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SPECIAL FEATURE: EDITORIAL

Special Purpose Money for Sustainability

Editorial: Special-purpose money for sustainability

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Abstract

The rationale for this Editorial and the Special Feature Issue (SFI) it introduces is the conviction that money and monetary system design are largely overlooked in debates concerning sustainability. Modern monies (i.e., conventional sovereign fiat currencies) and aspects of them (such as their issuance, functions, and features) tend to be taken for granted as self-evident foundations for the organization of human exchange. The design of conventional money is not so self-evident as generally assumed, however. In its function as a generalized unit of account, modern money makes possible an economic conceptualization of efficiency that now dominates markets and economic thinking. Combined with currency convertibility and capital mobility, this has provided unprecedented levels of commensurability. As a feature of modern markets, this generalized commensurability is rarely questioned or reflected upon despite its significance for sustainability and growing awareness within the humanities and social sciences of the "agency" potential of artifacts (Latour in Reassembling the social: an introduction to actor-network theory, Oxford University Press, Oxford, 2005). From an ontological stance of actant theory, we argue here that money and its design clearly impact on the nature of both social and human–environmental relations. Paradoxically, money—perhaps the most influential artifact of all in modern society with momentous consequences for human society, ecosystems, and the biosphere—has so far largely escaped critical scrutiny. This Editorial and the Special Feature Issue it introduces examine the relation between money design and sustainability, and explore the potentially transformative roles that Special or Limited Purpose complementary currencies might play in sustainability transitions.

Introduction

This Special Feature Issue (SFI) of *Sustainability Science* brings together a multidisciplinary group of researchers with a diverse range of competences and interests relating to the potential of new forms of monetary design and monetary system plurality to promote social and ecological sustainability. What unites them is the conviction that the design of complementary forms of special or limited purpose money may be key to the widely anticipated global transition to more sustainable ways of organizing social and human–environmental relations. Some contributors, including the co-editors, are active participants in the research project *"Special-purpose money: Complementary digital currencies and the sustainable development goals,"* funded by the Swedish research council FORMAS.[1] Other contributors responded to an open call for papers issued by *Sustainability Science*. Many of our contributors participated in an online workshop convened to present and discuss draft papers, which were then revised before final submission to the regular journal external review process. As co-editors of this Special Feature Issue, we want to thank all contributors not only for their papers, but also for their constructive engagement in this collective and mutually enriching endeavor. We especially thank those who responded to the open call. We also thank the external reviewers whose comments and suggestions for

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change have improved the quality of individual papers and the overall collection.

Through this recruitment process, we have been able to draw on a wide range of disciplinary and interdisciplinary perspectives including economics, business management, economic anthropology, and sustainability science. The collection represents an international collaborative research effort and exhibits, also, the transdisciplinary nature of complementary currency initiatives, which typically involve close cooperation between researchers and practitioners. Several authors of the included papers were involved as action researchers in the reported initiatives. The set of papers includes a mix of reviews, research papers, and case studies. Some of the articles provide conceptual and theoretical background to complementary currency research and practice. Others are more empirical and focus on the successes and failures of particular experiments. All the papers are concerned with the compatibility or incompatibility of monies and monetary systems of different design with the goal of more sustainable development. This collection therefore both presents the main points of departure of the Special-Purpose Money project and advances its goals to highlight and explore design considerations and features of complementary currencies and their associated implementation processes that are potentially relevant to their contribution to sustainability transitions, importantly also bringing these to the attention of practitioners and stakeholders, including policymakers.

Money as artifact, infrastructural element, institution and actant

There is a widespread consensus within social and sustainability science that many of the obstacles to sustainable development derive from the structure of the global economy (e.g., IPCC Sixth Assessment Report 2023). Analyses differ, however, regarding how sustainability problems are identified and how they may be alleviated. Mainstream economists tend to understand unsustainability in terms of market failures and lack of development (e.g., Schnabel 2020). Heterodox economists generally refer to incentives inherent in globalized capitalism (e.g., Stern 2022). Across the spectrum of analyses, there is a common assumption that greater sustainability requires reforms and regulations pertaining to the organization of market exchange (e.g., Gadgil et al. 2022). Rarely, however, is the phenomenon and artifact of money itself subjected to critical scrutiny. Whether mainstream or heterodox, economists tend to take modern money for granted as a self-evident foundation for the organization of human exchange and to attribute little or no effect to it on the ecological impact of our societies.

The global deliberations on social and ecological sustainability are widely experienced as having reached an impasse aligned with claims that the "free" market economy is the only system that works and that debate about this is over. The hegemony of globalized capitalism has for decades disarmed the kinds of resistance represented, for instance, by national labor and environmental movements. To the extent that the logic of the world market derives from the artifact of money itself, it is reasonable to seriously scrutinize and question the design of that artifact. In doing so, it may be possible to challenge exclusive reliance on the world market and its logic: "Yes, there *is* an alternative." The rules of the global economy are not written in stone, and it is not inevitable, for instance, that market efficiency as measured by modern money should confer competitive advantages to enterprises capitalizing on low wages and lax environmental legislation in the Global South. These aspects of market logic are clearly not sustainable (e.g., Hornborg 2017, 2018). In view of the pervasive failures of other measures to counter such tendencies, the causal role of money and monetary design has been underestimated and understudied.

Contemporary 'mainstream' monies—the set of national fiat currencies—are human artifacts that offer functions as media of exchange in economic and financial transactions, as units of account and as stores of wealth. As elements of the prevailing economic and financial infrastructure, national fiat currencies have become accepted institutions. Both they and their designs are largely taken for granted and go unquestioned.[2] The point of departure for this Special Feature Issue, however, is that the design of conventional money is not so self-evident as is generally assumed. This conviction draws in part on two fields of research on alternative ways of organizing human economies. First, the field of economic anthropology has documented a great diversity of economic arrangements and money forms in different cultural contexts and historical periods (e.g., Hart 2000; Carrier 2005; Hann and Hart 2011). Second, the study of community currency experiments in the modern world has investigated

[2] It is important to reflect on the possible reasons for this. Since the 1870s, economists have focused on studying how markets work given that these operate using modern money. This means that modern money and its design are not challenged by mainstream economists and any potential for redesign is not raised. Rather, the design of modern money is taken as the starting point for economic analysis. Furthermore, as argued more fully by Hornborg in his paper within this Special Feature Issue, the models and understandings of mainstream economists are flawed because these have been developed in isolation from the implications of thermodynamics. Hornborg concludes that "*in focusing exclusively on the artifact of general purpose money, neoclassical economics since the 1870s has detached itself from the biophysical context that would need to be included in any account of deepening global inequalities and unsustainability*" (Hornborg, this issue).

and encouraged the emergence of complementary economies alongside regular markets (e.g., Dobson 1993; Lietaer 2001; North 2007, 2010; Lietaer and Dunne 2013). Both of these fields permit us to "defamiliarize" or relativize the kinds of money and monetary systems to which most modern people are accustomed and to imagine alternative ways of designing these.

Albeit that conventional modern monies are sovereign currencies associated with specific national territories, issuance (or money creation) is mostly by private banks as credit money (Graeber 2011). Modern monies are neither commodity monies nor are backed by commodities, so money supply is less constrained than in the case of older forms of money made from or backed by scarce commodities. Depending on their position in the global hierarchy of currencies, modern currencies are convertible to differing degrees (Herr and Nettekoven 2022). Convertibility extends the geographical realm of the purchasing power of money holders. Currencies of the richer countries that occupy the highest positions in the currency hierarchy have a high degree of convertibility, bestowing near global purchasing power on their holders (Olk 2024). Coupled with capital mobility, this bestows, also, global investment potential on such currencies. Modern money is also akin to what Polanyi (1957) called all-purpose or general-purpose money (GPM), which means that it fulfils all the functions of money: medium of exchange, unit of account, and store of value. A common unit of account—money—is applied to "value" anything that enters production processes, reducing fundamentally different entities to apparent equivalence and making incommensurable values apparently commensurable, thereby increasing fungibility. Money, as a unit of account, also makes possible the now dominant concept of economic efficiency that acts as an incentive, driver, and means to pursue unsustainable development outcomes.[3]

Together, these features of modern money have the tendential outcome that higher ranking currencies can be used directly or indirectly for exchanges of all kinds of values that are traded among humans, including in markets across the globe. This generalized commensurability is a feature of modern markets that is rarely questioned or reflected upon, because modern people usually have no experience of other principles of exchange. Before the nineteenth century, however, most people recognized a distinction between two or more "special-purpose monies" that provided access to much more restricted spheres of exchange. A classic example in economic anthropology is Bohannan's (1955) study of the so-called multi-centric economy of the Tiv people of Nigeria, who denounced conversions between different cultural spheres of value such as food, labor, and valuables. Another is Solyga's (2013) study exploring a traditional shell currency of the Tolai people of Papua New Guinea—the Tabu—and its cultural embedding. His study demonstrates conflicts in the coexistence of traditional and modern monetary systems, due to the associated logics of action, which point to challenges in designing interfaces between monies in plural monetary systems.

Modern experiments with local or community currencies (cf. North 2007) have been initiated for diverse reasons, but a commonality is the intention to increase local control over the flows of labor time and other resources and to enhance the resilience, self-sufficiency, or sustainability of a community or region. A frequently voiced goal is to localize flows of resources and reduce long-distance transports. These experiments are generally initiated and organized by local enthusiasts in an explicit effort to provide alternatives to regular markets. Recent initiatives have also experimented using new forms of currency, employing digital technologies and most recently cybercurrencies—digital currencies that exploit blockchain technology—for managing the exchange of products and services. Decades of experiments with multiple forms and types of complementary currency in several countries and assessments of their success, as reported, for example, in the *International Journal of Community Currency Research*, have generated substantial knowledge of recurrent problems and pitfalls. This Special Feature Issue aims to assemble some of this knowledge and draw conclusions on how complementary currencies and initiatives to implement these are best designed and managed to achieve objectives related to sustainability transition.

Insights into the importance of focusing on the design of currencies, rather than on how money is regulated through, for example, taxes and subsidies, also derive from the significance increasingly attributed to the role of *artifacts* in organizing human social relations. Over the past three decades, the humanities and social sciences have been transformed by a pervasive concern with the "agency" of artifacts. Rather than treating human fabrications merely as products of human intentionality, as in traditional social theory, "post-humanist" social thought such as actor–network theory, or ANT (Latour 2005), views material objects and the ideas with which they are associated as "actants" that impose their specific designs on social life. In line with this general ontological position, we argue that the design of currencies clearly impacts on the nature of both social and human–environmental relations. Special purpose money

[3] In its function as a generalized unit of account, modern money makes possible an economic conceptualization of efficiency that has come to dominate markets and economic thinking. Combined with convertibility and mobility, this has provided unprecedented levels of commensurability. Together, this provides logics, incentives, and means for consumers to buy distantly derived goods produced with minimal wages and environmental controls and for investors to finance the supply of these. In this perspective, then, the design of modern money is a key factor in economic globalization and the phenomenon of "uneconomic" growth as posited by Daly (1999).

could, for instance, be designed to generate more localized resource flows involving less transports and more face-to-face interaction between producers and consumers. It could be used to incentivize and steer changes toward more sustainable levels, profiles, and patterns of production and consumption and support more just and equal distributions of development opportunities, economic activities, and incomes across people and places.

An important factor in this perspective is that the positions of government authorities in respect to complementary currencies, especially at national level has, to date, been largely hostile in most jurisdictions across the world. This has constrained the design of experiments in building complementary monies and markets, and in developing monetary plurality. It has also restricted experiments so far to largely local scale. Backing by authorities, however, could render initiatives stable and reliable over time and open options to experiment with complementary currency realms and develop markets at greater than only local scale, thus overcoming obstacles that have beset many earlier and extant complementary currency initiatives. Complementary currencies supported by authorities could serve to enhance sustainability, equity, and community cohesion, and could serve as potentially powerful policy instruments in addressing the so-called "wicked" problems currently afflicting development trajectories for which transformative solutions are required.

Although we should not go so far as to impute purposive agency to non-living artifacts, the acknowledgment that inanimate objects may significantly influence human social behavior, although evident, remains undertheorized in social science. Remarkably, very little work from ANT has been concerned with the artifact of money and its capacity to mold market behavior. Even where ANT has been applied to the operation of markets (Callon 1998), the causality inscribed in the design of money itself has escaped scrutiny. Paradoxically, the most influential artifact of all in modern society thus appears to qualify as the "elephant in the room." Modern money with its high tendential capacity to enable commensurability across markets, values, and space is indeed an artifact with momentous consequences for human society, ecosystems, and the biosphere, but is rarely approached as an artifact worthy of detached analysis.

Yet, the social and ecological trajectories of modern monies as tendential general-purpose monies are distinctly different from those generated by the so-called special or limited purpose monies with which they have been contrasted (Bohannan 1955; Polanyi 1957). In the idiom of ANT, the "agency" of modern money is very different from that of special-purpose money. Although societies for most of human history have been dominated by systems featuring special-purpose money, the historically recent expansion of money with the tendential character of general purpose and high commensurability has eclipsed the very idea of special-purpose money. In usurping our economic imagination, modern monies thus continue to constrain our capacities to deal with the global metabolic impasse of the Anthropocene.

It is easy to understand why such a detached perspective on different forms of money rarely enters the discourse of mainstream economics. The mandate of economics is to understand the logic and operation of modern money, not to transform it. However, in interdisciplinary studies of obstacles to sustainability, the design of the money artifact should not escape scrutiny. As the pivotal role of artifacts in organizing social life is recognized throughout the humanities and social sciences, it is high time to apply this insight also to economics. A crucial research question for sustainability scientists informed by recent advances in the humanities and social sciences is thus*: How might differently designed money artifacts and associated monetary systems impact on social and human–environmental relations?* This Special Feature Issue is an attempt to address that question. Contributions made in the different papers within the issue are discussed below in relation to three core issues: money and sustainability, digitization, and political support. As a collection, the papers also suggest directions and questions for future research in this emerging domain.

Money and sustainability

In his paper, Olk provides definitional clarity over special-purpose monies. Olk establishes that the global monetary hierarchy is characterized by "core" nations and their currencies with the USA and the US$ at the pinnacle, and by more "peripheral" nations and their currencies occupying the lower positions. He also observes that shifts in the direction of more sustainable development will likely require two simultaneous transitions. One transition involves degrowth in the core countries leading, among other impacts, to an absolute reduction in the directly and indirectly induced entropy of production and consumption for which the richer countries are accountable. The other transition involves a de-linking of countries of the periphery and their economies from those of the core countries. This is needed to reduce the impact of inequalities in the purchasing power of their currencies on the overall draws and transfers of biophysical resources and on ecologically unequal exchange between the poorest and richest nations.

Olk highlights key differences in the literature to date concerning types and classifications of monies. He makes an important contribution by reconceptualising the key distinction between conventional national currencies and special-purpose monies. The acceptability and utility of the former, he argues, are constrained, only in practice and only by default. In contrast, special-purpose monies are limited

intentionally; their use is constrained by design. What distinguishes special-purpose monies from national fiat currencies is not the existence, per se, of geographical or institutional constraints on acceptability, but the intentional imposition of strong constraints. It is this intentionality—the aspect that constraint is a deliberate design feature—that distinguishes special purpose from mainstream monies.[4]

Through this distinction, Olk is able to integrate special-purpose money into the global hierarchy of monies using, as dimensions, sovereignty and liquidity (the latter including the degree of commensurability and convertibility) to classify the position of different monies in the global hierarchy. He is able, also, to develop a typology using these same dimensions to define four schematic types of special-purpose money. This allows him to explore relationships between each type and the prospects for each to support sustainability transitions. His characterization of trade-offs between guaranteeing convertibility, doing without sovereignty, and protecting against arbitrage as a design choice trilemma offers helpful insight for practitioners and policymakers interested in designing and using complementary special-purpose monies to support sustainable development goals. The insight that the prospects to contribute to sustainability are likely to be greatest from state-backed, non-commensurable monies, a type of special-purpose money not yet represented among extant complementary currency initiatives, is extremely pertinent as, also, is the brief reflection in the concluding remarks that political contexts have so far not been propitious for this type of money to emerge. Olk notes, nevertheless, that political contexts are ever evolving. In view of current trends and pressures, an opportunity space could open for sustainability-oriented special-purpose monies to be introduced. He points also to the likely need for public agencies to play active roles in developing the markets that such special-purpose monies might support; for example, through new systems of public provision.

The paper by Diniz et al. adds to the framing that Olk provides for the Special Feature Issue, as it draws out the important links between the design and evaluation of monies and their intended purpose(s) in their contexts of application. With this Special Feature issue, our interest lies not in special-purpose monies per se, but in the design of *sustainability-oriented* special-purpose monies, by which we mean those that might support sustainability transitions and the achievement of goals embracing all dimensions of sustainability. At different times, the links between purpose and design have been represented to different extents in debates and literatures concerning money. They were highlighted especially in Dodd's seminal work on "utopian" monies (Dodd 2015) and, in the specific context of sustainable development in the works of Lietaer et al. (2012) and of Seyfang and Longhurst (2013). However, these links have been much less prominent in more recent work, especially since the emergence of blockchain technology (Nakamoto 2008), which some commentators consider has turned recent discussion in the field of complementary currencies away from currency purpose and on to currency form. In re-emphasizing the prominence of purpose in complementary currency design, the contribution of Diniz et al. is therefore welcome.

We, nevertheless, still require some further framing. Most extant cases involving the use of complementary special-purpose monies have been bottom-up, local initiatives intentioned to support a limited set of mostly socio-economic goals.[5] With a small number of exceptions, these have achieved modest success in terms of the scale, scope, and diversity of the economies, transactions, and participants that currency initiatives have supported as well as in terms of impact on, for example, local self-sufficiency. Most initiatives have met with disappointing outcomes and impacts compared with the ambitions that inspired them. This highlights that complementary currency initiatives face considerable challenges even when they focus on only a limited set of goals. Building a critical mass of users and building provisioning capacities to meet a range of currency users' basic needs are both significant challenges if the territorial realm of a currency is restricted to a local scale to promote, for example, greater local control over local resources and reduced reliance on the global economy over which local communities have little or no influence. The fact that most special-purpose money experiments to date have been grassroot initiatives introduced into largely hostile institutional contexts also raises questions.

Clearly, there are paradoxes and trade-offs inherent in the design of initiatives concerning, among others, the role of public authorities in project development, the appropriate scale of projects, and the compatibility of some forms of currency with the espoused values, principles, and goals of initiatives, as arises with blockchain-based forms of special-purpose money, for example. Such paradoxes need to be articulated clearly and addressed explicitly in monetary system design if future projects are to be more successful than their precursors. A particular and important challenge in the sustainability context and one that so far has hardly been encountered in practice owing to the limited success of extant schemes, concerns the ecological dimension. If future initiatives can achieve a critical mass of users and

[4] This resonates with Schroeder's observation that "boundaries" are the distinguishing feature of alternative currencies (Schroeder 2020a).

[5] There has been rapid growth in the creation of local-scale complementary currencies since the financial crisis of 2007, with many of these established as digital currencies and, since the COVID-19 pandemic, with some established as cryptocurrencies. Most initiatives to date have prioritized social and economic over ecological concerns.

can address users' basic needs through the development of markets that operate on different from mainstream logics, especially if this provides inclusion opportunities for those now largely excluded from mainstream arrangements, what will this imply for the overall socio-ecological metabolism and entropy production? More specifically, how can the development at scale of complementary economies that use special-purpose monies be made compatible with reducing overall rates and levels of entropy?

Within this Special Feature Issue, the paper by Hornborg explicitly addresses this complex set of integrated design challenges. Hornborg explores the design and use of special-purpose currencies from a degrowth perspective of localizing economies, reorienting levels and profiles of production and consumption, and lowering the socio-ecological metabolism. In respect to his aim to "*transcend the political impasse of economic globalisation*", Hornborg proposes the introduction of national special-purpose currencies exclusively for local use and as a complement to modern money. The complementary currency should "*distinguish a local sphere of exchange for basic needs from a global sphere of more remote exchange values*". To avoid the pitfalls that have beset most local complementary currency initiatives to date, specifically their failure to attract enough users to scale, sustain and support consumption of locally produced goods and services (rather than only local retailing of distantly produced products, e.g., Marshall and O'Neill 2018), Hornborg supports combining the concept of a complementary currency with that of a universal basic income (UBI).

Hornborg argues that combining these innovations strengthens both, allowing each element of the combined scheme to counter the weakness of the other: the inherent potential in complementary currency to politically influence consumption patterns by limiting the use of a currency to basic products and services produced locally, which UBI paid in a regular currency cannot achieve; and, the generalized scale of adoption and use inherent in UBI that usually eludes local complementary currency initiatives and has typically reduced their impacts. In terms of design and implementation implications this would require national authorities to be involved as actors, schemes to have sustainable production and consumption as specific goals, and incentives built-in for citizens and entrepreneurs to use the currency and to encourage its circulation.

A major contribution of the paper is the design aspect of a national complementary currency that can be used only to purchase goods and services produced locally to the currency holder; i.e., the use of a relational definition of "local" specific in each case to the geographical location of the currency holder. Hornborg therefore concurs with Olk in the view that a sustainability-oriented complementary currency is likely to involve a state-backed, non-commensurable or limited-commensurability currency; i.e., a currency of a type that has not yet been implemented. This resonates with Schroeder's arguments that the true potential of complementary currencies cannot be inferred from extant cases, as these have been developed and implemented within legal and fiscal frameworks that have typically been hostile, such that their designs are compromised and sub-optimal (e.g., Schroeder 2015, 2020a, b).

Digitization

Two papers within the Special Feature Issue are concerned with a specific aspect of currency design, the form that the currency takes. Digital forms of currency involving smart cards, mobile phone-based apps, web-based accounting platforms and related technologies already opened new possibilities for creating complementary currencies before blockchain came along. Digital currencies can offer advantages over paper and other non-digital forms of currency, including the possibility to track how currency is used and how it circulates in the supported monetary realm, as well as to connect these data with profiling data on users. Depending on how the digital technologies and platforms are designed, developed, and implemented, they may also provide scope to communicate with currency users in real time. They can also reduce risks of counterfeiting, multiple spending, and fraud, thereby increasing confidence and trust in a currency. In turn, these advantages open opportunities to improve monetary system governance, expand currency functionality, increase the scale and scope of initiatives, expand the range of stakeholders and the benefits they obtain from participation, and help to cover operating costs, for example by potentially providing valuable information and services to sponsors and interested parties.

Nevertheless, with the development of blockchain technology and with a complementary currency, Bitcoin, as its first tangible application (Nakamoto 2008), a powerful new technological potential was injected into the complementary currency arena. Since its introduction in 2008, blockchain technology has transformed the context for complementary currencies because it can be used to create cryptocurrencies with features that exceed those of pre-existing digital currencies. Its capacity to embed rules for currency use in codes and to verify and register transactions automatically on a distributed ledger using protocols that create immutable and transparent records offers unprecedented levels of autonomy, security, and auditability. These attributes are widely considered by monetary analysts to offer a new way to establish trust in a currency on the part of its user community that does not rely on the currency being backed by commodities or sovereign power. They can also remove the roles and therefore the need for establishment intermediaries in money and monetary system creation and operation, offering scope

for decentralization and avoiding or significantly reducing transaction costs. Transparency and auditability are important attributes for authorities accountable for how public money is spent. For municipalities, complementary currencies established as cryptocurrencies can therefore offer an attractive means of distributing a basic income to their citizens. During the Covid-19 crisis, some municipal cryptocurrencies were therefore established to distribute basic income to vulnerable citizens and to try to bolster local social and economic resilience.

The best-known (and first) example of a cryptocurrency is Bitcoin, but it is important to understand that Bitcoin is a particular instance of a cryptocurrency and that it has specific features that do not necessarily need to be present in other cryptocurrencies. Three aspects of Bitcoin are particularly noteworthy here. The first is that some characteristics of Bitcoin make it more akin to currencies aimed at general commensurability than to currencies with uses limited by design. Bitcoin is not a special-purpose or limited-purpose currency. The second is that some features of Bitcoin, notably a-territoriality, global range, freedom from third party interference and control, and anonymity of holders, have led to uses of Bitcoin that are wholly at odds with the principles and goals of sustainable development; for example, in speculation, money laundering, and fraud. Such uses have inflicted reputation damage on Bitcoin, but unfortunately also on cryptocurrencies more generally. The third, is that the ecological footprint of Bitcoin in terms of energy requirements and carbon emissions is high and growing (Onat et al. 2025).[6] The large environmental footprint of Bitcoin arises from its reliance on a Proof-of-Work consensus mechanism in the blockchain. This requires computers with high processing power (i.e., ones incorporating Application Specific Integrated Circuits) and involves a large number of computers (nodes) in the networks that process transactions. These are energy intensive. Again, this energy demand and associated carbon emissions make Bitcoin incompatible with sustainable development and sustainability transitions.

However, Bitcoin is not synonymous with cryptocurrency (Onat et al. 2025). Rather, it is a particular instance of a cryptocurrency with particular design characteristics and impacts. This is important as there is a confusion in the minds of many between blockchain as a generic technological potential and Bitcoin as a high-profile but nonetheless specific instance of a blockchain-based cryptocurrency. Equally, there is confusion between Bitcoin and other cryptocurrencies that have been developed or that could be developed to have different designs. It is useful, therefore, to draw out the distinctions and to flag that the high energy and climate footprint of Bitcoin is not necessarily a feature of all blockchain-based currencies. Cryptocurrencies using protocols other than Proof-of-Work—such as Proof-of-Stake—need fewer and less powerful computers, so are less energy intensive and can be designed to have negligible ecological footprints.[7] In short, it is important that sustainability scientists, complementary currency practitioners, and policymakers distinguish between Bitcoin and other cryptocurrencies.

This provides a backdrop for the two papers in this SFI that focus on the design, development and implementation of special-purpose monies as forms of cryptocurrency. These papers explore different aspects of a seemingly paradoxical and contradictory relationship between, on the one hand, features of blockchain-based currencies and, on the other hand, the normative values and principles of sustainable development.

The paper by Valdecantos et al. asks whether blockchain is a game-changer for local complementary currency initiatives that aim to build social and solidarity economies. It draws on the authors' experiences as action researchers and proponents of a local, bottom-up cryptocurrency initiative in Argentina, which uses a currency called Moneda Par. The question that the paper addresses arises from the contextual change for local, grassroot complementary currency initiatives introduced by blockchain technology. The need to secure trust in local complementary currencies has been a major challenge for initiatives developing currencies not backed by the State. Blockchain, with its key attributes of security, transparency, and immutability has led to a widely accepted characterization of blockchain-based

[6] Onat et al. (2025) address a set of highly relevant questions concerning the overall energy use and climate-forcing impacts of Bitcoin, how these are constituted, why these are growing, and how these might be estimated. Deficiencies in earlier methods and estimates are addressed by implementing a comprehensive and detailed accounting framework—a global multiregional input–output model—that includes all greenhouse gas emissions across all elements and stages of the concerned processes in Bitcoin mining and transaction operations wherever these arise across a geographically distributed supply chain. This includes energy and emissions associated with the manufacturing of computers and integrated circuits used by Bitcoin. The paper estimates emissions per hash rate, and, on an annual basis, emissions per country and per transaction in each country. The findings highlight the incompatibility of current Bitcoin operations and trends in these in relation to ecological sustainability. However, the paper makes clear that Bitcoin is not synonymous with cryptocurrency.

[7] This implies the need for further discussion to highlight trade-offs, for example, between currency design and currency performance. As the performance requirements for Bitcoin are different from and more stringent than those for local-scale blockchain-based complementary currencies, it will be useful to explore whether, how, and the extent to which the energy and climate footprint of local-scale projects using cryptocurrencies to support complementary and alternative economies might be kept low and compatible with ambitions for projects to contribute to sustainability transitions.

systems as "trustless" systems. In this characterization, the emergence of blockchain would seemingly circumvent the need to establish trust in a local complementary currency established as a cryptocurrency, which leads to the hypothesis explored in this paper that blockchain could be a game-changer for such initiatives.

This question is explored in the paper through a multidimensional conceptualization of trust that distinguishes three component dimensions: ethical, hierarchical, and methodical trust. Findings from the case study show that blockchain can be designed to align with ethical requirements and can strengthen both hierarchical and methodical trust, but that this last component depends on the usefulness of the currency, which broadly translates into whether goods and services that currency holders want to buy are produced in the local complementary economy and made available on markets to currency holders. Valdecantos et al. find that market development cannot be guaranteed simply by introducing a complementary currency, whatever its form.[8] After 5 years of experience with Moneda Par, its users indicate that they are able only to satisfy low levels of their overall needs using the currency. Aligning with Olk's conclusions concerning the need for additional market development measures to be undertaken alongside the introduction of special-purpose complementary currencies, Valdecantos et al. conclude that spontaneous market development has been insufficient in the case of Moneda Par. They advise that an active strategy to stimulate the supply of goods and services is needed to quicken the market development process.

In the second of the papers exploring cryptocurrency, Sanches et al. seek to establish design principles and implementation strategies for sustainability-oriented cryptocurrency platforms that might support a number of individual but networked local solidarity-economy initiatives. There are already several local-scale initiatives in solidarity economy development in Latin America that use digital currencies, including those in Brazil that operate on the e-Dinheiro currency platform. There are also examples around the world of blockchain-based, local cryptocurrency projects. The specific focus of the paper by Sanches et al., concerns an ambition to build cryptocurrency platforms that might be shared by networks of local solidarity economies and how to handle the paradoxes and contradictions this entails given that the underpinning values and principles of local solidarity economies are often at odds with the high-tech nature of cryptocurrencies and other intrinsic aspects of the technology.[9] Examples of such paradoxes when using cryptocurrency to support solidarity economies that are intended, among others, to redress social and economic injustices, empower local people, and build strong community bonds based on mutual trust, are the risks of creating new dependence on external techno-elites and replacing trust in neighbours with trust in technology. Sanchez et al., propose a set of principles for design and implementation of cryptocurrency platforms to help mitigate potential conflicts.

A multi-level political project

The Special Feature Issue holds three papers that add significantly to the range of perspectives on complementary currencies represented within the collection. Like Hornborg, Blanc adopts a critically constructive approach to dominant monetary arrangements but, in the context of averting ecological crises and collapse, his interest in alternative currency projects lies in learning lessons from them that can be used to address major flaws in monetary system arrangements. The flaws in mainstream monetary systems he specifically addresses concern the issuance of money as bank credit, which skews investment decisions in favor of projects with poor ecological outcomes; the a-territoriality and a-specialization of money, which contribute to uneven development, deprivation and (often) the political discontent of those experiencing deprivation; and the fact that mainstream monies are aimed at the most general use and circulation, including use as unit of account "*even for externalities and biophysical entities so far as these are considered resources*", which translates to the high levels of commensurability mentioned earlier in this editorial and a reductionist approach to ecosystem complexity. The question he raises is: *how might the monetary system be adapted to support an ecological and sustainability turn in development trajectories*? He proposes that this might be achieved by including alternative currencies as complements to national currencies within an expanded, plural monetary system infrastructure. Importantly, he thereby points to a transformative potential of alternative currencies in adapting and reorienting the monetary system and to the need for a plurality of monies and monetary systems to realize this potential.

[8] In reviewing the literature on money and its origins, Valdecantos et al. challenge the widely held view that money arises spontaneously from market exchanges. Rather, money was created originally by communities to facilitate their political and economic organization. Money is a precondition for the market economy, not a development from market exchanges. In this perspective money is a necessary condition for a market economy to develop, but not necessarily a sufficient condition.

[9] The underpinning values and principles of local solidarity economies emphasize the involvement of local people, groups, and resources in solidarity economy development, local empowerment, local governance and control, the importance of place and community, and the intent to reinforce identity and trust among individuals and groups through proximity and the strengthening of social relations.

Furthermore, he sets out that such extension and inclusion—essentially a restructuring of the monetary infrastructure—is a political project. It requires political power, intention and direction, as well as innovation by state actors. By contrast, he draws out that alternative currency projects to date have largely "*by-passed the State*", being mostly bottom-up initiatives driven by local actors critical of mainstream monetary arrangements and anxious to recapture some control over local territorial development. Also, the very issue of concern, the structure of the monetary system, is hardly discussed in the political arena. Any ongoing changes, he argues, affect finance not money. In the context of the ecological turn, which requires changes in the orientation of consumption and investment, he highlights that a flaw of alternative currencies to date is therefore the weakness of their relation to public policies and even more to public spending and taxes.

Blanc calls, therefore, for reflection by policymakers, practitioners, economists and sustainability scientists on the way that monetary systems are built. He especially calls for reflection on specific features of the dominant monetary system that impede an ecological and sustainability turn in development trajectories, and to features exhibited by alternative currencies of different types that stand in contrast with these, specifically the territorialization and socio-economic specialization of alternative currencies, and attempts of some alternative currency projects to limit fungibility and commensurability. Considering these features seriously and making them part of the existing monetary infrastructure, he argues, "*requires adapting the existing monetary infrastructure by creating specific circuits through the establishment of boundaries*". Making this argument, Blanc opens the door to instrumentalising alternative currencies within policymaking more generally. His is therefore a major contribution to thought and literature about alternative currencies, how they are perceived and contextualized by the concerned actors, and their importance and role in ecological and sustainability transitions.

Aguila et al. address their paper to the specific challenge facing countries of the Global South in financing green projects and green transition, a challenge that is made especially acute for them by the current international monetary system, which privileges the US$ and other high-ranking currencies in the international currency hierarchy. The need to acquire high-ranking currencies to fund imports of goods that countries of the Global South do not produce domestically leads many of these to specialize in exporting low value-added natural resources at low prices, which contributes to excessive annual draws on biophysical resources and to unequal ecological exchange. But insufficient capacity to earn or attract inward investment in high-ranking currencies is also a barrier to the possibilities for countries of the Global South to finance green infrastructural and related projects that would reduce their ecological footprints, such as mitigating climate change by using imported photovoltaic panels, as the needed imports must be bought on international markets with high-ranking currencies. In turn, these are both hard to obtain and, if obtainable, are likely to be obtained by exporting raw materials and mass commodities, adding to unequal ecological exchange and global entropy.

The paper seeks to demonstrate a conceivable solution that involves developing a form of special-purpose money with the dedicated and specific role of financing green investment projects. The proposal by Aguila et al. builds on concepts that were part of Keynes' rejected proposal to the Bretton Woods Conference, in which Keynes specified the creation of an International Currency Union with a unit of account, the 'Bancor' as a way to shape the post-war international monetary system in a way that might avoid financial crises and balance global trade, thereby introducing greater global justice into the system (see, for example, International Monetary Fund 1996). It is also designed to resonate with recent and current calls and initiatives "*for Governments to come together, re-examine and re-configure the global financial architecture for the twenty-first century*".

Aguila et al. propose a supranational arrangement to provide (prospectively) all countries, but especially those of the Global South, with financial leeway to import green goods, services, and technologies essential for sustainability transformation. This involves creating a Green World Central Bank that would issue its own supranational unit of account, which the authors call the "Ecor", with the specific purpose of financing a worldwide sustainability transformation. Again, this paper highlights that monetary system reform is a political project and, in this case, a supranational political project that requires support by national governments, international cooperation, and international agreement among at least a subset of countries that embraces richer and poorer countries. It highlights, also, that special-purpose monies can be conceptualized to operate at multiple levels and at a range of scales. There is therefore no reason to suppose that because most existing examples of complementary special-purpose currencies have been bottom-up, local-scale initiatives, this need be the case for future initiatives.

In their paper, Bouchez et al., explore perspectives and debates on special-purpose complementary currencies within the degrowth movement for insights into issues and arguments concerning potential roles these might play in degrowth and de-linking.[10] Debates within the degrowth movement are interesting in this context because of its

[10] Although degrowth is discussed mostly among academics, intrinsically it is a political project that would require political support and decision for implementation, so it is considered here under the subheading: a multi-level political project.

emphasis on the ecological dimension of sustainable development. The ecological dimension of sustainability is typically the least prioritized both by those who promote complementary currencies and, with a few notable exceptions, such as Seyfang (2009), by those who study them, so debates on complementary currencies taking place within a movement that explicitly challenges the growth orientation, globalization and efficiency logic of neoliberal capitalism from the perspective of their incompatibilities with sustainable development and its ecological dimension particularly can offer unique insights. Bouchez et al. draw insights, for example, into preconditions for projects that seek to moderate the socio-ecological metabolism through economic localization and shorter supply chains, changes in the structure and technologies of production and consumption, and changes in behaviors and lifestyles. They draw insights, also, into the challenges entailed in realizing the potential of complementary currencies to support ecologically sensitive sustainability transition and suggest promising directions and questions for future research. In this logic, it is indeed sensible to explore how degrowth protagonists and researchers view complementary currencies and to highlight differences in perspectives within the degrowth movement that might suggest issues that warrant investigation through future experimentation and research.

Concluding thoughts

We hope that this Special Feature Issue will draw attention to the fact that money is not neutral in the sustainability of development. To the contrary, the design of monies and monetary systems is a core determinant of development pathways and outcomes. Modern societies have come to take money as an immutable given, rather than as a social construct and artifact that has been designed and is open to be redesigned to serve purposes different from economic growth and accumulation. Monies and monetary systems can be designed to support goals of sustainable development. Albeit that designing plural monetary systems that include complementary special-purpose currencies is not without its challenges (see, for example, Solyga 2013), it holds the potential to be an important part of reframing the development paradigm. Far from being peripheral and unimportant, as until now they have largely been portrayed, alternative currencies as complements to mainstream currencies and part of a restructured monetary infrastructure can be instrumental and transformative as innovative elements of policy for the ecological turn.

There have been attempts previously to use complementary currencies to advance sustainability goals and studies made of these (e.g., Seyfang 2009; Seyfang and Longhurst 2013), but the potential of complementary special-purpose currencies to contribute to sustainable development has, so far, hardly been touched, as the design of most complementary currencies and experiments and initiatives involving these have to date been compromised by unsupportive policy stances and unfavorable institutional settings. There have not yet been any experiments using potentially the most promising types of complementary currencies for supporting sustainability transitions, i.e., state-backed, non-commensurable special-purpose currencies. Given the perilous state of world affairs and the ubiquitous challenge of wicked problems that appear immune to conventional solutions, the time may be propitious for government authorities at all levels and across the globe to see complementary special-purpose monies positively as instruments with transformative agency for achieving sustainable development goals. There is a need for experiments, especially using so far untried designs of special-purpose currencies as part of plural monetary systems, and for research to evaluate and help improve these.

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