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# Can virtual currencies drive sustainable de-growth?

Claudio Vitari, Associate Professor, [claudio.vitari@grenoble-em.com](mailto:claudio.vitari@grenoble-em.com); Grenoble Ecole de Management, 12 rue Pierre Sémard, 38000, Grenoble, France

## Abstract

By one hand, the nature of money influences the objects, the objectives and the methods of production and consumption. On the other hand, the distribution of money influences human behaviors, the supply and the demand of goods, and hence their prices. Today, the banking sector enjoys the privilege of creating around 95% of the money supply. Moreover, as bank money bears interest as a condition of its existence, it has long been argued that a systemic growth imperative is inherent to its design. The pursuit of the interrelated goals of ecological sustainability and social justice calls for changes to money-as-usual. This article focuses on degrowth as a novel paradigm that advances changes in money nature and distribution. We scrutinize electronic currencies, which may be defined as alternatives or complements to legal tender money that circulate in electronic forms.

At the hearth of the electronic currencies, Information and Communication Technology has the potential for changing modern society. But does Information and Communication Technology shape our society for purposive degrowth? The article aims to explore to what extent electronic currencies can be considered as practical initiatives for advancing socially equitable and ecologically sustainable degrowth. A literature review is the method employed to bring a first preliminary answer to the research question. Our results show that electronic currencies can contribute at the individual level to support purchases and at the society level to support optimal allocation of resources. Nothing emerged, in literature, supporting the hypothesis that electronic currency could shape our society for purposive degrowth. Extension of the literature review and empirical study of electronic currencies in action will be the next research steps.

## Track:

Degrowth for the rich

## Keywords:

Electronic currencies, degrowth, money, work system framework, Information and Communication Technology

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## Introduction

By one hand, the nature of money influences the objects, the objectives and the methods of production and consumption. On the other hand, the distribution of money influences human behaviors, the supply and the demand of goods, and hence their prices. Modern Society is mainly based on exchanges, and money is a fundamental mean for that. It is the main mean of exchange since the end of large scale bartering and gift/counter-gift exchange. *“Today, the banking sector enjoys the privilege of creating around 95% of the money supply ex-nihilo as interest-bearing debt to itself, and sets the direction of the economy by controlling how money enters into circulation, giving preference to lending for short-term profit over long-term value to society (Robertson, 2012). Moreover, as bank money bears interest as a condition of its existence, it has long been argued that a systemic growth imperative, antithetical to the second law of thermodynamics, is inherent to its design (Soddy, 1926). Reflection upon these somewhat under-publicized issues can suggest that the pursuit of the interrelated goals of ecological sustainability and social justice calls for changes to money-as-usual” (Dittmer, 2013).* This article focuses on degrowth as a novel paradigm that advances changes in money nature and distribution. We scrutinize electronic currencies, which may be defined as alternatives or complements to legal tender money that circulate in electronic forms.

Since the early 1980s, considerable research attention has focused on the strategic role of Information and Communication Technology and its potential for changing modern society (Evans and Wurster, 1997; Kohli and Grover, 2008). Information and Communication Technology is at hearth of the electronic currency systems. Linden dollars, Warcraft’s gold, Riot Points, Bitcoins, and dozens other electronic currencies has emerged last decade. This new medium of exchange is shaping our society, but does it shape our society for purposive degrowth?

Research on the nature of money and its distribution is largely neglected in mainstream economics and sustainability research. A framework to understand the functioning of the virtual currencies is lacking. This framework would help the assessment of the importance of this society shaping trend. In this way, the article aims to explore to what extent electronic currencies can be considered as practical initiatives for advancing socially equitable and ecologically sustainable degrowth.

The article is structured as follows: Section 2 introduces degrowth. Section 3 defines monies and currencies and their respective electronic variants. Section 4 presents the methodology. Section 5 describes the results. Section 6 concludes this article and opens on further research.

## Degrowth

In the field of Ecological Economics the emerging degrowth paradigm is studied from a macroeconomic perspective and theorized with the concept of “Socially Sustainable Economic Degrowth” (SSED). The SSED contributions mainly focus on ecological macroeconomics (Alier, 2009; Daly, 2010; Jackson, 2008; Kallis, 2011; Kallis et al., 2009; Kerschner, 2010; van den Bergh and Kallis, 2012; Victor, 2008). *“Not only are ecological economists working on the idea of sustainable Degrowth and its implications as an emergent paradigm to break locked-in concepts inherited from the very malleable 1980s idea of sustainable development, but there are also vigorous social debates in non-academic spheres, such as within Northern social movements for environmental and social justice” (Martinez-Alier et al., 2010, p. 1741).* Ecological economists call for “*management without growth*” (Victor, 2008) in our economies, for a stable and prosperous Degrowth (Jackson, 2008).

Continuing the pioneering work of Nicolas Georgescu-Roegen (1999), many contributions in the ecological economics field deal with the desirability and feasibility of a Degrowth transition in our economies. *“It can be argued that sustainable Degrowth is both a banner associated with social and environmental movements and an emergent concept in academic and intellectual circles, they are*

*interdependent and affect each-other*" (Martinez-Alier et al., 2010, p. 1742).

It is important to emphasize the fact that SSED is a grounded theory, because emerging social movements, practices, experiences, collectives and networks call for conceptualisation. The "*Nowtopias*" (Carlsson, 2008) inspire academic research (Kallis et al., 2012). Academic research would thus provide an institutional strategy for Degrowth, especially in times of crisis (Martinez-Alier et al., 2010).

Among the concrete actions endorsed by degrowth advocates is the creation of alternative currencies, mainly in the form of local ones (Douthwaite, 2012; Kallis, 2011; Latouche, 2009). This endorsement for alternative currencies is attributed to a preference for grassroots initiatives over government policy-making, as the latter is deemed to have failed to implement effective environmental policies during the sustainable development epoch (Kallis, 2011).

## **Monies and currencies**

### ***Legal tender money***

The monetary exchange system is largely influenced by the legal context of the exchange between actors, as the laws and regulations could establish a specific money as legal tender. For example, Euro is the legal tender in the Eurozone as well as US Dollar is the legal tender in the United States of America. It means that if debtor owes legal tender money, this debtor can clear up her debts instantly offering this legal tender money. The fact that legislation is delimited by the country frontiers, what is legal tender in a country is generally not legal tender in another one. Euro is not legal tender in the United States of America as well as US Dollar is not legal tender in the Eurozone. Hence the importance of the legal context of exchange.

Few exceptions exist to this main legal rule. For example, both parties of an exchange could, beforehand, agree to a sort of payment, different from legal tender money. As a consequence, the legal tender can be legally refused by the seller as form of payment. This exception explains the presence of notices informing customers about the accepted and refused means of payment, at the entrance of many shops.

We use the word money for the legal tender mean of exchange (European Central Bank, 2012), which, in modern economies is typically "*fiat money*", as legal tender cannot be redeemed for any commodity. People are willing to accept it in exchange for goods and services simply because they trust the authority issuing it.

### ***Electronic money***

Electronic money (e-money) is the digital equivalent of money. E-money is broadly "*defined as an electronic store of monetary value on a technical device that may be widely used for making payments to undertakings, other than the issuer, without necessarily involving bank accounts in the transaction, but acting as a prepaid bearer instrument*" (European Central Bank, 1998). E-monies include the immense torrents of digital funds that transfer through international and national payments networks, such as SWIFT, Fedwire, and CHIPS (Bernkopf, 1996).

We should note that "*technical device*" does not necessarily mean physical device: e-money can be software or hardware based. E-money stored on a PayPal account on the web is software-based e-money, as the PayPal software application runs on general purpose computer hardware. E-money stored on a GeldKarte is a hardware-based e-money, as the GeldKarte software application requires specific physical card and specific physical card-reader hardware.

E-money inherits the legal characteristics of its 'physical/not-electronic' counterpart and it can be exchanged into 'physical/not-electronic' money.

## ***Currency***

Opposed to legal tender money, we use the term “currency” as the means of exchange without the regulatory status of being legal tender. As a consequence, there is no legal obligation for people and companies to accept currency. The role of the context is again fundamental. For example, in the Eurozone, the US dollar is simply a currency, as far as it is not legal tender money in the Eurozone. Nevertheless, some currencies, such as the US dollar in the Eurozone, can be recognized as legal tender money in other contexts, such as the same US dollar in the United States of America. On the opposite, some other currencies have nowhere legal tender status, like Green Dollars (Dittmer, 2013), or privately issued bank notes (Smith, 2001).

## ***Electronic currency***

Electronic currency (e-currency) is the digital equivalent of currency. In line with the definition of e-money, e-currency is an electronic store of currency value on a technical device that may be used for making payments to undertakings other than the issuer (European Central Bank, 2012).

## ***Methodology***

In order to understand the extent to which electronic currencies can shape our society for purposive degrowth we base our study on a literature review structured around the work system framework (Alter, 2013).

## ***Literature base***

As far as degrowth is a multidisciplinary issue, we decide to review e-currency English-language scientific publications in different disciplines (Webster and Watson, 2002): economics, environmental economics, finance, management and information systems. We leverage the existing journal rankings to be sure to include the top scientific journals (Table 1).

<b>Discipline</b>	<b>Reference</b>	<b>Number of journals</b>
Environmental economics	(Horrace, 2010)	30
Economics	(Ritzberger, 2008)	25
Economics	(Kalaitzidakis et al., 2011)	50
Economics	(Keele University, 2006)	121 (4* and 3* categories only)
Finance	(Chan et al., 2013)	20
Finance	(Currie and Pandher, 2011)	20
Economics Management and Finance	(The Financial Times, 2012)	45
Information Systems	(Lowry et al., 2012)	11

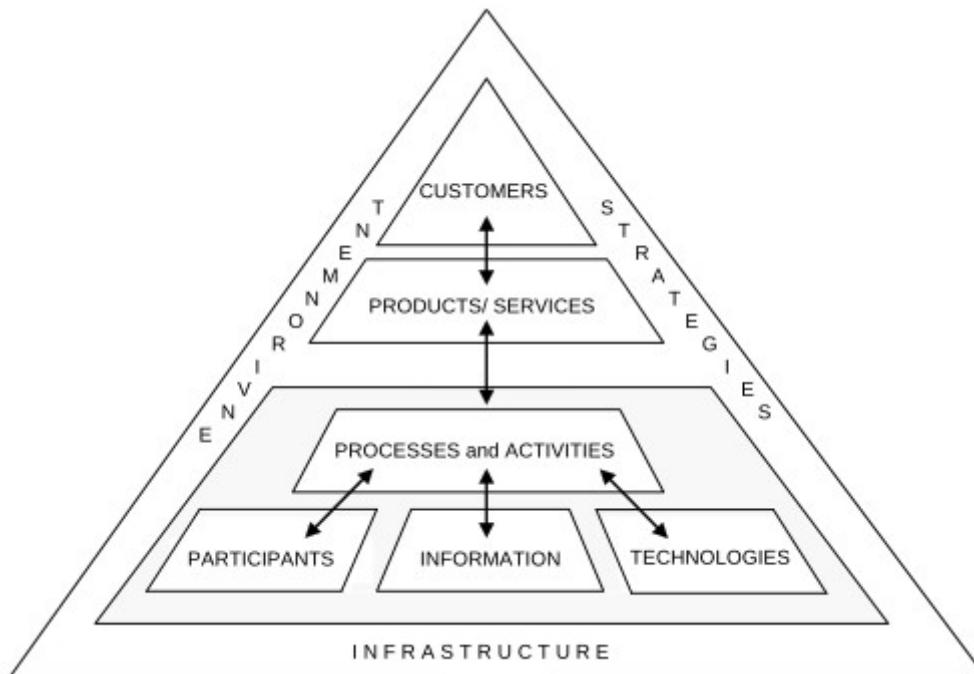
Table 1 The list of journal rankings, the discipline, the author the year and the number of included journals

We exploit the following literature collections: ABI/INFORM Global, Business Source Complete, ScienceDirect, JSTOR and Wiley Online Library. We search for electronic currency articles in Title, Abstract, and Keywords fields. We input the following text strings: electronic money, e-money, internet money, i-money, virtual money, v-money, electronic monies, e-monies, internet monies, i-monies, virtual monies, v-monies, electronic currency, e-currency, internet currency, i-currency, virtual currency, v-currency, electronic currencies, e-currencies, internet currencies, i-currencies, virtual currencies, v-currencies. We try also with other text separators, beyond “-” and “ ”, like “\_”. We extent the search giving the possibility to accept up to three words between the first part of the search string (such as “electronic”) and the second one (such as “money”), in order to include in the output articles with similar text: “electronic local money”.

## ***Work System Framework***

The identified literature is analyzed basing on the Work System Framework (Alter, 2013). Its choice depends on the nature of the object of analysis and on the objective of the framework. By one hand, as far as money and currency carry information (Greco, 1994), monies and currencies are also defined as “*information system we use to deploy human effort*” (Greco, 2001). The information system reference is even more appropriate when money and currency are fiat money and fiat currency. As far as fiat money and currency cannot be redeemed for any commodity, money and currency do not simply carry information, they are pure information which can be conserved and exchanged, because people trust the authority issuing it.

On the other hand, Work System Framework is an analytical theory (Gregor, 2006) which provides a perspective for understanding systems in organizations, in particular where Information and Communication Technology is use intensively (Alter, 2013). The central idea of this framework is that processes are the application of human, informational, physical and other resources to deliver products/ services for specific customers. Environment, infrastructure, and strategies are outside of the work system but they have direct effects in the work system, hence their inclusion in the framework (Drawing 1).



*Drawing 1: Work System Framework*

Conforming to the Work System Framework, we review the literature in order to present the electronic currencies. We identify the customers, the products/services offered to the customers, the processes, the participants, the information and the technologies of the electronic currency system. Finally, the environment, the strategies and the infrastructure are also traced.

## Results

### *Demographics*

Throughout all the analyzed literature, at the end, 11 articles has been identified: 6 full research papers, 2 short opinion articles, 2 reviews of the same book and one editorial article introducing a special issue (Table 2).

Reference	Journal name	Article Title	Type of article
(Mbiti and Weil, 2013)	American Economic Review	The home economics of e-money	research article
(Sumanjeet, 2009)	Asia pacific journal of finance and banking research	Emergence of payment systems in the age of electronic commerce	research article
(Skeie, 2008)	Journal of financial intermediation	Banking with nominal deposits and inside money	research article
(Marimon et al., 2003)	Journal of monetary economics	Inside-outside money competition	research article
(Amor, 2001)	Journal of Information Technology Theory and	The industrialization of the	Short opinion

	Application	Internet Gold Rush	article
(Azariadis et al., 2001)	Journal of Economic Theory	Private and public circulating liabilities	research article
(Hartmann et al., 2001)	Journal of International Money and Finance	The microstructure of the euro money market	research article
(Smith, 2001)	Journal of Economic Theory	Introduction to monetary and financial arrangement	Introduction to special issue
(James, 2000)	Financial Management	The bucks here	Short opinion article
(Nurnberg, 1972)	The Accounting review	The electronic money: evolution of an electronics fund-transfer system	Book review
(Jacobs, 1971)	Journal of finance	The electronic money: evolution of an electronics fund-transfer system	Book review

Table 2 The list of articles: the name of the first author, the year of publication, the name of the journal, the title of the article and the type of article

The six full research papers adopt the same positivist philosophical perspective. Methodologically speaking, out of six articles, three perform a theoretical mathematical demonstration, two are based on empirical examination, and one is built on a literature review.

### ***The Work System Framework of the electronic currency system***

The application of the Work System Framework to the electronic currencies, identified in the literature, allows to structure the gathered information in the different components of the Work Systems Framework: customers, products/services, processes, participants, information, technology, environment, strategy and infrastructure (Table 3).

<b>Components</b>	<b>Declination for electronic currencies</b>
Customers:	<ul style="list-style-type: none"> <li>• Buyers in electronic currency;</li> <li>• Holders of electronic currency.</li> </ul>
Products/ services:	<ul style="list-style-type: none"> <li>• Purchasing service for the buyers exchanging electronic currencies for goods and services offered by the electronic currency issuers as well as by third parties (Azariadis et al., 2001; Mbiti and Weil, 2013; Sumanjeet, 2009);</li> <li>• Storing value service for holders of electronic currencies (Sumanjeet, 2009).</li> </ul>
Processes:	<ul style="list-style-type: none"> <li>• Issuance of electronic currency by the supply, production, mining of new electronic currency (Azariadis et al., 2001; Mbiti and Weil, 2013; Sumanjeet, 2009);</li> <li>• Transaction of electronic currency, which is the agreement carried out between a buyer and a seller to exchange electronic currency for payment of a good or service (Azariadis et al., 2001; Mbiti and Weil, 2013; Sumanjeet, 2009);</li> </ul>



	<ul style="list-style-type: none"> <li>• Redemption, i.e. the cancellation of electronic currency by the issuer with or without compensation (Azariadis et al., 2001; Mbiti and Weil, 2013; Sumanjeet, 2009);</li> <li>• Conversion, in case of the agreement carried out between a buyer and a seller to exchange electronic currency for other currencies or monies (Mbiti and Weil, 2013).</li> </ul>
Participants:	<ul style="list-style-type: none"> <li>• Issuers of electronic currency, i.e. the organization that developed the electronic currency system (Mbiti and Weil, 2013; Sumanjeet, 2009), acting as lender of electronic currency (Azariadis et al., 2001);</li> <li>• Owners of electronic currency, who is the buyer and holder of electronic currency (Mbiti and Weil, 2013; Sumanjeet, 2009), acting as borrowers of electronic currency (Azariadis et al., 2001);</li> <li>• Trust fund, that is the organization holding money deposit reserve, backing electronic currency value in case the electronic currency can be converted in money (Mbiti and Weil, 2013).</li> </ul>
Information:	<ul style="list-style-type: none"> <li>• Amount of value of the issued, transacted, deposited, redeemed and converted electronic currency (Mbiti and Weil, 2013; Sumanjeet, 2009);</li> <li>• Information references about the issuers, the owners and trust funds (Mbiti and Weil, 2013; Sumanjeet, 2009);</li> <li>• Fee for the operations of issuance, transaction, conversion and redemption of electronic currency (Mbiti and Weil, 2013; Sumanjeet, 2009);</li> <li>• Signatures and watermarks to prevent counterfeit electronic currency (Mbiti and Weil, 2013; Sumanjeet, 2009).</li> </ul>
Technology:	<ul style="list-style-type: none"> <li>• Information and Communication Technology, such as smart cards (Sumanjeet, 2009), or mobile phone handset (Mbiti and Weil, 2013).</li> </ul>
Environment:	<ul style="list-style-type: none"> <li>• A banking system to manage trust funds (Mbiti and Weil, 2013),</li> <li>• Trade habits accepting electronic trade and transactions (Sumanjeet, 2009).</li> </ul>
Strategy:	<ul style="list-style-type: none"> <li>• A for-profit business strategy of a particular company (Mbiti and Weil, 2013),</li> <li>• A pursuit, at the society level, of the optimal allocation of resources, when an electronic currency complements legal tender money (Azariadis et al., 2001).</li> </ul>
Infrastructure:	<ul style="list-style-type: none"> <li>• Electronic telecommunications (Sumanjeet, 2009) and, in particular, mobile phone networks (Mbiti and Weil, 2013).</li> </ul>

Table 3 The Work System Framework for electronic currency systems

## Conclusions

This review of the literature put in light the very limited research in economics, finance, management and information systems about electronic currencies. Grey literature is abundant in newspapers and magazine but it seems that academic community is not willing to study electronic currency or the editors of the top journals are not willing to publish electronic currency research. The few identified articles are on the advantages, disadvantages and the functioning of the electronic

currencies. The literature identifies two conceptually distinct but empirically overlapping customers: the buyers who purchase products/services and the holders who store value with electronic currencies. To satisfy these customers, the electronic currency is issued, transacted by the owner in exchange of products/services, eventually converted for other money or currency and at the end redeemed by the issuer. To the extent that electronic currency is fundamentally electronic, Information and Communication Technology is compulsory technology and infrastructure. The introduction of electronic currencies can be part of a for-profit business strategy of a particular company (Mbiti and Weil, 2013), but more interesting for our research aims, its introduction could pursue, at the society level, the optimal allocation of resources (Azariadis et al., 2001).

Our results show that electronic currencies can contribute at the individual level to support purchases and at the society level to support optimal allocation of resources. Nothing emerged, in literature, supporting the hypothesis that electronic currency could shape our society for purposive degrowth. Hence, our next step will be to look empirically at the use of electronic currencies to explore the extent to which electronic currencies can practically support purposive degrowth.

Finally, we remain without information about the development and implementation of electronic currency systems. We plan to explore it basing on the Work System Life Cycle (Alter, 2013). We will expand the literature review to include “engineering” discipline, where maybe issues about initiation, development, implementation, operation, maintenance and termination of the electronic currency systems can be studied.

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