BLOCKCHAIN SPECIAL EDITION

OF CLIMATE CHANGE MITIGATION ACCELERATION

A SOLUTION LOOKING FOR A PROBLEM?

Reaching Net Zero by 2050 will require a herculean effort. Solutions that can promote systemic change and further the transition to a zero-carbon economy are much needed. Is blockchain one such solution? Our special edition on blockchain-related climate solutions does not attempt to give a definitive answer to this question. Rather, we provide background for the argument, present prominent research, and showcase a variety of cutting-edge solutions. The two key reservations we have are the sustainability of blockchain as a technology, and the degree to which it offers a cheaper, faster and better solution. On the first, the technology's energy consumption has been a focal point of criticism. Of particular issue is the energy intensity of mining crypto currencies. While this remains a major issue, our focus here is assessing the theoretical potential of the technology, and the solutions it could unlock.

SUBSCRIBE HERE

IS BLOCKCHAIN THE KEY?

When it comes to assessing the advantages of distributed ledger technologies, it is important first to give context. There are three parallel paths to achieving Net Zero. They are all important, albeit not equally important. A first path is the "less harm" path, where high emitters find solutions to reduce GHG released into the atmosphere. Cement and steel, two key materials for our society, emit a lot of CO2e during their production phase and it is crucial that these industries decarbonize. The oil & gas industry also has a key "less harm" role to play in terms of scopes 1 and 2, with less natural gas flaring or less methane released during oil & gas E&P phase, being activities directly under their control. Alongside this "less harm" path we have the solutions that promote systemic change. These are products and services that move us away from Business as Usual. iClima focuses very much on this second path; an "exclusion and innovation" approach, where a myriad of applications allows us to satisfy our needs for food, electricity, communication, heat and transportation in lower carbon ways. We can drive a battery electric vehicle as opposed to an internal combustion engine, we can eat a plant-based burger as opposed to a beef one, we can use telepresence as opposed to fly on planes to meet in person, we can produce electricity from renewable sources as opposed to using fossil fuel power plants. These two first paths are about not emitting GHG into the atmosphere to begin with. Having said that, there is a need to sequester carbon that is already in the atmosphere; the third path. The only proven and potentially economical way of doing so is the use of nature based sinks. Carbon offsets in the voluntary market have often been referred to as a way to claim carbon neutrality. While a company cannot offset its way into Net Zero, it can claim carbon neutrality by use of carbon credits and this market has potential to evolve and provide a mechanism for more afforestation and reforestation projects.

Can blockchain help accelerate and better solve these issues? We note examples such as Yale's climate accounting open source shared protocols platform Open Climate and the Ethereum based Blockchain for Climate Foundation, looking at concrete use cases of digital innovation to drive climate action is the focus of Climate Ledger Initiative, and the World Bank backed Climate Warehouse, attempting to link climate markets registry systems. What we did was to engage directly with co-founders and senior managers at Frigg, Flexidao, Moss Earth and Power Ledger. These four new climatech ventures looking at advancing blockchain based solutions with real climate change impact. In this newsletter we share more details on their theory of change.

Is blockchain the key for systemic change in the path to Net Zero?

Cryptocurrency and the application of blockchain technology have progressed leaps and bounds since it first went mainstream in 2017. As of 2021, there were nearly 300 million active crypto users worldwide, with roughly 18,000 businesses accepting some form of cryptocurrency as payment. Entrepreneurs and developers alike had to take one step back to take two steps forward; beginning with understanding the features which make the technology an attractive proposition, and only then exploring feasible applications; applications that can disrupt their respective industries. Blockchain, as we know it today, offers a tamper-resistant distributed ledger such that no one entity governs the network. When two parties transact on a particular chain, an entry is made to a ledger and is available for all to see. Most blockchains contain a series of rules and consensus mechanisms to ensure that there is agreement on the state of the network amongst various computers dispersed around the world, irrespective of computing power or quality of internet speed.

What benefits does this bring us? IBM lists five:

- Enhanced security
- Greater transparency
- Instant traceability
- Increased efficiency and speed
- Automation

Alongside a blockchain network, many projects also issue tokens to unlock the full range of capabilities a blockchain can provide. From serving as a simple method of payment to representing equity ownership in a physical or nonphysical asset, and adding utility to a particular cryptocurrency project's framework, the functionalities of tokens and the methods to incentivise users to participate are endless. However, as the entire cryptocurrency market ballooned to an all-time high of ~$2.9 trillion in early 2021, the consensus remains that 'blockchain is the future' without many understanding how and in what capacity. A lot of the articles published have established blockchain as the answer to many things but in the context of this edition, the question remains, how can blockchain be implemented in decarbonising the planet? In the next section, we will explore some key problems being faced within climate change-related markets.

Existing Applications

New and emerging markets within the climate change space are not without their problems. First, there is peer-to-peer (P2P) energy trading, which entails a platform that allows "ProSumers" to sell excess electricity at the desired price to consumers willing to pay that price. Whilst P2P trading improves accessibility for prosumers looking to buy and sell green energy, it faces many issues in its current state. From a security standpoint, the threat of a data-diddling attack is a serious issue, whereby an attacker could compromise data integrity and alter the data of any participant in the network. Looking further at privacy, participants who frequently engage in multiple transactions may not want their personal information being revealed when communicating with many different counterparties. Next, from a technical point of view, energy optimisation can be hindered when the communication infrastructure within a distributed network fails to effectively coordinate the demand and supply of electricity, due to data not being in a state of sync across all participants. This can result in the market forces underpinning the entire configuration, becoming inefficient, even leading to the possibility of overload.

Zooming out a bit more and other challenges, across renewable energy markets as well as carbon offset markets, have arisen, primarily from the inability to accurately trace where a particular offset or unit of electricity originated from. How do we know a provider hasn't overestimated the avoided emissions of a project? In what way can we tell whether there has been double issuance or a double claim for the same offset? How do we know if the energy we believe to be from 100% renewable sources actually is or not? As companies become increasingly mindful of sustainability reporting, the emphasis on tracking all their data has never been greater. In energy markets currently, the inefficiency of the system requires companies to manually interact with third parties to forge an audit trail, meaning the probability of there being errors remains a real risk. Similarly, in offset markets, a high degree of trust is placed in offset providers to ensure both that there have been no mistakes in the calculation of offsets generated, and that the actual impact of a project has been realised.
Where transparency, security, and traceability - or a lack thereof - have highlighted the flaws in many green markets, the inaccessibility of capital in the project financing space, particularly across emerging markets, has also slowed progress in the energy transition. According to a survey of 992 senior managers involved in energy investment decision-making across the G20, 31% cited that initial capital was a barrier to investment, with 34% also citing a lack of information available to inform decision-making. We know that the effective reallocation of institutional money will ultimately dictate whether or not we meet our Net Zero targets, however, is there another way to fill the gaps in financing?

CASE STUDIES

In the quest to understand further whether blockchain can tackle some of these key problems described, iClima presents four innovative companies who believe they have the solutions: Powerledger, Flexidao, Frigg Eco and Moss Earth.

1 POWER LEDGER

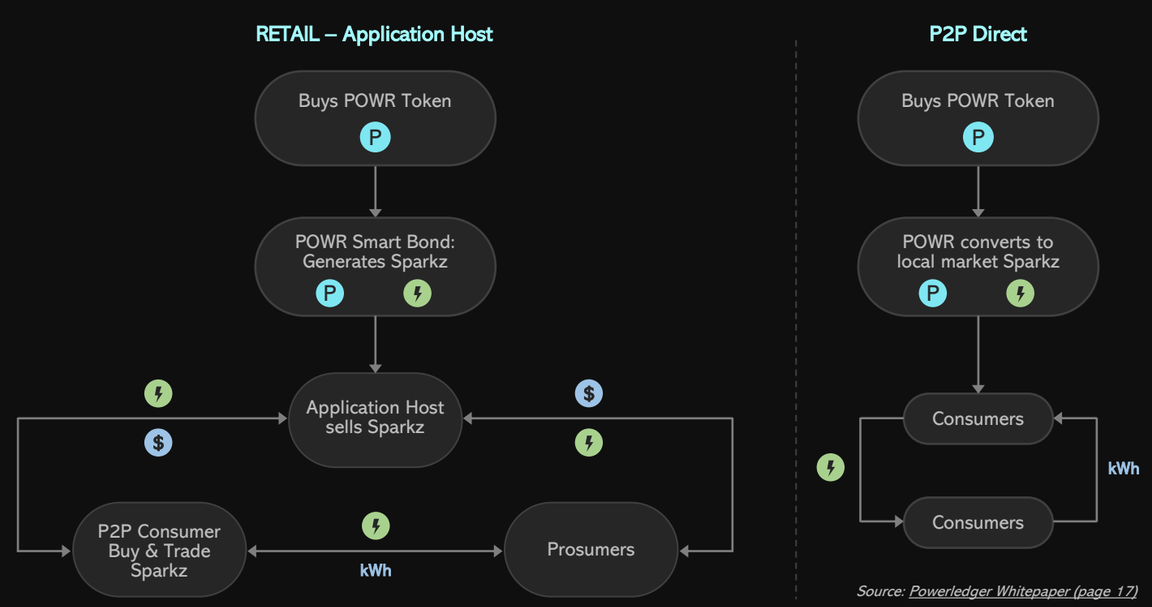
Power Ledger is the perfect example of the power of blockchain, and is particularly exciting given its potential to unlock distributed energy generation – an iClima favourite. The system functions as a marketplace where those with solar panels on their roofs, termed 'prosumers' (consumers + producers), can sell excess energy to their neighbours. Traditional energy systems have relied on centralised production with relatively fixed prices and overseen by large utility companies. Here, energy is typically sold on the international market, meaning prices are vulnerable to geopolitical shocks, as we have seen during the current energy crisis. By contrast, a system of distributed generation enabled by the Power Ledger marketplace allows prosumers to sell their electricity at the desired price to consumers who are willing to pay that price (rather than selling to a utility company at a reduced rate) while also giving consumers a lower price.

The platform functions through the trading of units termed 'Sparkz', which are backed up by a blockchain bond called POWR tokens. Two setups are possible: firstly, a local market can be run by an 'Application Host' such as a utility company or electric vehicle (EV) charging services provider. In this instance, the Host sells the Sparkz to consumers and prosumers, who can trade them for energy, before selling them back to the Host for fiat currency. The Host can monitor performance in real time, thus ensuring grid optimisation and stability. Secondly, the simpler 'Direct' setup involves prosumers and consumers buying the initial POWR tokens to gain access to the platform, before trading them in for Sparkz, which producers can convert into fiat currency.

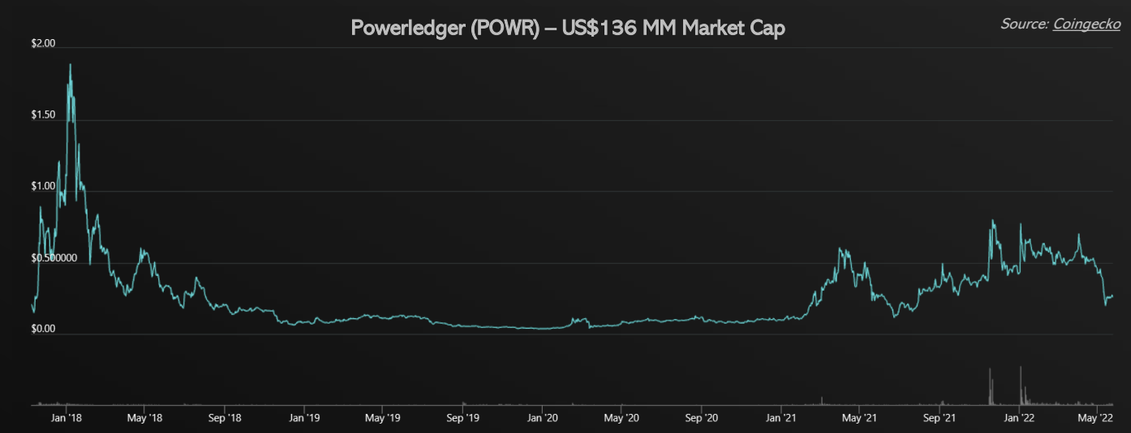
The system has a number of advantages. Firstly, the simple lack of an intermediary leads to lower costs and higher flexibility. Secondly, the use of cryptocurrency means that transactions are settled almost instantly, and stored automatically in a transparent and secure ledger. This creates an audit trail that is simple and compliant from a regulatory standpoint. A third benefit of Power Ledger enabled distributed generation is the potential for load balancing, frequency management and demand side response management by an Application Host or other entity. This functionality is critical for a grid based predominantly on intermittent renewable sources of energy, and is something that a traditional centralised arrangement would struggle with. Finally, this system allows for the seamless integration of electric vehicle charging stations into the local grid, unlocking the power of vehicle-to-grid (V2G) technology.

In the case of distributed generation, blockchain represents a very real solution put to work on a very real problem.

Ecosystem's Application Layer:



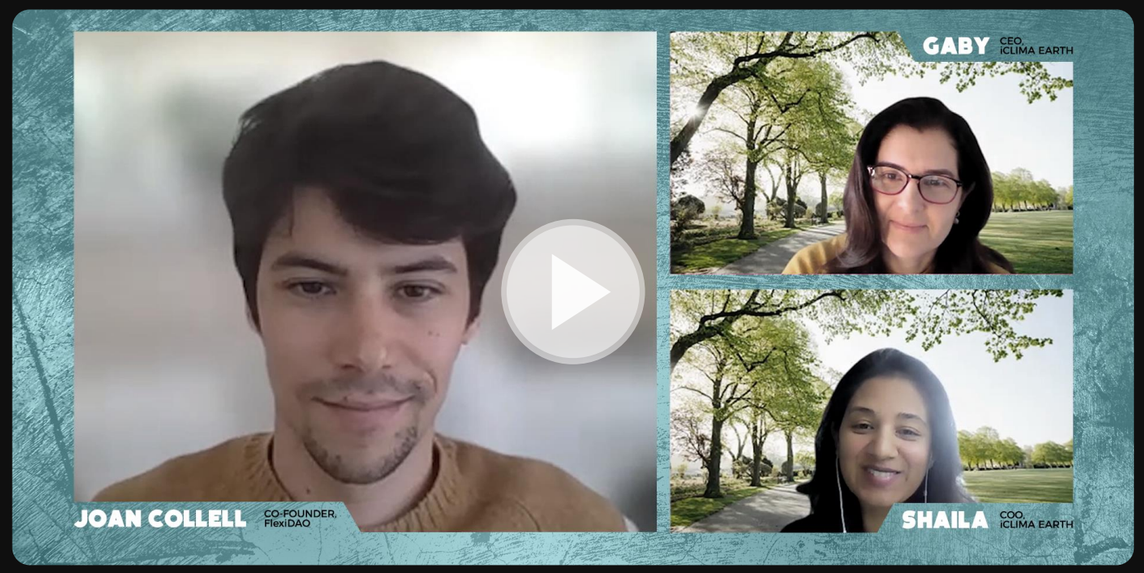
Source: Powerledger Whitepaper (page 17)



2 FlexiDAO

Joan Collell is COO and co-founder of FlexiDAO. FlexiDAO is harnessing the revolution in blockchain technology to enhance transparency, a much-needed prerequisite for a successful low carbon transition. With the intermittency of renewable sources, what we think is 'green' energy, may actually be coming from fossil fuels while the wind doesn't blow or the sun doesn't shine, and it is devilishly difficult to find out whether this is indeed the case. The current system of energy source tracing relies on certificates which do not reflect the physical reality of the grid hour by hour. This is becoming a significant problem for those trying to set credible net zero targets, and regulators trying to monitor them.

FlexiDAO uses blockchain to tackle this problem. Their solution effectively matches business consumption with renewable energy output statistics in order to determine whether supposedly 'green' energy can actually be termed so. The certification is thus transparent, granular and works in real time. The innovation has been well received, with Collell's fledgling company already partnered with global giants like Microsoft and Vodafone. Indeed, as regulation tightens and consumer pressure increases, demand will inevitably grow for such a solution. Indeed, Collell believes that there is huge scope for a scale-up of FlexiDao's solution in both the short and long term, with the company looking at once to cover entire value chains for the organisations it is already involved in, while also expanding its reach to new players. Join us as Joan offers a fantastically simple explanation of the problem, FlexiDAO's solution, and the road ahead. In a similar way to GHGSat which we covered in last month's special edition, this is one of those innovations which could genuinely move the needle on emissions reductions, once again through enhancing transparency.



Apple Google Spotify

3 FRIGG

Frigg.eco is a marvellously simple idea brought to life by cutting edge innovation. Together, these two component parts have the potential to revolutionise the way in which we finance climate change solutions around the world. If we are to meet our collective climate goals, we need a rapid and drastic scale-up of this financing; 590% according to the Climate Policy Initiative. A number of barriers exist to investment in the necessary projects, which range from sustainable infrastructure, to clean water processing and all forms of renewable energy generation and distribution: CAPEX can be high, investors perceive projects to be risky, funding structures are as yet underdeveloped, progress can be hard to measure, returns remain uncertain and the majority of interested investors remain those to which these barriers are especially significant, for example small scale impact-focused investors or risk averse institutions.

Frigg single-handedly circumvents most of these barriers. The premise is simple; what if we could split large investments into a lot of much smaller ones, which could then be made easily accessible to all types of investors. Even better, what if investors were not locked in, able to cash out their return easily and trade the rights to the investment at will. Five years ago, these would have been stimulating questions, but perhaps no more. That has all changed, however, with the development of blockchain, which has allowed this vision to be brought to life. Frigg's brilliant solution was to tokenise these projects, thus splitting major investments up into myriad smaller ones, with the tokens then sold on the Frigg marketplace. Tokens can be based on both equity and debt financing structures and can be bought or redeemed in most forms of currency. In this podcast, we hear more from one of Frigg's inspirational co-founders, PHD student Philip Berntsen. As always, we hear about Berntsen's own journey, as well as the practical power of Frigg's idea and its potential impact. This is the perfect example of crypto in action, tackling real and important solutions.

Apple Google Spotify

4 MOSS EARTH

Moss Earth has simplified carbon offsetting processes, by guarantee the traceability and transparency of the carbon certificates via blockchain technology. Moss has tokenized governance and economic rights to small forest areas into NFTs. Individuals and companies can therefore buy an Amazon NFT through Moss and protect a piece of the forest. Moss has incorporated carbon credits into the MCO2 token, listed on some of the largest global exchanges like Coinbase, Gemini, and Uniswap.

The four cases we present above do seem to indicate that their architecture based on blockchain enables a faster, cheaper and more transparent solution. Web 3.0 may indeed help accelerate the transition!

IS THE ZUG BASED TOUCAN PROTOCOL THE SOLUTION MISSING FOR REGENERATIVE ECONOMY?

Previously examined were a couple of endemic issues within the carbon offset industry, namely credit validity, transparency, and double counting. A new and creative application of blockchain, Toucan, could offer solutions to these issues.

Adding fungible value to retiring offsets is something previously unseen, but it could create the chance for carbon offset projects to grow in number, be validated, and verified as well as accrue a financial return for the investor.

This is how it works: already established VCM standardising bodies (VERRA, Gold Standard) are linked to the Toucan ecosystem through a carbon bridge, with each real, verified offset from each of these bodies linked to a Toucan offset. Once the 'real' offset has been retired, its Toucan counterpart is placed into a carbon pool of tokens with similar characteristics (as each token is not homogeneous). In return for this fungible carbon reference, tokens are provided, which can be used across many decentralised finance applications such as mining, NFTs and collateral for borrowing.

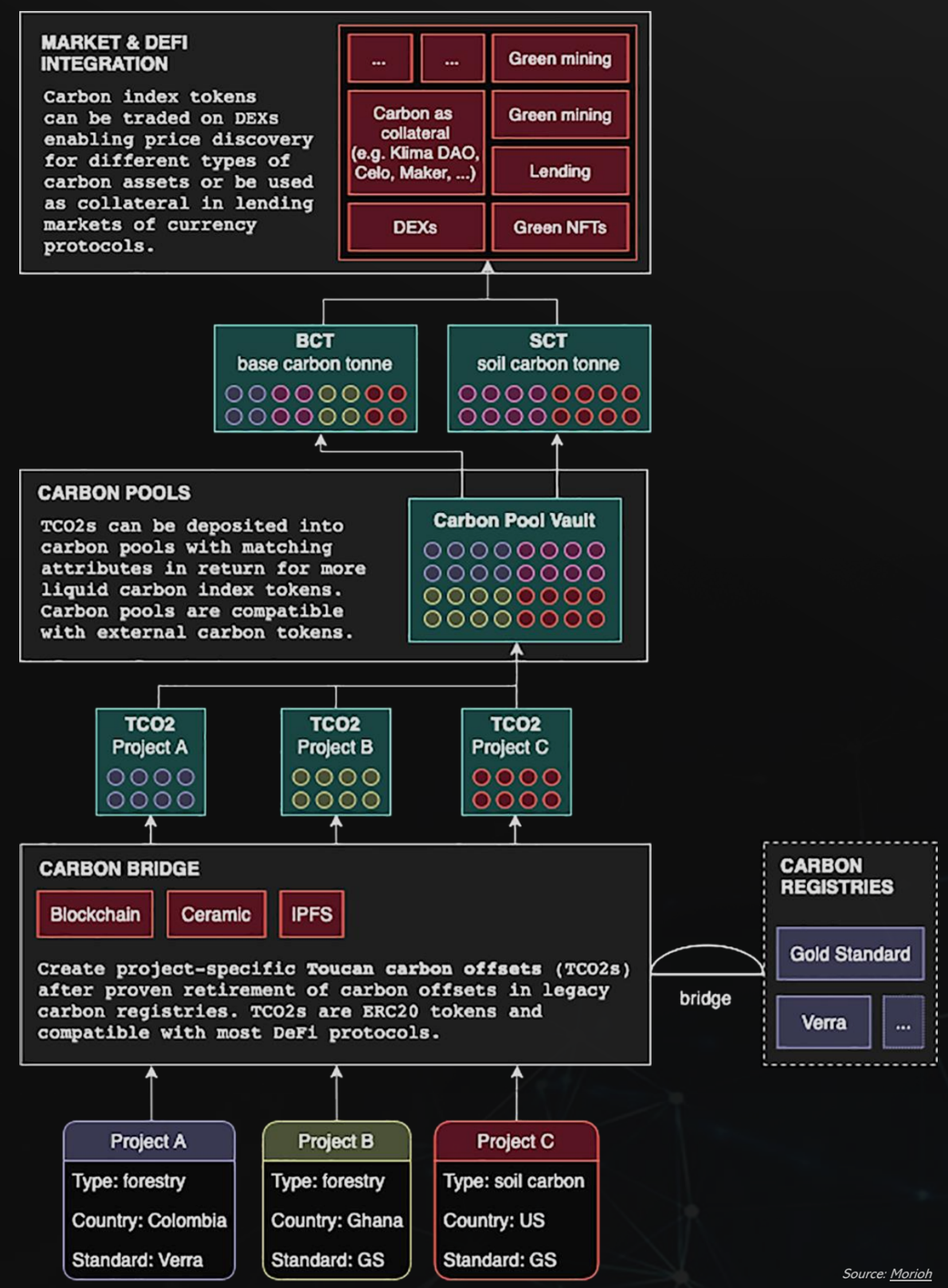
Again, each carbon reference token is backed by a real carbon offset that has been verified by the producers/standardising body and retired.

If this process were to become widespread it could finally monetarise carbon offsets in a way which would not risk credits being traded in exchange for polluting allowances as well as provide much needed liquidity into the market. This process could provide the VCM the necessary transparency that is being repeated as a staple issue throughout the industry.

Toucan Protocol – US$40 MM Market Cap

Source: Coingecko

The Toucan Architecture



Source: Morioh