2023

Crypto-assets and Climate Change: Understanding the Carbon Footprint and opportunities to dampen it

ROUNDTABLE TAKEAWAYS FROM POINT ZERO FORUM

MNB AND CFTE

Insights from the POINT ZERO FORUM 26-28 JUN 2023 Zurich, Switzerland

Outline

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Preface

"Climate change is one of the most important challenges of our time, and we cannot afford not to put financial innovation on our side in the fight against it. As crypto assets gain and lose momentum, we need to examine their impact on our sustainability goals. This was the aim of the roundtable discussion organized by the MNB entitled "Cryptoassets and Climate Change: Understanding the Carbon Footprint and Opportunities to Dampen It". During the roundtable, experts in the field shared their thoughts on the topic, highlighting the importance of data quality, a transparent, standardized data provision system, the cooperation of market players, and global regulatory efforts."

Dr Mihály Patai, Deputy Governor, MNB, the central bank of Hungary

Introduction

Despite the disruption and benefits brought by crypto assets, there are still frequent claims about the perceived significant energy consumption inherent in this technology. With Bitcoin consuming an equivalent amount of energy annually to some countries such as the UAE in 2021, it is time to speak of taming its environmental impact (Figure 1).

Annualised electricity usage from crypto assets grew rapidly, with the growing interest in the assets across sectors worldwide. Published estimates of the total global electricity usage for crypto assets are between 120 and 240 billion kilowatt-hours (KWh) per year where Bitcoin dominates roughly 107.21 billion KWh in 2022 (OSTP, 2022 & CCAF, 2023).

The PoW-based cryptocurrencies dominate 80% of the market cap and are notable for their higher energy consumption than PoS-based cryptocurrencies, accounting for approximately 95% of all crypto emissions (Gschossmann et al, 2022). Within, the annualised emissions from Bitcoins were roughly around 70 MtCO2 based on the CCRI data and Cambridge Bitcoin Electricity Consumption Index. Compared to one transaction via VISA only making up 0.00045 kgCO2, 1 Bitcoin transaction accounts for 361.42 kgCO2 (Digiconomist, 2023) (Figure 2).

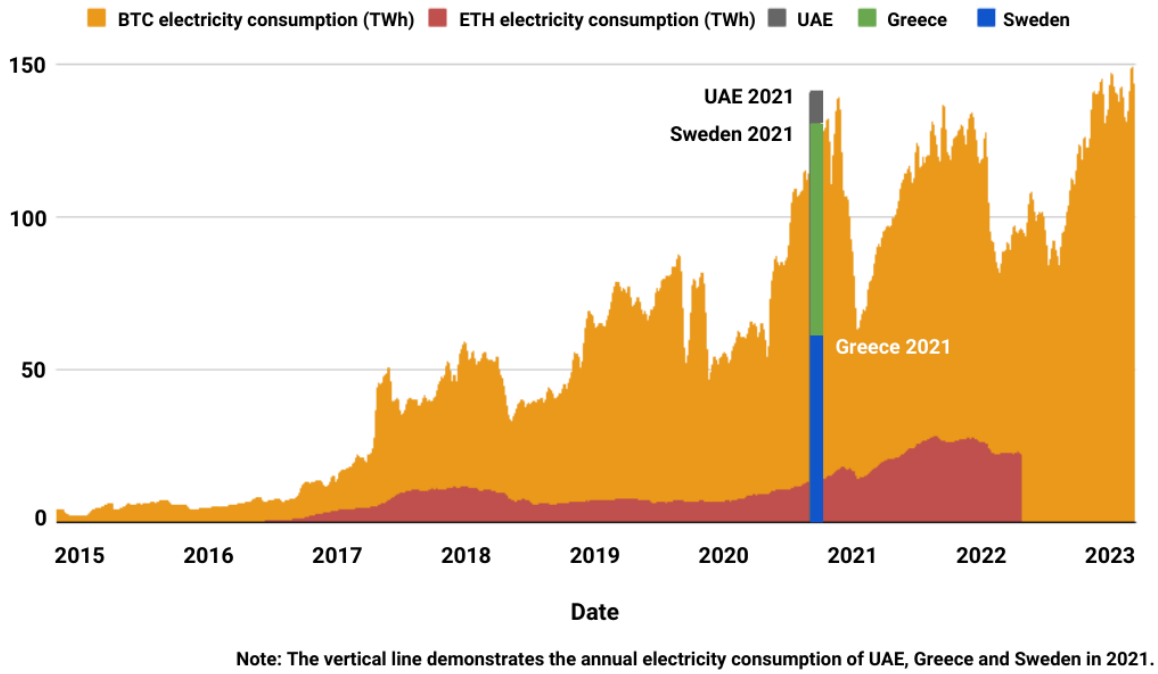
Given the extensive reliance of mining and the expansion of crypto assets on the availability of energy, alongside the rising adoption of these assets by institutional players in the financial services sector, the potential for amplifying the risks associated with the transition to greener practices is anticipated. Scholars and Bitcoin advocates acknowledge the high energy consumption of miners, yet they diverge on the climate effects. Critics link Bitcoin's carbon footprint to mid-sized nations' emissions, while supporters emphasise climate benefits through grid balancing, renewable energy support, methane emissions reduction, and utilising waste heat for additional purposes.

As regulators are increasingly acknowledging the significance of this issue, a comprehensive and globally adaptable standard could pave the way for the transition.

The report was based on a roundtable discussion during the Point Zero Forum on June 27th in Zurich: *Crypto Assets and Climate Change: Understanding the Carbon Footprint and opportunities to dampen it*. The report aims to raise awareness about the importance of sustainability actions to mitigate the risks associated with crypto on climate change and provides strategies to fully unlock the potential of this innovative technology.

To begin with, collecting data and calculating the carbon footprint of crypto assets and mitigating the emission to a more sustainable ecosystem is the key. Therefore, *Part 1* introduces different data collection methodologies of energy consumption measurement. In *Part 2*, use cases for sustainable crypto activities are demonstrated. *Part 3* focuses on the possible regulatory approaches for sustainability in crypto assets, pros and cons of any bespoke requirement are discussed, by also keeping an eye on the EU ambitions to produce a report on the environmental impact of validation mechanisms and release sustainability guidelines. In *Part 4*, the report highlights that sustainability is not confined to environmental impacts but also in terms of social and economic consequences. In *Part 5*, based on the discussion during the roundtable, the report outlines some calls to action and best practices for the industry to transition to a more sustainable future in the realm of crypto assets.

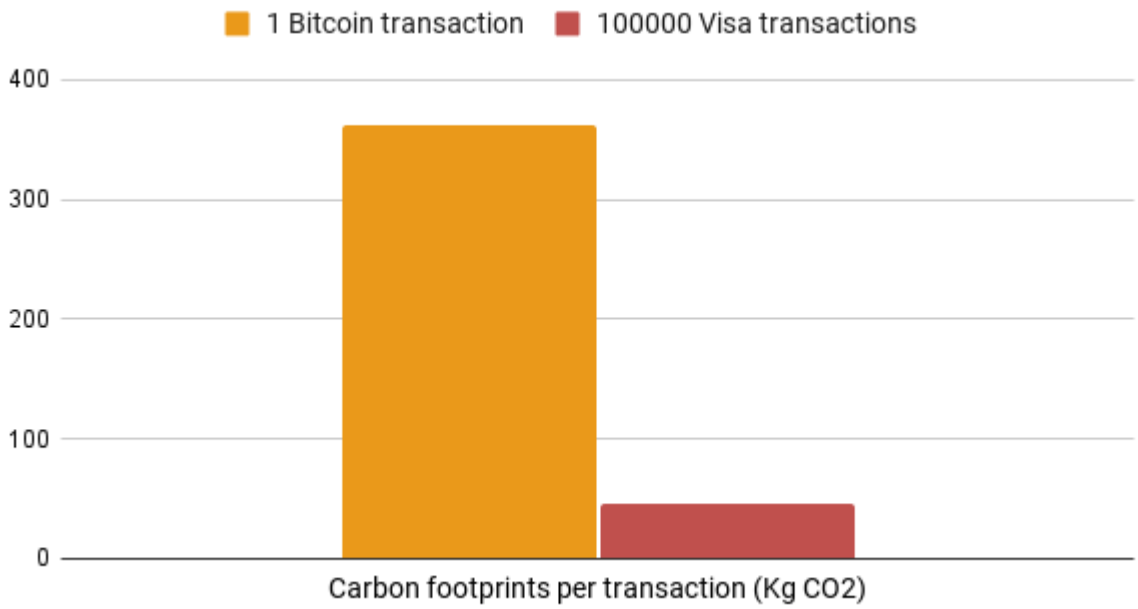
Figure 1: Annualised electricity consumption in Terawatt hours (TWh)



Note: The vertical line demonstrates the annual electricity consumption of UAE, Greece and Sweden in 2021.

Source: CCRI, 2023; CEIC, 2022; Enerdata, 2022; Statista, 2022

Figure 2: Estimated Carbon footprints per transaction in KWh (Bitcoin vs. VISA)



Source: Digiconomist, 2023

Part 1: Data collection and measurement of crypto assets' carbon footprint

Categorisation of the main crypto algorithms and factors affecting energy consumption

Understanding the different methodologies used while measuring the environmental impact of crypto systems is key. A step before that however is to categorise the various types of blockchain initiatives to date. When we use the word 'blockchain', we mostly understand either the proof-of-work (PoW) or proof-of-stake (PoS) concepts based on the type of underlying consensus mechanism.

Since PoS was created to overcome the deficiencies of PoW, its energy consumption is significantly lower than that of PoW. The roundtable nevertheless highlighted that PoS is not a perfect substitute for PoW in terms of the value it provides, since PoW's high amount of energy consumption provides, amongst others, higher level of network security. Furthermore, it remains vital to track the energy efficiency of PoS networks as their performance may differ greatly, for instance, in terms of electricity consumption per node, per transaction, and per value transferred. When considering the overall impact, the roundtable also reminded the audience that the high demand for highly energy efficient mining equipment has led to developments in the semiconductor industry that have benefited other industries beyond the cryptocurrency world.

New types of mechanisms are also emerging: proof-of-useful-work means solving problems directly affecting climate change rather than solving random algorithms. One could also choose to use e.g. proof-of-activity, proof-of-authority or proof-of-history – it only depends on the use case one would like to solve.

The roundtable agreed that there are several factors to consider when choosing a blockchain type. However, the environmental implications are not priced in, and considering the full picture must imply actions into sustainability directions.

When defining the energy usage of a blockchain system, in addition to the type of consensus mechanism used, we have to look at several other determining factors. The solution's level of control (e.g. control over the number of nodes, ability to assign roles to participants etc.) comes first. Table 1. shows the main types of blockchain solutions based on authorization types. By deciding on which solution to choose, one would optimize either for security or performance. Permissioned chains (e.g. most CBDCs) raise the concern of losing the purpose of decentralized technology, since a central authority has control over the system, but in return, their energy consumption tends to be moderate. On the other hand, permissionless chains (e.g. Bitcoin) naturally consume far more energy, since they need some form of consensus mechanism to validate the users identity and provide security for the community.

Table 1: Types of blockchain solutions by level of control

permissionless	permissioned	
public	private	consortium

Source: authors, based on Rauchs et al. (2019), WEF (2023)

The roundtable highlighted that the duplications in the industry are also important for the environmental implications of crypto assets. They suggested that not every node has to store the whole ledger of the network. For instance, by sharding, the ledger can be partitioned into different parts, meaning that different nodes could store different parts of it, which would reduce energy consumption and environmental implications.

Methods of calculating

"Making data available basically means that people have a choice. It means that we have a new set of citizens emerging in this world. I like to call them: Blockchain citizens."

When measuring the environmental impact of blockchains, it is crucial to have efficient, quality data points available. For the different types of crypto assets, different types of data collection method have to be considered:

- PoW – most prominently Bitcoin, which accounts for ca. 95% of all crypto emissions (after the Merge) – can be traced by techno-economic models (e.g. CBECI).
- PoS – more granular approaches attainable, when measuring the energy efficiency of single nodes, because node count and transaction volume drive electricity consumption in those networks[1].
- For tokens, stablecoins, NFTs and wallets that were built on top of the PoS networks or PoW networks, one has to allocate emissions from the base layers[2].

While data availability keeps improving with time, it is still a challenge to have a commonly accepted method of calculating the environmental footprint of a particular blockchain. The roundtable discussed that it is important to understand what is actually causing the emissions. Based on the above categorisation, the following measurement and allocation techniques can be utilized:

- Bitcoin miners have two sources of income: transaction fees and block rewards. Transaction fees come from transacting activity and block reward can be seen as an inflation fee for coin holders. Therefore, by holding coins one would contribute

[1] Gallersdörfer et al., 2022.
[2] Gallersdörfer et al., 2023.

to the block reward and by transacting, one would contribute to the transaction fees. Therefore, one can calculate the total carbon footprint of Bitcoin based on these activities and allocate emissions to a single investor[3].

- For the PoS chains, the electricity consumption of a node in the idle state is known. Measurement data shows which share of electricity consumption is caused by which transaction or holding. Therefore, one can allocate emissions to a single investor in the ecosystem.
- The same framework can be used for tokens and NFTs, which also traced back to transactions and costs of holdings on those underlying networks. And with those frameworks, one can allocate a fair share of the total crypto emissions to whomever interacts in the ecosystem[4].

Sedlmeir et al. (2020) points out that calculating the energy consumption of PoW and other permissionless chains is still an exceptionally hard task, because we don't know the exact number of participants, the properties of their hardware, and the effort which they put into mining. Stoll et al. (2019) and Sedlmeir et al. (2020) presented a method with which we can obtain an estimate, a lower and an upper bound of energy usage.

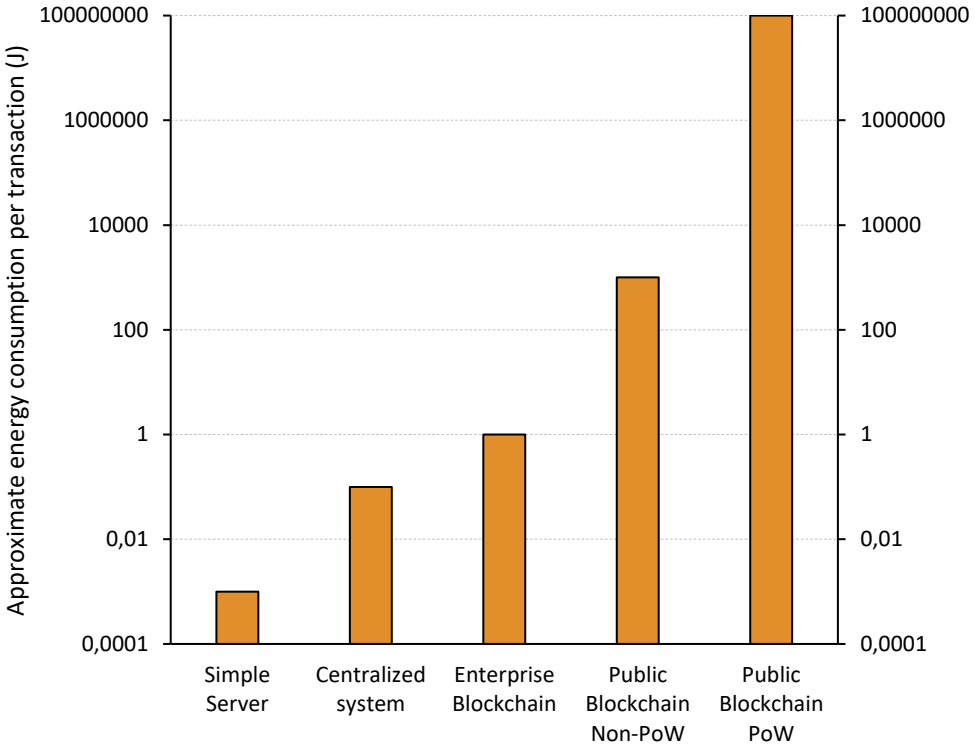
Lower bound: $total\ power\ consumption \geq total\ hash\ rate \times min.energy\ per\ hash$

Upper bound: $total\ power\ consumption \leq \frac{block\ reward \times coin\ price + transaction\ fees}{avg.block\ time \times min.electricity\ price}$

Sedlmeir et al. (2020) determined the electricity consumption of Bitcoin to be between 60 and 125 TWh per year. Although it is only an estimate, a rough comparison of some selected systems is on Figure 3.

[3] See for further details: https://www.southpole.com/publications/report-accounting-for-cryptocurrency-climate-impacts-publication
[4] Gallersdörfer et al., 2023.

Figure 3. Estimated energy consumption of different blockchain architectures



Source: Sedlmeir et al. (2020)

Numerous other approaches have been published in the past years. Some suggest that the model used should only account for the emissions directly linked to the minting of new coins (The Green Bitcoin Project). Others say to use average energy consumption for every coin minted since the first coin has been minted (Global Digital Finance, 2021). However, these approaches ignore that ongoing electricity consumption of Bitcoin miners is essential to safeguard the value of the mined coins. The Cambridge Bitcoin Electricity Consumption Index (CBECI) is a well-known way to follow the energy usage of Bitcoin. This index provides a hypothetical range consisting of a hypothetical lower bound (floor) and a hypothetical upper bound (ceiling) estimate. Within the boundaries of this range, a best-guess estimate is calculated to provide a more realistic figure that approximates Bitcoin's real electricity consumption."[5]

[5] https://ccaf.io/cbnsi/cbeci/methodology

The roundtable highlighted that we already have numerous approaches to calculate the energy usage of blockchain solutions, however it would be important to have a standardized data disclosure system, and a consistent methodology, which can be achieved with common standards self-imposed by the industry itself or prescribed by regulatory bodies.

Part 2: Use cases for sustainable crypto activities

Although an increasing number of regulators acknowledge the importance of addressing the environmental issue on crypto assets, the absence of a comprehensive and universally applicable set of regulations or standards is a pressing concern. However, there are encouraging initiatives emerging within the industry itself that deserve attention, as they strive to create a more sustainable blockchain ecosystem.

Sustainable crypto activities aim to reduce the environmental impact of cryptocurrency mining and usage, and such mitigation techniques can be both **forward-looking** and **backward-looking**. The former refers to proactive measures aimed at reducing the environmental impact of future operations, such as shifting consensus to PoS, or implementing more energy-efficient algorithms for transaction verification. The latter involves addressing current issues with existing technologies and compensating for past emissions such as recycling waste heat in mining operations.

Since there is more awareness on the topic, it is anticipated that there will be further projects working on sustainability in crypto. In addition, utilising blockchain and Web3 technologies, transparency can be enhanced in measuring and reporting the ecological footprints of different activities. These technologies enable the verification of green claims and the tracing of carbon emissions across complex supply chains.

The Ethereum Merge was definitely the most prominent sustainability initiative up until now.

The Ethereum Merge: Decreasing 99.95% energy consumption

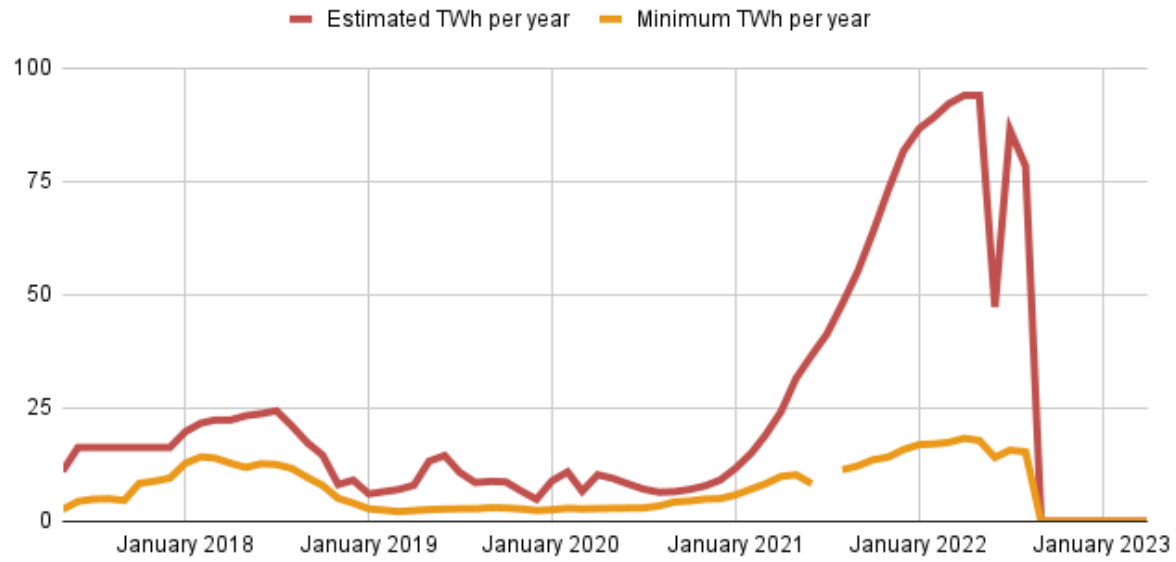
The potential of Web3 and Blockchain to combat climate change and enhance inclusivity is explored. One of the prominent examples is "**The Merge**" executed on September 15, 2022.

Prior to The Merge, transactions on the Ethereum network were validated and appended to its blockchain using a Proof-of-Work (PoW) system. However, following The Merge, the role of Ethereum miners were taken over by stakers, who lock up ETH in order to validate transactions. The goal of this transition is to create a more energy-efficient and scalable system compared to Ethereum's previous architecture.

This shift led to a dramatic decrease in the energy requirements for processing Ethereum transactions (Figure 4). As part of this Merge, operations were moved from the original Ethereum Mainnet to the new Ethereum Beacon Chain.

"The Merge, which is considered one of the most significant blockchain upgrades on Ethereum to date, brought down the network's energy consumption by 99.95% immediately."

Figure 4: Global Ethereum Energy Consumption in Terawatt (2017-2023)



Source: Digiconomist, 2023

The success of The Merge in significantly reducing more than 99% energy consumption and improving scalability has established it as an ideal role model. The positive outcomes achieved, serve as an inspiration for other cryptocurrencies to consider the transitions towards more sustainable and efficient protocols.

After the successful implementation of the Merge, a wave of sustainability-focused crypto initiatives has emerged. Notably, initiatives led by Celo, ConsenSys, Cardano Foundation, and NEAR Foundation, being all present at the roundtable discussion, are at the forefront of shaping a more inclusive economy. By addressing the limitations of first-generation cryptocurrencies, such as scalability, interoperability, sustainability, and governance, these projects play a pivotal role in advancing the blockchain space.

Other sustainable crypto initiatives

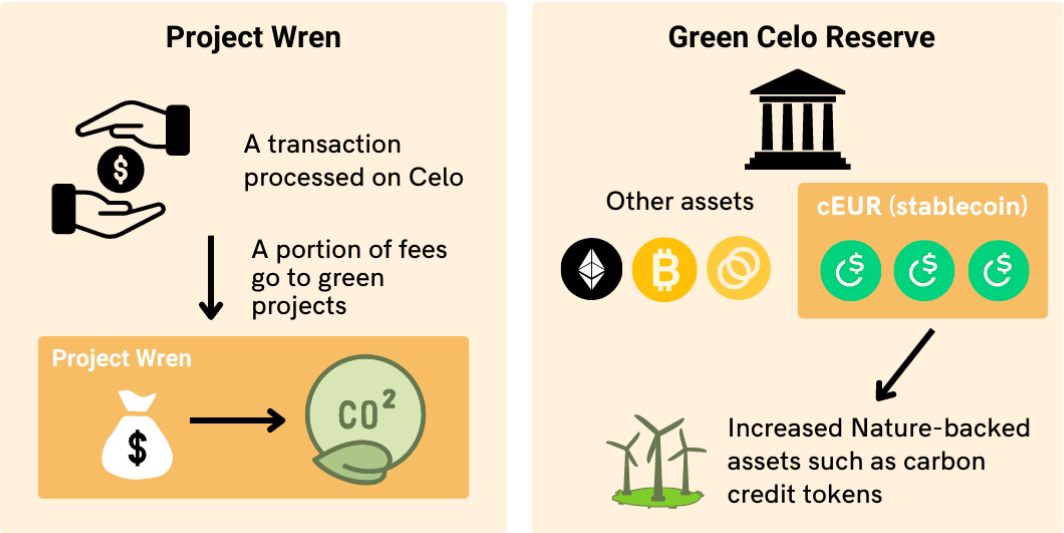
The Celo Platform - Carbon negative blockchain network

Celo is a carbon negative blockchain that prioritises environmental sustainability, mobile accessibility, and compatibility on the Ethereum Virtual Machine (EVM) with stablecoin stability protocols. Celo's sustainability is based on several pillars, aiming to foster a thriving digital economy accessible to all.

Firstly, Celo employs a PoS consensus algorithm, significantly reducing its energy consumption. It has committed to becoming the first carbon-neutral platform by partnering with **Project Wren** to offset GHGs by contributing to sustainability projects in 2020. Once processed a transaction, Project Wren will receive a fee which can contribute to green projects and daily carbon offsets. To date, 3997.6 tons of CO2 have been offsetted through Celo's network (Wren, 2023).

Additionally, the Celo network uses the Celo reserve to ensure the price of cEUR (Celo's stablecoin). As cEUR gains traction, the reserve will grow and increase the circulation for its holdings. The reserve can hold any tokenized asset like nature-backed assets, including those protecting the environment.

Figure 5: Main pillars of Celo's sustainability implementation



Source: CFTE

Consensys

Consensys, a leading Ethereum software company, is dedicated to fostering the growth of this community and actively participating in its development. The approach involves utilising a blockchain-based system to enable advanced purchases of carbon benefits that result from investments in future mitigation and decarbonisation assets. It aims to contribute an astounding 35 million plus metric tons of benefit back to the planet.

This endeavour brings together a unique coalition of 10 to 12 companies, coming together to collaborate in a truly innovative Web 3 climate solution. In this unified effort, each company's technological expertise will be harnessed in the most suitable manner, ensuring that everyone is represented and their strengths are leveraged effectively. The scale and scope of this collaborative project are genuinely impressive and highlight the commitment of each participant to address climate challenges collectively. Together, they strive to build a better, sustainable future for the planet.

Furthermore, ConsenSys co-launched the Ethereum Climate Platform (ECP) during the United Nations climate change conference (COP27) in Egypt, with other industry partners. Unlike traditional methods of offsetting emissions through carbon credits, the ECP aims to financially support the creation of climate projects that have a substantial impact on reducing greenhouse gas emissions, addressing the carbon emissions caused by Ethereum's previous PoW system and achieving large-scale decarbonisation.

NEAR Foundation

NEAR Foundation is an organisation that contracts protocol maintainers, funds ecosystem development, and shepherds core governance. It operates a PoS Layer1 blockchain and commits to addressing environmental challenges through technology. The three main roles of the foundation in promoting sustainability are: raising awareness about the technology and its impact, fostering the growth of self-sustainable ecosystems, and ensuring appropriate governance and regulations to increase transparency and traceability.

Through participating in the Ethereum Climate Platform (ECP), NEAR is demonstrating its commitment to serve as a role model for sustainability within the wider technology and business sectors. NEAR's commitment goes beyond just carbon tracking. In addition, NEAR built a partnership with SailGP last year, offering opportunities in sustainability and inclusivity.

The company recognises the significance of looking at the bigger picture and acknowledges the impact of its actions on communities and business models. NEAR believes in fostering sustainable ecosystems and aims to be a leader in creating a positive and lasting influence on both the environment and society.

Cardano Foundation

The Cardano Foundation is an independent non-profit organisation, with a mission to empower the digital architects of the future. It sees open and permissionless blockchain technology as a tool to address the asymmetry in collaboration that is prevalent in our world today. The foundation also aligns its resources and engagements with the UN's 17 Sustainable Development Goals to demonstrate the possibilities and benefits of inclusive and sustainable blockchain applications.

A key aspect of their work is enabling full traceability within supply chains. It aims to track raw materials, verify sustainable sourcing, and detect responsibility for environmental harm. One of the main focuses extends to the community, with approximately three to four million people interacting with Cardano every single day. In 2022, Cardano announced that 1 million trees were planted in partnership with Veritree, an organisation that partners with businesses to plant verified trees. This initiative was done by the donors of ADA cryptocurrency. And to further prove the power of blockchain, these donors received a tree planting certificate with the exact location of their donation.

"Second and third generation crypto assets have a significant role in the development economy."

Part 3: Regulation for sustainability

Regulating the crypto ecosystem requires a delicate balance between preventing harms, protecting users and promoting innovation. Addressing this challenge requires a combination of mitigation measures, such as reducing greenhouse gas emissions, and adaptation measures, for example, preparing for and adapting to the already inevitable impacts. At present, we can see that national regulations are rather different and diverse.

Some regions see the crypto industry as a competitive advantage and others see more of the risk to their financial industry, even economic stability.

Figure 6: Regulation relating crypto-assets in different countries

Country	Anti-Money Laundering (AML) /Counter-Terrorist Financing (CFT)	Travel rule	Stablecoins
United Kingdom	**Yes**	**Yes**	Pending final legislation
Switzerland	**Yes**	**Yes**	**Yes**
United States of America	**Yes**	**Yes**	Pending final legislation
Saudi Arabia	*The country prohibits the use of crypto-assets*		
United Arab Emirates	**Yes**	**Yes**	**Yes**
Australia	**Yes**	Process initiated or plans communicated	Process initiated or plans communicated
China	*The country prohibits the use of crypto-assets*		
Hong Kong	**Yes**	No	Process initiated or plans communicated
India	Process initiated or plans communicated	No	No
Japan	**Yes**	**Yes**	**Yes**
Singapore	**Yes**	**Yes**	Process initiated or plans communicated

Source: PwC, 2023

Regulatory frameworks

"We need data that is coherent, comparable and science-based, and without that there can't be any policy action because we would be operating in the dark."

When it comes to verifying carbon credits, regulatory frameworks provide a set of guidelines and standards that ensure the credibility and accuracy of these credits. Additionally, by establishing regulations that require organisations to prepare and disclose sustainability reports, regulatory frameworks promote transparency and

accountability in corporate practices. Clear guidelines and standards can contribute to the realisation of sustainable development goals, facilitating a transition towards a more environmentally responsible and socially conscious future.

"What makes crypto activities distinctly different, that would justify a bespoke regime, separate and distinct from regulatory obligations already contained or to be contained within sustainability regulatory framework applicable to all life types?"

During the roundtable, the issue of bespoke regimes versus overarching regimes soon arose. There are many aspects of crypto assets which are unique and existing frameworks don't fit into, and this would favour regulation specific for crypto related activities, or a bespoke regulatory framework. On the other hand, most of the crypto or digital asset relevant regulatory obligations don't sit in a specific regulatory framework, rather into AML, payments, and securities' frameworks. But when we look at the environmental perspective, when in terms of energy consumption, it is not clear what makes crypto activities distinctly different that would justify a bespoke regime separate from regulatory obligations already contained or to be contained within sustainability regulatory frameworks applicable to all items.

Principle-based regulation rather than detailed prescriptive regulations could be more effective in case of sustainable finance policy making. Creation of an effective basis for decision making for investors based on data, transparency and disclosure, could lead to proper self-regulation from the industry.

Several participants argued that regulators should not try to write a "perfect regulation" at this stage. Rather, there should be a standardized, basic template that all players can apply to and is enforceable. Regulators should allow space for the industry to build on that and either through industry standards or self-regulation, and in a voluntary manner take steps to complement those basic standards. We also need to understand that these

disclosure standards are going to fall over time, thus the first version might not be perfect, and regulators might develop it as time progresses. The biggest risk is that the regulation is not going to be enforceable, and no one is going to apply it properly, only leading to greenwashing. The high potential of regulatory arbitrage among the globally differentiated approaches can also end up in similar outcomes. This would undermine the credibility of the rules and the reputation of the industry.

One of the key aspects of crypto regulation should be tech neutrality and to make sure that it's not product specific. As one participant reminded the audience of the European regulation, MiCA almost overcame this by suggesting banning the PoW consensus mechanism in an early draft. Choosing a “winner”, in this case PoS over PoW, can force the industry to adopt something that ultimately proves not to be the best solution from a sustainability point of view. We do not know whether there is going to be a better version of consensus mechanism, therefore, we should not tunnel the industry towards PoS when there could be other better options in the future.

Data labelling

Research demonstrated the impact of energy labelling on cryptocurrency choices among consumers, implying that market direction could be influenced by consumer choice. Despite certain limitations, the research points towards the potential significance of energy use service labelling. This form of data transparency is likened to calorie counts on menus or energy labels on devices.

While some argued that the focus of regulation should be around disclosures, others pointed out that the crypto industry is fundamentally different because of the technology, thus even when we think about disclosures, it might not make a lot of sense

to apply the rules that exist in financial regulation, that apply to financial entities one on one.

Existing frameworks, like the one co-developed by CCRI and South Pole, used by companies like PayPal, can be used globally for assessing these aspects[6]. The new PayPal global impact report used the hybrid emission allocation method by those two organisations as a basis to calculate PayPal's scope 3 emissions associated with crypto assets. Having proper frameworks in terms of data and methodologies for a transparent and accurate reporting of emissions of crypto assets is vital.

Another key aspect of future regulation is not to hinder innovation. Innovation is the driver force for economic growth and especially in the area of sustainable finance policy making, we should focus on promoting innovation. At the same time, we should not turn blind eye to the issue of digital assets with extremely high footprints, we need a balance between sustainability objectives and innovation.

Taxation

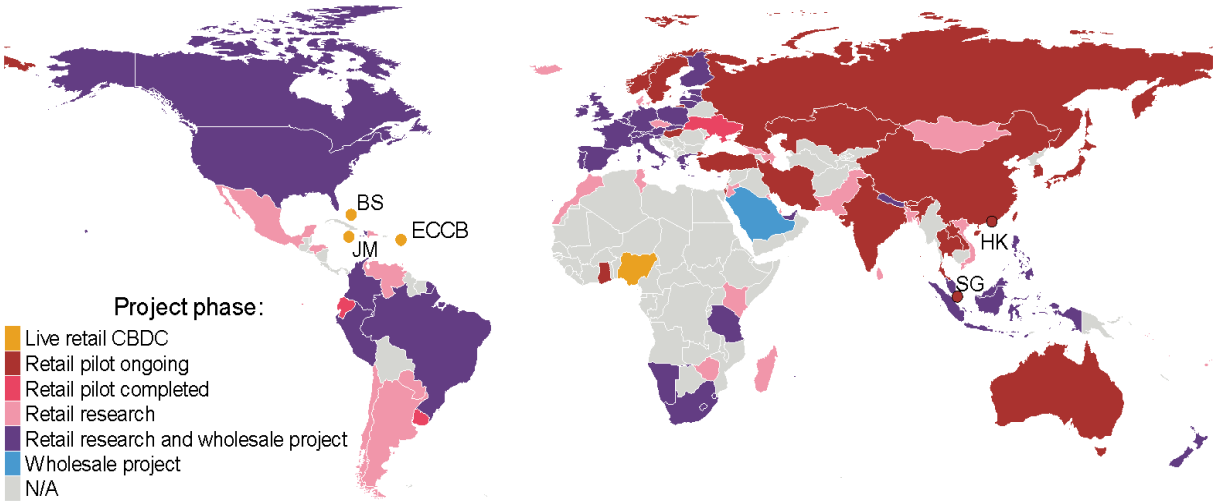
Another unconventional idea discussed is taxation, which has been used to address external negative impacts in areas like tobacco and alcohol. The tax rates on these items are higher due to their negative effects. Similarly, diesel was once taxed at a low rate in France due to perceived benefits, but the tax increased when its harmful impacts were recognised. This approach could potentially be applied in other areas as well.

[6] Report: Accounting for Cryptocurrency Climate Impacts (southpole.com)

CBDC

CBDC could outcompete the demand for cryptocurrencies as a payment mechanism amongst a large proportion of the population. A retail CBDC that has some guaranteed privacy features and some ability to make 'permissionless' payments, could compete with the core value proposition of crypto assets such as Bitcoin. A retail CBDC could very much take the wind out of the crypto ecosystem's sails if it can match the expectations, making cryptos outcompeted in the market rather than by regulation. On the other hand, as we did not foresee the environmental impact of cryptocurrencies, we do not know where CBDC could lead from a sustainability perspective, but the negative externalisation can potentially be bigger, if we get CBDCs wrong.

Figure 7: CBDC development worldwide



Source: Auer et al., 2023

Part 4: Sustainability beyond environmental impact

During the roundtable, experts provided different perspectives on crypto assets in climate change, highlighting that sustainability in this context should not only be confined to environmental considerations. The impact of crypto technologies is evaluated not just on environmental grounds but also in terms of social and economic consequences, changing the way we think about finance, value transfer, and digital asset ownership.

"When we think about sustainability, indeed it is about carbon footprint, but it goes way beyond that. It is actually about the impact we have on the communities that we work with."

Financial Inclusion

Crypto assets have made it possible for people in areas with little or no access to banking infrastructure to participate in the global economy. Through a simple smartphone and internet connection, individuals can hold and transact digital assets without needing a traditional bank account. In addition, individuals have direct control over their own money, without the need for intermediaries such as banks. This can empower people, especially in regions with unstable local currencies or restrictive capital controls.

Crypto assets can also lower transaction costs, creating a more inclusive ecosystem for people to transfer money in an affordable way. This can be particularly beneficial for migrant workers sending international remittances back home or gig workers receiving and transferring money. Nevertheless, the regulatory safety net, which is often missing from the crypto ecosystem, is not able to prevent fraudulent actors from causing harm to individuals who want to transfer, trade, or hold crypto assets.

Community and Social Projects

Cryptocurrencies like Bitcoin and Ethereum are more than just digital assets; they represent vibrant and active communities that have emerged as powerful ecosystems. These communities consist of developers, investors, enthusiasts, and end-users who actively engage in dialogue and contribute towards the growth and evolution of their respective cryptocurrencies.

The communities often share common social impact goals. For instance, many are invested in promoting financial inclusivity, privacy, and independence from traditional banking systems. They advocate for a world where everyone, regardless of geographical location or economic status, has access to financial services.

Cryptocurrencies have also revolutionised the concept of crowdfunding, opening new avenues for social impact projects. Initial Coin Offerings (ICOs) and token sales are methods by which funds are raised for new projects in the crypto space. This funding method allows community members to directly support projects they believe in, potentially leading to an increase in socially impactful initiatives.

Sustainability extends beyond environmental protection, encompassing other vital dimensions. Businesses should seek methods to minimise their environmental footprint while also embracing social responsibility and contributing to economic development. By integrating these aspects, the ecosystem of crypto assets has the potential to truly embody sustainability and make a positive impact on the world, especially when caveats about some of the consensus mechanisms discussed above can be resolved or mitigated via these initiatives.

"Today, businesses approach their operations differently, prioritising the sustainability and impact of their technology."

Part 5: Calls to action

The roundtable identified the opportunity to lean towards making blockchain more sustainable in a broader sense. Given the wide coverage of the representatives from within the blockchain ecosystem, there could be high potential in a joint call for action.

Roundtable participants raised the following potential action points worth considering for the broader crypto- and blockchain-related community:

1. Develop a transparent and standardised data disclosure system based on quality data. Harmonising data collection and measurement approaches is fundamental in devising sustainable solutions for the crypto assets' ecosystem.
2. Enhancing public understanding and engagement, starting with education, can lead to higher awareness, and more action this direction.
3. There is high potential for further efforts towards the discovery of forward-looking and backward-looking mitigation tools and alternative technology solutions, while also disclosing pros and cons, including the main differences that the new solutions might represent. A standardized taxonomy of mitigation techniques' toolset could also help market participants take self-initiated actions.
4. Given the nature of blockchain technology itself, the discovery of techniques to incentivize network-wide, collective actions and their coordination mechanisms could be relevant.
5. Along with general regulatory efforts in the crypto and blockchain space, more emphasis on the environmental effects should be placed. Regulators could also create space for experimentation with new techniques – e.g., set-up crypto sandboxes with carbon-intensity limits.

Conclusion

The rapid growth of the crypto industry has raised valid concerns regarding its environmental impact and potential contribution to climate change. The sooner the industry develops sustainability initiatives to align with global climate goals, the better the environmental issue can be addressed. Throughout the roundtable discussion, diverse perspectives were shared, ranging from the representatives of the **private sector** like tech companies and academia to the involvement of **government** and **regulators** in addressing the impact of crypto assets on climate change.

For this to happen, **data collection and measurement** is vital to improve environmental impact data transparency and traceability. Joint efforts to achieve further harmonisation and global coverage, initiated either by the industry participants or by global standard setting bodies should aim to realise this in the foreseeable future. For example, a set of **guidelines and standards** can ensure the credibility and accuracy of carbon credits, sustainability data disclosure and reporting and promote accountability in corporate practices. Additionally, to balance the advancements of technologies and the environmental impact, a **collective community** from all stakeholders involved is vital. The Ethereum Climate Platform (ECP), joined by Celo, Polygon, Global Blockchain Business Council and other ecosystem players, is a prominent example to foster cross collaborative initiative to tackle the climate crisis. **Education** is another key to ensure the industry understands crypto terms such as different consensus mechanisms, data disclosure and regulations in sustainability. This can further enhance the engagement of the community and lead to higher awareness and actions in this landscape.

Although the crypto industry has gained more traction these years, it is isolated and the crypto community itself still works in silo, compared to other sectors in finance. There is a lack of a united framework that is agreed by the whole community. For example, the PoS consensus is valued by its low carbon emission but some say it is not as secure as

PoW consensus. Further discussion and alignment are definitely needed to ensure the stakeholders are at the same pace. And instead of only having people in crypto to be sustainable, it would be beneficial for crypto companies to open the door to the public and sustainability sector across different industries to work on green projects together and contribute to the global climate goal.

The concept of **'Tech for Good'** highlights the potential for disruptive innovations to bring positive change to communities. However, ensuring that such advancements genuinely lead to positive outcomes requires concerted efforts in various areas. This report summarises discussion from the roundtable at Point Zero Forum, acting as an important starting point to raise awareness for the topic and bring diverse perspectives to the future cooperation. Through continued cooperation and mindful innovation, the industry can harness the immense potential of technology to create a world where progress is synonymous with social responsibility and sustainability. Striking a balance between innovation and sustainability is not just a desirable goal; it is crucial to ensure that the crypto industry's growth is truly beneficial for society at large.

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