and Stripple, 2014).

Evidently, the framing of carbon markets as virtuous has been successful as, despite criticisms, VCM, is predicted to grow: "overall, the market for carbon credits could be worth upward of $50 billion in 2030" (McKinsey, 2021). The role of technology in carbon markets is also expected to increase as VCM increasingly adopts emerging digital technologies like blockchain, Internet of things (IoT) and machine learning (Miltenberger et al., 2021). The former gave rise to the Regenerative Finance (ReFi) community who see Web3 tooling as critical in addressing carbon market inefficiencies and broader systemic issues in the economy as a whole.

The problem

Beyond ideological criticism of markets in climate change mitigation policies, carbon markets suffer from a number of technical challenges as they are "oversupplied and malfunctioning" (Wettestad, 2014). The ReFi community is driven by people who identify with a mission to address the significant challenge of financing climate change policies. Because these focus on solving carbon market inefficiencies, ReFi also focuses on how to improve carbon markets. In pursuit of the overarching goal – financing climate change policies –, the people involved in the ReFi industry identify a multitude of interconnected sub-issues, many of which are intricately tied to the functioning of carbon markets. When

discussing carbon markets as they exist today (and described above), that is, without the use of Web3 technology, they refer to them as 'conventional', 'traditional' or 'legacy' markets and position ReFi as a way to improve them. It is these practical aspects of carbon markets that the ReFi community is critical of, rather than the theoretical concerns discussed above. Their criticisms of carbon markets can be grouped into three categories, each described below.

Opaque and fragmented design

One of the central criticisms of the Voluntary Carbon Market (VCM) pertains to its lack of transparency, primarily because it lacks a standardized pricing benchmark. Interviewees underscored the necessity of establishing a value for carbon and carbon reductions, which would otherwise not exist without the presence of standards. This standardization in the market, characterized by environmental integrity, plays a crucial role in building trust regarding emission reductions, as emphasized by the Climate Scientist profile of interviewees. The theory echoes this critique as Schletz et al. argue that the fragmentation observed in global carbon pricing systems can be interpreted as a market failure, as it results in an inefficient distribution of goods and services (2023). The pricing mechanism within VCM also suffers from a lack of transparency, with prices being determined behind closed doors (Betz et al. 2022). This opacity has generated a common sentiment of exclusion among participants in the carbon market due to the secretive nature of deals, as pointed out by respondents in all interview profiles.

Many respondents expressed serious concerns about the need for transparency and efficiency, citing a lack of trust due to the existence of "a lot of low-quality projects out there" and risky assets "in an illiquid market with no price signals," according to the Traditional Business profile of interviewees. The absence of transparency also complicates the task of accurately assessing the value of ecological health within the market. This is where the features of Web3, particularly its potential to provide information parity and inclusive governance for stakeholders, can prove to be particularly beneficial. Respondents in the Climate Scientist profile emphasized the importance of having consistent data on ecological health, carbon cycles, water cycles, and biodiversity cycles, which can serve as a robust foundation for funding regeneration and conservation work. The interviews underscored the critical need for high-quality data to avoid another financial crisis and green washing. For example, respondents from the Early Entrepreneur profiles warned: "If we don't have a foundation of scientific quality climate data that's timely, tamper-proof, verified, and made accessible in user-friendly formats, what are the chances that we recreate a 2008 situation in ReFi or in the larger greening of the financial system, this time with just a big green ribbon around it?" They argue that robust scientific data is necessary for proper functioning of carbon markets and eliminating fragmentation and opaqueness.

Moreover, members of the ReFi community across all profiles cite the absence of contract standardization and see the current state of environmental services as "backwards" and "outdated," resulting in significant coordination challenges. For example, current MRV approaches suffer from significant bottlenecks and often come with issues of accessibility and they require trained physical auditors. Transactions within the VCM are often manual and time-consuming, highlighting the urgent need for automation and a reduction in reliance

on intermediaries. As a respondent in the Climate Science profiles noted, "currently there are intermediaries between project developers and buyers who essentially take massive margins. And that money doesn't go back down to the project developers". They stressed that the funds "should be going to the project developers and the communities that are involved."

The majority of respondents identify transparency, trust, and the standardization of ecological value assessment as central concerns within the carbon market, particularly the Voluntary Carbon Market (VCM). They see the adoption of Web3 technologies and decentralized institutions under the ReFi umbrella as a promising approach to addressing these issues and improving the efficiency and transparency of carbon markets. Overall, the ReFi community echoes criticisms regarding the abstraction at the heart of carbon markets and, as we will see in the following sections, propose blockchain technology as a possible solution to this abstraction.

Limited funding and scale

An overarching trend that emerged from the interviews highlighted a consistent challenge: a lack of funding for decarbonization projects, alongside centralized control over resources. Limited liquidity in the VCM makes it harder to meet the pressing need for scalability. Respondents in the Traditional Business profile emphasized the necessity for VCM to expand significantly, stating that, "In order to deliver the climate impact, which it can deliver, it needs to scale by orders of magnitude in a very short period of time." These respondents commonly expressed the belief that the carbon market is poised for massive growth. However, the VCM faces a serious financing hurdle, primarily due to the high

development costs associated with decarbonization projects: "project developers right now struggle to price their carbon credits, and they also struggle with their costs of project development", according to a respondent in the Climate Science profile. They also note that rigorous MRV systems are costly. These projects often entail a lengthy wait for returns on investment, making them an unattractive prospect from a profitability standpoint. Therefore, the lack of sufficient funding and the small size of VCM present a major challenge for emission reduction.

Structural inequality

Some respondents delved into structural issues of the global financial system, highlighting the "tremendous disconnection" that exists between climate stewards and average consumers. ReFi community members from the Global South were particularly prone to sharing this view. They drew attention to the inequities within the global financial system, where the value of money varies significantly depending on one's geographical location and economic status. They offer the example of small farmers in Mexico who pay more in interest than farmers in Spain despite similar risk profiles because farmers in Mexico do not have enough collateral (financial capital) to qualify for loans. The members of the ReFi community in the Global South interview profile consistently leaned on the ReFi movement to address what they regarded as "the biggest dysfunction of the current financial system," that is, the persistent poverty faced by small farmers who produce food. The interviewees see farmers' poverty as a symptom of the current financial system, which favors populations with more financial capital and access to modern financial services and banking

than farmers. They point also to the digital divide that leaves many agricultural workers in the Global South without access to WiFi and credit score systems. An interviewee from the Climate Sc emphasized the issue of global injustice and the historically unequal design of the financial system in which among about 2 billion small farmers that exist in the world "almost all of them, which is a shocking statistic, a vast, vast majority of them upwards of 80 to 90% live at or below the poverty level in the country in which they live." Ultimately, ReFi members in the Global South profile underscore that existing carbon markets suffer from the uneven distribution of wealth between the Global South and Global North.

In sum, the interviewees see the implementation of Web3 along the ideals of regenerative economics as the way to mitigate all the problems identified above – fragmentation, lack of transparency and reliable data, which lead to lack the financial resources to support mass decarbonization projects as well as clear pricing signals. In order to understand the practical solutions that the ReFi community is pursuing, we need to examine their conceptual roots.

ReFi as the Solution

Foundations of regenerative economics

The emerging Regenerative Finance community sees blockchain as a solution to these climate finance problems. In their view, besides technical benefits, blockchain offers an ideological value proposition. ReFi's advocates claim that regenerative finance can bring regenerative worldview to life. This perspective gains traction as an increasing number of

people in the Web3 industry rally around a shared vision aimed at creating structural changes within the economy, creating a community or a network of organizations called ReFi. The ReFi community takes inspiration from regenerative economics, a theory that argues that economic systems should aim to restore and enhance the well-being of both people and the planet by adopting more community-centered and circular economy approaches. Unlike other attempts to introduce environmentalism through Environmental Social Governance (ESG)[8] investing initiatives, regeneration advocates argue that sustainability is not enough as it simply maintains the status quo. Regeneration is a better framework, in their view, because it strives to revitalize the ecosystem, not merely sustain it. Building on regenerative economics, the ReFi community shares an ideological commitment to structural change in the economy. While ReFi is a novel community, the ideas of regenerative economics have been around for some time and have become more and more popular among ReFi advocates, especially the perspectives by Paul Hawken, Charles Eisenstein, Kate Raworth, John Fullerton and Carol Sanford.

According to Paul Hawken, an environmentalist and regeneration advocate, regeneration "means putting life at the center of every action and decision" (2021). This perspective broadens the perception of the climate crisis, to redefine it as "not a science problem, [but] a human problem." As such, "The ultimate power to change the world does not reside in technologies. It relies on reverence, respect, and compassion—for ourselves, for all people, and for all life" (Hawken 2021). Hawken believes that we need to move away from a mindset of fear and despair and embrace a positive, solutions-oriented approach to

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https://www.unepfi.org/fileadmin/events/2004/stocks/who_cares_wins_global_compact_2004.pdf

climate action (2021). Charles Eisenstein, another prominent regenerative economist, goes on to state that climate change is a symptom of "a larger crisis in our relationship with the natural world and with each other" (2018). He argues against 'the mentality of instrumentalism', 'climate fundamentalism' and 'carbon reductionism' as "by focusing on a measurable quantity, we devalue that which we cannot measure or choose not to measure" (Eisenstein, 2018). Eisenstein ultimately believes that the climate crisis "requires a fundamental shift in our worldview, from one based on separation and control to one based on interdependence and cooperation" (2018).

The ideas of regeneration and cooperation are closely linked with the concept of circular or shared economics. Circular economics, or what Raworth calls 'Doughnut economics' is a new economic model that seeks to balance the needs of people and the planet, and promote equity, sustainability, and well-being: "The Doughnut: a twenty-first-century compass. Between its social foundation of human well-being and ecological ceiling of planetary pressure lies the safe and just space for humanity" (Raworth, 2017, p. 49). Overall, circular and doughnut economics represent a departure from traditional economic models that prioritize short-term profits and resource exploitation. These ideas are sometimes referred to together as the New Economy which also includes conscious and regenerative capitalism.

John Fullerton and Carol Sanford are two prominent business researchers and impact investors, referenced by the ReFi proponents, who promote these New Economy ideas. In his paper on regenerative capitalism published by the Capital Institute, Fullerton discusses "ways to reimagine capitalism so that it works for all levels of society, as well as for the planet" (p. 5, 2015). He advocates for a regenerative form of capitalism that is aimed to produce "lasting

social and economic vitality for global civilization as a whole." Fullerton argues that the concept of regenerative capitalism can bridge today's world of extractive capitalism and the emerging new regenerative world by implementing "universal principles and patterns of systemic health and development" as found in other living systems (p. 7). Similarly, Sanford's interpretation of regeneration seeks to create economic systems that are in harmony with the natural world, promote social well-being, and ensure the long-term prosperity of both human societies and the planet. She develops paradigms that guide how we work as a human species, these paradigms "impose lenses between our eyes and the world" (p. 15). Sanford (2019) lists the four modern paradigms or lenses: Extract Value (accepting hierarchy and assume the ownership of natural resources), Arrest Disorder (limits of scientific method tends to simplify the problem, isolate it), Do Good (holding moral boundaries) and Evolve Capacity (continual regeneration of communities and ecosystems). Sanford provides a framework for understanding regeneration in which "Evolve Capacity and the living systems worldview are the basis of regenerative practice" (p. 14). She advocates for seeing life not as fixed or predetermined but as a living system. In this view regeneration is understood as "the innate ability of a living system to bring itself to a new level of organization and expression after it has been destabilized or disrupted" (Sanford, 2019, p. 24). Essentially, regeneration is described as a renewal of the potential that is at the core of a living system.

To sum up, the positionality of these regeneration thinkers focuses on the relationship between business and the living systems. They advocate for environmentally conscious entrepreneurialism which is the central motivation behind the ReFi community. This

motivation seems to fall along the lines of Goldstein's critique of "green spirit of capitalism" discussed in the conceptual framework section.

Defining Regenerative Finance

Driven by the regenerative ideas discussed above, the Regenerative Finance community has been growing in its size and influence. However, the timeline of ReFi development is inseparable from the rise of the blockchain technology that began with the inception of the original cryptocurrency, Bitcoin, in 2008. This rise of interest in cryptocurrencies coincided with a growing public distrust in traditional financial institutions, catalyzed by the aftermath of the 2008 global financial crisis. That said, the application of blockchain technology to climate-related projects did not gain significant traction until nearly a decade later. The origins of the term 'ReFi' (Regenerative Finance) are somewhat debated within the expert community. In general, early references to ReFi can be traced back to around 2016-2017 when discussions revolved around the notion of placing public utilities on blockchain, exemplified by the EnergyWeb initiative. Gregory Landua (the founder of Regen Network) is believed to have coined the term and used it to connect concepts of regenerative economics with Web3 tools.

More commonly, the formal inception of ReFi as a conceptual framework is attributed to the emergence of early Web3 and climate-focused startups like Regen Network and Nori in 2017. The movement gained further momentum with the introduction of Toucan Protocol and Klima DAO in 2021, aligning blockchain technology with carbon certification and finance. Nevertheless, it is crucial to recognize that the ReFi sector remains in its nascent

stages, far from reaching maturity. This early phase underscores the significance of studying

how pioneering individuals and organizations are shaping and defining the Regenerative

Finance community.

The name of the community is inspired by the ideals of regenerative economics.

However, not all ReFi advocates center regenerative practices. And many have different

approaches on how to make sense of this emerging sector. In light of the ReFi community's

relative newness, its definition remains subject to multiple interpretations. Advocates of

regeneration aspire to breathe new life into natural resources and ecosystems, ensuring their

sustained well-being and vitality. What sets ReFi apart is its techno-financial dimension—the

intersection of decentralized technologies of Web3 and regenerative economics. This section

hones in on specific frames the interviewees used in defining the term 'ReFi'.

The following sections discuss how the members of ReFi describe their community

along two distinct frames. The first one is a conceptual one that views the community as a

cultural movement building towards more regenerative systems. The second is a practical

one that sees ReFi as an extension of cleantech and impact investing. Such conceptualization

of ReFi focuses on the specific ways Web3 promises to solve some of the practical issues

with the carbon market, such as providing technical infrastructure for more transparent and

scalable markets.

Conceptual definitions of ReFi

A number of interviewees in the Climate Science profile argue that ReFi should

embody more than just technology but also the ambitious goals of regenerative economy.

They emphasize the need for a more narrow and nuanced rather than blanket understanding of the term: "So regenerative finance are financial instruments and systems that increase the evolutionary capability and capacity of life on Earth... it's important to ask, are those activities actually increasing the capacity and capability for the systems to evolve and be healthy and resilient… The carbon market per se is not regenerative finance." They underscore that it is wrong to associate ReFi solely with carbon credits and markets. In their view, ReFi represents a new regenerative community with a global network of members.

Notably, only a few respondents (all of whom are in the Climate Science profile) referenced the original ideals of regenerative economics returning to the etymological meaning of regeneration – "regenerative finance means that we generate more value than the one we extract". They envision more ambitious goals of the agency to redesign the economic system: "humans created our initial financial system and financial structure. So, who is to say that we can't transition or really even recreate a financial structure that is based off of the planet and that works for the planet and that regenerates the planet rather than extracting from the planet." Fixing the existing system and changing the narrative is a common thread in this interpretation of ReFi: "it's an opportunity to write the wrongs or make some course corrections on our global finance, global economic ship that we know accounts our environment counts, our ecosystem as externalities." ReFi in this view is a mechanism for valuing the earth more than profits, it is "an opportunity to recenter our natural world."

An even more ambitious conceptual interpretation of ReFi is that of a cultural community with activist goals in mind. For example, a member of the ReFi community in a digital forum defines the ReFi as a cultural movement that "extends beyond changing financial infrastructure. It aims to transform social narratives and politics, fostering a better

world rooted in ethics, consciousness, and distributed technology." Respondents in the Climate Science profile noted the lack of a homogeneous understanding of the terms and argued that it "just comes down to how we fund our shared priorities" evoking the cultural questions of what constitutes these common priorities. Moreover, respondents in the Traditional Business profile referenced technological subcultures such as Solarpunk which is an emerging cultural movement that envisions the future of environmentally friendly technologies.

Some interviewees in the Climate Science profile compare ReFi with a grassroots movement stating: "it feels like the digital evolution of grassroots activism." They emphasize community involvement and governance as the key defining characteristic of ReFi. The community is also viewed as an empowerment tool: "I see this new digital adoption for decentralized impact that's enabling new vehicles of empowerment to take place." Some believe there is a strong activist component to the community: "Broadly speaking, it's scaling impact through decentralization. It's putting power in the hands of many to drive social and environmental impact to the areas that all parties involved want to see that impact focused." Moreover, in their view, this activist energy is what defines the character of the ReFi community: "there's such an energy and dynamic, collaborative spirit among this community. And that's why we have partnered with so many other companies. And I think that that's the spirit that infuses the refi movement."

All in all, the ReFi term points to a certain set of beliefs which makes it a cultural phenomenon "ReFi is basically a mindset more than the name", according to an individual in the Climate Science profile.

Practical definitions of ReFi

Unlike ideological and cultural conceptualizations above, many ReFi advocates view the ReFi term strictly in a technological sense. On a practical level the definitions of ReFi boil down to climate tech, financial incentives, business model and digital infrastructure. According to this view, as an immutable data ledger, blockchain could improve tracking mechanisms of carbon emissions and offsets to solve for fragmentation and lack of trust in the VCM and ESG reporting. For them, the technology's self-executing smart contracts for funding mechanisms can be easily tracked and thus could reduce transaction costs and send more money to project developers by removing secondary brokers.

ReFi is seen as a new iteration of cleantech and is used as "a blanket term for describing how Web3 can support climate goals and climate activities", or simply put ReFi is "the intersection of blockchain and climate", according to the respondents in the Traditional Business profile. They believe that ReFi is part of cleantech entrepreneurialism and equate it with 'impact finance' without any references to regenerative ideas. In this interpretation, ReFi is seen as an alternative term for climate tech broadly which includes a combination of other emerging technologies beyond blockchain (such as AI, metaverse, IoT): "I don't think it is standalone, and is the solution to everything. I think that it works in tandem with other technologies, other solutions that we create, and accelerates and scales them because it's essentially decentralizing access and making it easier to build out these solutions." This view presents a point of disagreement within the ReFi community because it is a departure from the ideological ideals of regeneration discussed above.

One of the main promises of ReFi as climate tech is its technological capabilities to introduce digital and decentralized measuring, reporting and verification systems (dMRVs).

In essence, the technology could serve as the foundational infrastructure for the digitization

of MRV solutions that integrate blockchain technology with a mix of other cutting-edge tools

such as smart meters, sensors, drone imagery, data science, and citizen science. Within the

ReFi community, there is a concerted effort to optimize 'citizen science' or human data

collection for MRV. This is achieved through the provision of accountability tools, including

mobile software that enables real-time reporting of deforestation data via a network of

validators and a consensus mechanism (e.g. Open Forest Protocol). The open and verifiable

nature of blockchain technology, in theory, could allow for the encoding of these oracles into

tokenized (digitized) carbon credits. This dynamic monitoring process can provide real-time

visibility into the actual effectiveness of ongoing carbon sequestration efforts. This

technologically sophisticated approach aims to streamline and enhance the MRV process.

Besides dMRV, proponents of ReFi as climate tech emphasize the features of scalability and

automation via smart contracts.

More narrowly, the question of value and incentives is another common thread. Some

respondents, especially in the Early Entrepreneur profile, focus on incentives and

monetization of nature and see ReFi's value in "the ability to program incentives and

behavior for the better" and "the ability also to empower local communities and enable them

to monetize stewardship of their natural capital and ecological assets." According to this

logic, ReFi offers new technological approaches to valuing natural resources: "challenges

that we face today is how we determine what value means, [for example], what is value

creation? And so, for me, regenerative finance is about …how do we redefine [value] in a

way that is supportive of the world rather than destructive?" In this interpretation of ReFi as a

financial incentive mechanism, it boils down to the question: "how do we bring value that supports a healthy, fair planet into our economy?"

Some ReFi community members in the Climate Science profile see ReFi as a system for creating new incentives for "greater climate action" by providing "finance back to project developers in a way that isn't possible in the normal market because smart contracts can allow a share of revenue to go back to a project developers and saying we can create incentive mechanisms and pools to increase liquidity to raise the price of carbon and therefore to provide kind of a stronger signal into the market." This framing attempts to solve accounting and incentives issues associated with CDR.

Another practical conceptualization of ReFi is an entrepreneurial one. Some respondents in the Traditional Business profile see ReFi as a new kind of a sustainable business model that combines profitability with environmentally positive impact. This ReFi framing focuses on a regenerative business model from the perspective of organizational science. According to this logic, ReFi as a business builds a more creative workflow and removes hierarchical structures in management.

Lastly, a few interviewees from the Business and Early Entrepreneur profiles have a technological imaginary of ReFi as a network of interoperable and composable open-source protocols. In other words, ReFi for them is about creating a common digital infrastructure that removes middlemen and allows gamification of carbon offsetting in an attempt to connect entertainment and climate action. An interviewee from the Climate Science profile emphasized that ReFi's unique value proposition is the ability to code tokenized carbon into the digital infrastructure of blockchain: "We are completely focused on the infrastructure. We're focused on building those green Lego blocks." These "blocks" are essentially different

applications that "a lot of tools that can be put together to amplify each other" providing interoperability, as per Traditional Business profile.

All in all, people behind ReFi have varying perspectives on what constitutes this community ranging from more ambitious ideas of redesigning the economy to a more technological way to improve coordination and incentives in climate finance. These differences of opinion are important because they point to internal disagreements within the ReFi community on its own conceptualization. The varying approaches to defining ReFi are summarized in the table below (see Figure 1).

Figure 1. Conceptual and practical approaches to define 'ReFi'.

ReFi definitions	
Conceptual *(focus on ideology)*	*Practical* *(focus on technology)*
- Regenerative economic system - Cultural community - Digital activist movement	- New iteration of climate tech - Financial incentive mechanism - Regenerative business model - Decentralized digital green infrastructure

Ultimately, the main objective of ReFi is to enhance the governance of common pool resources across three pivotal domains: a) improve transparency through dMRV accounting (better climate data management); b) finance through tokenization and pooling of assets

(increase money flow); c) empower through decentralized governance and community building (give local communities the power). However, these narratives overlook a wide range of factors which lead to inevitable tensions.

The tensions

This section details the implicit tensions within the ReFi community and offers an assessment of what perspectives were left out of the conversation. Specifically, this research finds that the ReFi community relies on the assumptions of market primacy which leads to investors dictating and imposing their interests resulting in prioritization of finance over regeneration.

As highlighted in the section above, the majority of interviewees adopted market assumptions in their framing of ReFi. Notably one respondent from the Traditional Business profile summed up this vision in the statement: "And I want to stress on the market-based aspect because I truly believe that market is a friend to environmental efforts." Such prioritization of market in solving climate finance is evident in respondents' view of ReFi as a profitable model: "I think a big piece that needs to be addressed is this disparity in mentality where nature-based economics does not mean not profitable economics." The conflation of profit-seeking and regeneration aspiration creates a major tension in the way the ReFi community is evolving.

Moreover, regardless of how progressive the ReFi community attempts to be, members of the Climate Science profile stress that it follows the same crypto hype cycles and questions of capital accumulation, speculation and greed as other financial applications of

Web3: "the biggest challenges are the internet hype cycle and the crypto hype cycle...the risk is how much of a real impact it's going to have transforming people's lives and the way that humans interact with the planet versus opportunity for capital to accumulate more capital to itself." They also point out common expectations of growth of the industry, as some in the Business profile are anticipating the next 'bull run' in ReFi. Such perception of ReFi resembles green capitalism logic more than the regenerative one.

Market aspirations are also visible in how decision makers in the ReFi community navigate investor relations. Some respondents from the Climate Science profile note that "it's oftentimes not clear where people's incentives are" when it comes to raising capital. While ReFi positions itself as a public and collaborative community, some people choose to make decisions behind closed doors, do not use open source code and rather choose proprietary corporate approaches to secure investment capital which defeats the ethos of Web3. Individuals in the Climate Science profile warn that "investors are the core of the problem" as they seek quick return on investment which tends to favor projects with more monetary than ecological payouts. Instead, proponents of ReFi call for the community to be more accountable "we just really have to set a high bar of integrity."

It is clear from the interviews that the major tension in the ReFi community is the issue of ideology and framing. In conversations with the ReFi community members, two major competing approaches emerge. The first one views ReFi as solely a technological and financial tool for improving carbon markets. The second view embodies a more ambitious mindset envisioning deeper structural transformation emerging from regenerative economics. The clash of framing: 'ReFi in opposition to the traditional climate finance' & 'ReFi as a mindset' presents a major challenge for the future of this community. While there is a lack of

consensus on whether ReFi is more of a progressive ideal or simply a concrete set of tools to improve carbon markets, the interviews uncovered a trend of Climate Scientist and Global South profiles leaning towards restricting the strictly technological and market-oriented conceptions of ReFi inviting other community alternatives.

In conclusion, ReFi is both an idea for future change, and a tool (or a series of tools) for increasing market efficiency. In this chapter I identified these contradictions through an analysis of how the members of this community describe this field. Conceptually, ReFi represents a cultural community with a network of members united by the ideals of regeneration and the promise of Web3 technologies. While some ReFi advocates are driven by a bigger vision of building a mass movement that can challenge the power of the fossil fuel industry and the capitalist system (Howson, de Vries, 2022), practically ReFi serves as an efficiency tool for carbon market solutions. This tension is evident in how there is a split in how Traditional Business and Climate Science and Global South profiles talk about the future for ReFi. The former see it as a market instrument. The latter – a vision for a system change. So far, the regenerative vision remains an idea. Whether this idea turns into a material implementation depends on how the ReFi community gets institutionalized. The process of institutionalization of this emerging community is discussed in the next chapter.

Chapter 2 – Institutionalization of Regenerative Finance

To solve inefficiencies of carbon markets, the ReFi community – described in Chapter 1 – advocates for creating high-integrity, digital and decentralized institutions that can ensure transparency and integrity in a digital context. They also believe that the conceptual framework of ReFi should be incorporated in the existing institutional framework on climate financing, that is, the framework of carbon markets and carbon registries. In other words, the ReFi community aspires for some kind of institutionalization. This chapter examines what institutionalization for this community means and what it might look like, as well as how much progress, if any, the ReFi community has made towards becoming a socially stable and legitimate structure. While Chapter 1 showed ReFi operating as a cultural community and technological network, Chapter 2 asks whether ReFi has attained a sufficient level of regulative, normative and cultural cohesion to be considered a new institution. The chapter starts with a discussion of institutional theory that introduces frameworks for analyzing the creation and diffusion of institutions and informs a framework for assessing 'what counts' as institutionalized. The second half of the chapter then discusses empirical examples and concludes with challenges facing the ReFi community's institutionalization.

Institutional theory

This section develops a theoretical framework to be used to analyze how ReFi gets institutionalized in practice. It draws on work by prominent institutional scholars,

organizational scientists, and sociologists to understand what makes social structures resilient and how they change over time and space. First, I discuss conceptual differences between organizations, institutions, communities, and networks. Then I discuss pillars of institutionalization and institutional carriers and agents. The theory analysis concludes with a discussion of institutionalization mechanisms and organizing visions as two major theoretical frameworks.

Institutions and organizations

Institutions and organizations, though conceptually different, both reflect the complex dynamics of social organization. They provide stability and order in society. Institutions, according to Richard Scott, "comprise regulative, normative, and cultural-cognitive elements that, together with associated activities and resources, provide stability and meaning to social life" (2013, p. 56). Rules, norms, cultural beliefs, power, and resources are crucial components of any institution. Institutions perform a number of important functions in society. They "exhibit stabilizing and meaning-making properties" (p. 57), as well as act as enabling and prohibiting mechanisms: "Institutions provide stimulus, guidelines, and resources for acting as well as prohibitions and constraints on action" (p. 58). Overall, institutions provide stability and meaning to social life. They play a crucial role for social theory as they serve as actors of social systems that allow us to analyze social behavior overall and how it can be changed. In a nutshell, institutions are "those types of social structures that involve more strongly held rules supported by stronger relations and more entrenched resources" (p. 93).

Organizations, on the other hand, are a more narrow type of social structure. Scott theorizes organizations as collectives of highly formalized structure pursuing explicit objectives and maintaining formal and informal relationships and communication channels among their members. Scott provides two distinct ways to explain the relationship between organizations and institutions. First, drawing on the work of Douglas North (1990), he discusses a game analogy in which institutions "provide the rules of the game, whereas organizations act as the players" (p. 182). Second, Scott emphasized that some theorists view organizations as institutionalized forms: "organizations are relatively distinct institutions that are either designed by or evolve out of the choices made by organizational agents" (p. 183). Therefore, organizations can be institutions in themselves, but not all institutions are organizations. Moreover, organizations and institutions operate at different scales as "many if not most organizations operate in complex institutional environments and confront fragmented and contending institutional pressures" (p. 182). Scott concludes that not all organizations get institutionalized in the same manner as "organizations vary in susceptibility to and, hence, degree of institutionalization" (p. 25). Organizations, as instrumental entities, are ultimately "a product of institutional processes—constitutive processes that define the capacities of collective actors, both generally and as specialized subtypes" (p. 104).

Virtual communities and networks

A group of organizations can constitute a network, as in the case of ReFi which is both a network and a community. Manuel Castells defines networks as "a set of interconnected nodes" (2001, p. 1). Networks have increasingly proliferated in economic and

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social domains as they "have extraordinary advantages as organizing tools because of their inherent flexibility and adaptability" (p. 1). Unlike organizations with "centrally defined goals" and "vertical chains of command", networks are decentralized and horizontal in nature (Castells, p. 2). Networks, as forms of organization, "rely more heavily on mutuality" (Scott, 2013, p. 147) and have a more democratic hierarchy. Increased prevalence of networks led scholars to hypothesize the existence of a 'network society' as a new economy that is based on the production and exchange of information and knowledge and is characterized by the rise of new forms of work, such as telecommuting and freelancing (Castells, 2001).

Networks are particularly common among digital communities and, at times, can give rise to new communities. Castells argues that online networks "when they stabilize in their practice, may build communities, virtual communities, different from physical communities, but not necessarily less intense or less effective in binding and mobilizing" (Castells, 2001, p. 131). Moreover, online networks can become forms of "specialized communities" – "forms of sociability constructed around specific interests" (p. 132). Chan argues that such digital networks "could produce new logics of inclusion offering the formerly excluded a means of participation and even competition within global networks" (Chan 2014, p. 13). Therefore, online communities can serve important functions of social mobilization and inclusion. These communities also provide "sociability, support, information, a sense of belonging, and social identity" to its members (Castells, 2001, p. 1).

ReFi can be considered an online community. The ReFi community consists of multiple organizations, individual agents and groups who participate in forms of sociability which form a network. Virtual communities and networks are considered new "patterns of sociability arising from the use of the Internet" (Castells, 2001, p. 117). However, networks

and communities are not necessarily institutions. Ultimately, the digital space allows for "extreme flexibility in the expression of sociability" but at the same time a "relatively low level of commitment may induce a certain fragility of the forms of social support" (Castells, 2001, p. 132). That is why networks and online communities do not always become a robust and cohesive social form. More specific conditions need to be met for networks and communities to get institutionalized, and these are discussed next.

Institutional pillars

In his foundational volume on institutions, Scott lays out the necessary conditions for a social form to become a new institution along three conceptual pillars. These three perspectives differ along several dimensions which are "interdependent and mutually reinforcing" (2013, p. 59). The first pillar supporting institutions is a regulative one since "institutions constrain and regularize behavior" (p. 59). Regulatory processes "involve the capacity to establish rules, [and] inspect others' conformity to them" with a goal "to influence future behavior" (p. 59). Scott lists the following 'empirical indicators' of the regulative pillar: "the expansion of constitutions, laws, codes, rules, directives, regulations, and formal structures of control" (p. 62). Second, Scott identifies the normative pillar which emphasizes "normative rules that introduce a prescriptive, evaluative, and obligatory dimension into social life" (p. 64). This pillar includes values and norms, focusing on appropriate behavior in a given situation. In the normative pillar "empirical indicators of the existence" include "accreditations and certifications by standard setting bodies such as professional associations" (p. 65). The third pillar is the cultural-cognitive one that centers

the following elements of institutions: "the shared conceptions that constitute the nature of social reality and create the frames through which meaning is made" (p. 67) This pillar emphasizes the "construction of a common frame-work of meanings" through discourse analysis and culture.

While the distinction of the three pillars is a useful analysis tool, in reality, to be an empirically observed institution, it is necessary to possess "varying combinations of elements" (p. 70). The pillars may be aligned yielding institutional strength or misaligned yielding conflict and possible institutional change. Therefore, an effective institution has to have elements of all three pillars. The process of becoming an institution is discussed next.

Institutionalization

The process of "creating and sustaining institutions" is called institutionalization (Scott, 2013, p. 144). Specifically, institutionalization refers to "the process through which components of formal structure become widely accepted, as both appropriate and necessary, and serve to legitimate organizations" (Tolbert and Zucker 1983, p. 25). Institutionalization is a crucial social element which establishes deep cultural understanding of a customary state of things in societies. Institutionalization gives legitimacy to organizations which can be evaluated along the three pillars described above. In the regulative pillar: "legitimate organizations are those established by and operating in accordance with relevant legal or quasi-legal requirements" (Scott, 2013, p. 74). In the normative pillar, legitimacy is assessed by morals and internalized 'normative controls' which serve as "the incentives for conformity" (p. 74). In the cultural-cognitive pillar, legitimacy "comes from conforming to a

common definition of the situation, frame of reference, or a recognizable role (for individuals) or structural template (for organizations)" (p. 74). Therefore, the process of institutionalization is critical for organizations to become legitimate and recognized.

Scott examines three mechanisms leading to institutionalization. First, he names institutionalization based on increasing returns which falls under the regulative pillar. According to this mechanism, institutional development is based on "the process of positive feedback" (p. 144). This mechanism highlights "the role of interests and incentives as a motivating force in social life" (p. 145). Second, Scott identifies institutionalization based on increasing commitments which aligns with the normative pillar because it "highlights the role of identity" (p. 147). Third, in the cultural-cognitive view, institutionalization is seen as "increasing objectification" which "favors ideas" (p. 149). Cultural institutionalization includes the component processes, such as innovation, habitualization, theorizing, objectification, and sedimentation. Overall, institutionalization takes place through regulative, normative, and cultural mechanisms.

Lastly, once a new institution is constructed its patterns can be diffused, or "spread over time and space" (p. 157). Institutional diffusion occurs when an institutionalized form is replicated elsewhere. Diffusion is an important aspect for institutional analysis because "the extent of diffusion of a set of rules or structural forms is often taken as an indicator of the growing strength of an institutional structure" (p. 157). Diffusion can also be analyzed in line with the three pillars. For the regulative processes, institutional diffusion is manifested in the power of states establishing 'hard laws'. For the normative processes, network ties and commitments, or 'soft laws' and informal ties are critical for institutional diffusion. Lastly, for the cultural-cognitive processes, diffusion happens through theorization and

objectification allowing actors to regard themselves as similar and provide causal explanations. Overall, institutional diffusion along the three pillars indicates increasing levels of institutionalization.

Institutional agents

Institutionalization can occur in two, complimentary ways: it can be "naturalistic" where institutions emerge habitually or "agent-based", that is, created by purposeful action with self-interest (Scott, 2013, p. 114). The latter relies on agency which "refers to an actor's ability to have some effect on the social world" (p. 94). Scott stresses the importance of considering power in institutional processes as it affects the amount of agency, therefore institutional agents, individual and collective, have a more proactive role and are necessary for creating institutions. Scott identifies major categories of institutional agents, such as nation-states, corporations and other business organizations, professions, associations, social movements and marginal players. States play a crucial role in defining "the nature, capacity, and rights enjoyed by political and economic actors, including collective actors" (2013, p. 120). Corporations and other business organizations as agents can also "mobilize politically to advance their collective interests" (p. 121). Associations "are organizations established to more effectively pursue the interests of their members" (p. 123). Scott stresses that in the context of neoliberalism – in this case, characterized by a lack of regulative authority –, the systems of 'private regulation' "relying on mutual surveillance and voluntary compliance provide valuable alternative to regulatory regimes," making 'soft power' a more used tool of control (p. 124). Another important agent in institutional construction is the concept of

"institutional entrepreneur". Eisenstadt (1980) and Paul DiMaggio (1988) define such entrepreneurs as "individuals or organizations who participate in the creation of new types of organizations or new industries, tasks that require marshalling new technologies, designing new organizational forms and routines, creating new supply chains and markets, and gaining cognitive, normative, and regulative legitimacy" (p. 119). Institutional agents differ along the three pillars as they can employ "primarily regulative, normative, or cultural-cognitive tools in their construction efforts" (p. 142).

Institutional carriers

Scott argues that institutions of all three pillars can be distinguished by their mode of carrier, or 'vehicles' by which they are conveyed (2013, p. 95). Carriers clarify how institutions change over time and space. Institutions can be carried by four systems: "symbols, relational structures, activities, and artifacts" (p. 111). In the regulative pillar, symbolic systems, or carriers, include rules and laws, relational systems include governance and power systems, activities as carriers include monitoring, sanctioning, disrupting, and artifacts as carriers include objects complying with mandated specifications (Scott, 2013). For institutions in the normative pillar, symbolic carriers are values, expectations and standards, relational carriers are regimes, activities are roles, jobs, routines, habitualized behavior and artifacts are objects meeting conventions, standards. Lastly, in the cultural-cognitive pillar, symbolic carriers constitute categories, typifications, schemas and frames, while relational carriers constitute identities, activities constitute predispositions, scripts and artifacts constitute objects possessing symbolic value.

Importantly, institutional carriers are partial and political as they "affect the nature of the message and the ways in which it is received" (p. 96). They explain how, who and what transports new ideas and they affect the 'trajectory of institutionalization processes' through institutional mechanisms. These mechanisms work along the four carrier systems. First, in symbolic systems the mechanisms of "interpretation, theorization, framing, and bricolage" (p.171) play an important role in institutional construction. Bricolage is a mechanism that consists of a hybrid combination of ideas from varying traditions and fields. Second, in relational systems, institutional mechanisms reflect the importance of informal ties and "emphasize social connections among individuals, groups, and organizations and the ways in which these channels carry institutional materials" (p. 174). Third, activities as carriers are crucial because categories and classifications often follow from action. Activities can reproduce institutions, create new ones, or disrupt existing ones. Lastly, artifacts as carriers include tools, equipment, and technology. In sum, institutional carriers and mechanisms largely define how new institutions are created and diffused.

Organizing visions

Another useful framework for theorizing institutionalization of a specialized community centered around a new technology, such as ReFi, is the concept of 'organizing visions' developed by E. Burton Swanson and Neil C. Ramiller. They discuss how a community introduces new concepts and ideas that give it legitimacy. Swanson and Ramiller argue that an interorganizational community "collectively creates and employs an organizing vision of the innovation that is central to decisions and actions affecting its development and

diffusion" (1997, p. 459). This kind of community intentionally employs sensemaking in which they "actively contemplate new technology and ponder, to varying degrees publicly, what it means and it is going" (p. 459). Therefore, in this view, a new technology is central to the creation of new institutions under an organizing vision which "is formed and reformed in the ongoing interpretation of the innovation's adoption and diffusion" (p. 462).

Organizing visions provide an idea of an imagined future of opportunities for organizations that adopt a new technology. Organizing visions perform three main functions: they offer interpretation to better understand the innovation, they provide legitimation to give reasons for the adoption of the innovation, and they perform mobilization to attract resources for material realization of the innovation (1997). Discourse by "the parties to which constitute a heterogeneous community united by a common interest in shaping it" is the main mechanism through which organizing vision is "produced and sustained" (p. 462). A crucial part of this discourse is the concept of 'buzzwords' or 'labels' as they "provide a portal into the community discourse" and give "a title to the story" represented by the organizing vision (p. 463). There are many 'storytellers' contributing to the organizing vision which constitutes a discourse community "united in their commitment to the innovation's public interpretation, but differentiated by the interests that motivate them" (p. 464). This community has a subculture around a shared future-oriented worldview as it adopts an organizing vision to make sense of the innovation and thereby defines and creates it. The utility of the innovation is critical for an organizing vision as it needs to be shaped around a specific 'business problematic' that determines "perceived practical importance" (p. 466) of a new technology. Organizing visions have a 'reciprocal relationship' with a core technology as the former "both gives meaning and significance to the technology, and is challenged by the

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technology's latent and evolving potential" (p. 467). Organizing vision, therefore, is shaped

and reshaped during "the material processes of innovation adoption, implementation and

diffusion" (p. 468).

To sum up, as underscored in Chapter 1, a community around ReFi exists with robust

networks among actors. Members of this community and network aspire for

institutionalization – a difficult prospect as suggested by this conceptual framework. That

said, Web3 is a technological innovation that grounds an organizing vision which presents a

pathway for institutionalization. This process is analyzed next.

An empirical assessment of ReFi's institutionalization

The ReFi is a community in the making that seeks institutionalization within the

existing climate structures as well as aims to create new institutions so that established

institutions can draw on the ReFi frames. Based on Richard Scott's and Swanson and

Ramiller's institutional frameworks discussed above, this section provides empirical

evidence of institutionalization of ReFi according to the three pillars: regulative, normative

and cultural-cognitive and the framework of organizing visions.

Regulative institutionalization of ReFi

This section analyzes how ReFi navigates the existing regulatory environment and

creates their own rules and structures of control. These efforts are analyzed as part of the

regulative pillar of institutionalization, which focuses on the role played by conventions, rules and laws, governance, and power systems. The views of various members of the ReFi community – as identified in the introduction: Traditional Business, Climate Science, Early Entrepreneurs and Global South profiles –, are analyzed.

The regulatory capacity of the state is critical for institutionalization of the ReFi community, as per neo-Polanyian economic approach discussed in the introduction, the state is necessary to keep carbon markets, and, consequently, ReFi organizations alive. Therefore, the ReFi community needs to adapt to the regulatory frameworks of states and carbon markets. This poses a double regulation challenge because the Voluntary Carbon Market (VCM) and the emerging Web3 technologies central to ReFi are both poorly regulated. While VCM is unregulated by design unlike the compliance market (discussed in Chapter 1), ReFi suffers from governance challenges due to "the absence of a formal framework for the governance of now digitized global commons in the ReFi space" (Schletz et al., 2023). This lack of clear regulatory approach to Web3 by national governments raises questions for regulatory institutionalization of the ReFi community. Overall, the dual regulatory challenge of global climate finance governance, which suffers from fragmentation, and of the Web3 community governance, which due its novelty has not yet received enough attention from the policymakers, poses a lot of uncertainty for ReFi's future.

ReFi voices on regulation largely highlight this double challenge of fragmented regulatory environments for both VCM and Web3, and the need to establish clear governance rules that encourage innovation as currently ReFi is "operating in an environment which is quite uncertain", as highlighted by a respondent in the Climate Science profile. Individuals in the Traditional Business profile underscored: "Good regulation opens new opportunities,

bad regulation just kills the space and pushes it to other countries." These interviewees also shared a concern about overregulation, or "putting unreasonable requirements on us." And they were not alone; indeed, most ReFi interviewees agreed on the need for more "regulatory clarity," including those in the Global South profile. As one respondent said, "the biggest challenge would be to understand that regulation should enhance innovation, not stop it."

The Traditional Business and Climate Science profiles predict that there will be "more required compliance moving into the next decade" which explains why most interviewees expressed that they are "in close contact with the regulators" and are "regulatory forward". They actively participate in meetings with legislators and decision makers around the world on carbon markets guidance seeking organizational legitimacy. However, as an individual in the Early Entrepreneur profile noted, regulation of carbon markets is region specific "so it gets a little bit geopolitical at that point." In other words, ReFi actors who conceive of Web3 technologies as borderless worry about what happens when this meets with the realities of nation states and prospects of compliance carbon markets.

Another common regulatory challenge for ReFi's institutionalization shared by the interviewees is the tendency of governments to put all Web3 applications in "one basket". The respondents from various profiles expressed the importance of differentiating regulation for specific Web3 products and the need to recognize the variety, given that blockchain is a general purpose technology. An individual in the Climate Science profile stated that this kind of nuanced approach is necessary to keep the ReFi sector alive: "the threat is bad regulation, [with] blunt instruments that aren't really sensitive to the different use cases and the different real world implications of those decisions." In their view, such a blanket

approach speaks to the "lack of knowledge, lack of willingness to understand the innovation and being able to separate the previous use cases of Web3 tech versus the possibilities." According to this perspective, this lack of ability and willingness is assumed to exist among governments and other established climate institutions, such as carbon registries and associations.

To address these gaps of knowledge, the ReFi community conducts educational campaigns with policymakers to improve relations between them. For example, a respondent from the Traditional Business profile noted that "it's a really important responsibility of ours to take the time to go to DC to meet with lawmakers on the Hill … to demonstrate how blockchain can be the technology infrastructure that underpins a really robust and transparent carbon market." Notably, ReFi proponents engage at sub-national and trans-national levels. For example, during EthDenver, a major Web3 conference, a ReFi working group hosted a Colorado lawmakers roundtable to educate them on the potential of Web3 for carbon markets in their state. Most interviewees also act as institutional entrepreneurs on the transnational level – they described with enthusiasm work done with existing climate actors such as UNFCCC and attending bi-annual Conferences of the Parties (COPs). In short, these efforts point to ReFi community members' willingness to integrate into existing regulatory frameworks in their pursuit of institutionalization.

Besides formal governing bodies, the ReFi community also complies with "soft laws" set by the business community. For example, they do this by participating in professional business gatherings, like that at Davos. Soft laws as informal structures of control are considered a gray area that can move between the regulative and normative institutional pillars. While the distinction of pillars is helpful in theory, informal ties show that, in

practice, they can be hard to separate. Since soft rules are created as a result of normative commitments, they are discussed in the next section.

Normative institutionalization of ReFi

This section discusses the process of norm and value creation in the ReFi community spread by professional networks and business associations, in both top-down and grassroot, bottom-up ways. Although some of these are codified in formal agreements, they represent normative commitments that guide the behavior of the ReFi community through informal ties. Top-down, private regulation is done by established carbon registries, such as Verra and Gold Standard, and professional business associations, such as the International Emissions Trading Association (IETA), the WEF Crypto Sustainability Coalition, and the Climate Collective. They are the formal associations that determine shared values and normative expectations that guide the behavior of the ReFi community.

Carbon registries exercise major influence and establish norms in the VCM. They are seen as 'gatekeepers' by the ReFi community because their institutionalized status allots them more 'soft power' in decision making around carbon credits. This concentration and centralization of power among traditional carbon registries – as defined in Chapter 1, traditional in contrast to ReFi – is an informal regulative mechanism that the registries exercise through informal consultations and working groups. Respondents in the Climate Science profile stressed that in order to get agency in such normative environments many prominent organizations under the ReFi umbrella have to participate in public consultations with the established registries to evaluate various approaches to third party tokenization and

other Web3 propositions. Besides consultations, the ReFi community participates in "a series of working groups which are trying to bring together different actors in the market to look at how digital solutions can support greater climate impact and one of those is focused on digital MRV." These working groups bring together different stakeholders to think about how Web3 might "be maximized to deliver the greatest impact for the climate and for sustainable development", as highlighted by an interviewee in the Climate Science profile.

This uneven power distribution over climate finance in which a handful of major carbon registries, such as Verra and Gold Standard, have a monopoly decision-making power over carbon credit issuance as well as the absence of formal regulatory frameworks of carbon markets makes it necessary for the ReFi community to engage in norm creation with key partners to build its institutional capacity. As a respondent in the Traditional Business profile noted: "We are very actively engaged with the policymakers and decision makers in the voluntary carbon market which are not government officials, but rather are those at some of the really key governance bodies in the market. So, the standards bodies, like Verra, Gold Standard, the American Carbon Registry, the International Emissions Trading Association (IETA), which is the main trade association in the market, so this market is really one that largely self regulates and so we're very actively engaged in a lot of the policy conversations." The self-governing nature of the VCM affords more agency to the ReFi participants to engage in norm creation and establish more informal ties with other institutional players of the carbon market.

IETA is another example of such players assisting in normative institutionalization of ReFi. As an association for carbon credits businesses, it is a major voice bridging existing carbon companies and ReFi ones. As a respondent from the Traditional Business profile

declared, IETA is "an advocate for carbon markets on behalf of business." The diffusion of ReFi in the carbon business is notable. The first ReFi organization joined IETA about 2 years ago, and now over forty ReFi and Web3 members participate in working groups and sponsor policy initiatives at IETA. These initiatives, according to the voices in the Traditional Business profile include "bilateral communication in the form of emails or in person meetings with regulators, or hosting roundtables, where we invite specific regulators to meet with some of our members to discuss this specific topic." These communications are then put into reports and press releases forming new normative commitments for carbon business. Moreover, IETA requires its members to commit to the organization's mission to "Empower business to engage in climate action and pursue net zero ambitions to advance the Paris Agreement's objectives, and establish effective market-based trading systems for GHG emissions and reductions that are environmentally robust, fair, open, efficient, accountable and consistent across national boundaries."[9] Therefore, ReFi's increased membership in a major business association with the focus on proactive involvement in environmental assets provides evidence for ReFi's normative institutionalization.

WEF Crypto Sustainability Coalition and Climate Collective are two other empirical cases of corporate, top-down identity creation for the ReFi community. Climate Collective is a formal organization aimed at education, coalition building and marketing of ReFi. Its mission is "to accelerate innovation in markets for trusted, high-quality environmental assets that enable people and planet to thrive."[10] Climate Collective's members establish partnerships with other member organizations as well as other established institutions, like

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[9] https://www.ieta.org/about/#vision

[10] https://climatecollective.org/

the World Economic Forum, whose Crypto Sustainability Coalition was led by one of the Climate Collective leaders. Such close collaboration between these professional groups establishes common standards and soft rules for the ReFi community.

While professional membership associations discussed above represent a top-down approach to normative institutionalization of ReFi, the ReFi community also engages in bottom-up, grassroots approaches to institutionalize. For example, ReFi is actively working with its own decentralized network of organizations, establishing new relational contracts. An interviewee from the Climate Scientist profile believes that ReFi's core values are about collaboration and support that extends beyond the ReFi community and invites 'non-Web3' actors, such as "indigenous people and farmers, cooperatives and scientists" to "create a community governed core" which, in their view, would represent "a new institution type" with better and more open governance than existing traditional registries and other established climate institutions. They are explicit about "trying to build a new public institution form" to overcome the centralized power of current climate institutions, as highlighted in the previous section.

One of these new proposed institutional forms is the concept of impact DAOs (decentralized autonomous organizations) which are "internet-native nonprofits and social impact organizations that operate on the principles of decentralised power, collective decision-making, and transparency."[11] For example, the organization called ReFi DAO acts as the arbiter and a representative body for normative standards of ReFi. ReFi DAO also plays a major role in the culture development and sense making of the ReFi community, as discussed below.

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[11] https://mirror.xyz/0x7340F1a1e4e38F43d2FCC85cdb2b764de36B40c0/ye6fI3GDY2FJA6mNbxru2L_97OjMalhdbVjKOunq2EI?ref=blog.refidao.com

Cultural-cognitive institutionalization of ReFi

This section focuses on the importance of common sense-making, culture development, and common categories in shaping interpretations for institution building. Sense making in the ReFi community is exercised both from the top by established institutions like the WEF and from the bottom, by community-owned entities like ReFi DAO.

WEF Crypto Sustainability Coalition, an initiative to explore blockchain applications in the sustainability sector, is an empirical example of top-down sense-making for the ReFi community. The Coalition was tasked with understanding the emerging landscape of ReFi organizations and their role in the carbon markets. It coordinated working groups of multiple stakeholders to conduct studies and produce reports and whitepapers as symbolic carriers of ReFi's institutionalization and legitimization of Web3 within existing climate discourse. WEF whitepapers and other official documentation are also examples of artifacts that objectify beliefs in ReFi as an institutional force. This process of co-interpreting and theorizing by a mix of actors from various disciplines – from climate science to business to technologists – represents 'bricolage', cross-sectoral collaboration to establish common frames for new institutions. Other examples of such cultural bricolages include traditional registries' experimenting with blockchain via task forces and consultations (as discussed above) as well as other partnerships, such as the Climate Action Data Trust, a blockchain based platform launched with the World Bank and Verra's engagement in the Global Blockchain Business Council (GBBC).

At the same time, decentralization has enabled an alternative, bottom-up approach to ReFi's cultural institutionalization. For example, ReFi DAO (discussed above) has launched the 'Local Nodes'[12] initiative which mobilizes "local startup communities around the world" with the goal of "working towards a shared vision of regeneration". These decentralized communities "are led by entrepreneurs but are a cross-pollination of public, private and third sector leaders." The long-term vision of these local nodes, according to ReFi DAO, is "to build a mobile-first 'classpass' for regeneration." These ReFi local nodes are examples of institutional diffusion of the cultural pillar as through this initiative the ReFi brand and framing are adopted across regions. Notably, the Local Node initiative purposefully centers the voices from the Global South, e.g. ReFi Colombia, Mexico and Costa Rica and names diversity as a major aspect of their mission. According to this mission, "ReFi DAO aims to support a diverse, global decentralized network of local communities that share in our mission, vision and values of using the most powerful tools of our time to regenerate the earth."[13]

Moreover, cultural institutionalization from below is carried forth via other mechanisms, such as digital community spaces and ReFi working groups that are brainstorming shared meanings of the community in various Discord and Telegram chat rooms and virtual community meetings. Besides online deliberation spaces, cultural-cognitive institutionalization is carried out via the many media outlets, for example, Regens Unite and ReFi DAO roundups, blogs and newsletters, that serve ReFi's culture development and legitimization.

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[12] https://blog.refidao.com/local-node-applications-are-open/
[13] https://blog.refidao.com/refi-local-nodes-on-gitcoin/

Within this cognitive pillar, meaning making is accomplished through discussions of new concepts and ideas by organizations and individuals in the ReFi community increasingly united by a common organizing vision, as discussed in the next section.

Organizing visions of ReFi

Organizing vision frameworks is instrumental for assessing ReFi's institutional maturity because the ReFi community is organized around one key innovation, Web3, that employs common frames. Moreover, the ReFi community represents a "network of enterprises with material stakes in the community's interpretation" (Swanson, Ramiller, 1997, p. 462). The examples of various cultural sensemaking for ReFi, both top-down and bottom-up, points to the collaboration between a variety of actors united by one organizing vision behind ReFi.

Framing, discourse and buzzwords are all common elements of such organizing vision that are present in the ReFi network. For example, the intentional separation of 'crypto' and ReFi as well as framing of ReFi as 'impact investment' are two intentional efforts to create a new symbolic frame. Notably, top-down co-interpreting of the ReFi community tends to use more 'neutral' frames, such as 'climate tech', 'distributed ledger technologies' and 'emerging technologies' to intentionally separate themselves from the bad reputation of 'crypto'. Bottom-up sense-making approaches, on the contrary, openly draw on Web3 and crypto discourse as an integral part of their culture. This selective usage of labels suggests varying views on public perceptions as discussed in the 'Challenges' section below.

Moreover, the ReFi community is confronting dilemmas regarding whether to include other emerging technologies, such as the Internet of Things (IoT) or Artificial Intelligence (AI), into ReFi discourse. Lastly, a notable feature of ReFi's organizing vision is the use of buzzwords, such as 'ReFi', 'regeneration', 'decentralization', and 'regenerative economics'. The organizing vision of ReFi as an "interorganizational community" is summarized by a respondent from the Climate Science profile that sees the bigger vision of ReFi is to "move towards this moonshot vision of an economic system that works from the regenerative standpoint, rather than from the extractive standpoint." The reference to 'moonshot vision' underscores that this is a future-oriented imaginary about future opportunities, in which Web3 operates as an institutional carrier capable of realizing this vision.

Web3 as a technological artifact embodies "both technical and symbolic elements" (Scott, 2013, 103). From a technical perspective, Web3 allows for practical optimization of carbon markets, as argued in Chapter 1. From a symbolic perspective, Web3 represents new aspirations of decentralized, transparent, and accountable institutions. As an interviewee from the Climate Scientist profile argues "the promise of Web3 is to create transparent public institutions and to embed markets into them." Web3 can be seen as a carrier to create more transparent institutions in the climate tech sector with a dual nature: it is a product of human action but also becomes a structure once it is developed. Thus, Web3's materiality (Leonardi et al., 2013) as an open and decentralized digital infrastructure can in itself become an institution. This inevitable connection between Web3 as an institutional carrier and ReFi as an aspiring new institution creates one of the key challenges for the institutionalization of the ReFi community. (The summary of empirical indicators of ReFi's institutionalization is listed in Figure 2.)

Figure 2. Conceptual frameworks and empirical indicators of ReFi's institutionalization.

Institutionalization of ReFi	
Conceptual frameworks	Empirical indicators
Regulative pillar	- Educational campaigns and discussions with policy makers - Lack of clear legal requirements and hard laws around ReFi - Dual regulatory challenge of fragmented regulatory environments for both VCM and Web3
Normative pillar	- Top-down: normative commitments via engaging with established carbon registries (Verra and Gold Standard), and professional business associations (IETA, WEF, Climate Collective) - Bottom-up: informal ties via network organizations (ReFi DAO)
Cultural-cognitive pillar	- Top-down: common frames, discourse, and culture development (WEF whitepapers, the Climate Action Data

	Trust, the Global Blockchain Business Council) - Bottom-up: ReFi DAO Local Nodes, blog posts and online meetings - Lack of agreement about the common definition of ReFi
Organizing visions	- Buzzwords and labels: 'ReFi', 'regeneration', 'decentralization' - Practical importance of Web3 for climate finance - Web3 as a technological artifact

Challenges

This chapter laid out the theoretical framework and empirical examples of the ReFi's community aspirations to become institutionalized. The extent of this institutionalization differs along the three pillars and top-down and bottom-up approaches. The ReFi community faces the most challenges in the regulative pillar as it is navigating the uncertainties of Web3 and carbon market regulations. So far, the ReFi community has to conform to the existing rules due to the absence of new rules that are better suited to the specific needs of Web3. In the normative pillar, the ReFi community has been successful in establishing informal ties

and creating common values through both top-down and bottom-up approaches, as evidenced by ReFi's increased involvement in professional associations and community-owned organizations. As for the cultural-cognitive dimension, the ReFi community demonstrated common culture development and interpretation efforts through multiple symbolic carriers, such as reports, whitepapers and blog posts. There is also a level of diffusion of ReFi frames via regional communities, such as Local Nodes. However, the homogeneity of the ReFi culture remains debated. While community members operate similar frames and buzzwords under a common organizing vision, the meanings behind them are not consistent across interviewee profiles. As Chapter 1 demonstrated, the definition of 'ReFi' varies among ReFi members which suggests a certain degree of disagreement over the framework of meanings, especially when it becomes conflated with Web3 frames, as discussed below.

In order for ReFi to become more institutionalized, it needs to overcome a number of key challenges and contradictions. Specifically, the ReFi community faces tensions between ReFi and Web3 framing, questions on regulation and legitimacy, as well as representation and diversity in institutional construction.

A major challenge for ReFi's institutionalization is its inevitable link to Web3 as an organizing vision. There cannot be a ReFi community without Web3 technologically but also conceptually, and this poses various problems for the community's efforts to institutionalize. The ReFi community uses many frames which are specific to the Web3 community, such as 'decentralization' and 'transparency', and this makes it difficult to distinguish between ReFi and Web3. This is a problem because the public legitimacy of ReFi seems to depend on intentional separation from the crypto world due to its increasingly poor reputation, but crypto is also technologically and conceptually linked to Web3. While ReFi discourse

proactively masks blockchain terminology with more neutral frames, such as "impact finance" and "climate tech", in practice, at the regulatory and technical levels ReFi and Web3 are inseparable.

Crypto's bad reputation – confirmed recently in the quick trial of crypto entrepreneur Sam Bankman-Fried for fraud – is affecting how ReFi is perceived and legitimized among the general public, policymakers, and investors. This challenge is especially visible in the top-down institutional approaches as established institutions are more dependent on the public image, while bottom-up initiatives embrace the spirit of Web3 as a necessary cultural element. For example, IETA shies away from 'Web3'-focused labels and instead uses terminology, such as "a decentralized and secure digital infrastructure". ReFi advocates, on the other hand, see ReFi as a more advanced development of crypto, and this puts them in a conundrum: how can they simultaneously celebrate the technological innovation of Web3 and create new discourse of this technology which started as cryptocurrency, but also gave rise to the ReFi community which sees itself as driven by impact and regenerative values? As a member of the Global South profile argues, "people are distrustful of what they don't understand", thus, the ReFi community is facing a major awareness and cultural legitimacy challenge.

Legitimacy is necessary for organizations to survive and maintain stability. In terms of cultural legitimacy, ReFi faces a public perception problem, as a result of inevitable association with 'crypto'. A controversial image, as a respondent in the Early Entrepreneur profile warned, can "nudge the politicians and leaders into making knee jerk reactions and banning things and putting in place too much regulation that prohibits or restricts growth." They lament that "a lot of people shut down when they hear blockchain or especially when

they hear NFT or crypto". In their view blockchain has become "the hot word that just poisons conversations because people have such a horrible perception of what crypto is". They highlight the importance of distinguishing between cryptocurrency speculation and the fundamental decentralized digital infrastructure that makes ReFi possible.

Moreover, regulatory legitimacy is especially difficult for the ReFi community, as it depends on two sets of regulation: of Web3 and carbon markets, which are both lacking in clarity and breadth at national and transnational scales. Therefore, in terms of regulation, Web3 cannot be considered as "complying with mandated specifications" as per Scott's framework (2013). Additionally, the future of carbon markets as a whole poses major challenges for the ReFi's regulatory institutionalization. Some scholars predict that VCM may be transformed into the compliance market as countries face increasing pressure for stricter climate regulation (Clemençon, 2023). And thus, the role of ReFi for the compliance market remains unclear.

Lastly, representation is another major tension in ReFi's institutionalization. This tension is particularly evident in the top-down down approaches, as the majority of bottom-up agents were not part of the WEF Coalition, and hence have to express their agency via digital participation rather than in formal reports and business meetings. The majority of the WEF Crypto Sustainability Coalition members interviewed constitute a predominantly male, Western, and neoliberal approach to climate action. As described in the methodology section, only a handful of respondents represented female voices and perspectives from the Global South. This raises questions about who is not included in the debate around ReFi and whether such exclusion is intentional. The interviewees act as "institutional entrepreneurs" of ReFi and therefore play a major role in navigating the direction of institutionalization. Exclusion

of certain social groups may explain the dominance of green capitalism logics and emphasis on market-centric and technocratic solutions. Notably, it is the respondents from the Global South that stressed the structural issues that underpin the modern economy. The bottom-up approaches to normative and cultural institutionalization of ReFi attempt to amend this tension by explicitly stating diversity as part of their mission. For example, the ReFi DAO's Local Nodes initiative empowers the voices from the Global South by crowdsourcing funding via community grants. However, these efforts remain localized at scale. All in all, the tensions around legitimacy, regulation and representation act as major obstacles to ReFi's institutionalization.

Conclusion

This thesis analyzed the emerging community of Regenerative Finance (ReFi), and asked how it envisions the future of climate finance and gets institutionalized. To answer these research questions, I adopted a mixed methods approach combining literature review, semi-structured interviews and digital ethnography. Conceptually, I situated the ReFi community within the theoretical framework of Neo-Polanyian economics, techno-boosterism and green capitalism to understand the role of technology, the state and the market in climate finance.

Through the interview analysis, Chapter 1 showed that ReFi evolved as a result of inefficiencies of climate finance, particularly, carbon markets which suffer from opaque and fragmented design, limited funding and scale and structural inequality. While the ReFi community is inspired by the ideals of regenerative economics, the members of the community have varying definitions of what ReFi represents. I found that ReFi consists of conceptual and practical definitions. Conceptually, ReFi represents a cultural movement for a regenerative system. Practically, ReFi is viewed as a new iteration of climate tech, a financial incentive mechanism and a business model. Chapter 1 concluded with several tensions within the ReFi community, such as reliance on market assumptions, investor influence and emphasis on finance over regeneration. These tensions cast doubt on the solo capacity of markets and private profit-driven businesses to tackle a challenge as large and complex as climate change. Climate entrepreneurs' dominant positionality rooted in the faith in conscious capitalism as exemplified by Traditional Business profile should be challenged by

alternative approaches that invite more regulatory intervention and challenge aspirations for constant growth and financialization. Instead, the ReFi community needs stand for a profound systemic shift and seek out community funding initiatives to challenge investor influence and focus on underlying structural causes of climate change.

Chapter 2 focused on ReFi's aspiration for institutionalization within the existing climate structures as well its desire to create new institutions so that established institutions can draw on the ReFi frames. Conceptually, I drew on Richard Scott's and Swanson and Ramiller's institutional frameworks to assess ReFi's degree of institutionalization along three pillars. Regulative institutionalization of ReFi analyzed how ReFi navigates the existing regulatory environment and creates their own rules and structures of control. The informal structures of control are discussed in the normative pillar of ReFi's institutionalization which includes the process of norm and value creation in the ReFi community spread by informal ties among professional networks and business associations, in both top-down and bottom-up ways. The cultural-cognitive pillar showed that the ReFi community engages in sense-making and culture development across sectors. Lastly, the ReFi community is also a discourse community which is getting institutionalized through the proliferation of an organizing vision around the adoption of Web3. The second chapter concluded with several challenges to ReFi's institutionalization, such as tensions between ReFi and Web3 framing, questions on regulation and legitimacy, as well as representation in institutional construction.

These findings present some practical recommendations of what the ReFi community can do differently to allow for institutional diffusion. The community needs to reconcile the discrepancy between the conceptual and practical definitions of ReFi as well as clarify the difference in framing of Web3 and ReFi in order to become legitimate and institutionalized.

They can accomplish this by bringing top-down and bottom-up institutional entrepreneurs together for common sense-making. ReFi organizations also need to be more accountable, disclose relationships with investors, and expand beyond carbon market solutions to embrace regenerative economic ideas in practice, while staying away from techno-boosterist logics. Achieving this would mean making choices based on the original ethos of Web3 rooted in transparency and community. Yet, the ReFi community inevitably faces the structural challenges of the dominant green capitalist system prioritizing short-term profit over long lasting (and costly) changes. To overcome the legitimacy issue, the ReFi community has to embrace existing regulatory frameworks as well as close the knowledge gap between the community and policymakers. To achieve regulatory institutionalization, the ReFi community will need to engage with regulators on local and national levels as well as extend the solutions to compliance carbon markets.

Moreover, institutionalization of ReFi needs to include more voices from the Global South, people of color and female perspectives. As of now, the majority of institutional entrepreneurs of ReFi are white males which fits every stereotype about who holds the power and has a seat at the table. Personal characteristics of the interviewees manifest to different world views and approaches to ReFi which lack diversity and predominantly convey Western ideals for climate finance. Bringing more diverse voices to the table would mean challenging some of the dominant positionality of market-oriented approaches and allow for decentralization of ideas. The ReFi community should particularly seek more input by the people with different conceptions of nature rooted in indigenous knowledge and climate education. However, the lack of access and historical exclusion of minority voices makes this

step challenging particularly on the top-down level leaving more hope for bottom-up community-led approaches, like ReFi Local Nodes.

This study has several limitations and areas for further research. First, a more nuanced discussion of theoretical foundations of regenerative economics and regenerative capitalism is necessary for better understanding of the ideological rationale behind the ReFi community. This debate should expand on the specific distinctions between green and conscious capitalism and how these ideas would lead to a regenerative economy away from the extractive one. Second, there needs to be further exploration of how ReFi fits in the changes in the carbon markets and the looming shift to compliance markets. Questions remain whether ReFi can function beyond the unregulated VCM. Third, the relationship between grassroots institutional approaches and representation needs to be evaluated further with more voices from the Global South. Lastly, more research is needed to further understand new developments under the ReFi beyond carbon markets, such as ReFi Villages as emerging grassroots ecological actors driven by the Solarpunk ideology. Ultimately, ReFi is not going away. If anything, it is growing with new initiatives that may challenge the dominant conceptions identified in this research by affording more power to the bottom-up agents of ReFi's institutionalization.

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