THE GREEN BLOCK REPORT

EDITION 2023

WEB3 & AI IN SUSTAINABILITY

Roland Berger

CRYPTO OASIS VENTURES

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Foreword

Contemporary businesses, irrespective of their scale or industry, are increasingly cognizant of the profound implications of Environmental, Social, and Governance (ESG) matters, commonly encapsulated under the umbrella of sustainability. This awareness spans a broad spectrum, encompassing both external pressures from stakeholders and evolving internal considerations that significantly influence decision-making at executive and board levels. In today's dynamic landscape, societal and consumer expectations place a premium on companies actively contributing to the resolution of challenges such as climate change, diversity and inclusion, retail protection, and education.

The Blockchain industry, a dynamic and transformative sector, is not exempt from this paradigm shift; instead, it actively embraces and responds to it. Its role unfolds in a dual manner – addressing internal ESG challenges, such as the imperative to reduce carbon emissions in its operational practices, while concurrently endeavouring to act as a catalyst for carbon reduction through the innovative application of Blockchain technology. Blockchain technologies, with their inherent transparency and decentralised nature, are increasingly hailed as potential solutions that can offer novel, positive, and socially and environmentally impactful alternatives or complements to traditional approaches.

An illustrative example of this is evident in the deployment of Distributed Ledger Technology (DLT), the foundational technology supporting Crypto tokens. DLT is currently being harnessed to confront environmental challenges, with the tokenisation of traditional carbon offsets on the Blockchain introducing enhanced transparency and assurance mechanisms for purchasers, ensuring that carbon offsets genuinely contribute to intended projects.

Leading corporations, such as Google and Microsoft, are proactively addressing the environmental impact of their operations. Google, for instance, has set a target to operate its data centres on carbon-free energy by 2030, while Microsoft aims not only to be carbon-negative by the same year but also to achieve 100% reliance on renewable energy by 2025. The Blockchain industry is echoing this commitment by exploring energy-efficient alternatives to proof of work (PoW), such as Ethereum's transition to proof of stake (PoS), promising a staggering 99.95% reduction in energy consumption.

Globally, initiatives such as The Green Block, championed out of the Crypto Oasis in Partnership with Roland Berger, demonstrate a keen understanding of the intricate relationship between the expansion of the Blockchain ecosystem and the progression of ESG objectives. The primary goal of The Green Block is to function as both a Think Tank and a launchpad for ESG projects within the realms of Web3 and AI. Having initiated operations earlier in the year in the UAE and later launching at the Swiss Web3 festival during the summer, The Green Block is actively engaged in establishing a collaborative environment for projects, institutions, investors and other major stakeholders in the ecosystem. The release of this report marks the initial stride towards establishing thought leadership in this domain.

The timing couldn't be more opportune to highlight The Green Block, considering the UAE's distinguished efforts in fostering a favourable environment for Blockchain enterprises. Paired with a dedicated commitment to curbing carbon emissions through inventive policies and investments in low-emission technologies, the convergence aligns seamlessly with the occurrence of COP28. The UAE's proactive stance makes it an ideal moment to showcase The Green Block's ecosystem.

However, even as the Blockchain industry champions the benefits of its technology in addressing ESG concerns, it must introspect and address its own responsibilities, particularly concerning carbon emissions. Policymakers are actively engaged in assessing regulatory frameworks for Cryptocurrencies as a new asset class, meticulously examining energy consumption, and exploring avenues to mitigate the industry's carbon footprint.

Recognising the growing interest among policymakers in low-emission technologies, the Blockchain industry underscores the imperative for collaborative efforts between the public and private sectors. Although the cost of these technologies remains a challenge, collaborative initiatives are deemed essential for driving innovation, reducing costs, and scaling up the supply of low-emission technology.

The journey toward these ambitious goals necessitates strategic partnerships between government entities and industry players, with the UAE setting a commendable example. However, stakeholders globally must acknowledge that sustained global efforts are imperative to navigate the intricate intersection of Blockchain technology and ESG considerations.

The Green Block's Vision for a Sustainable Digital Age and Digital Freedom

In the vast tapestry of the 21st-century digital frontier, digital assets, Web3, and AI offer not just technological leaps but transformative solutions to our world's most pressing challenges. The pace and profundity of the digital revolution have been breathtaking. Yet, as with any transformative journey, it's the vantage point that defines the view. As the leader of the global digital assets, Web3, and Metaverse practice at Roland Berger, I've had the pleasure of witnessing, firsthand, the evolving dance between technology and sustainability. It provided me with a front-row seat to the innovation and dedication with which visionaries, technologists, and pioneers approach these challenges, turning them into opportunities.

"The Green Block," our collective endeavor, seeks to amplify this harmonious confluence into a global movement. Our current environmental and societal challenges are not mere hurdles but intricate puzzles, demanding a nexus of innovation, collaboration, and vision. ESG metrics, no longer merely benchmarks, act as catalysts driving intersectionality of sectors, stakeholders, and solutions. Approximately 85% of the ESG KPIs can be boosted by technology. The core of these solutions can often be found in the most advanced technological frontiers:

Digital Assets - The Universal Equalizer: Digital Assets are perhaps the most inclusive value asset globally. In places where conventional banking remains elusive, Crypto offers a bridge to economic participation, erasing traditional barriers. My firm belief is that by 2030 most of the value we transact will in the form of Digital Assets.

AI - The superpower co-pilot: Breakthroughs in generative and predictive AI is leveling the playing field for anyone on earth with the motivation to create and compete in a global economy. Barriers and thresholds to participate have been significantly reduced. In theory humanity is looking towards a future where it can focus stronger on the core elements of sustainability, prosperity, and philanthropy.

Web3 – a trust machine with new economic opportunities: Web3 will not only de-monopolise the value flow on the internet, it also serves as the necessary trust machine in a world that's powered by AI and trustless transactions. It will boost inclusion, fairness and prevent green washing.

However, recognising potential is merely the first step. The Green Block's core vision revolves around nurturing these intersections into tangible, global solutions. We aim to establish an ecosystem that not only identifies but fosters and accelerates sustainable projects, integrating startups, corporates, governments, and innovative ideas.

The horizon I envision for The Green Block is one teeming with promise. As a member of its steering committee, I see it blossoming into the global crucible for sustainable digital transformation and digital freedom. Each project, each innovation pushes us closer to a future where technology's exponential growth is in harmony with its vision for an inclusive, green world. A future where technology aids prosperity of humanity and the planet.

I invite you to join us on this monumental journey. Let's co-create a digital era where sustainability and freedom isn't an afterthought but the very foundation.

Pierre Samaties
Partner, Roland Berger
Steering Committee Member, The Green Block

The Green Block
Pioneering a Sustainable Future Through Web3 Empowered Solutions

In a world grappling with the challenges of environmental degradation, social inequality, and evolving corporate governance, The Green Block emerges as a beacon of innovation and collaboration in the Web3 and AI ecosystem. This groundbreaking initiative, orchestrated by Crypto Oasis Ventures in partnership with Roland Berger, marks a transformative stride toward leveraging the potential of Web3 and Artificial Intelligence (AI) in fostering sustainability. The Green Block's inaugural report stands testament to its commitment to creating the landscape of Environmental, Social, and Governance (ESG) projects in Web3 and AI on a global scale.

At its core, The Green Block is more than a

think tank; it is a launchpad for envisioning and showcasing cutting-edge solutions that transcend geographical boundaries. Embracing the ethos of promoting corporate governance, environmental sustainability, and social responsibility, this initiative is a response to the pressing need for concerted efforts to address the challenges outlined in the UAE's COP28 initiative and the United Nations Sustainable Development Goals (SDGs). By concentrating on aligning industry efforts with these global aspirations, The Green Block aims to shape a sustainable future that transcends borders.

Nurturing Global Sustainability Beyond Borders

The Crypto Oasis Ecosystem, a flourishing ecosystem in the Middle East and North Africa region, has provided the fertile ground from which The Green Block emerges. With more than 1,800 organisations and over 8,650 individuals actively contributing to the vibrancy of the Crypto Oasis, The Green Block is poised to delve into specialised niches requiring heightened attention, time, and dedication. The focus is a strategic move, recognising the inherently global nature of the challenges we face. As The Green Block takes root during the journey to COP28, its ambition is to grow exponentially, transitioning into a rich, all-encompassing ecosystem in the near future.

Looking ahead to 2024, The Green Block is set to make its mark on the international stage, participating at the winter edition of the Swiss Web3 FEST during the World Economic Forum (WEF) in Davos, Switzerland. This endeavour underscores the initiative's commitment to scaling its impact and engaging with diverse stakeholders on a global scale.

The multifaceted approach of The Green Block encompasses deploying capital, connecting projects with investors, and exploring innovative funding instruments like tokenisation. The initiative's focus on enabling infrastructure includes navigating regulatory frameworks, fostering community engagement, organising impactful events, generating insightful reports, and ensuring effective communication channels.

Moreover, The Green Block is positioned as a catalyst for empowering talent within the Web3 and AI space. By connecting projects with thought leadership, facilitating publications, conducting interviews, and orchestrating round-table discussions, it aims to amplify the impact of sustainability initiatives through collaborative knowledge exchange.

Transformative Pioneer in Web3 and AI Sustainability

The Green Block Report highlights the confluence of ESG activities in the Blockchain space in the MENA region. It delves into the pivotal role of Blockchain in the realm of ESG (Environmental, Social, & Governance) initiatives, and underscores the transformative potential of this technology. The Green Block report highlights achievements, stakeholders, key players, and technological innovations in Blockchain projects within the ESG domain.

The Green Block Report provides an important platform for Blockchain thought leadership to share their views on global impact, challenges, and economic sustainability, encapsulating the initiative's multifaceted efforts for a sustainable future. Beyond its association with Cryptocurrencies, Blockchain emerges as a robust solution for building, managing, and reporting on environmental and social impact metrics. The distributed ledger's immutability serves as a model for maintaining ESG metrics across borders and supply chains, ensuring granular data accuracy needed for provenance in this space. The report addresses the contribution of Blockchain as we work towards a sustainable future.

Blockchain's transparency becomes a powerful tool in countering the manipulation of climate and social-related disclosures. The distributed ledger, with its communal accountability, provides real-time impact records accessible to consumers, investors, and regulators alike. Moreover, the trust engendered by the technology allows companies to document the environmental impact of their operations down to the energy source, with the assurance that these records are immutable and true.

In essence, The Green Block's inaugural report not only unveils a comprehensive dive into Web3-empowered sustainability projects but also signifies a pivotal moment in the trajectory towards a more sustainable and responsible global future. As the world navigates intricate challenges, The Green Block stands at the forefront, poised to catalyse transformative change through collaboration, innovation, and a steadfast commitment to the principles of ESG.

In the initial phase of our report, we identified around 400 ESG organizations operating in the Web3 and AI sectors. Nearly half of these entities have been selected to provide our readers with a comprehensive overview of the rapidly evolving industry. We invite organizations within The Green Block's domain to connect with us, enhancing the inclusivity and strength of our upcoming reports. Your input will contribute to making our future reports more thorough and resilient.

The Green Block is a Think Tank and launchpad for Web3 Empowered Sustainability Projects

Benefits of Blockchain

Blockchain has the potential to go beyond Cryptocurrencies and play a significant role in addressing environmental, social, and governance (ESG) initiatives. While concerns about the energy consumption associated with mining coins exist, Blockchain offers solutions for building, managing, and reporting on such matters. For example, The Task Force on Climate-related Financial Disclosures (TCFD) and consumers are pushing for increased reporting on climate-related financial information and value based companies, and Blockchain's distributed ledger technology can provide a pathway to meet these demands.

Traceability

The immutability of the distributed ledger is a model for how ESG metrics can be maintained across borders, throughout a supply chain, and across sectors—ensuring the granular data needed to tackle provenance in this space.

Transparency

Climate and social-related disclosures can be manipulated. The distributed ledger and the communal accountability offered by the Blockchain makes real-time impact records available to consumers, investors, and regulators.

Trust

The distributed ledger helps companies document the impact of their business on the environment. It can go down to the source of energy powering a plant, and know their records are immutable and true.

How Blockchain Maximises the Potential of ESG

ESG responsibility has emerged as a crucial business priority and is now a prominent topic discussed at high-profile events like the World Economic Forum. Different organisations perceive ESG in various ways, whether as a business strategy, self-regulatory initiative, or marketing approach. However, it is clear that achieving positive ESG outcomes is highly beneficial for society. To effectively communicate ESG progress, companies need quantifiable metrics and reliable validation. With increasing scrutiny from regulators and socially conscious consumers, setting goals alone is insufficient.

Blockchain technology can play a vital role in introducing traceability to ESG policies, especially in complex supply chains across different regions. Blockchain's inherent transparency, trust, immutability, and ability to represent assets digitally along value and supply chains make it an ideal solution for enhancing sustainability reporting and credentials.

Repsol, a global energy company, is already leveraging Blockchain to digitise its downstream supply chain, enabling the tracking and certification of physical resources throughout the production process. Blockchain offers numerous opportunities beyond the petrochemical sector, such as tracking the environmental and social impact of value chains in industries like sustainable fashion.

The ability to measure and trace assets aligns with ESG objectives and can provide evidence of their achievement. The potential of Blockchain in supporting sustainability is vast, and as ESG requirements evolve, we can expect to witness further Blockchain applications in the future. The relationship between Blockchain and sustainability continues to grow and strengthen.

Capabilities of AI

Artificial Intelligence (AI) offers several benefits when applied to Environmental, Social, and Governance (ESG) initiatives. Overall, AI brings advanced analytics, automation, and predictive capabilities to ESG initiatives, empowering organisations to make data-driven decisions, improve sustainability practices, and drive positive environmental and social impact.

Analytics

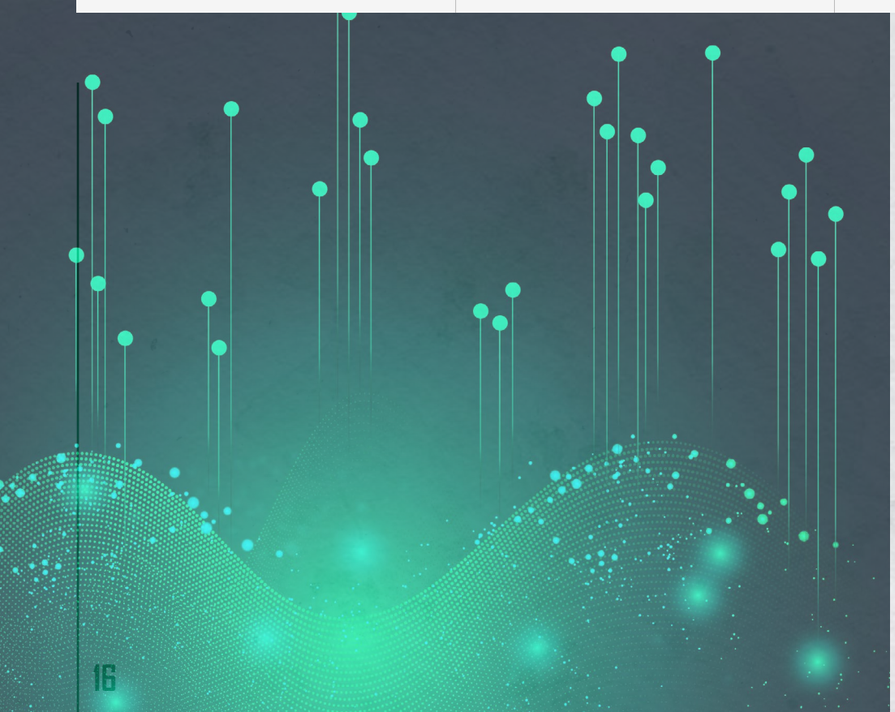
AI analytics is transforming sustainability and ESG efforts. By harnessing advanced algorithms and big data, organisations can optimise resource management, reduce environmental impact, and ensure ethical governance. AI enables data-driven decision-making and promotes transparency for a more sustainable future.

Automation

AI automation drives sustainability and ESG initiatives by streamlining operations, optimising resource usage, and promoting ethical practices. It reduces environmental footprint, enhances social impact, and ensures transparent governance for a sustainable future.

Predictive

AI's predictive capabilities empower organisations to drive sustainability and ESG initiatives. By leveraging advanced algorithms and data analysis, businesses can make informed decisions, optimise practices, and foster a more sustainable future.



How AI Maximises the Potential of ESG

Artificial Intelligence (AI) is a powerful tool that maximises the potential of Environmental, Social, and Governance (ESG) initiatives. Through data analysis, risk assessment, supply chain optimisation, reporting automation, impact investing, and energy efficiency enhancement, AI drives positive change.

AI's ability to analyse vast amounts of data enables organisations to gain valuable insights into environmental and social trends. It empowers data-driven decision-making by identifying patterns, detecting anomalies, and monitoring environmental impacts. This helps organisations track their ESG performance and make informed decisions for sustainable practices.

Risk assessment and management benefit from AI's machine learning algorithms. By analysing historical data and market trends, AI conducts risk assessments and predicts potential impacts. This proactive approach enables organisations to address ESG risks, improve performance, and make informed investment decisions.

AI optimises supply chain management by analysing sourcing, transportation, and logistics data. It identifies opportunities for waste reduction, energy efficiency improvement, and ethical practices. This promotes sustainable sourcing, reduces environmental impacts, and ensures responsible business practices.

ESG reporting and transparency are streamlined through AI automation. Natural Language Processing (NLP) and machine learning algorithms extract and analyse data from various sources, simplifying reporting and enhancing transparency.

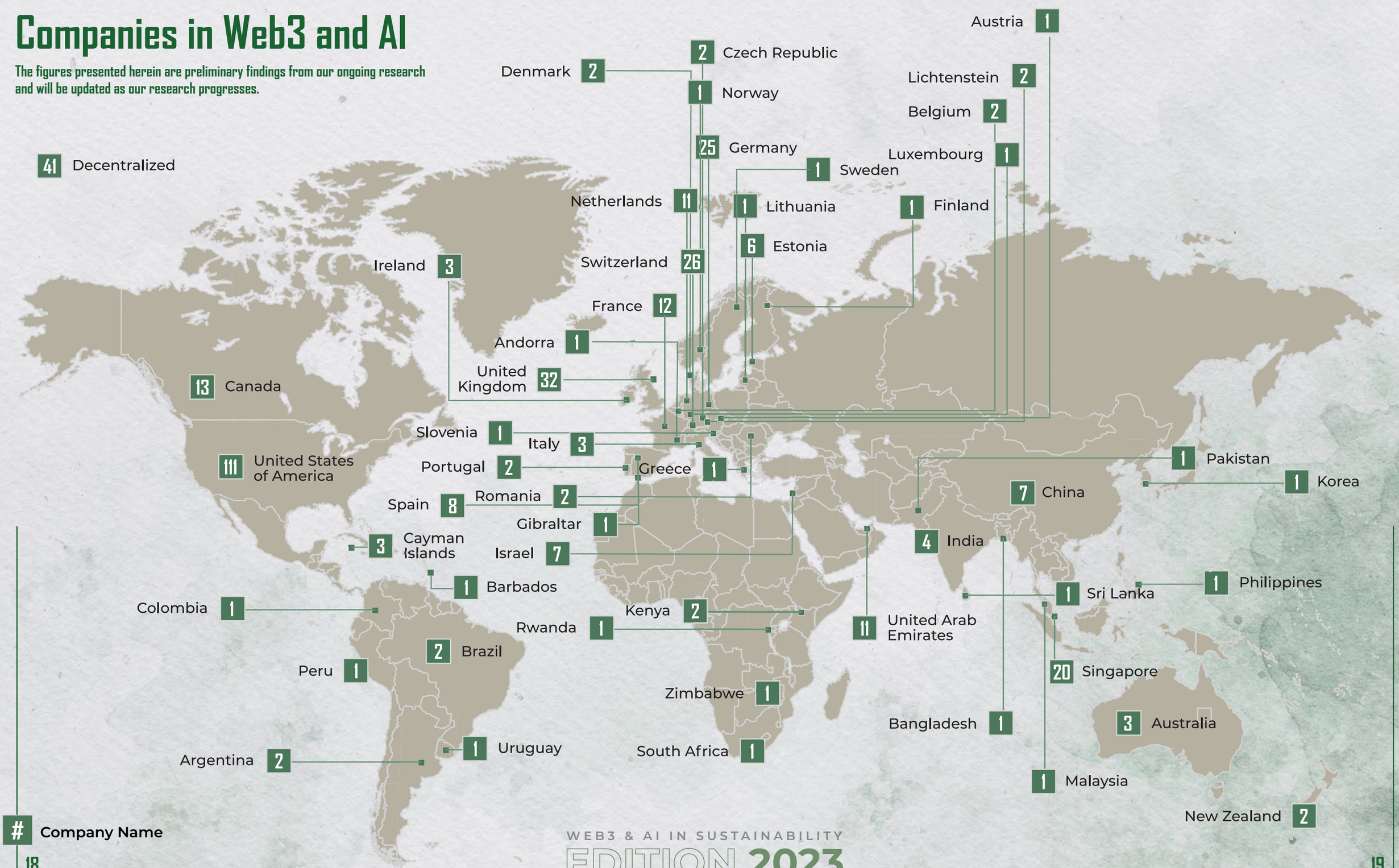
AI facilitates impact investing by analysing large datasets and identifying investment opportunities aligned with specific ESG criteria. This enables investors to allocate resources for projects generating positive social and environmental impacts.

Lastly, AI enhances energy efficiency through advanced analytics and machine learning. It identifies opportunities for energy conservation, optimizing energy usage, and reducing carbon footprints.

In conclusion, AI maximises the potential of ESG through data-driven insights, risk management, supply chain optimisation, reporting automation, impact investing, and energy efficiency enhancement. Its transformative capabilities drive positive change and contribute to a more sustainable and socially responsible future.

Global Distribution of ESG Companies in Web3 and AI

The figures presented herein are preliminary findings from our ongoing research and will be updated as our research progresses.



Company Name

Embracing Sustainability 2.0: A Vision for Transformation

In the fast-evolving landscape of sustainability, the power of technology has emerged as a driving force, redefining our approach to environmental conservation and shaping the future of industries. As we stand at this crossroads, I am keen to share my perspective on the critical role of technology, particularly Web3, in accelerating the changes needed within the sustainability industry.

The urgency of our times demands innovative solutions that transcend traditional boundaries. This is where technology, powered by the principles of Web3, steps in as a formidable ally. Web3, with its decentralised and interconnected nature, has the potential to revolutionise how we address environmental challenges. It offers a platform where collaboration knows no limits, where ideas can flourish and be transformed into impactful actions that drive positive change.

In this paradigm, BEEAH has positioned itself as a pioneer. Over the years, we have harnessed the transformative power of technology to amplify our impact on sustainability. From cutting-edge waste management systems to renewable energy solutions, our journey is a testament to the potential that technology holds in making a difference. By embracing Web3 principles, we can further magnify our efforts, creating a network effect that accelerates progress beyond our imagination.

But the transformation we seek requires more than just innovation. It demands a collective commitment to action. This is where The Green Block comes into play. The Green Block is not merely a platform; it is a dynamic ecosystem that unites voices, resources, and expertise in the pursuit of sustainability. It is a catalyst that amplifies the work of pioneers like BEEAH, creating a ripple effect that resonates across industries and borders.

By aligning our efforts, we create a force multiplier that has the potential to reshape the sustainability industry. The Green Block›s role in supporting and amplifying the work of organisations like ours is paramount. It is a hub where ideas converge, where collaborations flourish, and where the seeds of change are sown. The Green Block›s commitment to technology and its potential for positive disruption make it an ideal partner in our shared mission. Notably, the launch of The Green Block took place at our prestigious BEEAH headquarters, symbolising the shared spirit of aspirations for a more sustainable future.

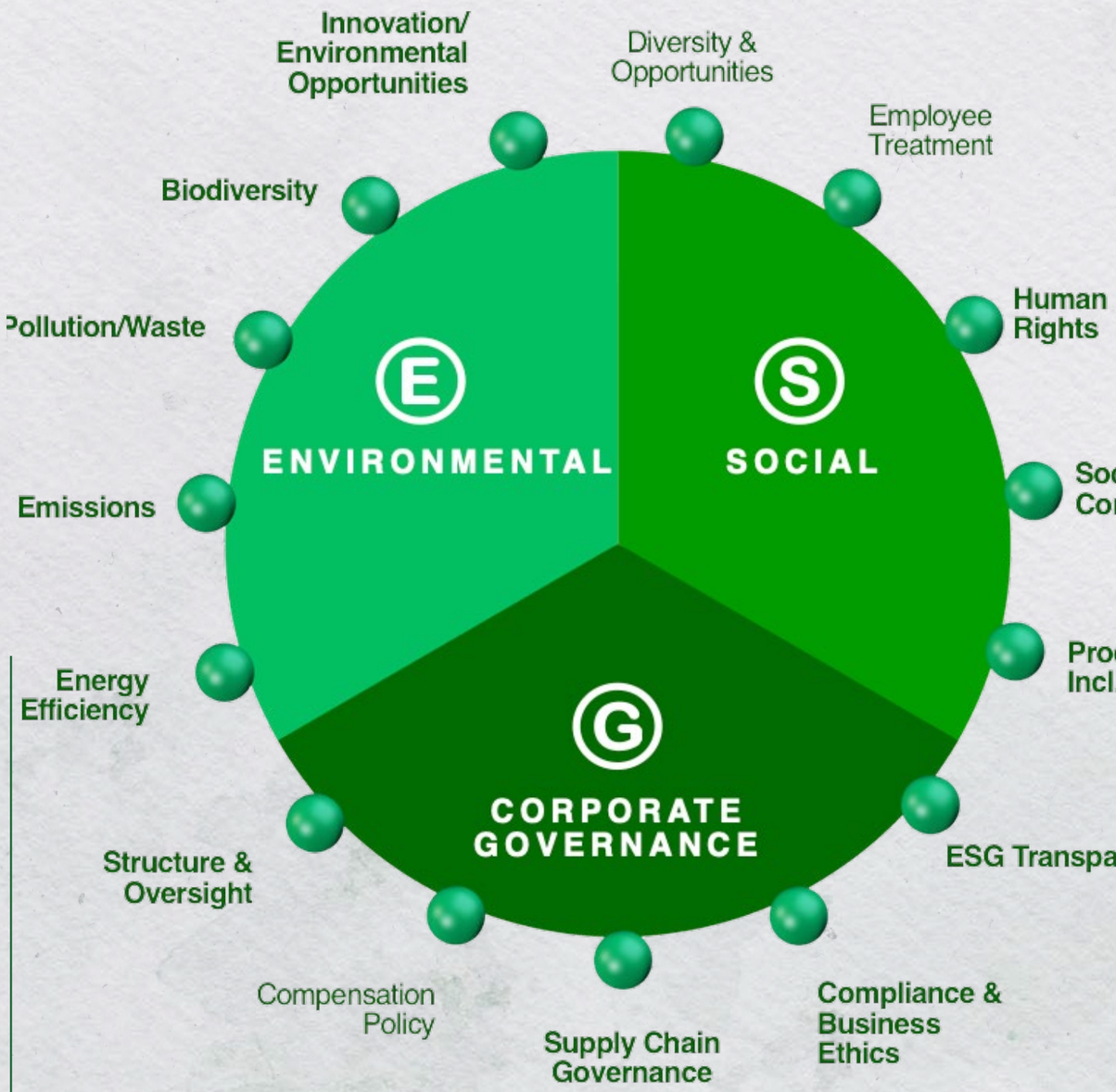
At BEEAH, we believe that the journey towards a sustainable future is marked not only by challenges but also by boundless opportunities. As we embrace the digital era and the principles of Web3, we have the chance to rewrite the narrative of sustainability. Together with The Green Block, we can magnify our impact, accelerate our pace, and create lasting change that transcends generations.

In conclusion, the sustainability industry stands at a pivotal juncture, and our actions today will shape the world of tomorrow. Technology, particularly the principles of Web3, is our compass in this transformative journey. BEEAH is committed to leading the charge, and The Green Block is our steadfast ally. Let us harness the power of technology, amplify our efforts, and create a legacy of sustainability that resonates for years to come.

Khaled Al Huraimel
Group CEO, BEEAH Group

ESG Dimensions

XXX = Dimension that will be enhanced through technology



The majority of the ESG dimensions will be enhanced through Web3 like Distributed Ledger Technology and Artificial Intelligence. The Green Block's mission is to discover, connect and accelerate the adoption.

THE GREEN BLOCK

Roland Berger

CRYPTO OASIS VENTURES

Project & Startups

Circular Economy & Waste Management

Ecoterra
Romania

All-in-one Recycle2Earn app featuring recycling tokens and ecology actions. Recycled Materials & Carbon Offset marketplaces and more — for empowering companies and rewarding consumers.

5 Employee | Web3

Empower
Norway

Empower.eco works with waste pickers & recycling companies to collect plastic waste. The waste is then sorted & cleaned, & is given a unique identifier on the blockchain. This identifier allows the plastic to be tracked throughout its journey, from collection to recycling.

17 Employee | Web3

Plastiks
Spain

Plastiks is a platform leveraging blockchain technology to address plastic waste & promote circular economy solutions.

9 Employee | Web3

Climate Data & Analytics

ESGpedia
Singapore

ESGpedia is a website that provides information on ESG & Blockchain.

1 Employee | Web3

Hyphen Global AG
Switzerland

Our solution is atmospheric-based GHG digital Monitoring, Reporting, and Verification (dMRV). This advanced system accurately measures GHG fluxes in real-time, providing a credible alternative to traditional methods.

16 Employee | Web3

MetAmazonia
Brazil

A next-gen, photorealistic 3D Metaverse, MetAmazonia is using Blockchain & the Metaverse to help the fight against climate change, poverty & deforestation, & aims to positively impact the lives of millions of people. A digital twin of the largest private reserve created in the Amazon Rainforest's history – & fully explorable in virtual reality – Amazon Rio I is based on real time data, & is built to encourage sustainable development.

16 Employee | Web3

Climate Data & Analytics

BFLO
United States

BFLO's protocol is Blockchain-enabled for secure audits around claims & third party verification, & is being designed to help make it easier to manage complex information. For businesses & investors globally looking for transparent sustainability reporting reputation & risk management solutions.

1 Employee | Web3

CO2 Connect
Singapore

Launching Singapore's First Sustainability One-Stop Solution Leveraging on IoT, Blockchain, and Data Analytics.

2 Employee | Web3

Diginex
Switzerland

Diginex is a digital asset exchange that is listing ESG-focused Cryptocurrencies.

39 Employee | Web3

OpenESG
United States

OpenESG enables everyone to understand where their products come from and buy from companies that reflect their values - by building the world's first Sustainability Data Infrastructure for everyone.

13 Employee | Web3

PlanetAlphaForest
United States

PlanetAlphaForest is a company that is developing a Blockchain-based platform for tracking the restoration of forests. The platform will

1 Employee | Web3

Proof
Netherlands

Proof is a company that is developing Blockchain-based solutions for the ESG space.

29 Employee | Web3

Projects & Startups

MetAmazonia

Can Technology Save the Planet?

Natural capital, comprising ecosystems, biodiversity, and the services they provide, is essential for sustaining life on Earth. As humanity faces unprecedented environmental challenges, the need to accurately assess and value natural capital becomes paramount.

Technology plays a pivotal role in this endeavor, offering innovative tools and methodologies that enhance our ability to quantify and appreciate the true worth of ecosystems. Driven by the urgent need to channel the right kind of finance into the twin carbon and biodiversity crises, technology is increasingly being deployed by investors and project owners alike to value natural capital, emphasising its significance in promoting sustainable resource management and informed decision-making. However, in the race to make nature economically visible there are some significant obstacles, most of which are related to the sheer complexity of the challenge.

Advances in arial and satellite imagery mean that we're now able to monitor vast tracts of forest and other biomes in extraordinary detail and in some cases in real and near-to-real time, although Earth Observation takes us only as far as the canopy. To really understand what's happening on the ground it will always be necessary to include an element of ground truthing in monitoring changes to natural environments.

This can be supported by the application of terrestrial sensors including camera traps, eco-acoustics, environmental DNA monitoring and other tools, but this is far more effective with the direct involvement of local experts, communities, and indigenous people. Their tacit knowledge is an invaluable component in the development of truly robust solutions for the long term.

The next challenge is related to data. As with many systems approaches to tackling complex problems, it is very easy to generate huge volumes of data, which must be high quality and managed interoperably if it is to be of any real utility. Add to this, issues of data ownership and privacy, of intellectual property and the right of individuals who participate in the generation of that data and it's clear that some serious innovation is required.

For these reasons, it is critical that we develop a pragmatic approach to the generation and analysis of data. Data generation and analytics has a significant carbon footprint, so the question needs to be asked "what's the minimum amount of data that we need in order to deliver the impact that we're striving for?" At the same time, real time data is very rarely practicable in an environment like a rainforest. For this reason, the development of an outcome and impact-focused technical architecture and data strategy that combines earth observation with terrestrial data is crucial if we are not to be swamped with data that in the end obfuscates its true meaning.

Addressing these challenges then leads us to think about future opportunities for innovation and the developing maturity of both Digital Measurement Reporting & Verification, and of the global investment marketplace.

It is arguable that there are two main areas of development that are particularly interesting, that are developing quite quickly and will no doubt continue to do so in the coming years. The first relates to prognostics and being able to ingest large volumes of data from multiple sources and from those that predict the behavior of natural ecosystems, whether that be climatic systems, biodiversity, levels of carbon sequestration etc. and understanding how those different systems interact with one another. That capability will allow us to hopefully get ahead of some of these problems and spot poor decision making before it has a chance to have a real impact. The second area relates to economics and financial models. AI applied to the monitoring, measurement and analysis of natural capital presents an opportunity to really accelerate the way in which nature is not only made financially visible but made material to mainstream investors.

The ability to demonstrate impact and to measure value across a range of different dimensions, to check for additionality, to factor-in social and socio-economic impacts, as well as carbon and biodiversity measures, and converting all of that into assets and liabilities on the balance sheet will help us to change the way that money flows, creating a virtuous circle where your dollar has a positive and lasting impact.

Finally, and no less important, is how both B2B and B2C stakeholders can engage with all of this. Great technology should be easy to access, exciting and engaging. Stunning advances in the use of photorealistic digital twins that draw together the environmental, social, climatic, economic, technological and governance aspects of radical innovation helps to lay the foundation of a new economy where a living forest is worth more, far more, than a dead one.

Dr Robin Daniels
Co-Founder & CEO, MetAmazonia

Climate Data & Analytics

Xpansiv

United States

Xpansiv.com is a company that is using Blockchain technology to track commodities.

158 Employee — Web3

Clarity

United Arab Emirates

We build-in a customisable, scalable sustainability tech kit to your existing workflow, which empowers you to efficiently and confidently assess, analyse and report on anything valuable to your clients and everything required by law.

319 Employee — AI

Deepmind

United Kingdom

We're a team of scientists, engineers, machine learning experts and more, working together to advance the state of the art in artificial intelligence.

1813 Employee — AI

Conservation & Biodiversity

ConservatioNFT

Decentralised

CNFTs is a platform for carbon-neutral non-fungible tokens (NFTs) with a focus on environmental sustainability.

1 Employee — Web3

Gainforest

Switzerland

GainForest is a decentralised fund using artificial intelligence to measure & reward sustainable nature stewardship. It is a global initiative that aims to reverse the deterioration of nature by enabling dignified & sustainable work for forest communities using trust-enhancing technologies.

7 Employee — Web3

Open Forest Protocol

Switzerland

Open Forest Protocol (OFP) is a scalable open platform that allows forest projects of any size, from around the world, to Measure, Report, & Verify (MRV) their forestation data. Through OFP, individuals, communities, NGOs, entrepreneurs, & governments are able to create transparent, immutable, proof-of-impact data that is comprehensively verified by a network of independent experts.

31 Employee — Web3

Emitwise

United Kingdom

Our mission is to future-proof businesses as we accelerate the transition to a net-zero carbon world.

51 Employee — AI

Persefoni

United States

Persefoni, Inc. is the leading Climate Management & Accounting Platform (CMAP).

297 Employee — AI

rreefs

Switzerland

RREEEFS is a marketplace for trading carbon credits & other environmental assets using blockchain technology.

14 Employee — Web3

Unsinkable

United Arab Emirates

Unsinkable is a nonprofit organization that works to accelerate the transition to a sustainable economy. It supports projects that use blockchain to address environmental and social challenges.

1 Employee — Web3

Treejer

Estonia

Treejer works by connecting tree planters with funders. Funders can purchase Treejer tokens, which they can then use to plant trees. Tree planters can earn Treejer tokens by planting trees & maintaining them for a certain period of time.

10 Employee — Web3

Projects & Startups

Chainalysis

An Analysis of the Crypto Industry's Growing Climate-Consciousness

In the ever-evolving technology landscape, few sectors have garnered as much attention, and controversy, as Cryptocurrencies. While digital currencies have ushered in a new era of financial possibilities, they have also raised legitimate concerns about their environmental impact. Against the backdrop of assessments such as the latest Intergovernmental Panel on Climate Change (IPCC) report which warn that only 'swift and drastic action can avert irrevocable damage to the world', it stands to reason that the energy-intensive process of Cryptocurrency mining, particularly in the case of Bitcoin, has come under scrutiny. It is encouraging to see then that as the Crypto industry continues to mature and the Crypto community is not only demonstrating an awareness of these issues, it is actively seeking solutions to mitigate its carbon footprint, paving the way for more sustainable financial infrastructure.

Drawing Distinction

At the heart of the debate around the environmental impact of Crypto mining lies the contrasting consensus mechanisms employed by various Cryptocurrencies. Bitcoin's Proof of Work (PoW) mechanism, which underpins its security and transaction validation, requires copious amounts of computational power and thus energy. In contrast, Proof of Stake (PoS) Blockchains like Ethereum offer a more energy-efficient alternative. This duality prompts an essential distinction: not all Cryptocurrencies are equal in terms of their environmental impact. It would therefore be incorrect to apply the same judgement to the entire industry.

Alternative Energy

Irrespective of their comparative carbon footprints, all stakeholders should seek to minimise the impact of their operations. And many are indeed heeding the call. Being in the sustainability spotlight is prompting the Crypto mining industry to explore innovative ways of reducing its energy consumption.

A notable example is Marathon Digital's strategic shift from a coal-powered facility to a wind-powered one. This transition symbolises a broader trend in the industry towards renewable energy sources. According to the Bitcoin Mining Council, renewable energy accounted for the majority (nearly 60%) of the electricity used in Bitcoin mining by the end of 2022. This marked improvement from just 36.8% less than two years prior is a testament to the industry's adaptability and its commitment to finding cleaner solutions.

Another creative approach to energy sourcing is exemplified by Giga Energy's endeavour. By converting natural gas flares, which are often wasted in the oil drilling process, into electricity to power Bitcoin mining operations, Giga Energy has shown how symbiotic relationships between industries can emerge. This innovation not only reduces carbon emissions but also bridges the gap between energy sectors that might otherwise seem disconnected. The ripple effects of such initiatives could reshape how industries collaborate for mutual benefit and sustainability.

Moreover, Crypto mining's unique flexibility in location enables it to synergise with renewable energy sources that might otherwise go untapped. For example, hydroelectric power plants in rural areas frequently generate excess energy. Traditionally, this surplus has posed a logistical challenge, but the emergence of Crypto mining can provide an unexpected solution. By setting up mining operations in these regions, Crypto miners can effectively consume this surplus energy that might otherwise go to waste.

A Bid for Balance

To gauge the value of any technological advancement, society must weigh its drawbacks against its contributions. Sure, the power requirements of Cryptocurrencies might have seemed excessive when their utilisation was concentrated to a small group of tech-savvy traders. But as new use cases emerge — from enabling the world's large underbanked population to aspire towards financial inclusion, to empowering businesses to pay suppliers across geographies instantly and at minimal cost — the trade-off is easier to justify.

Furthermore, it's essential to recognise the unparalleled transparency of Cryptocurrencies. Blockchain technology, the backbone of these digital currencies, introduces a level of accountability and openness that is unprecedented in the financial world. This transparency, while crucial for tracking transactions and ensuring security, can also play a role in monitoring and reducing the industry's environmental impact. It's this aspect that underscores the transformative potential of Cryptocurrencies beyond their financial implications.

A Promising Outlook

The rapidly evolving and maturing world of Cryptocurrency represents an intricate interplay among innovation, responsibility, and challenge. As the industry presses forward, it is becoming increasingly apparent that environmental consciousness is a central narrative. The evolution of climate-conscious Crypto mining is a compelling testament to the industry's adaptability and potential for positive change. The transformation from energy-intensive processes to eco-friendly alternatives speaks volumes about the willingness of Crypto stakeholders to confront challenges head-on.

The sceptics must consider the advancements and transparency that this technology brings to the table. The journey toward a greener digital future is far from over, but the strides already taken showcase an industry that is committed to mitigating its environmental impact while continuing to drive innovation on a global scale.

Nicola Buonanno
VP Southern EMEA, Chainalysis

Projects & Startups

Conservation & Biodiversity

Veritree
Canada

Veritree is a company that is using blockchain technology to plant trees.

24 Employee — Web3

Gamaya
Switzerland

Gamaya improves efficiency and sustainability of farming businesses by offering unique and compelling digital agronomy solutions

25 Employee — AI

Single Earth
Estonia

Single. Earth is a GreenTech company with significant venture capital funding for scientific research and innovation development in nature-based solutions. Using natural sciences and Blockchain technology, Single.Earth builds accessible and scalable tools to mitigate climate change and biodiversity loss.

38 Employee — Web3/AI

Protocols

Alastria
Spain

Alastria is a European Blockchain alliance that is working to develop Blockchain-based solutions for a range of problems, including climate change.

57 Employee — Web3

Algorand
United States

Algorand's high–performing Layer-1 Blockchain is unparalleled for bringing fast, frictionless, and inclusive technologies to everyone. With an extraordinary commitment to interoperability and consistent delivery, our sustainable technology powers more participation, transparency, and efficiency for all.

153 Employee — Web3

Celo
United Kingdom

Celois a Blockchain platform that is designed to be environmentally friendly.

123 Employee — Web3

Protocols

Chia Network
United States

Chia is a Blockchain-based Cryptocurrency that uses proof of space & time consensus, which is more energy efficient than proof of work consensus.

89 Employee — Web3

DFINITY
Switzerland

The DFINITY Foundation's mission is to build, promote, and maintain the Internet Computer — the world's first web-speed, internet-scale public Blockchain. It enables smart contracts to securely serve interactive web content directly into the browsers of end users, making it possible to build dapps, DeFi, open internet services, and enterprise systems that are capable of operating at hyperscale.

274 Employee — Web3

Filecoin Green
United States

Green.filecoin.io is a website that provides information on how Filecoin can be used to store environmental data.

2 Employee — Web3

Renewable Energy & Carbon Offset

AirCarbon Exchange
United Arab Emirates

A global exchange revolutionising the voluntary carbon market. The Exchange's client base comprises of corporate entities, financial traders, carbon project developers & other industry stakeholders. ACX provides its clients with an efficient & transparent trading platform which is easy to use, frictionless & with the lowest commission fees available on the market.

45 Employee — Web3

Blok-Z
Germany

Blok-Z is an energy sector software provider based in Germany and Turkey. They help accelerate the digital transformation of the energy industry. The company was ideated in 2018 and launched in 2019.

9 Employee — Web3

Carbonland Trust
Decentralised

Carbonland Trust is a platform that enables individuals & organizations to offset their carbon footprint through landconservation projects.

1 Employee — Web3

IMPACT SCOPE

How Can Blockchain and AI Integrate With The ESG Agenda?

In the modern business landscape, the focus on Environmental, Social, and Governance (ESG) factors has never been more pronounced. Companies are increasingly recognising the importance of sustainable and responsible business practices, not just for ethical reasons but because consumers and investors are demanding it. As technology evolves at an unprecedented pace, two key players emerge as potential game-changers in the ESG space: AI and Blockchain.

Since November 2022 and the launch of ChatGPT, it has become more and more clear to the general public the potential impact of AI on a varied number of sectors. But when paired with Blockchain, could these technologies amplify their capabilities to address pressing global challenges related to ESG? What are the requirements to leverage AI and Blockchain for sustainable development?

Surprisingly, AI and Blockchain share a significant degree of complementarity. At its core, Blockchain means trust and transparency. Every transaction made on a Blockchain is permanent, transparent, and immutable. This trust machine ensures that whatever occurs in a Blockchain remains there forever, providing an unalterable record accessible to all. On the other hand, AI's strength lies in its unparalleled data processing capability, allowing it to predict and solve increasingly complex problems. However, AI's solutions often grapple with the black box issue, leaving users questioning the path it took to arrive at a particular conclusion.

Herein lies the synergy. By recording AI models and inputs (like LLMs) onto a Blockchain, a new level of traceability can be introduced into AI-driven decision-making. Such an approach can help demystify AI decisions, offering insights into the decision-making process and subsequently refining it. Moreover, AI models, though powerful, frequently perpetuate existing biases, such as the unfair or prejudicial treatment of people based on their membership in certain groups or categories. Blockchain can offer a transparent mechanism to monitor and rectify these biases.

AI models stored on a Blockchain could be complemented with sustainability requirements that are directly integrated into AI models. Imagine AI models that inherently consider the triple bottom line – social, environmental, and financial – ensuring holistically beneficial decisions. This integrated approach aligns with the broader corporate trend, where sustainability isn't just a department but is embedded across business functions. For instance, ChatGPT's prompt engineering could be fine-tuned to account for environmental and social parameters as intrinsic parts of a query.

Moreover, quality data is the lifeblood of effective AI decision-making. The age-old IT adage, garbage in, garbage out, holds true also for AI models. For AI to be truly transformative in the ESG space, it needs to be fed with high-quality data. There lies the potential for tools like ChatGPT to be trained on curated sustainability data from reputable sources like the World Bank, NOAA, UNDP, IMF, or Ecoinvent and ELCD regarding environmental data for Life Cycle Analysis (LCA), ensuring decisions grounded in accurate and relevant information. Independently from the sector, it is likely that paying premium AI models based on high-quality and reputable data will become more and more common in the future.

Once similar requirements are considered in AI and Blockchain implementations, significant applications leveraging the two technologies can be implemented. As industries shift towards a circular economy – one that aims to eliminate waste and continuously reuse resources – the integration of these technologies becomes pivotal. Blockchain can facilitate transparent supply chain tracking, ensuring products are sourced and produced sustainably. Simultaneously, AI can optimise resource allocation, predicting where resources are most needed and when. Additionally, with the growing urgency to combat climate change, AI can analyse vast amounts of environmental data to predict and mitigate adverse climatic events. Blockchain, in turn, can verify and validate these data sources, ensuring their authenticity. Together, AI and Blockchain don't just support ESG initiatives; they redefine how we approach sustainability on a global scale, setting the groundwork for a more responsible and resilient future.

The potential regarding the possibility of integrating AI and Blockchain to reach ESG goals is very significant. Similarly to other technologies, meaningful improvements frequently take place when different technologies are combined. Nevertheless, the marriage of AI and Blockchain, it's not without challenges. Data privacy, energy consumption of the two technologies, AI hallucinations (i.e. confident but wrong AI responses), shifts in the job market and the potential for misuse are all hurdles that need addressing. Moreover, the sheer complexity of integrating two advanced technologies means that companies need a robust strategy, expertise and stakeholder engagement. These elements must be thoroughly studied, understood and discussed both in the private and public sectors to fully harness their development for the betterment of our society and planet.

Michele Soavi
Chief Sustainability Officer, ImpactScope

Renewable Energy & Carbon Offset

CarbonX
Canada

CarbonX is a company that helps organisations reduce their carbon emissions & become more sustainable. The company offers a variety of services, including carbon footprint assessments, carbon reduction strategies, & carbon offset programs.

3 Employee Web3

Climatecoin
Spain

Climatecoin will be creator of the world's first regulated digital carbon asset. Run on a carbon neutral Blockchain and backed by high-quality carbon credits, Climatecoin funds credible and impactful decarbonisation projects across the globe, providing investors and climate advocates with a meaningful investment to offset their carbon footprints.

9 Employee Web3

Earthbanc
Sweden

Earthbanc is a fintech platform that uses Blockchain technology to help individuals & businesses offset their carbon emissions. Earthbanc works by creating carbon credits that are backed by verified projects that reduce or remove greenhouse gases from the atmosphere. These credits can then be purchased by individuals & businesses to offset their carbon emissions.

29 Employee Web3

Renewable Energy & Carbon Offset

Energy Web
Germany

Energy Web Foundation (EWF) is a non-profit organisation that is developing & deploying open-source Web3 technologies that help companies unlock business value from clean & distributed energy resources. EWF's work includes developing the Energy Web Token (EWT), a utility-grade token that is used to track & trade energy on the Energy Web Platform.

58 Employee Web3

Enrex
Lithuania

Enrex is the one-stop-shop on your business journey towards sustainability. They provide tailor made solutions for digital businesses to offset their carbon emissions.

12 Employee Web3

Grid+
United States of America

GridPlus is a company that develops hardware wallets & software for managing Cryptocurrency. The company's flagship product is the Lattice1, a hardware wallet that uses a variety of security features to protect users' Cryptocurrency assets.

1 Employee Web3

Ecowatt
Ireland

Ecowatt is the renewable energy and social impact investment hub for everyone. We develop and operate renewable power stations, and use innovative technologies to enable access to these investment opportunities including, and beyond traditional methods.

16 Employee Web3

ElectricChain
Andorra

An Open Solar energy generation data project with an initial focus on verifying & publishing data from the seven million solar energy generators globally on an open Blockchain

1 Employee Web3

Energy Unlocked
United Kingdom

Energy Unlocked is a non-profit organisation that works to accelerate the transition to a clean energy system. The organisation does this by working with businesses, governments, & communities to develop & implement innovative solutions to the challenges of decarbonisation.

1 Employee Web3

HydroCoin
United Kingdom

HydroCoin will be the first Cryptocurrency for the Blockchain community empowering the hydrogen industry. It enables the Blockchain community to participate on hydrogen technologies. It will be a unique way to invest in companies, projects & new technologies for hydrogen production.

3 Employee Web3

Inuk
France

Inuk empowers businesses & individuals to reduce their carbon emissions & contribute to carbon neutrality. Our promise: to provide a quality, transparent & traceable carbon offsetting solution through the financing of local renewable energy projects & our Blockchain technology.

10 Employee Web3

Libra
United Kingdom

Libra is a digital currency project from Facebook that aims to make payments more affordable & efficient. Libra could be used to help reduce the environmental impact of traditional payment methods, such as credit cards & bank transfers.

1 Employee Web3

Projects & Startups

SUSTAINABLE BITCOIN PROTOCOL

Mining for a Greener Tomorrow

How Bitcoin is Digging Up Sustainable Solutions and Data Transparency Will Prove it

In the fast-evolving landscape of digital assets, the intersection of Bitcoin mining and environmental sustainability has emerged as a focal point for innovation for some and skepticism for others. As the CEO of Sustainable Bitcoin Protocol (SBP), an organisation committed to creating a climate-positive society, I believe that Bitcoin has the potential to become one of the most important technologies in achieving the clean energy transition.

Revolutionising Energy Use in Bitcoin Mining

Bitcoin mining has often been criticised for its energy-intensive nature, but it also presents a unique opportunity to accelerate the adoption of renewable energy. Bitcoin mining's unique characteristics as a flexible, interruptible, and location-agnostic buyer of electricity allow operations to be set up in locations with abundant clean energy resources. The International Energy Agency reports that in order to achieve a net zero energy system, the world will need to 10x global demand response capacity by 2030. At present, the only technology in existence that can scale at this level is bitcoin mining. By strategically locating mining facilities in areas with surplus renewable energy, miners can utilise otherwise wasted resources, turning excess energy into a valuable asset.

In order to create a market-based solution to incentivise Bitcoin miners using sustainable energy sources, SBP has established a new digital environmental commodity, Sustainable Bitcoin Certificates (SBC). By issuing SBC to miners who are using verifiable clean energy sources, SBP is bringing a new level of transparency to the Bitcoin network without compromising the core fungibility of Bitcoin.

Leveraging Bitcoin Mining for Environmental Impact

Bitcoin mining can also play a significant role in methane mitigation, a potent greenhouse gas that according to organisations like Environmental Defense Fund and the United Nations Environment Programme, is "the strongest lever we have to slow climate change in the next 25 years". Bitcoin miners can seek out sources of stranded methane such as at oil and gas operations or landfills and monetise the waste gas, dramatically reducing CO2e. Sustainable Bitcoin Protocol also incentivises miners to reduce methane emissions, creating a positive feedback loop that benefits both the environment and the Bitcoin ecosystem.

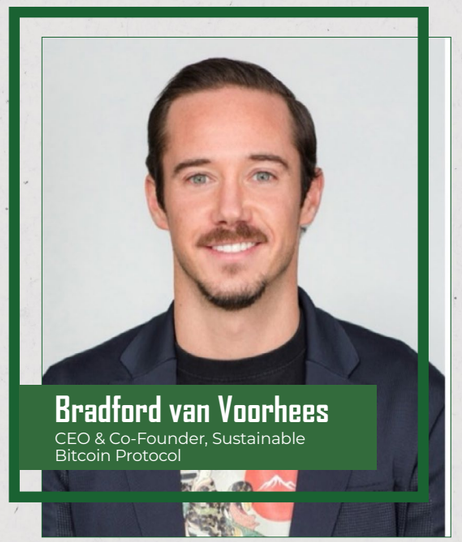
Clean energy transparency in Bitcoin mining is set to unlock significant institutional investment, particularly from climate and impact-focused investors. By showcasing the environmental benefits through clear data, Sustainable Bitcoin Protocol (SBP) is positioning Bitcoin as a compelling option for these investors. By partnering with leading institutional investors, asset managers, and Bitcoin ETF issuers, SBP aims to redirect institutional capital from traditional energy sources towards renewable projects, creating a win-win situation for both investors and the planet.

Driving Transparency and Global Collaboration

One of the key features of Sustainable Bitcoin Protocol is the transparency it brings to the Bitcoin network. By providing auditable data showing each MWh of clean electricity used to mine Bitcoin, SBP is showing that Bitcoin can be one of the most sustainable and transparent asset classes in existence, dispelling false narratives and providing a pathway for other industries to follow. This transparency not only builds trust within the digital asset community but also incentivises a high standard for responsible and transparent mining practices.

Sustainable Bitcoin Protocol is leading the first-ever delegation of Bitcoin companies at COP28 in Dubai, which includes BitDeer (NASDAQ: BTDR), Hut 8 (NASDAQ/TSX: HUT), Coinbase Asset Management (NASDAQ:COIN), and Giga Energy. This initiative underscores SBP's commitment to fostering collaboration between the Bitcoin mining sector and the global efforts to combat climate change. The delegation aims to showcase the potential of Bitcoin mining as a force for positive environmental impact, emphasising the industry's dedication to sustainability and innovation.

As we navigate the complexities of a sustainable future, it is imperative to harness emerging technologies for the greater good. Bitcoin mining, when conducted sustainably, can be a powerful driver for the clean energy transition. Sustainable Bitcoin Protocol's innovative approach, through the issuance of Sustainable Bitcoin Certificates, exemplifies the industry's commitment to transparency, accountability, and environmental responsibility. As we embark on this journey towards a greener future, the convergence of Bitcoin and clean energy marks a significant milestone in the ongoing global efforts to build a sustainable and equitable world.



Bradford van Voorhees
CEO & Co-Founder, Sustainable Bitcoin Protocol

Projects & Startups

Renewable Energy & Carbon Offset

Nori
United States

Nori's mission is to reverse climate change by making carbon removal accessible & affordable. The company's platform allows businesses & individuals to purchase carbon removal credits, which represent the removal of one ton of carbon dioxide from the atmosphere. Nori's carbon removal credits are verified by third-party organisations to ensure that they are genuine & high-quality.

37 Employee Web3

OpenCarbon
United States

Formed by a world-class team of technologists and climate leaders, the OpenCarbon platform delivers forward ready, SEC-compliant, carbon offset financial products to efficiently source, construct, manage and retire large-scale and complex carbon asset portfolios.

3 Employee Web3

Pachama
United States

Pachama restores nature to solve climate change. They use AI and satellite data to originate, verify and monitor nature-based carbon sequestration projects around the world.

108 Employee Web3

Renewable Energy & Carbon Offset

Regen.network
United States

Regen Network Development PBC (Public Benefit Corp) is the Blockchain software development company powering the Regen Network Blockchain protocol. RND is the core software developer of Regen Ledger, the Blockchain software & core carbon accounting modules of the Regen Network Blockchain protocol.

33 Employee Web3

Senken.io
Enrex

Senken.io is a Blockchain platform that helps businesses to manage their ESG data. It provides a secure and transparent platform for businesses to track their environmental and social impact.

31 Employee Web3

Sustainable Bitcoin Protocol
United States of America

Building sustainability infrastructure that is focused on driving climate conscious investors and institutional capital into Bitcoin.

8 Employee Web3

Projects & Startups

Patch
United States

Patch is the platform scaling unified climate action.

80 Employee Web3

Powerledger
Australia

Powerledger develops software solutions for the tracking, tracing and trading of renewable energy. They believe in the democratisation of power, for a sustainable future.

57 Employee Web3

RECDefi
Decentralised

RECDeFi is an automated, decentralised & scalable marketplace that accelerates investment in clean energy & climate solutions by making it faster, cheaper & easier to trade renewable energy credits, carbon offsets & other environmental commodities. Built on the enterprise-grade Hedera Blockchain, RECDeFi automates transactions from end-to-end at a fraction of the cost.

1 Employee Web3

Sustain-Cert
Luxembourg

Sustain-Cert is a company that is developing a Blockchain-based platform for tracking the sustainability of products. The platform will make it easier for businesses and individuals to track the sustainability of products, and will help to inform decision-making.

119 Employee Web3

Thallo
United Kingdom

Thallo fills a major gap in today's voluntary carbon market by using Blockchain technology to revolutionise & democratise the way individuals & businesses buy, sell & trade carbon offsets.

21 Employee Web3

Toucan Protocol
Switzerland

Toucan is a carbon offsetting protocol that uses Blockchain technology to make it easier & more efficient to offset carbon emissions. Toucan works by creating tokens that represent carbon offsets. These tokens can then be bought & sold on a decentralised exchange.

33 Employee Web3

Projects & Startups

senken

The Role of Blockchain Technology in Enhancing Reach, Credibility, and Scalability of Carbon Markets

With the climate crisis at the forefront of many people's minds, Carbon Markets have become a crucial tool for companies seeking to offset their carbon emissions and contribute to a more sustainable future. Alongside the increasing demand for high-quality carbon credits, there has also been a growing recognition and enthusiasm for how new technologies and new approaches can expand the reach, credibility, and scalability of carbon markets.

Emerging digital technologies will play a vital role in creating more streamlined, trusted, and transparent carbon markets. Capacity-building and knowledge-sharing will be crucial, particularly in developing countries, to effectively deploy market infrastructure and ensure carbon markets are game-changers in the fight against climate change."

How Does the Voluntary Carbon Market Work?

The voluntary carbon market operates through a series of steps that involve the creation, certification, and trading of carbon credits or offsets. Carbon credits are a useful way to measure and trade in greenhouse gas (GHG) reductions. Each carbon credit represents one tonne of GHG emission reductions or removals from the atmosphere. By voluntarily purchasing carbon credits and thereby funneling capital towards climate projects, companies actively reduce their carbon footprint and are supported in reaching net-zero emissions.

While carbon markets have gained popularity in recent years as a way to address climate change, they have faced criticism for a number of issues, including their lack of transparency, accessibility, equitability, and quality. And despite broad corporate interest, they remain underused and fragmented.

Harnessing Blockchain to Transform Carbon Offsetting and Emissions Trading

Blockchain technology has emerged as a promising solution to address the challenges of carbon markets. By leveraging Blockchain's transparent and tamper-proof nature, it enhances the credibility and traceability of carbon credits. Blockchain enables secure and immutable recording of carbon transactions, reducing the risk of double counting. Moreover, smart contracts and decentralised applications streamline carbon credit verification and trading, making the carbon markets more accessible and efficient.

Blockchain technology has the potential to address several challenges within carbon markets. Here are a few ways in which Blockchain can help:

Transparency, and Trust: Blockchain is a decentralised and transparent ledger that records all transactions. This ensures that each carbon credit has a unique and tamper-proof record, reducing the risk of fraud or double counting.

Streamlining Funding for Projects: Digital carbon markets have the potential to channel more funding towards project developers by streamlining asset discovery and purchase processes (which sits in stark contrast to the historically analogous and inefficient transactions of traditional carbon markets). This helps eliminate the need for intermediaries that traditionally collect and process data, reducing transaction costs. By leveraging Blockchain technology, intermediaries can be removed from carbon value chains, allowing more financing to reach project developers directly.

Enhanced Accountability: With Blockchain, all participants in the voluntary carbon market can have a shared source of truth. Smart contracts, which are self-executing contracts with predefined rules, can automate verification and ensure that all parties involved fulfill their obligations. This improves accountability and trust among market participants.

Efficient Verification: Blockchain can streamline the verification process for carbon offsets. By recording project data, methodologies, and third-party audits on the Blockchain, it becomes easier to verify the legitimacy and quality of carbon credits. This reduces the time and cost associated with lengthy manual verification processes, making it more efficient for buyers and sellers.

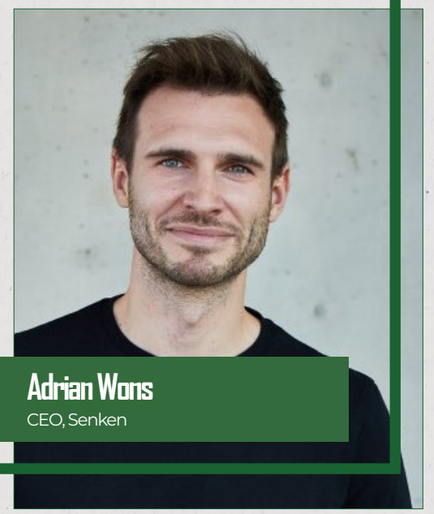
Democratising Access to the Carbon Market:. Traditional carbon finance markets primarily cater to large institutions due to the prevailing practice of selling carbon credits in quantities of at least one tonne of carbon sequestered. Blockchain, however, allows for the fractionalisation of carbon credits, enabling smaller investors to participate in the market. By tokenising carbon credits on the Blockchain, they can be divided into smaller units, making them more accessible to a broader range of tokens, increasing liquidity in the market.

Carbon Markets play a pivotal role in empowering companies and investors to engage in carbon emissions trading and contribute to a more sustainable future. By understanding the transformative role of Blockchain technology, businesses can actively engage in carbon offsetting and enhance their environmental reputation.

About Senken

Senken is a Berlin-based climate tech company that leverages Blockchain technology to bring transparency, traceability, and trust to climate projects. With tamper-proof recording of carbon transactions, our platform ensures price visibility and eliminates the potential for double-counting of carbon credits.

Seamlessly trade and retire climate assets from anywhere in the world, and invest with confidence in nature, diverse ecosystems, and impactful emissions reduction projects.



Adrian Wons
CEO, Senken

Projects & Startups

Renewable Energy & Carbon Offset

Veridium Labs
China

Veridium is creating a tokenized marketplace for natural capital (environmental) assets, beginning with carbon credit assets. By tokenising carbon credits into fungible assets that have liquidity on an enterprise grade platform, Veridium will bridge multiple liquidity pools: corporate traders & end-users, traditional commodities trading markets and market makers, as well as the Crypto-currency community.

1 Employee — Web3

Vespene Energy
United States

Develop innovative solutions that not only reduce greenhouse gas emissions, but also provide reliable and affordable energy to communities that may not have access to traditional power sources.

6 Employee — Web3

VlinderClimate
Austria

VlinderClimate is a company that is developing a Blockchain-based platform for tracking the impact of climate change on businesses. The platform will make it easier for businesses to track their exposure to climate risk, and will help to make them more resilient.

15 Employee — Web3

Voltus
United States

Voltus aims to be the distributed energy platform that fulfills the promise of the energy transition. Voltus represents the “potential of us” to better manage energy through simple, cost and risk-free programs for distributed energy resources.

272 Employee — Web3

WPPEnergy
Switzerland

WPP ENERGY serves as a repository for disruptive green energy and environmental technologies that the company builds or plans to build. They take ownership, operate, and maintain these technologies. Additionally, WPP ENERGY licenses technology and engages in strategic joint venture partnerships to expedite the implementation of crucial environmentally friendly technologies for the global benefit.

16 Employee — Web3

Supply Chain Traceability & Transparency

Circularise
Netherlands

Circularise is a software platform that provides digital product passports for end-to-end traceability & secure data exchange for industrial supply chains. The platform is designed to help companies improve their sustainability performance & reduce their environmental impact.

40 Employee — Web3

Open Food Chain
Netherlands

Open Food Chain is a proven and affordable infrastructure for entire agrifood supply chains to report and manage ESG claims.

27 Employee — Web3

ProofX
Switzerland

ProofX focuses on utilising Blockchain to enhance transparency & trust in supply chains, including sustainable & ethical sourcing.

3 Employee — Web3

TraceX Technologies
India

TraceX provides traceability solutions for supply chains, including the tracking of sustainable & ethical practices using Blockchain technology.

42 Employee — Web3

Verofax
United Arab Emirates

Verofax.com is a company that provides Blockchain-based solutions for supply chain management.

24 Employee — Web3

CarbonChain
United Kingdom

CarbonChain’s platform enables companies to track, report and reduce their supply chain emissions, covering the most carbon-intensive industries (metals and mining, agriculture, manufacturing).

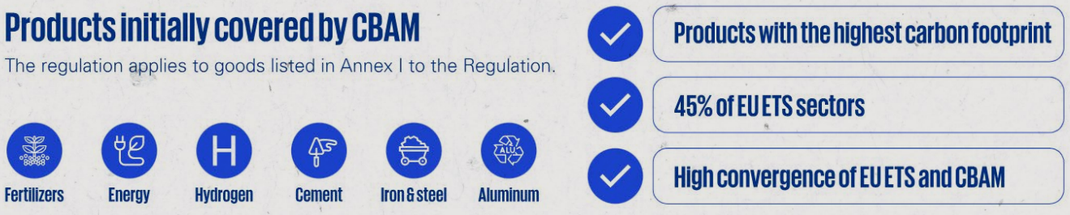
31 Employee — AI

Projects & Startups

Verofax

Sustainable Traceability: Key Toolkit for Exporting to EU Markets in Accordance with Carbon Border Regulations

In the evolving landscape of regulations to fight global warming, global trade is at a cross road. The recent Carbon Border Adjustment Mechanism (CBAM) was adopted on 17 August 2023, setting out rules governing the transitional phase of the CBAM, which runs to 31 December 2025. Global exporters to the European Union of key commodities, such as goods such as steel, iron ore, and cement, electricity, hydrogen, and fertilizers are now faced with losing market access to EU or facing crippling tariffs ranging from 20% to 35% on commodities labelled as carbon-intense. This puts immense pressure on manufacturers to adopt authentication and traceability systems that address key challenges related to exports certification.



This article seeks to to shed light on turning compliance from pain to profit and assist exporters to adapt their systems to seamlessly meet CBAM requirements and reap the benefits of access to market and generating profitable returns on investment in renewable energy, recycling materials and adopting immutable ledger traceability systems, enabling connection into Emission Trading System (ETS).

Meet Compliance requirements ahead of Dec, 31 2024 to avoid revenue loss:

CBAM-triggered market restrictions is a much needed policy to ensure industries accelerate towards net Zero commodities. However, existing ERP systems are not equipped to meet the reporting and certification challenges to achieve CBAM compliance.

The challenges that exporters existing systems cannot address are described below:

(1) Time consuming effort on understanding legal specifications and quantifying carbon emissions.

(2) Difficult to consolidate different systems to build a more efficient estimation and management system.

(3) Inefficient methods of calculating parameters and the preparation of records to meet verification requirements.

(4) Results do not present useful information on emissions for meeting ISO 14064s standards.

(5) Existing ERPs are siloed and does not allow for interoperable access to immutable ledger data by every key supply chain stakeholder with relevant user interface.

This is where Blockchain ledger on traceability platform emerges as the solution of choice for manufacturers, exporters and authorities to validate commodity conforming with CBAM criteria while averting double-counting and green-washing risks. The power of Blockchain technology lies in its interoperability, immutability, and security where every product in the supply chain is assigned a digital passport – a unique identity and Data repository stored on an unalterable ledgers.

Digital product passports enables manufacturers to meet CBAM requirements to offset part of their carbon footprint for commodities exported to EU, by purchasing Carbon Credits on emissions trading platform.

Track and Trace solutions empowers enterprises to aggregate data on:

A- Recycled material sourced.
B- Energy intensity and mix during fabrication
C- Transport emissions and integrate it with ERP systems.

Digital product passports can be printed using variable printing heads on commodity produce in the form of a weblink QR code pointing towards the immutable data container. Companies adopting such Traceability solutions can automate data gathering and processing, making it easier, faster and cost efficient to achieve compliance with regulations.

Executing the Blockchain Blueprint: Seizing the opportunity
Digital product passport not only ensures compliance but becomes the cornerstone of business growth strategy in compliance with CBAM. It helps exporters achieve CBAM authorised status based on verifiable accounting of their carbon footprint.

To achieve that, enterprises need to adopt ARVIT tool to evaluate their operations end-to-end ASAP:

ARVIT process covers steps to compliance: Assess, Report, Validate, Improve and Trace.

Assess: Review existing sourcing of recycled materials, Fabrication processes and IoT sensors for accurate reporting, renewable energy source mix and transportation emissions alternatives.

Report: Report existing state and desired state to achieve competitive advantage in exporting to the EU.

Validate: Attach lab certificates, complex supply chain validations, delivery orders & invoices to report trail.

Improve: Adopt required changes, such as increasing recycled materials in mix, diversifying to renewable energy sources, adopt traceability solution interoperable and integrated with ERPs.

Trace: Adopt end-to-end traceability for materials, energy, fabrication, inventory, transport emissions.
The power of such a Blockchain traceability and reporting solution addresses key requirements:

Aggregating structured and unstructured data related to operations from material sourcing, recycling validation, renewable energy and efficiency, transport emissions, and lab test attachment, with Microsoft Data integration solution or SAP 4 Hanna suite.

Applying computer vision from installed cameras, to identify recycled material, recycling and fabrication processes, and the production and serialisation of commdities (printing of Digital passports).

Connecting manufacturing facility IoT sensors: Automate the logging of sensor data capturing related to recycled materials weight received and processed, energy usage by source, recycled material produced weight. Aggregate data and demonstrate correlation between recycled waste and output weight.

Applying a digital passport in the form of a weblink QR code linked to a track-and-trace platform for recycled materials in bags and containers for preventing double counting and validation of product properties and and lab certificates confirming recycled material source.

Integrating passporting & traceability platform to enterprise ERP for automation of data gathering and processing.

Accelerate journey to trade emissions trading for offsetting carbon footprint if compliance proves too difficult for enterprises.

In summary, providing a comprehensive overview of a product's lifecycle, digital product passports can help companies achieve reporting compliance with regulations such as Carbon Border Adjustment Mechanism (CBAM) while also enabling them to receive carbon credits on material recovery and recycling to accelerate to NetZero and to access regulated markets under CBAM regulations.

For further discussion on CBAM regulations or adopting voluntary carbon offsets to engage consumers

Projects & Startups

Supply Chain Traceability & Transparency

Provenance

United Kingdom

Provenance's technology is increasing discoverability, conversion and brand value for hundreds of CPG brands and retailers, including Cult Beauty, Douglas, Belu, Pukka, Napolina, Arla and Unilever.

50 Employee

AI

Sustainable Finance & Impact Investing

IXO

Switzerland

Leading the development of a Web3 Internet of Impact, to provide essential digital financing and data verification infrastructure for sustainable social, environmental and economic development, and to mitigate impacts of the Climate Crisis.

18 Employee

Web3

Pyrpose

Switzerland

Pyrpose is co-creating into a new sector with decentralised finance DeFi - regenerative finance ReFi.

12 Employee

Web3

Sustainable Finance & Impact Investing

Aera Force

New Zealand

Aera VC set out to prove that the pursuit of a better world makes better investment opportunities possible. We are sector and geography agnostic but invest in deep technology with fluid thematics underpinned by the UN Sustainable Development Goals. These include Climate and Carbon, Future of Food, Future of Health and Future of Work and Education.

17 Employee

Web3

Eco Labs

United States

Eco Labs provides Ecological Assets to companies with sustainability goals which link their investments to verified regenerative practices performed by smallholder farmers.

1 Employee

Web3

Gitcoin

United States

Gitcoin.co is a decentralised platform that connects developers, projects, & communities.

183 Employee

Web3

Water & Natural Resources Management

Intelligent Water Services

United States

Helping utilities with their data management & cybersecurity through Blockchain technology.

2 Employee

Web3

Sea Chain Token

Decentralised

Bridging the gap between the cleanliness of our oceans and Blockchain by gamifying awareness & deploying river barriers.

10 Employee

Web3

Water DAO

Decentralised

This protocol, RH2O (which stands for regenerative water), is a digital smart water contract that conveys ownership over the beneficial impact of regenerative sources of water, such as sustainable desalination

1 Employee

Web3

Projects & Startups

Voluntary Recycling Credits Initiative

1. The Problem: A global waste crisis

The world is facing a 'global waste crisis' and does not even see it.

Individuals generate 2bn tons of municipal solid waste every year at the private level, and this is only the tip of the iceberg. Adding waste from various industrial, electronic, agricultural or other economic activities the total reaches 17-18 bn tons. Consider that only 50% of this waste is being treated and recycled, meaning that the world is landfilling, dumping or burning the rest, deeply damaging soils, water resources and increasing air pollution.

Now, let's consider that by 2050, the solid waste generation is expected to grow by 54% globally. The issues just mentioned, will be extremely amplified by the existing, limited, infrastructure for collection, treatment and recycling of solid waste.

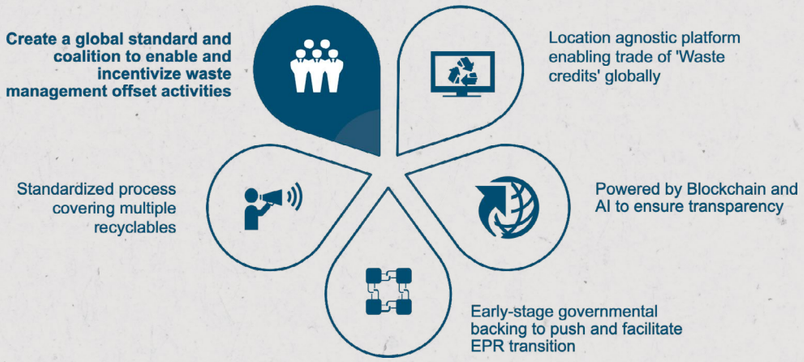
While private businesses and governments are progressively committing towards increasing recycling rates and the usage of recycled content in their products, they do not have access to an integrated solution to deliver on these goals.

There is a strong need for the creation of virtuous loops between waste producers and solution providers, being the latter the waste management industry; but currently no unified global initiative addresses the waste challenge in a standardised and comprehensive manner.

2. The Voluntary Recycling Credit (VRC) approach

The Voluntary Recycling Credit Initiative addresses the capacity problem by creating a credit system which could incentivise collection and recycling of solid materials, therefore directly supporting the development of the waste management sector. Defining a comprehensive set of standardised rules and processes, the VRC will provide a transparent ecosystem for institutions to compensate their waste footprint. Through the exchange of 'recycling credits', issued against treatment of additional material, recycling companies will get a financial incentive which they could then reinvest to build capacity and optimise infrastructure.

Exchange of the credits will take place on a Blockchain-based marketplace, enabling auditable and safe movements between 'waste offesetters' and recycling companies.



VRC Value proposition

The VRC Initiative is built over solid collaboration and exchange between public and private sector, with a cross national approach and a cooperative mindset. Involvement from different stakeholder across countries and multiple layers of the value chain is a crucial part of its value proposition, which aims at a joint effort to shape the future industry standards.

In this context, the Internet Computer Protocol (ICP) developed by DFINITY Foundation served as the underlying technical infrastructure required to bring transparency and scalability to the project during the development of its Proof of Concept.

3. Technology as part of the solution

Integrating technology into the waste management sector is crucial for enhancing transparency and establishing a sustainable and efficient solution. Specifically, traceability of materials and auditability of processes are crucial needs for an optimisation of the industry. In this context, Web3, Artificial Intelligence, and the IoT contribute the right ingredients for developing transparent, immutable and globally replicable processes.

Blockchain
..will serve as the immutable ledger where all transactions and audit history is recorded – all relevant documents can also be stored on-chain for safe-keeping

Artificial Intelligence
..will be embedded to optimize the auditing process across the recycling value chain

Internet of Things
..will enable real-time collection and aggregation of data to support the recycling auditing process

Blockchain technology facilitates the creation of an immutable ledger, ensuring the secure and public storage of every transaction. In an ideal scenario this also includes enough storage space to immutably capture every document, video or photo associated to the credit (for instance on next level Blockchain solution like ICP by DFINITY Foundation). This aims to guarantee comprehensive traceability of materials worldwide. Moreover, all credits and related information can be stored on an on-chain wallet to maximise security and sovereignty.

Achieving this objective also relies on the pivotal roles of AI and IoT. In fact, IoT sensors enable real-time data collection, supporting recycling audit processes, while AI facilitates remote waste audits and the construction of robust predicting models.

These technologies collectively enhance transparency throughout the value chain, fostering increased data collection and trust among all stakeholders.

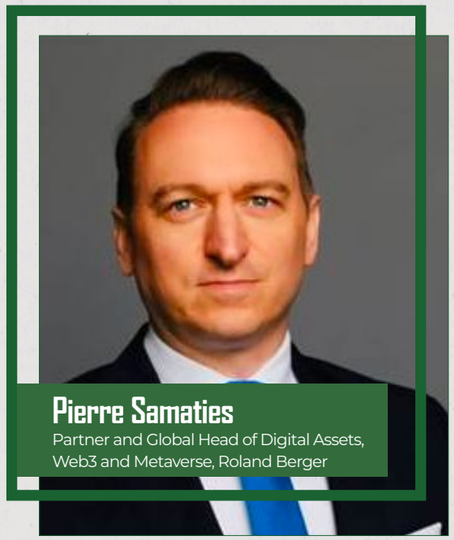
4. VRC next steps

The VRC Initiative, which was announced in Paris in May 2023 from Roland Berger together with BEEAH Group and International Solid Waste Association, is ready to drive a real impact and reshape the global approach to recycling contribution. Encouraging all stakeholders to take ownership of their impact on the planet, it will foster the development of more standardised processes and efficient infrastructures.

The Proof of Concept has been successfully developed and a first live transaction has been displayed on stage at COP28 on December 4th, 2023.

In the upcoming months the full-scaled platform will be developed and it will go live officially during 2024.

The VRC Initiative is currently looking for project investors, ecosystem partners to trade recycling credits and technology partners to build the underlying audit layer.


Pierre Samaties
Partner and Global Head of Digital Assets, Web3 and Metaverse, Roland Berger

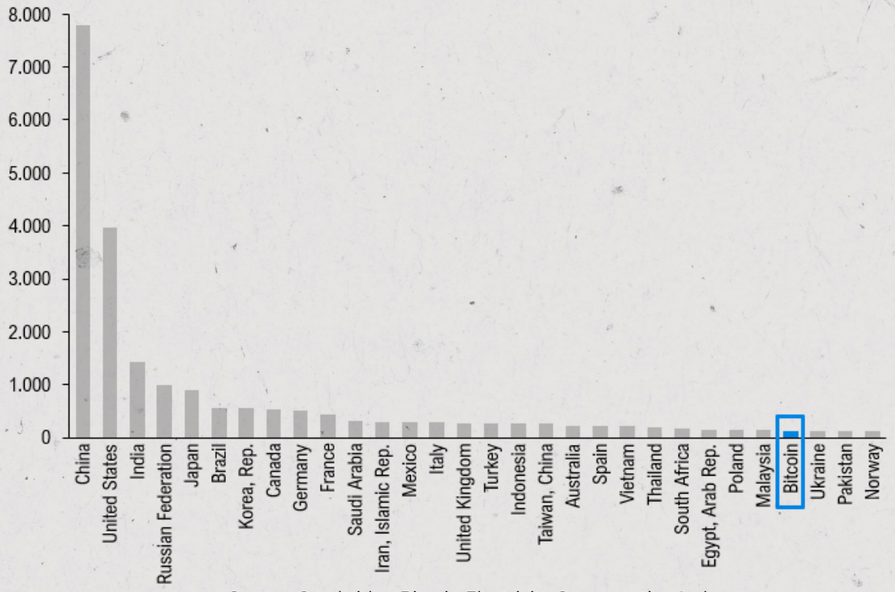

Hani Tohme
Managing Director of Middle East & Head of Sustainability MENA Region, Roland Berger

The Sustainability of Bitcoin Mining

1. Sustainability concerns around Bitcoin mining

Bitcoin mining is scrutinized for its significant energy requirements and resulting environmental impact. The core issue lies in the energy-intensive 'proof of work' consensus mechanism, which demands extensive computational resources. The magnitude of energy consumption is such that some large mining operations have their own dedicated power plants. The global energy consumption for Bitcoin mining is estimated at 90-345 TWh per year (mid-range estimate of 156 TWh per year), comparable to the energy usage of entire nations.

Figure 1: Country ranking by annual electricity consumption [TWh]

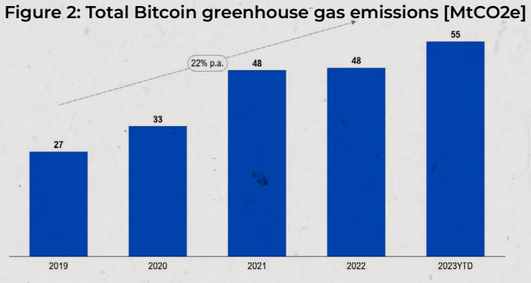


Source: Cambridge Bitcoin Electricity Consumption Index

This substantial energy expenditure raises questions about global energy supply pressures and carbon emissions. The Cambridge University Bitcoin Electricity Index reported a +20% annual growth rate in carbon emissions from Bitcoin mining from 2019 to 2023.

It is important to note, that the perceived value of Bitcoin heavily influences the interpretation of this energy use. If one views Bitcoin as lacking intrinsic value, every single megawatt dedicated to it would bee seen as "wasting energy". However, we believe that Bitcoin as an asset class has a significant positive ESG impact, that goes way beyond energy consumption. This perspective emphasises the necessity of examining Bitcoin's role and potential benefits in a broader socio-economic and environmental context.

Figure 2: Total Bitcoin greenhouse gas emissions [MtCO2e]



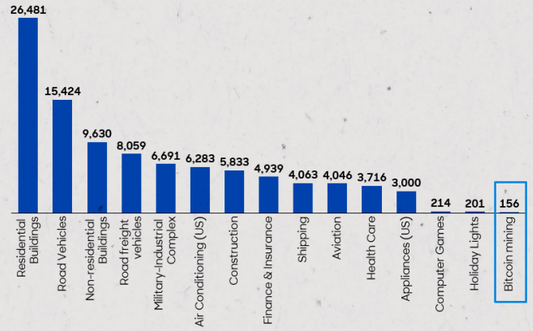
Source: Cambridge Bitcoin Electricity Consumption Index

2. Contextualizing the Problem

Comparison with other Sectors:

The traditional finance and insurance sector, often associated with Cryptocurrency, is an integral part of the global financial system. This sector includes various components like data centers, ATMs, physical branches, and the transportation of physical currency. The cumulative energy impact of these elements contributes significantly to the sector's overall energy footprint, which amounts to a staggering 4,939 TWh, compared to 156 TWh for Bitcoin mining. Furthermore, contrasting Bitcoin mining to other industries shows how insignificant Bitcoin mining's power consumption is in comparison.

Figure 3: Energy consumption of Bitcoin mining vs. other industries [TWh]

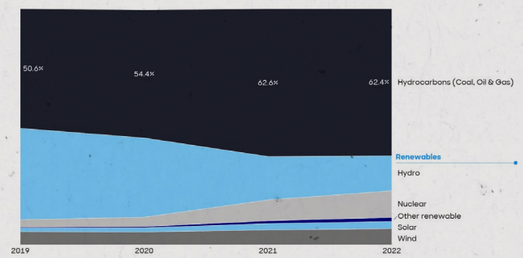


Source: Cambridge Bitcoin Electricity Consumption Index

Bitcoin Mining's Energy Sources:

A significant aspect of the discussion is the type of energy sources used in Bitcoin mining. Research indicates that c.40-50% of Bitcoin mining relies on renewable energy sources. This includes hydropower (15%), nuclear (15%), wind (7%), and solar (3%), with other renewable sources contributing 2% of the total energy used in mining. However, a considerable portion, c.62% as of 2022, still comes from non-renewable sources such as gas and coal. Despite this, there is an observable trend among miners towards using more renewable energy sources as they become more affordable and accessible. In fact, major Bitcoin miners are increasingly adopting renewable energy sources. The Bitcoin Mining Council, which comprises 57 of the world's largest Bitcoin mining companies, representing 43% of the global network, has shown a significant shift towards renewable energy. In 2022, 59% of the energy used by these companies was from renewable sources, indicating a strong movement towards more sustainable mining practices. This trend highlights the industry's growing commitment to reducing its carbon footprint and enhancing overall sustainability.

Figure 4: Bitcoin electricity consumption by power source [%]



Source: Cambridge Bitcoin Electricity Consumption Index

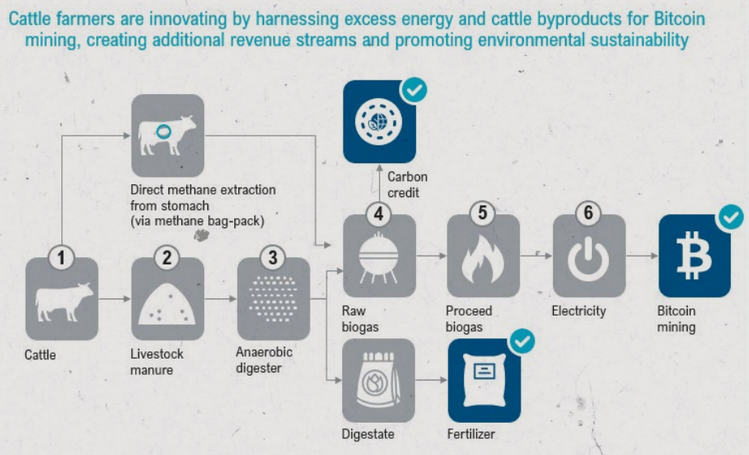
3. Drivers to Further Enhancing Sustainability of Bitcoin Mining

Increased Adoption of Circularity Use-Cases:

Recycled Heat Usage: Bitcoin mining generates significant heat, which is now being repurposed for a variety of practical applications. This includes climate control, where heat is used for district heating, food security through the maintenance of optimal conditions in aquaculture and greenhouses, and in the industrial sector for processes like Enhanced Oil Recovery and Heat-to-Hydrogen production. In other pilots the heat is used to derive drinking water.

Methane Mitigation and Reduction: Some Bitcoin miners are addressing environmental hazards by capturing methane from sources like landfills and cattle farms, converting the methane

Figure 5: Cattle farm-to-Bitcoin

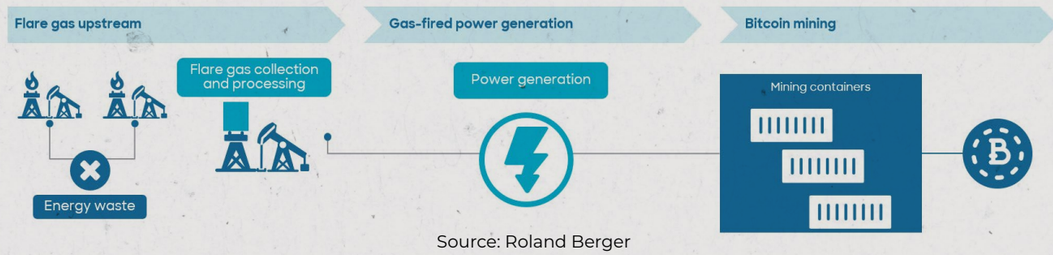


Source: Roland Berger

to biogas to power their mining operations. This approach not only reduces greenhouse gas emissions but also advances circular economic models.

Excess and Wasted Energy Utilisation: Bitcoin miners are utilising neglected energy reservoirs, especially from renewable energy sources that otherwise would be curtailed and excess

Figure 6: Flare gas-to-Bitcoin



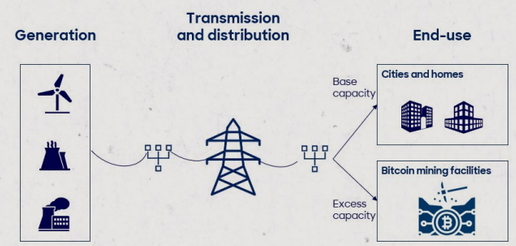
Source: Roland Berger

natural gas from industrial processes or oil extraction, which would otherwise be flared or released into the atmosphere. This practice aligns profitability with environmental sustainability by minimizing wastage and addressing gas flaring concerns.

Demand Response Programs:

Miners forming a symbiosis with utility companies by providing Demand Side Management flexibility. Miners are adjusting their energy consumption to align with fluctuations in electrical grid supply and demand. This introduces a dynamic and flexible load to the energy ecosystem, contributing to the stability and balance of electrical grids and facilitating the expansion of renewable energy capacity (i.e. through increasing its running hours).

Figure 7: Demand response program

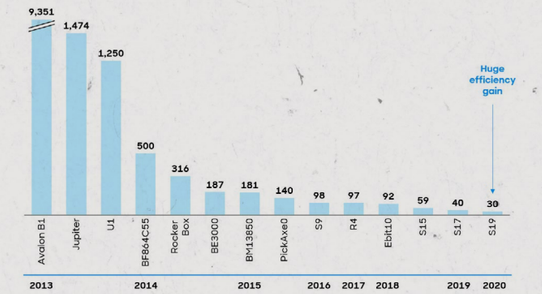


Source: Roland Berger

Increased Mining Hardware Improvement:

The Bitcoin mining sector has seen a 58-fold increase in efficiency over the past eight years due to technological advancements, particularly in the development of energy-efficient mining hardware. This improvement is significantly reducing the overall carbon footprint of mining operations. The industry is also embracing innovative cooling solutions and hardware optimisation techniques, which further reinforce its commitment to sustainable practices.

Figure 8: Improvement in ASIC mining machine efficiency [J/Th]



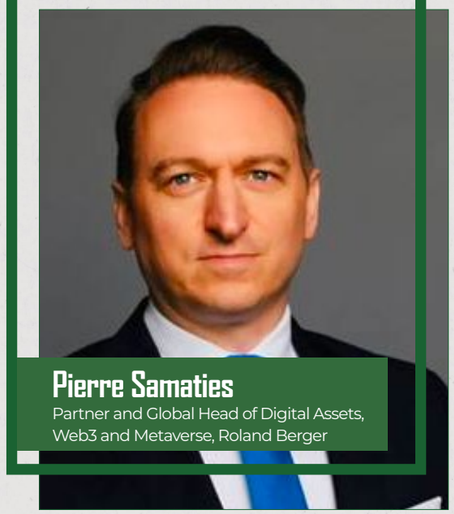
Source: Bitcoin Mining Council, Roland Berger

4. Social Inclusion of Bitcoin

Bitcoin is one of the most inclusive asset classes on earth as it does not discriminate anyone getting access to value transfer and storage. Not only has this the potential to include the large world population that is currently unbanked, it also provides a viable option of a store of value in regions where national currencies have been devalued at a massive speed (e.g. Argentina, Lebanon). This trait of Bitcoin cannot be underestimated and should also be considered in a fair discussion around energy usage.

5. Conclusion

The sustainability conversation around Bitcoin, often centered on energy consumption, is just a partial view. A comprehensive examination reveals its multifaceted impact with favorable implications across environmental, social, and governance dimensions. Bitcoin not only uses a significant share of energy from renewable sources but also promotes renewable energy infrastructure development and adaptable, efficient energy utilization. In some cases it also incentivizes removing methane from the atmosphere, contributing to a carbon-negative effect. However its potential to advance financial inclusion and provide a discriminatory-free access to value is the strongest argument for its increasing visibility as an ESG asset.



Pierre Samaties
Partner and Global Head of Digital Assets, Web3 and Metaverse, Roland Berger

Malik Aboul Naja
Senior Consultant, Web3 and Metaversen, Roland Berger

Service Providers

Technology & Advisory

Frigg

Switzerland

Upgrading our financial system to make sure sustainable finance is accessible, efficient, and sufficient

10 Employee

Web3

Ibexus

Switzerland

IBEXUS delivers a dependable platform tailored for reliable multi-stakeholder business processes. At its core lies an incorruptible single source of truth, promoting confident collaboration.

6 Employee

Web3

Porini Foundation

Switzerland

Porini Foundation is a non-profit Swiss based NGO fostering innovation technology that protects nature, environment and imperil humans.

8 Employee

Web3

Technology & Advisory

ERM

United Kingdom

ERM is a sustainability consultancy that helps businesses reduce their environmental impact.

9,446 Employee

Web3/AI

EY

United Kingdom

Working across assurance, consulting, law, strategy, tax and transactions, EY teams ask better questions to find new answers for the complex issues facing our world today.

419 Employee

Web3/AI

Impact Scope

Switzerland

ImpactScope helps organisations deploy AI and Web3 tools to measure, verify and amplify their sustainability achievements. We serve a wide range of clients including NASDAQ-listed Crypto mining companies, international NGOs and financial regulators.

12 Employee

Web3/AI

Service Providers

Tokengate

Switzerland

Tokengate is your SaaS(full form) platform for tokenising assets The whole process of token creation, issuance and sale in one easy-to-use applicationt

15 Employee

Web3/AI

3 Degrees Group

United States

3Degrees, a certified B Corporation, makes it possible for businesses and their customers to take urgent action on climate change.

316 Employee

Web3/AI

Chainalysis

United States

Chainalysis offers Cryptocurrency investigation and compliance solutions to global law enforcement agencies, regulators, and businesses as they work together to fight illicit Cryptocurrency activity. Backed by Benchmark and other leading names in venture capital, Chainalysis builds trust in Blockchains.

855 Employee

Web3/AI

Roland Berger

Germany

Roland Berger is a global management consulting firm with offices in 35 countries. The company provides strategy, operations, & technology consulting to a wide range of industries.

30+ Employee

Web3/AI

STACS

Singapore

FinTech company focused on ESG FinTech, operating ESGpedia, which powers the Monetary Authority of Singapore's (MAS) Greenprint ESG Registry.

60 Employee

Web3/AI

The Carbon Trust

United Kingdom

The Carbon Trust partners with businesses, governments and financial institutions worldwide to accelerate their journeys to Net Zero.

9 Employee

Web3/AI

Service Providers

Investors

Venture Capital

Allegory.Earth
United States

Allegory.Earth is a company that is developing a Blockchain-based platform for tracking the impact of climate change on nature. The platform will make it easier for businesses and individuals to track the impact of climate change on nature, and will help to inform decision-making.

2 Employee — Web3/AI

Amundi
France

Amundi is a leading asset manager with over €1.7 trillion in assets under management. The company has a long-string commitment to sustainable investing & has been a signatory to the United Nations Principles for Responsible Investment (UNPRI) since 2009.

4822 Employee — Web3/AI

BNP Paribas
France

BNP Paribas integrates ESG factors into its investment process, which means that it considers environmental, social & governance issues when making investment decisions. This helps to ensure that BNP Paribas' investments are aligned with its commitment to sustainable development.

176694 Employee — Web3/AI

Venture Capital

Farm
United States

Farm.vc is a venture capital firm that invests in sustainable businesses.

54 Employee — Web3/AI

Flori Ventures
United States

FloriVentures is a company that is using Blockchain technology to help people invest in sustainable agriculture. The company has invested in over 100 sustainable agriculture projects.

11 Employee — Web3/AI

INVESCO
United States

Invesco invests in a wide range of ESG sectors, including climate change, water, biodiversity, & human rights. The company has a strong commitment to sustainable investing & has been a leader in developing ESG-screened investment products.

6936 Employee — Web3/AI

Investors

Brown advisory
United States

Brown Advisory invests in a wide range of ESG sectors, including climate change, water, biodiversity, & human rights. The company has a strong commitment to sustainable investing & has been a leader in developing ESG-screened investment products.

936 Employee — Web3/AI

Calvert
United States

Calvert is a global investment management firm that helps individuals, advisors & institutions invest in solutions that people & our planet need. For over 40 years, Calvert has been a leader in responsible investing, integrating environmental, social & governance (ESG) factors into investment research & decision-making.

51 Employee — Web3/AI

East Ventures
Singapore

East Ventures is a venture capital firm that invests in Southeast Asia. It has a strong focus on ESG, and has invested in companies that are using Blockchain to address environmental and social challenges.

103 Employee — Web3/AI

Morgan Stanley
United States

Morgan Stanley invests in a wide range of ESG sectors, including climate change, water, biodiversity, & human rights. The company has a strong commitment to sustainable investing & has been a leader in developing ESG-screened investment products.

87406 Employee — Web3/AI

Nordea
United States

Nordea is a leading Nordic & Baltic financial services group with a strong commitment to sustainable development. The company's ESG (Environmental, Social, & Governance) strategy is based on the belief that sustainability is good for business & good for society.

30708 Employee — Web3/AI

Northern Trust
United States

Northern Trust is a leading global wealth management, asset servicing, & investment management organisation. The company's ESG (Environmental, Social, & Governance) Institute is a research & thought leadership platform that provides insights on the intersection of ESG & investment.

27053 Employee — Web3/AI

Investors

Vanagon

Vanagon Ventures: Investing in the Next Wave of the Internet for a Regenerative Economy

At Vanagon, we are dedicated to backing game-changing European founders who are reshaping the infrastructure stack towards a Regenerative Economy, applying unstoppable technology such as Blockchain, AI, and IoT, while seizing the potentially biggest business opportunity of our time. Our portfolio companies are building solutions that are based on the principles of circularity, renewable energy systems, and in which nature has become a critical asset class.

Nature as an Asset Class - What does it mean?

Let's take a look at where next-wave Internet technology is already helping accelerate the transition to a regenerative economy today. The voluntary carbon market (VCM) is the most known of a range of ecosystem service markets emerging, forming important tools to factor nature into the economic equation. Net zero pledges among Fortune 500 companies are about to become the new normal. For emissions that cannot be avoided or reduced, companies largely rely on offsetting via the voluntary carbon market (VCM). Sadly, today, the VCM is still largely dysfunctional. Many large players in the VCM market, such as the largest carbon registry Verra, were designed in the early 2000s and still mostly rely on technology from back then. APIs hardly exist. Carbon credits exist in the form of PDFs. Has a specific carbon credit already been used to offset an emission and therefore should be retired? Unclear. So «double spending» of carbon credits is a significant problem. Lack of transparency has also led to a high number of middlemen that are currently claiming a large chunk of the value creation. Only a small fraction of the price paid for carbon certificates actually reaches the projects. Furthermore, there is a lack of transparency regarding the quality of carbon credits. On average, the quality of carbon credits - if externally examined - is very low. The processes in the industry are surprisingly manual. To assess the amount of carbon sequestered and stored by a carbon project, registries have physically sent staff via intercontinental flights to sites, where they counted trees and measured them with tape.

How can technology help renew the voluntary carbon market?

The next-wave Internet technologies such as Blockchain or AI are massive catalysts to rebuild the dysfunctional market such as the VCM and finally make them work. Let's dive into some examples from our portfolio.

Renoster - Creating Transparency Regarding Carbon Quality.

Our portfolio company Renoster brings radical transparency into the voluntary carbon market by assessing nature-based carbon projects at scale with remote sensing technology and machine learning and publishing the results. Their publications have led to a global media echo (picked up by The Guardian, Forbes, WSJ) and play an important role in rebuilding trust in the VCM by setting incentives for honesty and quality in the market. At the same time, Renoster has built a solid revenue stream from customers (e.g. Time, dpd) who would like to access Renoster reports before their publication.

Senken - Avoiding Double Spending of Credits & Enabling New Use Cases

Our portfolio company Senken, for instance, is the largest marketplace for digital carbon credits. Based on Blockchain technology, the transaction history of carbon credits becomes transparent. Double spending can be avoided. Additionally, entirely new use cases are enabled by this new level of digitalisation. Together with multinationals, Senken is already exploring micro-offsetting use cases for machines to automatically offset machine emissions in real-time. A use case that we expect to become a standard for every future-proof business.

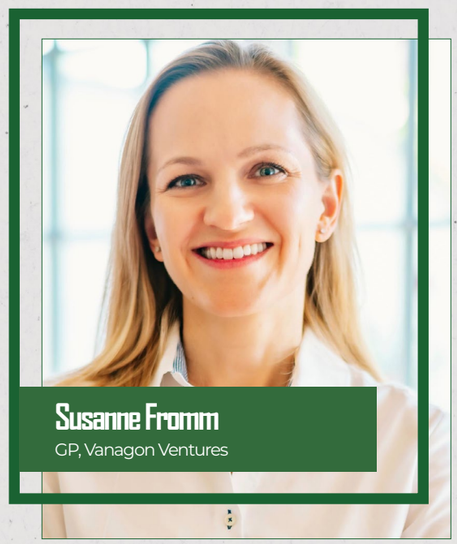
Looking beyond carbon markets

Although carbon credits are the most known, they are only one of many classes in the rapidly growing market for nature assets. Other examples are ecosystem services that lead to an uplift in water, soil quality, or biodiversity. More and more large food producers, for example, are keen to reduce the risk from climate change in their supply chain. Innovative solutions help them conclude nature service agreements with farmers. The buyer pays the farmers for engaging in regenerative agricultural practices to improve the soil's quality and its ability to store water, making them less vulnerable to harvest loss due to climate change. Additionally, the buyer can claim the uplift in ecosystem health as an asset and activate it on their balance sheets. Such novel collaborative models are already implemented and they are paving the way for a new trillion USD market for differentiated nature assets, connecting insetters, offsetters, investors, philanthropists, and public entities.

Interested to participate in this once in a lifetime market opportunity?

With a focused €30M fund, our commitment lies in seeding Europe's most promising startups that drive the regenerative economy forward. Our unique edge? A deep-rooted belief in the power of decentralization and an eye for identifying the true movers & shakers in the entrepreneurial world using next frontier technology to solve global coordination failures. Our track record speaks for itself, with early portfolio startups securing significant investments from top-tier US VCs.

Invest with us in the system changers to a Regenerative Economy.



Susanne Fromm
GP, Vanagon Ventures

Investors

Venture Capital

Pictet
Switzerland

Pictet is a leading global asset management firm with a strong commitment to responsible investing. The company integrates ESG criteria into its investment process, which means that it considers environmental, social & governance issues when making investment decisions.

4648 Employee — Web3/AI

PIMCO
United States

PIMCO invests in a wide range of ESG sectors, including climate change, water, biodiversity, & human rights. The company has a long history of sustainable investing & was one of the first investment firms to launch an ESG-screened mutual fund in 2000.

4138 Employee — Web3/AI

Planet A Ventures
Germany

Planet A is an organisation that aims to combat climate change by promoting sustainable lifestyle choices & supporting climate projects.

44 Employee — Web3/AI

Venture Capital

TIAA
United States

TIAA, a financial services organisation that serves the academic, research, medical, & cultural fields, offers a variety of responsible investing (RI) & ESG (Environmental, Social, & Governance) products.

13438 Employee — Web3/AI

Vanguard
United States

Vanguard's ESG investment products are designed to help investors align their investments with their values. The company's ESG investment products are subject to rigorous research & analysis, & are managed by experienced investment professionals

23334 Employee — Web3/AI

Vontobel
Switzerland

Vontobel invests in a wide range of ESG sectors, including climate change, water, biodiversity, & human rights. The company has a strong commitment to sustainable investing & has been a leader in developing ESG-screened investment products.

2282 Employee — Web3/AI

Putnam
United States

Putnam Investments invests in a wide range of ESG sectors, including climate change, water, biodiversity, & human rights. The company has a strong commitment to sustainable investing & has been a leader in developing ESG-screened investment products.

1751 Employee — Web3/AI

Schroders
United Kingdom

Schroders invests in a wide range of ESG sectors, including climate change, water, biodiversity, & human rights. The company has a long history of sustainable investing & was one of the first investment firms to launch an ESG-screened mutual fund in 1995.

5297 Employee — Web3/AI

Stewart Advisor
United Kingdom

Stewart Investors is a leading UK investment management firm with a strong commitment to responsible investing.

67 Employee — Web3/AI

Vanagon Ventures
United States

Vanagon Ventures is the early backer for founders building digital solutions at the intersection of climate and finance.

10 Employee — Web3/AI

Sarson Funds
United Arab Emirates

Sarson Funds is an investment firm that invests in ESG-focused Cryptocurrency funds.

21 Employee — Web3

Incubators & Accelerators

AYA Foundation

Switzerland

This initiative by the World Economic Forum explores the impact of Cryptocurrencies & Blockchain on sustainability.

103 Employee

Web3

CISA

Switzerland

This initiative by the World Economic Forum explores the impact of Cryptocurrencies & Blockchain on sustainability.

4,406 Employee

Web3

C3

United Arab Emirates

C3, a UAE-based social enterprise helping entrepreneurs unlock unique opportunities, achieve incredible growth, and maximise lasting impact.

15 Employee

Web3/AI

Catalyst

United Arab Emirates

An early-stage venture capital focused on climate-tech, we specialise in investing in high-potential startups and empowering them to reach new heights.

4 Employee

Web3/AI

Climate-KIC

Singapore

Climate-KIC is Europe's leading climate innovation initiative. We are a network of innovators, entrepreneurs, businesses, policymakers & citizens working together to accelerate the transition to a zero-carbon, climate-resilient society.

348 Employee

Web3/AI

New Energy Nexus

United States

New Energy Nexus (NEX) is the world's leading ecosystem of funds and accelerators supporting diverse clean energy entrepreneurs to thrive, from emerging tech through to clean energy distribution and adoption.

120 Employee

Web3/AI

IBEXUS

Shared Single Source

Humanity is facing an epochal sustainable transformation that represents an enormous challenge for our society and economy. This transformation is being driven by the climate crisis and geopolitical shifts.

The concept of transformation should be understood in both an economic and a technological sense. Economically, we are undergoing a transformation from a take-use-dispose system to a sustainable circular economy characterised by trusting, transparent and traceable cooperation between partners. Data security and the protection of privacy are key prerequisites for the successful implementation of such a sustainable business model.

The digital transformation has been the driving topic in industry and public administration for years. This technological transformation is primarily aimed at the automation of processes with sensors (IoT devices) and the implementation of data-driven business models that operate in real time. The demands on companies and administrations are considerable, as existing processes not only have to be digitalised, but also re-modelled and implemented. This complex task presents companies with enormous cultural and resource-related challenges.

The ESG framework and the associated legal obligations (ESG reporting) present companies with additional challenges that need to be resolved in a timely manner. In addition to the content requirements, globally cascading supply chains in a multi-stakeholder environment are particularly difficult to manage, as media disruptions make efficient process automation almost impossible.

New technological approaches in combination with proven concepts are needed to successfully solve these diverse requirements. Technologically, a bridge is needed that can be seamlessly implemented in existing IT infrastructures (Web2) and at the same time encapsulates the complexity of decentralised ledger technology and AI (Web3). Flexibility and adaptability to existing architectures, automation and cost efficiency are essential prerequisites. A loosely coupled multichain platform such as Ibexus.io, which combines data streaming with a flexible on-chain business rule engine, is able to provide solutions for a wide range of use cases such as smart cities, smart mobility, federated learning, trackers in logistics chains and ESG reporting.

ESG reporting is not just an obligation for companies, but rather an enormous opportunity to improve profitability, protect the brand and thus positively develop the company's rating.

A shared single source of truth that guarantees immutability, transparency, traceability and a secure audit trail is essential for this. The proven concept of measure, control and manageguarantees a solid basis for credibility. With Ibexus, we provide this layer of trust as a basic infrastructure - don't believe it, know it.

Global companies such as Unilever, Mars and Patagonia have long since proven that sustainable business models not only have a positive impact on the climate but are also significantly more profitable.

Beat Steiger
Co-Founder & CxO, IBEXUS

Science & Research

Research Institutes

Amatech

Brazil

Amatech uses the Amazon as an open-air laboratory; including Big Data technologies, sensors and drones, artificial intelligence (AI), cloud computing, IoT, bio-mimicry robotics, satellite & remote sensing imagery, 3D modelling & data visualization, image recognition, Environmental DNA Analysis and many more.

1 Employee — Web3

Climate Ledger Initiative

Switzerland

CLI is an international, multi-stakeholder initiative at the intersection of climate change and Blockchain technology, or more generally distributed ledger technology (DLT)

86 Employee — Web3

Web3 Climate Map

Decentralised

The Web3 Climate Map is a project by the Climate Collective, a coalition of organisations working to address climate change using Blockchain technology. The map provides an overview of the different projects and initiatives that are underway in this space.

1 Employee — Web3

Solve MIT

United States

Solve is an initiative of the Massachusetts Institute of Technology (MIT) with a mission to drive innovation solve world challenges.

119 Employee — Web3/AI

Sustainalytics

United States

Morningstar Sustainalytics is a leading independent ESG and corporate governance research, ratings and analytics firm that supports investors around the world with the development and implementation of responsible investment strategies.

1,394 Employee — Web3/AI

openfoodchain

What About Agriculture

Food is at the heart of our lives. Yet, our food system is not in great shape. We have exorbitant waste levels, production is damaging our resources and today's food makes people heavy instead of healthy. Trucost, part of the S&P market intelligence, shows that industrialised farming causes a $3 trillion environmental impact each year4. Our food system is slow in adopting solutions to mitigate these challenges. Food is the least digitised industry of all. We lose billions each year just because of that, because we do not have a reliable data infrastructure.

ESG and Agriculture

ESG, one of the current labels for sustainability, has been part and parcel of agriculture since its very emergence, hunting and gathering. Yet, supply chains have become so long and complex, with so many players in different jurisdictions, that sustainability superseed a conundrum. Governments aim to ensure food security, food safety and now also ESG by prohibiting deforestation, enforcing laws for supply chain due diligence and for example regulating labour conditions. Additionally, there is a minefield of so-called voluntary standards. More than 500 private ESG certificates cover less than 10% of food, aimed at crops like coffee, tea, cacao and bananas.

For companies, ESG compliance has become very challenging. CSR managers, CFOs, CPOs, CEOs, seek solutions that can help them deal with ESG issues in their supply chains.

What is the role of the internet and AI in ESG compliance

The new internet and AI will bring more trust, transparency and traceability to the entire food system. The new internet (Web3) and Artificial Intelligence (AI) are fundamentally transforming agriculture. The new internet is building a reliable data infrastructure, with verifiable data and data producers as data owners. Think of farmers earning when capturing carbon. AI is making many - unimaginably many - processes easier and better. Think of ESG reporting based on immutable farm management data. Both are critical for the ESG agenda.

ESG on steroids

Technology is key for getting results on the ESG agenda. The new internet, renowned for its secure and immutable nature, is revolutionising supply chain management. Its decentralised ledger systems ensure that every step, from planting to buying, can be recorded transparently and verifiably. This enhances accountability, mitigates risks of fraud and foodborne illnesses and strengthens the position of producers and consumers. However, the most important impact of Web3 (Blockchain) on ESG is supply chain optimisation. There is ample proof that Web3 will reduce operational costs.

Synergies between Web3 and AI amplify positive impact on ESG goals. With transparency promoting fair practices and accountable resource management, and AI's data-driven insights fostering sustainable farming practices, the agriculture sector moves closer to achieving ambitious ESG targets.

Open Food Chain's Pioneering Solutions

Open Food Chain (OFC) is on a mission to transform our food system. Globally, we lose over €2,5 trillion per year in supply chains, due to a lack of a solid data infrastructure. Recognising the potential of Blockchain and AI, OFC offers an affordable infrastructure for the entire agrifood supply chain to report and manage ESG claims. The platform guarantees end-to-end data traceability, ensuring supply chain efficiency, consumer trust, and the possibility to back up ESG claims. OFC's emphasis on reliable data is a game-changer for ESG compliance.

OFC's platform is an industry-owned public infrastructure that streamlines the compliance process. Every participant can instantly and automatically publish ESG claims related to batches, eliminating the need for traditional communication methods like emails and calls. Moreover, OFC's digital infrastructure is compatible with emerging technologies like AI, quantum computing and tokenisation, ensuring that businesses remain at the forefront of innovation. As food is 10% of our economy, we are on a mission to save the world 250 billion a year.

Marieke de Ruyter de Wildt
Founder & CEO, Open Food Chain

Science & Research

Corporates & Associations

Crypto Valley

SUSTAINABLE AI
How Can Blockchain Help?

The interest in AI increased exponentially in the last months with the launch of ChatGPT, a chatbot developed by OpenAI and released in November 2022. Although significant improvements are still required, the impact of ChatGPT and similar tools are becoming more and more clear, also outside of the AI community.

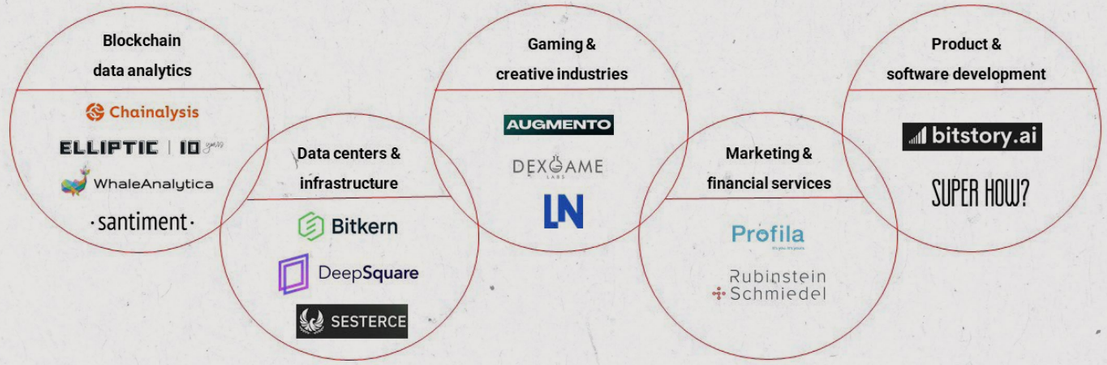
The potential impact of AI has been discussed for decades but in the last months it has become more tangible as it will undeniably impact our lifestyles and economies in the coming years. Process automation may lead to a radical change in the job market, resulting in a replacement effect – by the substitution of many jobs and tasks replacing human labor with AI processes. AI-related jobs to manage and maintain the infrastructure may counterbalance some of this effect but with a much lesser magnitude. Process automation may significantly impact lifestyle as well, contributing to the increase of free time available due to the increasing number of tasks potentially performed by a machine. There is an increasing need for organisations and individuals to understand AI's potential impact on their lives and their business.

Similarly to every technology of new introduction, its impact is neither positive nor negative but it depends on how the technology is used. The report SUSTAINABLE AI - How Can Blockchain Help? – written by the Sustainability WG at Crypto Valley Association - preliminarily explores the potential impact of AI from a sustainability perspective in connection to the use of Blockchain. The report is mainly based on the review of the topic performed in the first half of 2023 as well as a survey proposed to the members of the CVA and associated networks. Furthermore, the RESTART framework is proposed to ensure the ethical use of AI. Last but not least, a compendium of Blockchain-based, AI-focused CVA member organisations is introduced to illustrate the current landscape of products and services springing at the intersection of AI, Blockchain and sustainability.

The following conclusions have been derived concerning the need to create a sustainable AI. Firstly, the importance of providing open-source software to make sure that the advantages of AI are harvested by humanity and are not concentrated in the hands of a few companies or individuals. Secondly, the importance of thinking through concerning the goals to reach with the use of AI – RESTART framework offers the possibility to support such requirements. This is necessary to avoid the unintended consequences that AI may lead to, such as job loss or mental problems arising from AI predominance. Thirdly, the need of laying the foundations for a green AI, with a focus on creating efficient software, limiting

Sustainable AI report

Compendium of CVA member organisations (*)



(*) Examples are given for illustrative purposes and the list is not exhaustive. Not financial advice. Please do your own due diligence

the use of energy and the generation of electronic waste.

The report includes the following concepts that helped determining the conclusions as well as the elements of the RESTART framework. The ability to understand the sustainability implications of AI and the intersection with Blockchain required at first to provide background information needed in order to understand its potential implications. As this report is prepared by the Crypto Valley Association (CVA), the focus is on providing a deeper understanding of AI, rather than Blockchain (as we assume that readers have at least a general understanding of Blockchain technology). In the second step, the requirements for an ethical, green and democratic AI are exposed considering the potential support provided by Blockchain. As such, use cases, results of a survey and a framework are provided to help reflect and support the reader in understanding the implications for their industry.

In Chapter 1, The Uptake of Artificial Intelligence, AI is defined with its key terminology, history and development lifecycle to establish a common reference framework. The chapter concludes by looking at the benefits and challenges of AI and where the technology is headed in the next 5-10 years, also considering the results of a survey.

In Chapter 2, Ethical AI: How to Use AI Ethically the case is made that AI models should be designed from the start with an ethical goal in mind. The most important characteristics of such models are compounded into a simple framework (RESTART) that shows that Blockchain technology can act as a strong enabler of AI models designed with ethical use in mind. Lastly, the report illustrates how AI and Blockchain can work together for an ethical goal through a deep dive into the healthcare industry.

Chapter 3, Green AI: Sustainable use of data infrastructure considers the energy requirements associated with the use of AI tools, with the objective of promoting an energy-efficient

use of such tools and avoiding negative publicity from the general public regarding their environmental footprint - as it has been the case with Bitcoin. It concludes with a use-case concerning how AI and Blockchain can be used to improve the carbon offsetting industry.

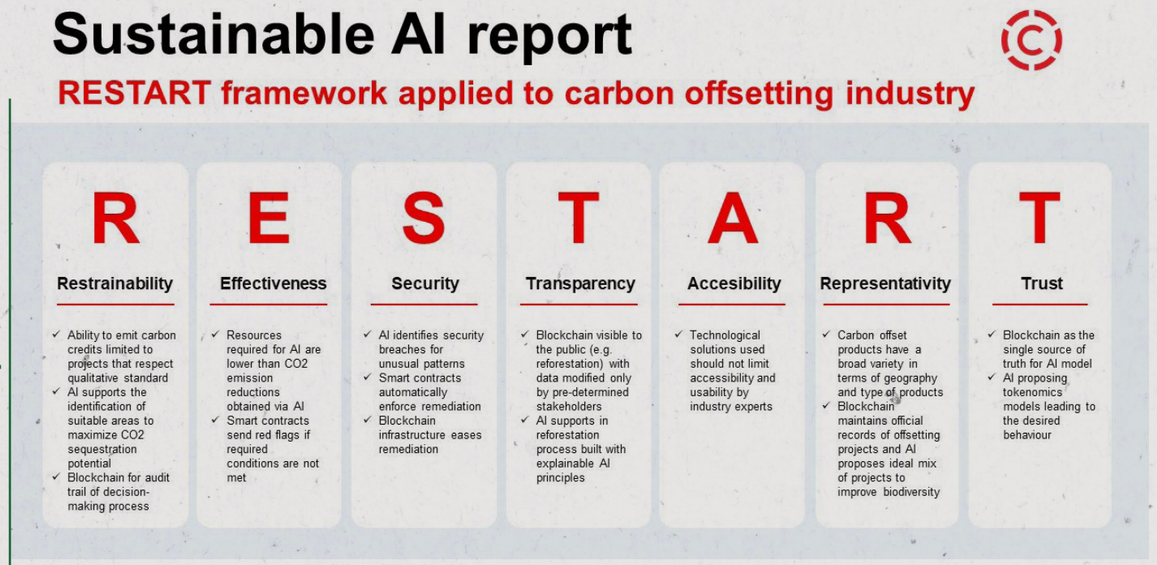
Chapter 4, Open-source AI: Democratising the Creation of AI Models, explains why AI should be accessible to everyone independently from their geographical location, income or technological knowledge. Similarly to the other chapters, it is explored how Blockchain can support such a requirement for a more inclusive AI and bring concrete examples of existing companies and initiatives working with this objective. Given AI's potential to enhance human productivity, but at the same time to carve its own life free of human control, an important consideration towards AI's long-term sustainability should be its ethical goals and use.

Chapter 5 includes the conclusion and potential development opportunities for the research that are being considered by the WG, including external collaborations. Last but not least, and after the acknowledgements in Chapter 6, a compendium of Blockchain-based, AI-focused CVA member organisations illustrate the current landscape of products and services springing at the intersection of AI, Blockchain and sustainability. These organisations are active in a wide range of domains, such as Blockchain data analytics, gaming, online marketing, financial services, data centers etc.

Key Considerations for Setting Ethical Goals and Use of AI: the RESTART Framework

Ethics can be an abstract and all-encompassing theme, therefore, in the report, it has been narrowed down to the most important principles and values when it comes to AI development and usage. In the process, an easy-to-remember framework has been created. It is based on the RESTART acronym to provide preliminary guidance for sustainable implementation of AI solutions:

1. **Restrainability:** at all times AI should ensure that humans maintain their freedom of choice and a "legal sovereign" status. In other words, development & use of AI should be restrained within the limits imposed by humans, be it for how they take decisions or for what they perceive as being allowed. Humans should act as the ultimate guardians against uncontrolled expansion of AI, when and if needed. Without restrainability, AI risks becoming autocratic.
2. **Effectiveness:** Given its core task of processing huge amounts of data, AI must ensure optimal use of resources/ infrastructure (e.g. energy consumption). According to a recent study, AI models can consume more than 1 GWh of energy just to be trained, which can translate into millions of dollars in electricity costs alone.
3. **Security:** Needless to say, that any AI model/algorithm should pay special attention to the way the data it uses will be protected. Handling PII (Personal Identifiable Information) is particularly well regulated around the world as 134 out of 194 countries have put legislation in place to ensure data protection and data privacy (e.g. GDPR in EU, HAPPY in Japan etc.).
4. **Transparency:** One of the most important characteristics of an AI model/algorithm should be that it is explainable and auditable. This means anyone with a legitimate interest to learn how the model has been created, trained, and deployed should be able to receive such information. At the other end of "transparency" should be a clear framework of who cannot see the data and why (e.g. cyber criminals, violation of human rights etc.) and how results were obtained (i.e. explainable AI).
5. **Accessibility:** Democratising contribution of the general public to an AI model creation might seem like a "nice-to-have" technical characteristic. However, from an ethical point of view, it is of utmost importance that AI is opened up for anyone interested to contribute independently from their income and technological knowledge.
6. **Representativity:** There are almost 8 billion people in the world, who speak 7.000 languages and produce daily almost 1.000 Petabytes of data. AI should reflect such diversity and inclusion in terms of its dataset composition, research questions, hypotheses and inference environments. Without representativity, data will be of low quality and so will the AI built on top of it (e.g., garbage in - garbage out). This, by the way, is a problem many data & analytics fields seem to have, for example in healthcare.
7. **Trust:** Any new technology that uses sophisticated processes to transform our personal data into insights that shape our decision-making needs to be trusted first. In the context of AI, trust can be recognised in user's confidence that models have been built thoroughly, that bias has been controlled/eliminated, and that results are correct and reliable.



Sustainability Working Group of CVA

Corporates

BEEAH Group

United Arab Emirates

BEEAH Group is a leading UAE-based environmental & energy services company. The company provides a wide range of services, including waste management, recycling, renewable energy, & environmental consulting.

874 Employee

Web3/AI

E.ON

Germany

The new E.ON is an international energy company focused on smart grids and customer solutions to drive the energy transition in Europe.

27,000 Employee

Web3/AI

Siemens

Germany

Siemens AG is a German multinational technology conglomerate. Its operations encompass automation and digitalisation in the process and manufacturing industries, intelligent infrastructure for buildings and distributed energy systems, rail transport solutions, as well as health technology and digital healthcare services.

2,14,000 Employee

Web3/AI

Associations

All for Climate DAO

Belgium

Building a 21st century movement of citizens taking action in the social and ecological crisis. Connected globally, rooted locally

8 Employee

Web3

Blockchain Climate Institute

United Kingdom

Blockchain Climate Institute (BCI) is a not-for-profit volunteers-led entity combining the functions of a think-and-do tank, an advocacy group, a law firm, and a chamber of commerce.

70 Employee

Web3

Blockchain Commission for Sustainable Development

United States

The Blockchain Commission is a group of Blockchain experts who are working to develop policy recommendations for the use of Blockchain technology.

10 Employee

Web3

Celo Climate Collective

United States

The Climate Collective is a coalition of companies working together to build a connection between Web3 & climate action.

7 Employee

Web3

Climate Chain Coalition

Canada

The Climate Chain Coalition is a group of organisations that are working to develop st&ards for the use of Blockchain technology in the climate change space.

8 Employee

Web3

Crypto Climate Accord

Switzerland

The Crypto Climate Accord (CCA) is a private sector-led initiative for the entire Crypto community focused on decarbonizing the Cryptocurrency industry in record time. Inspired by the Paris Climate Agreement, the CCA aims to achieve net-zero emissions from electricity consumption for CCA Signatories by 2030.

1 Employee

Web3

SIEMENS

How Blockchain can Accelerate the Energy Transition

How on track - or off track - are we in meeting our sustainability targets? While 2050 targets may feel far away, the first deadline of 2030 is approaching fast.

Real estate produces around 40% of global carbon emissions, so this sector is constantly in the spotlight to improve its sustainability performance. An increasing number of regulations and mandatory ESG reporting frameworks are prompting companies to act, but we need to accelerate change, move quicker - and at scale - to hit the deadline on time.

And buildings are no longer stand-alone; with the integration of renewables such as photovoltaics, they become “Prosumer” of energy with electricity grid connection, providing e-vehicle charging infrastructure for the electrification in the mobility sector.

Not to forget that about a third of all emissions worldwide are caused by industry. It is the task of the producing companies to make their contribution and to significantly reduce the carbon footprints of their products.

Digital technologies are the most scalable means of accelerating the decarbonisation and the quickest and most cost-effective way to start optimizing existing systems.

So, with just 6 years to go until the 2030 target, now is the time to switch to Blockchain solutions.

Tracking Product Carbon Footprint with SiGREEN

Many industries are already pressured to start disclosing their Product Carbon Footprint (PCF) or to implement it in the next decade; therefore adopting tools that help with the exchange of real data early on is key for carbon disclosure.

SiGREEN is a Siemens platform that simplifies the management of product-level emissions, also called Product Carbon Footprint (PCF).

The PCF measures the total greenhouse gas emissions associated with the entire life cycle of a specific product (cradle-to-gate). This life cycle includes all stages from raw material extraction, manufacturing, transportation, use, and end-of-life disposal or recycling. It helps consumers, businesses, and policymakers make informed choices about products based on their environmental performance.

SiGREEN provides actionable and trustworthy information, based on the principles of data sovereignty, decentralised trust and business confidentiality.

Companies can go beyond static reporting of CO2 emissions and instead of pure reporting, start to monitor the impact of improvement measures on their journey towards product decarbonisation.

Based on CO2 values measured where the emissions occur and aggregated along the value chain, dynamic PCF quantify the results of improvement measures and turn emission data into a management tool for decarbonisation at scale.

SiGREEN is a Web3-based application for fast adoption and easy supplier onboarding and data aggregation of the supply chain, including verifiable credentials for third-party verification of exchanged emission data. All partners keep full sovereignty over their data; Compliance with multiple established standards enables exchange of verifiable PCF with partners across industries.

SiGREEN uses Blockchain technology to facilitate the verification of shared PCF credentials that have been issued by trusted certifiers. The Blockchain network based on Hyperledger stores credential schemas, public keys of certifiers and revocation information, which allow a customer to Cryptographically verify PCF information presented by a manufacturer.

The Blockchain network does not store PCF information or information about suppliers and manufacturers. Instead, PCF information is exchanged along existing supplier/manufacturer and manufacturer/customer relationships.

How to ensure independency from Siemens?

A governing body called ESTAINIUM association is for those companies that want to actively shape the way product carbon reporting is done in the future, founded in April 2022.

ESTAINIUM association is an open and decentralised network that brings together manufacturers, suppliers, customers and partners and facilitates their cooperation.

How sustainable is the Blockchain technology used by SiGREEN?

The consensus in Hyperledger Indy is based on energy-efficient Redundant Byzantine Fault Tolerance (RBFT).

Peer-to Peer energy trading at the Grid Edge with Pebbles

The Pebbles project is a peer-to-peer energy trading based on Blockchain, supported by the Federal Ministry for Economic Affairs and Energy in Germany. The project is to design, develop and field test a digital platform concept for peer-to-peer trading (P2P trading) and the exchange of grid services. Pebbles analyses and tests the effects of Blockchain on the energy market. Local peer-to-peer energy trading not only assumes a practical function in controlling the supply and demand of the decentralised energy system. It is also a further indication of the business and monetisation opportunities the «energy flexibility market» is already opening up today.

With Pebbles we aim to decentralise energy systems by bringing to market non-centralised energy conversion plants, e.g. using a virtual power plant. At the same time we want to democratise the energy supply by actively involving end users and small-scale producers.

The Blockchain-based platform with trading agents also provides a smart contract library for energy applications. The smart contract-based billing automatically generates invoices based on the traded data and measurements.

The authentication of on- and off-chain streams ensures integrity & verifiability of trading process in decentralised environment, ensuring confidentiality.

As a result, energy cost was reduced up to 21% while earnings from energy supply increased up to 165% - enabled by 6.700 P2P contracts per day.

We are bringing the energy transition online!

Investing for impact – Financing the Energy Transition through DeFi

Sustainable assets and projects need finance and the impact investing market is growing fast. There is a genuine appetite for investment in projects that have a positive social and environmental impact. In fact, the Global Impact Investing Network (GIIN) reports that the market size is $1 trillion while the green bond market has experienced an annual growth rate of 50%.

Siemens was the first DAX-Corporate (non-financial) to issue a digital bond on a public Blockchain in accordance with Germany’s Electronic Securities Act (eWpG), being a pioneer in the ongoing digital transformation of capital and securities markets.

It has been possible to issue Blockchain-based digital bonds in Germany since the Electronic Securities Act came into effect in June 2021. Siemens has used the new possibilities of the Electronic Securities Act and sold the securities directly to investors without engaging established central securities depositories.

The bond has a volume of €60 million, maturity of one year and was sold directly to investors. And in this Blockchain application, there was no Crypto currency used, the settlement of the bond has been proceeded via bank account in EUR.

The bond is underpinned by Polygon’s public Blockchain. Issuing the bond on a Blockchain offers several benefits compared to previous processes. For instance, it makes paper based global certificates and central clearing unnecessary. What’s more, the bond can be sold cost-efficiently and directly to investors without needing a bank to function as an intermediary.

By moving away from paper and toward public Blockchains for issuing securities, transactions are executed significantly faster and more efficiently than when issuing bonds in the past. The transaction was able to be completed within two days instead of eight days.

How sustainable is the Blockchain technology used for the digital bond?

By using Polygon's Proof-of-Stake Blockchain, CO2 emissions were reduced to a minimum.

Digital MRV: 4 ways digital Measurement, Reporting and Verification will revolutionise ESG reporting

The new wave of mandatory (and also voluntary) ESG reportings sweeping across the globe, and the commitment by a growing number of companies to participate in voluntary reporting schemes has suddenly elevated the role of the independent auditor. The role is becoming a rapidly expanding function and one that is gaining importance within the realm of ESG reporting. With auditors now aiming to analyse ESG reports with the same level of scrutiny as financial statements, companies must be prepared to defend the way they measure and verify their data.

Essentially, the auditor investigates the processes by which ESG performance data is collected, evaluated, and how its consistency and accuracy is verified. In effect, inspecting the methods of measurement and verification.

Audits are often based on projects which have been executed months or years before, so mistakes might not be discovered at the time and it's difficult to clarify ex-post. By running validation and verification constantly, incidents will surface earlier, and errors avoided entirely.

Even in this age of digitalisation, Measurement, Reporting and Verification (MRV) is often a manual process, opening up the collection and calculation of data to human error. To maintain the highest accuracy, MRV requires reliable data but when the process requires manual participation, to what extent can we trust the numbers?

Accurate MRV is something we've been doing at Siemens for more almost 2 decades and we use it to provide evidence to our customers of the energy and carbon savings they achieve from our energy performance contracting services. In 2023 we were also able to automate and digitize the collection of energy data for 85% of used space within the Siemens Real Estate portfolio. The audit-proof data from 230 office buildings and manufacturing sites are reported into our global EHS environmental management system then.

But what about the future? How do we improve our current processes and systems?

To trust the data we need to know the source.

Digital MRV, or dMRV, is based on Blockchain and about to set new reporting standards by using Distributed Ledger Technology (DLT) - a database that's shared and duplicated across a network of computers in different locations.

A fully digitized MRV architecture collects data via IoT devices, remote sensors and API's, then processes data using machine learning and stores it decentralised.

For example, when an IoT device is connected to Web3 and performing first-time configuration, it will register itself as part of the Blockchain by sharing an address that is fully traceable. It marks day one of the device on the chain and receives a verifiable credential that certifies that the data is correct, providing a reference point of approval.

Digital MRV systems link sustainable investments to measurable results.

Overall, dMRV improves:

1. Transparency dMRV improves transparency and accountability that underpins the trust stakeholders have in a company and its climate change commitments. An automated system based on Blockchain allows you to safely, securely hash data – transparency creates trust.

2. Automated Monitoring Transforming a manual process to a digital one removes the possibility of human error and eliminates the potential for inaccurate or incomplete recording of data. When reports and records are on hardcopies, the possibility of loss or damage is relatively high compared to the safety of a distributed ledger on Blockchain. Digital MRV is a digital safety net for monitoring, recording and storing data.
3. Verifiable Credentials for Validation After measuring, cross-checking is essential to find proof or plausibility of the correctness of the monitored performance. Verification and validation through dMRV reduces time and resources needed while improving the accuracy of data. Verifiable credentials can be validated efficiently by an external auditor.

4. Tokenized Reporting ESG data has a tokenized representation which is created on Blockchain to ensure traceability. Further metadata can be linked to the item, for example, GHG emissions. Standardised formats for reporting accurately present results to provide a level of assurance not available using traditional systems.

Tokenisation of sustainable, real-world assets

Decentralised Finance (DeFi) is an emerging financial technology based on secure distributed ledgers. The use of Crypto tokens can prove ownership of a fixed asset recorded on a Blockchain and secure custody. But more important, a physical, fixed asset can be transformed in a tradeable, digital security. Tokenisation has the potential to open up private markets to institutional investors by reducing issuance costs and providing the same benefits as traditional models. The result being increased access to investment cases for private equity investors or private debt investors and more access to capital for project developers.

There is a group of Blockchain-powered projects that place a huge emphasis on creating systems that distribute value back to the environment and to communities, called Regenerative Finance (ReFi).

However, the market is still evolving and while some regulation has been implemented, there needs to be more global standardization to ensure transparency for the entire issuer and investor market. With the 'cons' being ironed out and the market developed, the 'pros' and possibilities that tokenisation can offer are far more compelling.

What's next? Tokenising the energy transition

There's another disruptive financial innovation that's being hailed as an enabling solution for impact investing: the creation of Crypto tokens through digitization of fixed physical sustainable assets with guaranteed ESG-impact.

The tokenisation of fixed assets eliminates the time-consuming acquisition process and the constraints of geographical boundaries. Crypto tokens facilitate liquidity, guarantee audit proof measurement & verification, and allow higher trading volumes paired with a better risk-return-impact ratio. Tokenisation improves speed and operational efficiency for stakeholders, investors and leaders who are driving the energy transition to achieve maximum impact.

However, there is no regulatory compliant marketplace for digitized sustainable assets established, but the demand is huge. Industry partners and finance, guided by banks and exchange authorities, need to collaborate to leverage demand.

The countdown to 2030

We do still have time to meet the 2030 decarbonisation target, but it means acting fast, thinking big, operating at scale and leveraging digital solutions, with Blockchain as enabling technology.

Tobias Huber
Sustainability Officer & Blockchain Enthusiast, Siemens Smart Infrastructure

Corporates & Associations

ECOTA
EUROPEAN CARBON OFFSET TOKENIZATION ASSOCIATION

How We Can Leverage Blockchain and AI in Tokenising Carbon Credits

Global carbon markets will, to some degree, most certainly always rely on human interaction in the process. We need developers on the ground to build, protect and expand carbon-negative projects like mangrove forest or educate about sustainable options in procurement, production and distribution. And we also need human buyers of carbon assets that are willing to make a change, willing to invest into carbon-negative projects to offset their own footprint. But in between these two human actors, the concept of tokenized carbon credits takes center stage, leveraging Blockchain technology to reshape our fight against global warming.

The Blockchain case for carbon credits

Tokenized carbon credits offer a pragmatic leap forward in managing our planet's carbon footprint. At its core, this concept involves converting carbon emission reductions into digital tokens, each representing a quantifiable environmental benefit. The practical benefits of this shift are abundant. First, it brings transparency to a complex landscape. By translating carbon reduction efforts into assessable and traceable units, we introduce a more precise measurement, reporting, and validation process. Blockchain's secure ledger acts as a digital record keeper, noting every transaction in an unchangeable manner. This can eliminate fraudulent activities, ensuring that carbon credits are genuine and dependable.

These advantages extend, second, to efficiency. The conventional carbon credit market has long grappled with intermediaries and convoluted procedures. Intermediaries in this market often have the right intention in mind, but in broad perception, the industry is – understandably – rattled with scandals: Credits get issued twice or more, forest are cut down in South America even though they are sold as carbon credits in Europe, calculations of the actual carbon offsets of a project are too optimistic. Tokenisation can simplify the lifecycle of a carbon credit, enabling direct transactions between buyers and sellers, funneling money to actual projects instead of intermediaries. Smart contracts, automated agreements inherent to Blockchain, facilitate token exchanges upon predefined conditions being met. This can create a streamlined marketplace where transactions flow smoothly, unencumbered by administrative roadblocks. In this context, Blockchain operates as an impartial mediator, reinforcing much-needed trust among participants.

The AI case for carbon credits

Bringing Artificial Intelligence (AI) into the picture, a broader perspective emerges. AI's data analysis and pattern recognition capabilities meld harmoniously with Blockchain's secure ledger. This collaboration amplifies the effectiveness of sustainability efforts. Through processing extensive datasets, AI can unveil nuanced insights that drive proactive decision-making in the lifecycle of a carbon credit. For instance, AI-powered predictive models can forecast environmental trends, analyse satellite imagery of forests or soil samples from the ground fast and accurately. On the trading side of carbon credits, AI could also help in making markets, reducing and hedging risks, and rebalancing portfolios.

The technology can assist governments and corporations in adapting sustainability strategies promptly to market realities. Here, Blockchain ensures data accuracy, fortifying the foundation on which AI operates. And AI allows small and medium enterprises to tap into this, presumably, complex market without having to build an entire sustainability department.

Bringing both technologies together

This narrative is not confined to mere reactions; it encompasses proactive solutions too. AI's optimisation capabilities find a natural fit in sustainability. Energy consumption, a pivotal facet of the sustainability discourse, also benefits from AI's touch. Machine learning algorithms, fine-tuned with real-world data, optimise energy distribution with exceptional precision, minimizing wastage and maximising efficiency. Blockchain plays a role by validating the authenticity of energy sources and consumption data, curbing any inaccuracies that might compromise the power of AI-driven solutions. The use cases go far beyond tokenising carbon credits.

When we consider the wider landscape, the fusion of AI and Blockchain resonates throughout the entire sustainability realm. Transparent supply chains, essential for ethical consumption, find support in Blockchain's ability to trace and verify each stage of production. AI complements this by analyzing social and environmental factors, providing consumers with a comprehensive view of their purchases' real impact – and possibly integrating automated offset with tokenized carbon credits into every transaction. Likewise, AI-driven sentiment analysis gauges public perception of sustainable initiatives, offering insight into public sentiment on carbon-negative projects or specific carbon credits and/or Blockchains.

I know, this future sounds very promising, so we should be cautious not to romanticize technology but to highlight its potential. AI and Blockchain will not fully replace human efforts; they will enhance them. They lay the groundwork for sustainable endeavors to flourish. Blockchain's transparency and security uphold the pillars of trust, while AI's cognitive capabilities illuminate the way forward to scale global carbon markets and make our economies more sustainable. But enhanced transparency can also bring complexity – if decision makers cannot interpret the data gathered by AI and stored on Blockchain: nothing is won. The global carbon markets thus offer a great opportunity for humans and technology to work hand in hand to achieve a better tomorrow for us all.

Maximilian Roesgen
Executive Director, ECOTA

Corporates & Associations

Associations

Energy Web

Switzerland

The Energy Web Foundation fosters value creation in the energy sector by building & promoting an open, decentralised software infrastructure built around Blockchain technology.

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Web3

AI for Good Foundation

United States

AI for Good Foundation is a nonprofit driving forward technological solutions that measure and advance the UN's Sustainable Development Goals.

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AI

Crypto Valley Association

Switzerland

The Crypto Valley Association (CVA) is an independent, non-governmental association. Established in 2017, the CVA took advantage of Switzerland's strengths – openness to innovation and sound regulatory framework, to build the world's leading Blockchain & Cryptographic technologies ecosystem.

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European Carbon Offset Tokenisation Association

Germany

The European Carbon Offset Tokenisation Association (ECOTA) is a think tank that aims to overcome challenges in the field of technological enabled decarbonisation to find token-based solutions for a faster route to a net-zero Europe.

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Verra

United States

Verra is a nonprofit organisation that sets the world's leading st&ards for climate action & sustainable development. Verra's programs are designed to help organisations reduce their environmental impact, protect natural resources, & improve the lives of people around the world.

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