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Federal Department of the Environment, Transport, Energy and Communications DETEC

Swiss Federal Office of Energy SFOE
Energy Research and Cleantech Division

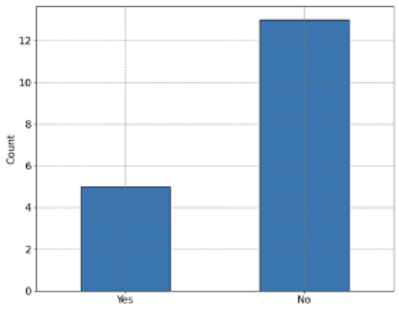
Interim report dated 01.11.23

Swiss Digitalization Framework for the Sustainable Energy Transition

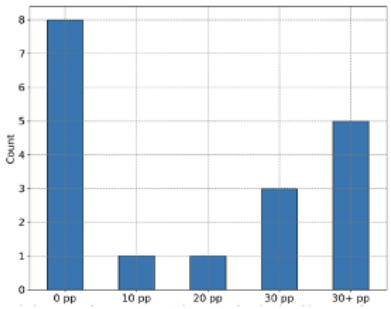
Scaling Green Loans with Decentralized Finance

Investor Survey: Risk-premium for blockchain-based project-based investments.

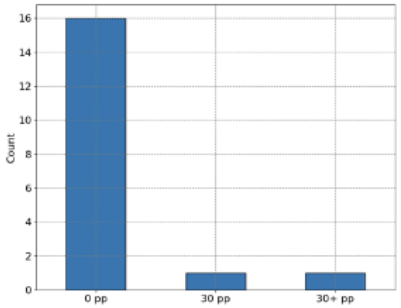
Q1: Would you be interested in buying the crypto-denominated bond rather than a CHF-denominated one?



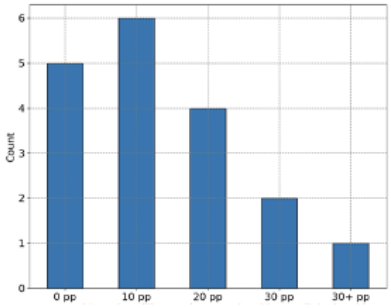
Q2: How much of your performance are you willing to give up to increase when buying this crypto-denominated bond?



Q3: How much of your performance are you willing to give up to receive daily reports on energy production?



Q4: How much of your performance are you willing to give up to be able to sell the bond instantly?



Source: Authors' pilot investor survey results. Risk-premium for blockchain-based project-based investments.

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The authors bear the entire responsibility for the content of this report and for the conclusions drawn therefrom.

Zusammenfassung

Dieses Projekt untersucht das Potenzial der dezentralen Finanzierung (DeFi) als Lösung für die Grenzen der traditionellen Finanzierung (TradFi) bei der Finanzierung grüner Projekte, insbesondere der Infrastruktur für erneuerbare Energien. TradFi hat mit Herausforderungen wie hohen Transaktionskosten und komplexen Vorschriften zu kämpfen, die die effiziente Bereitstellung von Mitteln für grüne Initiativen behindern. Im Gegensatz dazu erweist sich DeFi, das auf der Blockchain-Technologie basiert, als vielversprechende Alternative, da es die Prozesse rationalisieren und die Effizienz steigern kann.

Das Hauptziel dieses Projekts ist es, die Unterschiede zwischen TradFi und DeFi in Bezug auf Finanzierungskosten, Risikoprämien und regulatorische Verbesserungen zu verstehen, insbesondere im Zusammenhang mit der Emission von grünen Anleihen. Um dies zu erreichen, umfasst das Projekt eine gründliche Literaturrecherche und umfassende Umfragen, an denen die wichtigsten Interessengruppen, nämlich Originatoren, Vertreiber und Investoren, beteiligt sind.

Unsere vorläufigen Ergebnisse unterstreichen das transformative Potenzial der Tokenisierung, die die Kosten effektiv senken, die Prozesse beschleunigen und die Zugänglichkeit und Liquidität von Investitionen in erneuerbare Energien erhöhen kann. Gleichzeitig werfen sie ein Licht auf den unterschiedlichen Bekanntheitsgrad und Wissensstand der Beteiligten.

Im weiteren Verlauf werden wir eine umfassende Investorenbefragung mit einer angestrebten Teilnehmerzahl von über 1.000 Personen durchführen und aktiv mit über 50 Kreditgebern und 20 Händlern weltweit in Kontakt treten. Die anschließende Analyse der Ergebnisse soll Erkenntnisse über die potenzielle Rolle von DeFi beim Übergang zu einer kohlenstoffarmen Wirtschaft liefern.

Résumé

Ce projet étudie le potentiel de la finance décentralisée (DeFi) comme solution aux limites de la finance traditionnelle (TradFi) dans le financement des projets verts, en particulier les infrastructures d'énergie renouvelable. La finance traditionnelle est confrontée à des défis tels que des coûts de transaction élevés et des réglementations complexes, ce qui entrave l'allocation efficace des fonds aux initiatives vertes. En revanche, DeFi, qui repose sur la technologie blockchain, s'avère être une alternative prometteuse, car elle permet de rationaliser les processus et d'améliorer l'efficacité.

L'objectif principal de ce projet est de comprendre les différences entre TradFi et DeFi en ce qui concerne les coûts de financement, les primes de risque et les améliorations réglementaires, en particulier dans le contexte de l'émission d'obligations vertes. Pour ce faire, le projet comprend une analyse documentaire approfondie et des enquêtes complètes qui impliquent les principales parties prenantes, à savoir les initiateurs, les distributeurs et les investisseurs.

Nos résultats préliminaires soulignent le potentiel de transformation de la tokenisation, qui peut effectivement atténuer les coûts, accélérer les processus et amplifier l'accessibilité et la liquidité des investissements dans les énergies renouvelables. Simultanément, ils mettent en lumière les différents niveaux de sensibilisation et de connaissance parmi les parties prenantes.

Pour aller de l'avant, nous mènerons une enquête à grande échelle auprès des investisseurs avec un objectif de participation dépassant les 1 000 répondants, et nous nous engagerons activement auprès de plus de 50 initiateurs et 20 distributeurs à l'échelle mondiale. L'analyse ultérieure des résultats vise à fournir des informations sur le rôle potentiel de DeFi dans la transition vers une économie à faible émission de carbone.

Summary

This project delves into the potential of Decentralized Finance (DeFi) as a solution to the limitations of Traditional Finance (TradFi) in financing green projects, particularly renewable energy infrastructure. TradFi grapples with challenges such as high transaction costs and complex regulations, hampering the efficient allocation of funds to green initiatives. In contrast, DeFi, which is based on blockchain technology, is proving to be a promising alternative as it can streamline processes and increase efficiency.

The primary objective of this project is to understand the differences between TradFi and DeFi concerning financing costs, risk premiums, and regulatory enhancements, specifically in the context of green-bond issuance. To accomplish this, the project encompasses a thorough literature review and comprehensive surveys that involve key stakeholders, namely originators, distributors, and investors.

Our preliminary findings underscore the transformative potential of tokenization, which can effectively mitigate costs, expedite processes, and amplify accessibility and liquidity for renewable energy investments. Simultaneously, they shed light on the differing levels of awareness and knowledge among stakeholders.

Moving forward, we will conduct full-scale investors survey with a target participation exceeding 1,000 respondents, and we will actively engage with over 50 originators and 20 distributors globally. The subsequent analysis of the results aims to provide insights into the potential role of DeFi in the transition to a low-carbon economy.

Contents

Abbreviations

Not applicable.

1 Introduction

1.1 Background information and current situation

The financial system has a pivotal role in supporting activities such as forming, trading, and completing contracts that enable fund pooling, sharing risks, transferring resources, spreading information, and offering incentives. Traditional finance (TradFi) heavily depends on intermediaries like banks, brokers, and exchanges. A vital component within TradFi is securitization, which is designed to pool cash from obligors, partition it, and subsequently distribute it among investors. As the process involves multiple parties, it engenders frictions in the form of delays, higher fees, and information asymmetries. Furthermore, TradFi encounters notable constraints when supporting renewable energy projects, such as high transaction costs, and regulatory complexities, leading to a substantial gap between the demand for infrastructure development and the availability of financing (Aquilina et al., 2023). These factors hinder the efficient flow of capital to green projects.

The limitations related to TradFi have led to an increased interest in Decentralized Finance (DeFi), a financial system built on blockchain technology that aims to enable open and decentralized access to a wide range of regulatory compliant financial capabilities and products.

Blockchain technology has been identified as a potential solution for the frictions generated by securitization, offering various advantages such as increased efficiency, lower costs[1], transparency, privacy, and liquidity. An indispensable element within DeFi is tokenization, a pivotal process involving the conversion of tangible real-world assets (RWA), including physical assets or rights, into digital tokens that can be represented and traded on a blockchain or distributed ledger technology (DLT).

1.2 Purpose of the project

To understand the potential of DeFi to overcome some of the limitations of TradFi, it is essential to recognize the fundamental differences between the two financial systems. These include general structure; fees levied from the parties involved including issuance fees, securitization fees, placement fees, and trading fees; transparency aspects of using each model liquidity within models; access for investors and restrictions for issuers to leverage each model; and existing investment thresholds.

To investigate whether DeFi could become a viable alternative of TradFi, we conduct multi-stakeholder surveys. Our surveys cover the entire financial system value chain, namely all the different actors involved in the process of allocating resources to green projects.

Our focus is on whether the risk premia, and the cost of financing, differ under the TradFi and DeFi system for the same set of assets. The risk premia is an important indicator as it represents the excess return that investors demand as compensation for the uncertainty and potential losses associated with an investment and in the end affects the funding costs of the issuer of a (green) asset. We define the risk premia generated by relying on DeFi “tokenium'”. The tokenium will serve as an indicator for whether investors perceive a lower risk when an asset is traded in a decentralized or in a traditional financial system.

1.3 Objectives

More specifically, this project has two objectives: (1) mapping out end-to-end financing costs for TradFi and DeFi green-bond issuance and (2) identifying the regulatory improvements facilitating the scaling-up of tokenised green bonds. To fulfil the two project objectives mentioned above, we adopt a three-step approach including a) literature review, b) data collection through surveys and b) data

[1] The lower costs can result from several reasons. These includes reduced intermediation costs, reduced transaction costs, absence of issuing fees for securities etc.

analysis. During the data-collection phase, we will conduct interviews and surveys with green-infrastructure project originators, distributors, and investors to identify the bottlenecks of TradFi and the potential of DeFi from a financial-cost, and regulatory perspective. In the data-analysis step, we will analyze and summarize the data collected, quantify the impacts of DeFi funding and determine the optimal terms and regulatory implications when issuing, distributing, and holding tokenized green bond.

The scope of our project is primarily focused on green loans that facilitate the funding of unlisted assets, with a particular emphasis on financing renewable energy initiatives. This focus establishes a direct connection between the designated utilization of funds and the additional environmental benefits derived from those funds. It is important to acknowledge the existence of a disparity between the stated utilization of funds in the context of green bonds traded on public exchanges, as such funds may not invariably be directed toward the creation of new assets; instead, they may serve as an exit strategy for initial market investors and hence do not serve the purpose of additionality.

2 Description of facility

We have integrated this description into item 3 below.

3 Procedures and methodology

Over 70 % of the banks believe that tokenization, the DeFi equivalent of securitization in the TradFi industry, can be turned into a profitable business in the next 2 – 3 years (Finews, 2023). As many as 94 % of financial institutions have put crypto on their strategic agendas. However, only three out of ten customers are satisfied with the crypto offerings (Finews, 2023).

To justify the arguments about DeFi, tokenization, and crypto potential, we conduct our surveys with three different stakeholders: originators, distributors, and investors. We then assess the respondents' opinion regarding the potential of DeFi, as well as their attitude to asset tokenization and the use of cryptocurrencies instead of fiat currencies. The study conducted by (Engler et al., 2023) was taken as as guidance for our research.

The investor survey consists of 7 sections, including respondent's beliefs regarding the concept of sustainable finance, general investment preferences, trading platform satisfaction level, the awareness level of the green bonds concept, preferences while investing in them, "tokenium" that describes the risk premium associated with DeFi, and socio-demographic questions.

4 Activities and results

Various Working Packages of the project is developing with the following activities carried out:

1. **Review and classify the current landscape of digital DLT platforms in Switzerland.**

   We have reviewed the current landscape of Swiss DeFi platforms through literature review and internet search. There are around 40 key players that constitute the Swiss digital asset ecosystem, including advisory & wealth managers, service providers, asset managers, custodians, and trading & brokerage (Brunner, 2021). Out of the current key players that offer platform solutions for digital assets, our initial search indicates only a handful of companies

that focus on renewable- and energy-efficiency projects finance, and hence literature on this topic is scarce, especially academic literature.

2. **Review the current landscape of TradFi intermediaries in Switzerland that focus on renewables and energy-efficiency finance**

We have reviewed the division of current infrastructure asset ownership under the TradFi system and noted that private investor funds are managed by multiple layers of financial intermediaries. The inclusion of intermediaries is problematic because each additional intermediary adds (unnecessary) costs, such as transaction- and management fees. The cost of intermediaries impacts renewable energy projects reducing their financial viability. The combination of commitment fees, agency commissions, and due diligence costs are responsible for adding a premium to the required return of debt providers. In one study, this amounted to a change from 7.60% to 8.57%. (Fernandes et al., 2016) Given that lenders typically cover up to ~70% of the financing costs, a 100bp increase in debt costs affect the equity return significantly. This can ultimately place the financial viability of a sustainable project at risk.

3. **Surveys to map end-to-end financing costs (TradFi versus DeFi)**

We've launched comprehensive surveys to investigate the disparities in end-to-end financing costs between traditional finance (TradFi) and decentralized finance (DeFi) when it comes to green-bond issuance. These surveys are designed to engage a range of stakeholders across the asset-owner, securitization, and investor value chain within both the DeFi and TradFi sectors. The surveys target three key categories of stakeholders:

a. **Originators:**
Profile: These are sustainable project developers, with a specific emphasis on those involved in renewable energy projects. Originators should be capable of and willing to share data that is highly relevant for transparency and essential for underwriting tokenized green bonds, including operational data such as electricity production tracked by IoT devices.
Hypothesis: We anticipate that streamlined financing, broader access to investors, increased local stakeholder buy-in, reduced information asymmetry, and a powerful symbol of leadership in sustainable finance are some of the potential advantages.

b. **Distributors:**
Profile: Distributors represent institutions that serve as aggregators of funds and have the capacity to manage and deploy investor funds for digital securities. These can include banks, wealth and asset managers, family offices, sustainable fintech platforms, development funds, and crypto-native funds.
Hypothesis: We aim to assess the potential benefits of adding tokenized green bonds, backed by sustainable projects, to their product offerings. This opens the door to new business models, diversified revenue streams, improved ESG-reporting metrics, and positions them as pioneers in digital sustainable finance.

c. **End-Investors:**
Profile: These encompass fixed-income and green-bond retail and institutional investors who hold an interest in DeFi asset classes.

Hypothesis: We believe that they could benefit from access to alternative securities and potentially lower fees, and we're keen to explore this further.

Our investigation aims to uncover whether there are differences in the risk premia demanded by investors when comparing the TradFi and DeFi systems for identical assets. We rely on the concept of "tokenium" within the DeFi context to define and measure these risk premia.

The surveys are accessible through the following links:

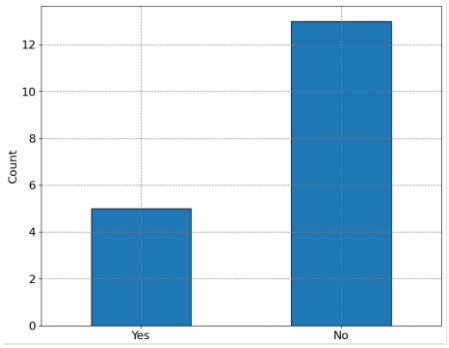
a. Originator Survey: [Link]
b. Distributor Survey: [Link]
c. End-Investor Survey: [Link]

As an initial step, we conducted a pilot survey involving 10 originators and 18 retail investors. Despite the relatively small sample size, the results from this pilot survey have provided valuable insights into the securitization industry and its potential interactions with DeFi, tokenization, and cryptocurrencies. These findings underscore the potential benefits of integrating tokenization with risk-weighted assets (RWAs) in the financial landscape. Notably, the pilot survey revealed significant interest among bond originators in utilizing tokenization to enhance the liquidity of their products. Additionally, a substantial number of investors expressed interest in investing in tokenized RWAs, especially green bonds.

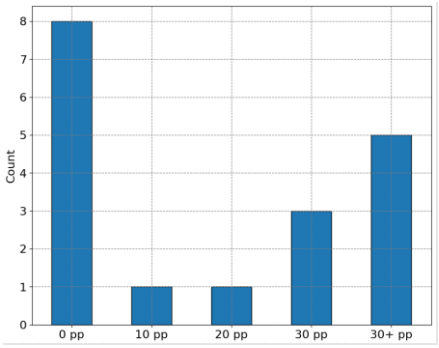
Below are some key findings and observations based on our pilot originators and investors surveys:

Figure 1 — Investor Survey: Risk-premium for blockchain-based project-based investments.

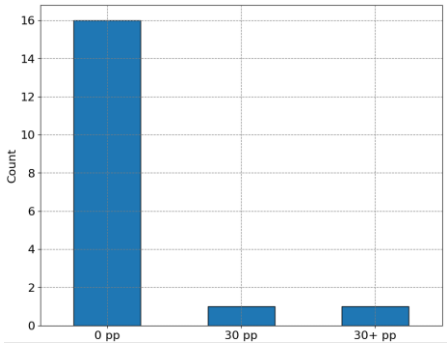
Q1: Would you be interested in buying the crypto-denominated bond rather than a CHF-denominated one?



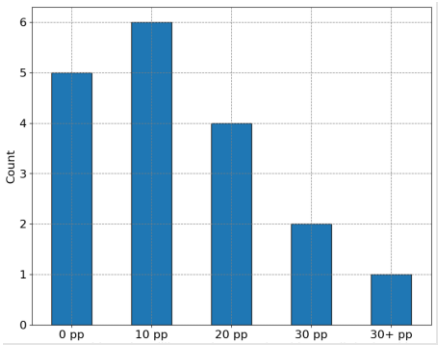
Q2: How much performance (returns) are you willing to sacrifice to buy this crypto denominated bond?



Q3: How much of your performance are you willing to give up to receive daily reports on energy production?



Q4: How much of your performance are you willing to give up to be able to sell the bond instantly?

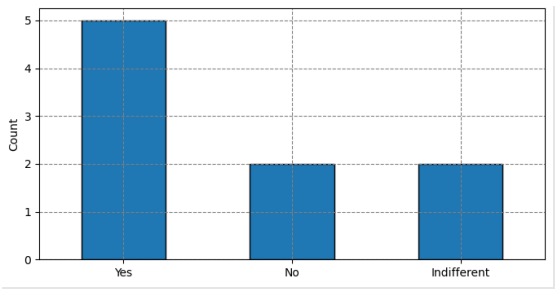


Retail Investor Survey Observations:

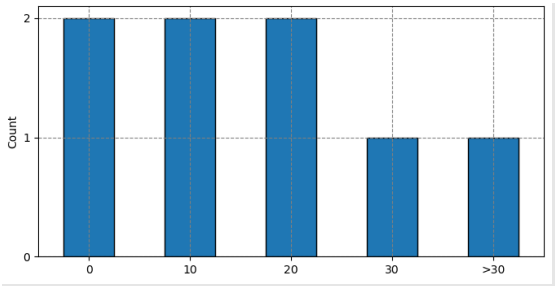
- Typical retail investors are characterized as young, educated, and diligent savers.
- The majority associate sustainable finance with investments in green projects.
- Green buildings are the preferred sector for investment, with a focus on local projects.
- Transparency, issuer credibility, and environmental impact are high priorities.
- Many investors express interest in including green bonds in their portfolios.

Figure 2 — Originator Survey: Risk-premium for blockchain-based project funding.

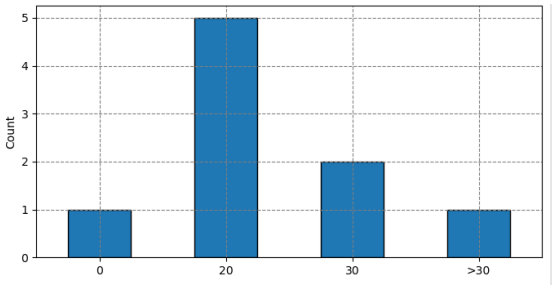
Q1: Is your company open to considering crypto-denominated repayments instead of the mentioned USD-denominated option?



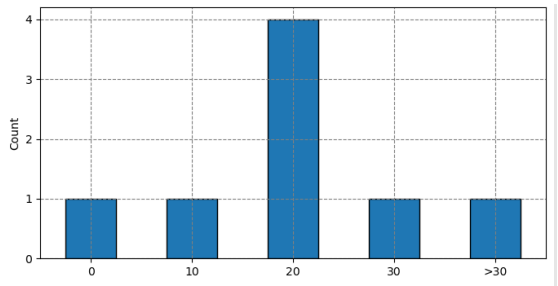
Q2: How much of a reduction in the cost of capital is your company seeking for bond settlement using USD-Coins compared to traditional USD-denominated settlement?



Q3: If it costs the project entity to provide daily reporting indicators to co-investors, how much would the reduction in the cost of capital need to be to justify offering this premium option to investors?



Q4: If a premium option exists that permits the project entity to trade its own bond, what level of cost increase in the cost of capital would you be willing to tolerate in order to obtain this premium option?



Originator Survey Observations:

- Originators predominantly target renewable energy projects.
- Key challenges for originators include cost, time, and outreach to investors.
- The use of IoT and satellite technology varies across asset types.
- Most originators are open to sharing reporting indicators with financiers.
- Many originators express their willingness to participate in the secondary market.

Although we haven't conducted a pilot survey for distributors yet, we are actively engaging with stakeholders to shape the survey questionnaire and facilitate its distribution. Our efforts include collaboration with industry leaders such as Credit Suisse (now ongoing discussions with UBS), and outreach to industry associations like Schweizerischer Bankverein (SBV) and Liechtensteinischer Bankenverband.

4. **Analysis of transparency regulations and sustainability-focused disclosure requirements in the DeFi and TradFi systems**

We conducted a comprehensive analysis of transparency regulations and sustainability-focused disclosure requirements in the DeFi and TradFi systems, particularly in Switzerland (Chenaux et al., 2023). While sustainability requirements in Switzerland are largely based on voluntary guidelines, recent efforts by the Federal Council aim to strengthen self-regulations and introduce sustainable financial product disclosure requirements. There is an opportunity to better align Swiss sustainability frameworks with global regulatory trends like those in the EU and the US.

Switzerland provides favorable conditions for platforms that are using distributed ledger technology, supported by the clear set of rules established by the DLT Act[2], which offers an advantageous legal and regulatory framework, for digital platforms.

In the context of DeFi, FINMA has proactively issued guidance for these platforms, enabling compliant issuance of securities without intermediaries. This streamlines the creation of securities, reduces costs, and classifies asset-backed tokens as financial instruments under Swiss law, subject to regulatory obligations akin to traditional financial instruments. This

[2] See Federal Council brings DLT Act fully into force and issues ordinance.

classification exempts issuers from certain licensing requirements, presenting digital platforms with an opportunity to offer innovative solutions while maintaining regulatory compliance. You can access the full report here for more details.

Our initial recommendations to the Swiss regulators include: (1) exploring the compatibility of disclosure frameworks across jurisdictions, e.g., through substituted compliance; (2) ensuring that financial market participants can access data on investee companies for their reporting obligations, for instance, by establishing standardized and accessible data repositories, implementing interoperable data formats, and encouraging the adoption of common reporting standards among financial market participants; and (3) focusing on transparency for decision-useful information by establishing disclosure requirements (a) at the product and provider level, (b) with science-based metrics, (c) considering engagement policy, and (d) on the potential of investee companies to improve their sustainability performance.

5 Evaluation of results to date

The application of smart contracts and tokenization in the field of renewable energy is nascent and the literature on the topic is scarce. To the best of our knowledge, this project is the first to make advances in analyzing stakeholder know-how, engagement, and application of blockchain technology to scale financing of renewable energy infrastructure. The positive feedback from presentations suggests that the topic is of high interest, yet knowledge is scarce and willingness to devote time to understand the topic from a research angle and answer surveys is low. This makes data gathering challenging.

We've experienced a fragmented know-how between the stakeholder participants. Particularly, Originators and Investors, despite being the largest potential benefactors of the application of this technology due to regulatory compliant disintermediation, appear to be less knowledgeable, whereas from our preliminary engagements it appears that the Distributors, traditional financial intermediaries, are more aware of the potential to leverage the technology to reinvigorate their processes to save overhead costs.

The fragmented stakeholder awareness suggests strong potential for our surveys to shed light on the difference between Decentralized- and Traditional Finance for scaling renewable energy investments. Their further implementation in the next Working Packages of the project is expected to yield more insights into the topic.

Regarding the tokenium, the findings from our pilot suggest that there is demand for tokenized RWAs from both issuers and investors. This demand is likely to drive the growth of the tokenized RWA market in the coming years.

Below are some specific examples of how tokenization could be used to address the TradFi-related pain points identified in the survey:

- Cost: Tokenization could help to reduce the cost of issuing and trading RWAs by eliminating the need for intermediaries such as banks and brokers.
- Time: Tokenization could help to speed up the process of issuing and trading RWAs by automating many of the manual tasks that are currently involved.
- Outreach to investors: Tokenization could make it easier for issuers to reach investors from all over the world by allowing them to trade RWAs on various exchanges.

Overall, the pilot results suggest that tokenization has the potential to make RWAs more accessible, liquid, and efficient. This could lead to significant benefits for both issuers and investors.

6 Next steps

1. **Ethical review and approval:** Seek approval from the Ethical Committee of the University of Zurich (UZH) Department of Banking and Finance for the investor survey. Many academic journals highly value this ethical clearance as a prerequisite before disseminating the survey.
2. **Investor survey pre-testing**: Conduct a preliminary survey pre-test using Prolific, a market research platform, to ensure the comprehensibility and clarity of investor-related questions, thereby enhancing the reliability of the forthcoming full-scale survey. We will also test the surveys with non-professionals to make sure the questions are clear.
3. **Full-scale investor survey deployment:** Engage Intervista, market research platform, to facilitate the comprehensive distribution of the investor survey with the objective of achieving a target participation rate exceeding 1,000 responses, ensuring statistical significance and robustness of the data collected.
4. **Originator and distributor engagement:** Initiate proactive engagement efforts with a diverse set of originators and distributors on a global scale, with a specific goal of involving over 50 originators and 20 distributors. Outreach channels encompass various entities, such as the Liechtensteinischer Bankenverband (including Bank Frick, LGT, and VP Bank), the E4S community (including Vontobel, Asteria Investment Managers, Symbiotics, Lombard Odier, Pictet, ZKB, Romande Energie, Eurofima, and Holcim), Credit Suisse and UBS (Digital Asset Team), SIX / SDX, McKinsey, and PwC.
5. **Refresh analysis:** With the new results from the originators, investors and distributors surveys, we will be able to provide more robust evidence about the tokenium and the perception of DeFi. Finally, we will discuss the importance of regulation to unlock the potential of DeFi.
6. **Comprehensive research report:** Develop an in-depth research report that focuses on the pivotal role of the financial system in supporting renewable energy, with a specific emphasis on the utilization of green bonds. The report will also elucidate the limitations within traditional finance (TradFi) and propose strategies for enhancing these shortcomings through decentralized finance (DeFi) innovations.

7 National and international cooperation

This project is in collaboration between the University of Zurich (UZH), the University of Lausanne, and the Enterprise for Society (E4S) center, a research and action center created by three institutions of academic excellence: the University of Lausanne through its Faculty of Business and Economics (UNIL-HEC), the Institute for Management Development (IMD) and the Ecole Polytechnique Fédérale de Lausanne (EPFL), under the stewardship of its College of Management of Technology.

8 Communication

The project has been presented at the following seminars and events:

- P. Berntsen. “Accelerating the energy transition through financial innovations.” Building Bridges 2023 Conference, 4 Oct. 2023, Geneva, Switzerland.

- P. Berntsen. “High costs for issuers and investment threshold, illiquidity, and lack of transparency for investors.” E4S Action Lab Workshop, 4 Oct. 2023, The International Institute for Management Development (IMD), Lausanne, Switzerland.
- P. Berntsen. “DeFi and the Future of Money.” From Idea to Startup – FinsureTech Hub, ETH Zurich, 1 Apr. 2023, ETH Zurich, Switzerland.
- P. Berntsen. “Building an Ecosystem for Impact using DeFi.” Showcase 2030 Sustainable Innovation Summit, 31 May 2023, SwissTech Convention Center, Lausanne, Switzerland

9 Publications

Berntsen, Philip and Leippold, Markus, The Monetary Benefit of Tokenizing Renewable Energy (September 14, 2022). Available at SSRN: https://ssrn.com/abstract=4219222 or http://dx.doi.org/10.2139/ssrn.4219222. To be published as a paper after analysis of surveys.

10 References

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11 Appendix

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