

The currencies of carbon and the fungibility of credits in the global carbon market¹

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Abstract

The global market remains at this time rather fragmented and allows for limited transfers of carbon credits between systems with the exception of the CDM. The credits also remains of a very different nature and rely on different regulation systems. The fungibility of the carbon credits has been the subject of an endless debate between those arguing for the need to create strong currencies at the national level first (House and Victor, 2004) and those arguing that the efficiency of a truly global market requires extensive linkage. But how is carbon a currency? And what are the main drivers for a global currency or some local or alternative/regional currencies? And how is the fungibility of credits possible between systems? This paper first explores the money dimension of carbon by looking at the traditional functions of money and applying it to carbon. Following Zelizer (1994) and the actor-network theory (ANT) literature, we secondly look at the devices (registries, international transaction log, etc.) and the social dimensions of money (the limits of fungibility). We then look at the variety of carbon currencies that are in circulation but also on the personal currencies that have been proposed (Paterson and Stripple, 2010) and find that their diversity reflects also the need to address different needs. We finally look at the resistance to the fungibility of carbon credits and witness the multiple levels of resistance (the State, NGOs, actants). We conclude that monetization of carbon is in tension between other moments of commodification such as invention and financialization and that the resistance from multiple levels so far does not allow for complete fungibility.

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Introduction

The carbon market is characterized by rather fragmented systems where many standards² and rules coexist. Although there are some movement and a willingness towards greater integration, there remains important hurdles that prevents a truly global market to function. The links between the different Kyoto systems are at the moment rather limited and have been criticized by many (Wara et Victor, 2007; Lohmann, 2005). In the case of the CDM, it is seen as a way to avoid developed countries responsibilities and representing a form of neocolonialism (Bachram, 2004). The vision of a globally integrated carbon market is thus, it seems, far in sight. But are we moving in that direction? And is it really desirable?

The carbon credits remain in fact rather weakly defined as legal instruments. There has been ongoing debates in Europe and elsewhere about the accounting nature of the carbon credit³ (Mackenzie, 2009a; 2009b). As the many characteristics of the ton of carbon allows it to take different forms (currency, financial instrument, potential liability), changing its status can also be problematic⁴. In this paper, we inquire the currency aspect of carbon credits with the example of CERs and ask whether that they can resemble a proto-form of currency as have been suggested by some (House and Victor, 2004). Following actor-network theory and economic sociology literature, we analyse the political and social limits of fungibility and commensurability. This has important theoretical and practical implications. It can help us to better understand the development of carbon markets and the political economy of carbon currencies as well as the eventual links between systems.

While some authors argue that there is a need to have strong national currencies before developing a truly global market (House and Victor, 2004), a greater fungibility of the credits allow for more efficiency. So far, very few carbon currencies can be used in other systems. The CDM credits (CERs) although of a very different nature than allowances, have been so far one of the few exceptions. They can be identified as the glue between different systems (Buen, 2008). While there remains important steps for the fungibility of credits, it is important to look at their political and social limits and also witness the dangers a non stabilized currency can present given political contestations around the environmental integrity of CDM projects.

² There is for example 18 different standards applied in the voluntary markets (Hamilton et al., 2009 : 18).

³ The debates on whether carbon should be treated as an intangible asset or as a financial product has lead to the directive IFRIC 3 (International Financial Reporting Interpretations Committee) that is not followed by everyone : « it remains permissible to treat carbon in this way: as inside an economic frame, but in a sense invisibly so, since no accounting recognition is needed if the above conditions are met. Some market participants seem to do just that” (Mackenzie, 2009a: 449)

⁴ « Romania has classified carbon allowances as financial instruments, threatening over-the-counter carbon trade in the country. » Carbon Market News 24 February 2010
Romania's ruling on EUAs threatens OTC

We first conceptualize carbon commodification and the monetization process following Callon's sociology of markets (Callon, 1986; 1998). We then look at the characteristics of carbon as a currency and the limits of that conceptualization. We thirdly analyse the state of the fungibility of credits and problems associated with it, as well as the advantages of doing so. We conclude that the most important step towards that fungibility is a social one, as there are many limits associated with carbon currencies.

The creation of carbon markets

The construction of carbon markets is sometimes assumed to be a natural process, but it takes an assemblage of many actors, devices and semantics. It is a process that relies partially on disjunctive and sociological foundations as well as political and economic ones. The discourse that presents cap-and-trade as a solution to address climate change has roots in the practices of emissions trading (ET) and the theoretical discourse of economics on cost-effectiveness of ET⁵. The experiences in the US such as the sulphur-dioxide and the acid rain program were presented as successes that could justify the adoption of cap-and-trade. However, some criticize this account by comparing the reductions achieved under command-and-control in Europe and cap-and-trade in US⁶.

Notwithstanding the debate between taxes and emissions trading⁷ that is still going on, it is paradoxically in Europe that ET has been adopted and developed. While this discourse has certainly helped to put the carbon markets in place, assembling a market and finding actors to participate is not an easy task. Paterson and Descheneau (forthcoming) have shown how cultural political economy can shape this market by mobilising desire and routine. The symbolic transformation of the carbon into a currency is also crucial in the creation of the market.

However, the legal nature of that carbon as a tradable instrument remains contested. It can in fact present different legal characteristics such as commodity, currency or security (Button, 2008). The process that give meaning to this status, the commodification and

⁵ Coelho (2010) suggest however that Dales himself, sometimes credited as the father of ET, was not recommending cap-and-trade for emissions from multiple sources "The major deficiency in this solution [ET] is that it would be impracticable to use it to reduce "multiple source" pollution –general run-off of insecticides, herbicides and fertilizers from farms or emissions from automobiles and domestic heating plants in the case of air pollution. Here a variety of regulations (as in automobile exhaust devices), subsidies (to build earthworks to reduce run-off from farm land, for example), and excise taxation (to reduce the careless over-use of insecticides, herbicides and detergents, for example) seems appropriate." (108)

⁶ "Compare the success of the often-touted sulfur dioxide trading system the U.S., instituted in 1990, with the speed and quantity of reductions under rule-based systems during the same period. U.S. SO₂ emissions dropped by 31% between 1990 and 2001. Over the same period of time, under old fashioned rule-based regulation, Germany reduced its emissions by 87%, Italy by 62%, and Western Europe as a whole by 57%" (Lipow, 2007).

⁷ That debate is beyond the scope of the paper. However, the price of carbon vs the quantity of reductions certainty is certainly a key element in the design of policy tools against climate change.

marketization of carbon is at the center of this ontology. That process involve different moments reflecting the positions of actors towards the symbolic status of the ton of carbon. The invention refers to the inscription (e.g. Walters, 2002) of the ton that has the impact of commodifying carbon⁸. The monetization represents the inscription of the value in the ton and the financialization refers to the number of trades that happens with the ton. Resistance appears from different agents and *actants* along that process.

Those moments (invention, monetization, financialization and resistance) are possible through the virtualisation⁹ of carbon into a currency-like unit and implies a number of devices and actors. Following a ton through that process can demonstrate how it is densely integrated into a network that allow it to be a functional unit. But that status is also fragile as the actor-network mobilised for the transformation is never fully stabilized.

Looking at the commodification from this perspective also allows us to relax some of the assumptions of neoclassical economics such as the atomized rational economic agent. Actor-network theory considers the rationalities of calculus as being social rather than individual (Callon, 1998). Instead of rational individuals taking decisions, calculus has to be understood as a process that involve indexes, statistical tools and metrologic instruments as an *agencement*¹⁰ or assemblage (Mackenzie, 2009). The rationality of the calculus in the case of the CDM can be entrenched in the calculus of the additionality that occur in several sites.

Accounting tools are crucial to determine additionality and to monetize carbon. They have however a performative value that has to be recognized¹¹ : « Not only do accounting tools contribute very largely to the performance of calculative agencies and modes of calculation, while allowing the constant reconfiguring of those agencies and modes of calculation, they also contribute directly to the shaping of a discourse through which these agencies account for their action » (Callon, 1998 : 26).

For ANT, the intervention of socio-technical devices is central to understand markets. The transformation of carbon into a PDD (project design document) and into a registry through formulas of global warming potential is a crucial process in the monetization of the ton (Mackenzie, 2009a). But ANT remains sometimes silent on the relations of power displayed in actor-network. We suggest that the monetization, far from being a mere technical process, have important political effects that can alter the evolution of carbon markets. The political economy of currency formation (cultural or not) can give us some insights.

⁸ For the commodification of wetlands, see Robertson (2007).

⁹ Miller virtualism can be described as an « hyper-abstract, fetishistic modelling that effectively creates that which it purposes to describe. » (Du gay and Pryke, 2002 : 16)

¹⁰ Mackenzie prefer the french term *agencement* because it refers to the idea of *agence* (agency)

¹¹ This is in line with what MacKenzie (2006) calls Barmesian performativity : « practical use of an aspect of economics makes economic processes more like their depiction by economics » (17)

The creation of carbon markets and the symbolic transformation of carbon

For Button, the main legal provisions on carbon credits have thus far defined « the tradable unit not in terms of what the unit is, but what it entitles the holder to do » (Button, 2008 :574). The debate about the status of the carbon credit is thus far from over. Button (2008), for example, argues that the carbon credit is « a *sui generis* right which, depending on the regulatory market under which it is created, exhibits characteristics of both a commodity and a currency » (Button, 2008 : 573). Understanding the status of the credit is crucial as it can help us to understand the possible effects of carbon markets as the future of the Kyoto Protocol remains uncertain.

Carbon credits can be considered as a proto-form of money as they present on different form many of its characteristics. Money can « act as both a medium of exchange and as a store of value. In performing these roles, money necessarily takes on two additional roles, as a unit of account and as a means of payment » (Thrift and Leyshon, 1997 : 5). The carbon credits can also act as a medium of exchange and a (relative) store of value that is guaranteed by the government. It is an unit of account as shown by the multiple national registries and exchange platforms, such as the interaction transaction log and the Community Independent Transaction Log (CITL) for the EU (see table 1). It is also used as a means of payment in some contracts where CER may be a form of payment for project developers.

Table 1. Main registries and exchange platforms for carbon units

Name	Organization	Type	Region	Methodology	Units covered
International transaction log	UNFCCC	Exchange platform	World	Platform for exchange	Kyoto units
Community transaction log	European Union	Exchange platform	EU	Transaction log	Kyoto units
National registry systems	National governments	Registry	Kyoto signatories	Rules determined by UNFCCC secretariat	Kyoto units
CDM log	UNFCCC	Registry	Kyoto signatories	UNFCCC CDM executive board	CER
RGGI COATS	RGGI	Exchange platform	10 northeastern	Uses data from the climate	RGA

(Co2 allowance tracking system)			States of the US ¹²	registry and organics auctions	
APX VCS registry	APX	Exchange platform	World	transaction system for the issuance, transfer, tracking, retirement, reporting and custodial services	Voluntary carbon units (VCU)
The climate registry (based on the California climate action registry)	The climate registry, 243 Founding Members, states and provinces	Registry	US, Canada and Mexico	calculate, verify and publicly report their GHG emissions annually	Voluntary GHG units, RGA (no trading)
American carbon registry	Winrock International	Registry	US	electronic registry system based on	Emissions reduction tonnes (ERT)
CCX	CCX	Exchange platform	US, Canada	Electronic exchange platform	CFI, CCX

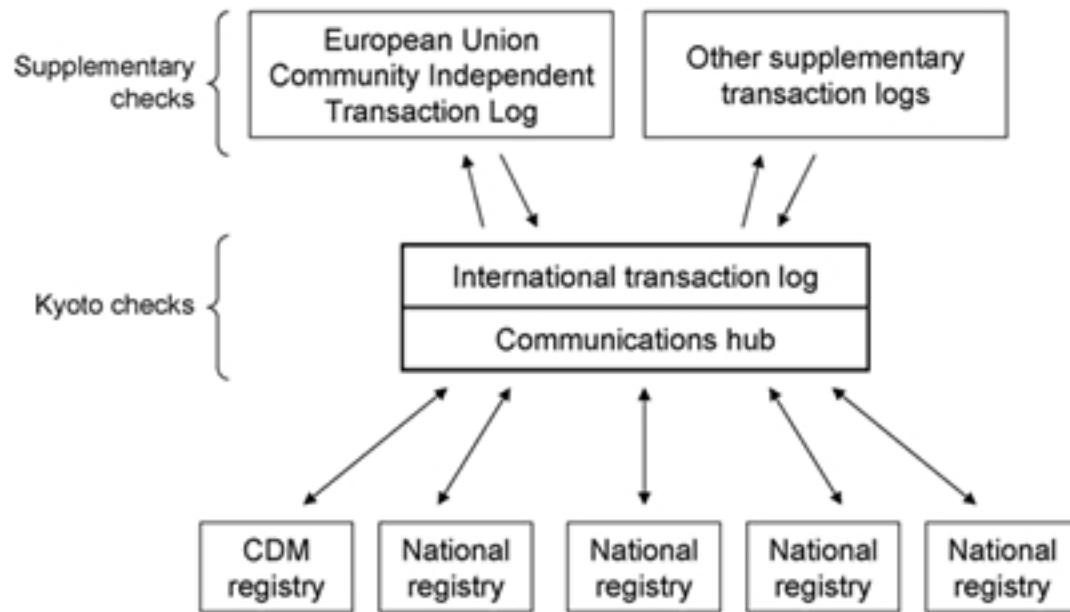
The technologies used in the carbon market have also the effect of reinforcing the idea of currencies. The number of registries and exchange platforms follow complex rules allowing carbon to be counted and exchanged¹³. The system is far from perfect at the moment. There have been cases of double-counting and fears that might happen again, especially in the voluntary markets, where there is an important number of systems. In the Kyoto markets, there are some more centralisation and many checks have been implemented by the numerous logs (see fig 2), but the system is not immune to questionable transactions. For example, Hungary¹⁴ has used surrendered CERs in an attempt to take advantage of better prices than AAU.

¹² Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont

¹³ For an example see data and exchange standards (UNFCCC, 2009)

¹⁴ Hungary has raised HUF 1 billion (\$5.1 million) from selling CERs surrendered by ETS companies taking advantage of higher AAU prices. Hungary sells “recycled” CERs 11 Mar 2010 Point Carbon.

Fig. 2 Transmission of carbon credit data



Source : UNFCCC (2010b)

The registry companies offer a system that is close to a management of a scriptural form of carbon money. For example, APX aims to : « Providing a bank and mint for environmental certificates, APX solutions are trusted to create, track, manage, and retire renewable energy certificates (RECs), energy efficiency and conservation certificates, carbon offset credits such as voluntary emissions reductions (VERs), and greenhouse gas emission allowances » (APX, 2010) A number of electronic solutions have also been developed around the management of projects like Carbon flow (2010).

The carbon currency makes visible the transformations of carbon from an abstract reduced ton in a project or as an allowance to a concrete unit in an account. This transformation materializes in the economy the ton of carbon, following the materiality of markets that Mackenzie (2009b) has described.

If the State create the caps in the first place, the evolution of carbon markets have been marked by an important degree of self-governance. The market evolves with many auto-regulations and the elements of the market are understood inter-subjectively. While the role of voluntary markets is essential for innovation, there is a danger of having too much registries that could in turn hinder the quality of credits. The situation can be compared to the issuance of money that was decentralised in the US (Helleiner, 2005). The American State was able to unify those and come with a central bank . When companies in the EU ETS see their account, they sometimes just see the convertible credits. A big criticism on the EU ETS is directed on the windfall profits that the

companies made from « cashing in » their free allowances. Sandbag has reported that this amount could be as big as 500 million Euros for the year 2008 alone (Sandbag, 2010).

Fungibility and money

The legal status of the carbon credit can have important consequences. For example, recognizing carbon credits as property rights would mean a number of other rights associated with it. But beyond this legal status, how carbon is perceived and used functionally is at least as important. Carbon exhibit various monetary characteristics and roles by the way it is perceived and can be used by actors. However, it is also limited as a symbolic monetary value by the number of people that have access to it, mainly project developers, verifiers or large enterprises.

The question of how money is perceived symbolically has been the subject of many works¹⁵. Money is seen as an item that incarnates value and become an object of desire *per se* as a subject of reification. In the case of carbon, the question of value is also of a great importance as it questions our representation of nature. For Sullivan :

“Behind this monetization of environmental crisis is a logic and language that transforms the global environment – Nature – into a provider of services for humans. This conceptual capture, and the economic rationalization of nature’s value that it permits, is facilitating the creation of markets for the exchange of ‘ecosystem services’ in the form of Payments for Ecosystem Services (PES).” (Sullivan, 2010: 256)

The same ton of carbon (or its abstraction) is expressed in many units and systems of intelligibility so it can enter accounting systems. But that economic value reposes on a invention and a commodification of nature that is contested and that expands through exchange. As Arthur reminds us : « What is essential to commodities is not to be found *inherent* to them through some reductive abstraction. It arises only in exchange relations and hence must be discovered in the *relation* of one commodity to an other, as determined through their outward forms, and especially their relation to money » (Arthur : 2005 : 32).

Considering carbon as a currency has indeed some advantages but cannot be overstated. It is certainly not as fungible as money, his exchange value being ultimately guaranteed by the state in many cases. But it can help us to understand the construction and the linkages between different systems. The possibility of exchanging carbon currencies is certainly limited at the moment, but it is expected to grow in the future. Looking at the key currencies can also help us understand better the political economy of carbon trading and the quality of different units. If offsets units can serve as a safety valve or a way to minimize the costs of compliance, it is not unrealistic to think of eventual exchange rates

¹⁵ It would be too long and outside the scope of this article to try to synthesize those views, but the reification of money is a common theme. See for example Simmel, 2007; Zelizer, 1994; Arthur, 2005.

between currencies¹⁶. The Waxman-Markey bill (US Senate, 2009) that was defeated proposed for example a discount rate of 5/4 for offsets and many studies have suggested other discounting approaches (Kollmuss, Lazarus and Smith, 2010). While this rate is fixed and the offer of offset is fixed, the rate could also be flexible (of course the price can also play that role). The China proposed cap-and-trade would in his case allow to allocate and trade the permits before the profits are calculated in an aggregate way between power generators (Reuters, 2010)¹⁷.

Table 3. Some of the main carbon units

Unit	Unit name	Issuer	Description	Jurisdiction	Type
AAU	Assigned Amount Units	National registry	Units representing the initial assigned amount of each Annex B Party	Article 3.7	Kyoto
RMU	Removal Units	National registry	Units given for net removals from land use, land-use change and forestry activities	Article 3.3, 3.4	Kyoto
ERU	Emission Reduction Units	National registry	Units converted from AAUs or RMUs on the basis of JI projects	Article 6	Kyoto
CER	Certified Emissions Reductions	CDM registry	Credits given for emission reductions certified for a CDM project	Article 12	Kyoto
tCER	Temporary CERs	CDM registry	Credits given for emission removals certified for an afforestation or reforestation CDM project (to be replaced upon expiry at end of the second commitment period)	Article 12	Kyoto
EUA	European unit allowance	EU ETS	Defined by national allocation plans	Directive 2003/87/EC	EU, Kyoto

¹⁶ The relation between the investment and exchange rates must also be acknowledged : As Eichengreen notes : « the trend toward greater exchange rate flexibility is an inevitable consequence of rising capital mobility » (1996 :191)

¹⁷ That certainly reinforces the idea of currencies that allow to use different accounting systems. The diffusion of reward point and fidelity programs (ex. Air Miles) that allow to save taxes by using a different currency.

VER	Voluntary emissions reductions	Many private organizations	Any « real, additional, and mesurable » reductions	Different jurisdictions	Voluntary
REC	Renewable energy certificates	Many organisms in US ¹⁸	represent the environmental attributes of the power produced from renewable energy projects	Different jurisdictions ¹⁹	Voluntary and mandatory

Adapted from UN Registry functionality (UNFCCC, 2010)

The banking of credits in the EU ETS on the other hand provides the best signs of the perception of actors of the credit. Allowances can be converted in dollars that in turn can finance expansion projects. This behavior has been criticized as many European utilities companies have converted their allowances into cash for investments, a strategy that showed the windfall profits of the EUETS (Sandbag, 2010). While we don't find yet characteristics of advanced currencies such as a currency relying on a basket, or pegged currencies²⁰ such possibilities are not excluded.

The political economy of carbon currencies

By studying the process of monetization of carbon, we can analyse currencies as political creations. As with traditional currencies, there are many problems associated with the control and emission of those currencies. For example, in the XIXth century, the many centers of emission of money posed an important challenge in the US as they were problems about counterfeiting and controlling the monetary mass. Thus the territorializing and centralising of the monetary functions has helped the control of the State on national economy (Helleiner, 2003) even if there has been some integration between different currencies.

Classical and contemporary studies on the political economy of money (Helleiner, 2005; Thrift and Leyshon, 1997; Zelizer, 1994) have looked at the social meaning of money and its political dimensions²¹. Carbon currencies are usually understood as mainly determined by a State power dimension (House and Victor, 2004) that is not far from a neo-realist approach of money employed by Kirshner (1995). While this dimension is important, the

¹⁸ see list at <http://apps3.eere.energy.gov/greenpower/markets/certificates.shtml?page=3>

¹⁹ see map at <http://apps3.eere.energy.gov/greenpower/markets/certificates.shtml?page=3>

²⁰ although there is a strong correlation between the secondary CER and the EUA mainly because of the demand in EU.

²¹ According to Boyer : money is not a particular commodity but a form of relation of centers of accumulations, workers and other merchant subjects. « *la monnaie n'est pas une marchandise particulière mais une forme de mise en rapport des centres d'accumulation, des salariés et autres sujets marchands* » (Boyer, 1986 : 48)

evolution of markets means that non-state actors and social dynamics also play a decisive role.

The cultural political economy of carbon currencies can help us to understand how carbon is framed by market actors and how it is understood and constructed inter-subjectively. Paterson and Descheneau (forthcoming) have for example showed how financial carbon markets are culturally constructed in advertisements and events such as Carbon Expo²². The cultural underpinings of carbon money can be shown for example in idea that trees can be transformed into money. Finite carbon, a US company, insist on the monetization in what they see as an objective chain of value : “Finite Carbon is the forest carbon development company that offers landowners a single-source, end-to-end solution to create and monetize carbon offsets” (Finite Carbon, 2010).

Carbon credits have however generally a much lower speed of circulation than money in general. Most of the transactions remains for immediate « consumption » either for compliance purposes or for direct offsetting by consumers leaving the carbon currency with a relative low volume of exchange. The carbon currencies can also be represented through the lens of classical political economy of money. They could for example be understood as forming a form of trilemma (quality, fungibility and traceability). The quality they represent form the basis value of the currency. Failure to give enough guarantees for additionality can for example explain the plunge of the CCX prices²³. The fungibility is also an important factor that allow for more efficiency and arbitrage will take place to take advantages of discrepancies between prices. The traceability is also important to avoid scandals of tax fraud that have plagued the EU scheme recently.

Those metaphors should however not mislead us on the distinctive nature of carbon markets. They are not a pure market in any sense. Offer and demand varies according to political, economic and more technical reasons. Demand is in the case of CER determined almost exclusively by compliance needs in the EU. Offer varies depending on the types of projects. The tools that government and the CDM EB to regulate the offer and demand are also to be used with caution threatening to have impact on the markets. The CDM pipeline that was intended to be uniquely a source of information is having more and more impact on the carbon markets²⁴.

²² « Carbon Expo is the ‘Global Carbon Market Fair & Conference’, where around 3000 carbon traders, investors, lawyers, project developers, market infrastructure developers, consultants, and policy-makers meet annually” (Paterson and Descheneau, forthcoming).

²³ At the time of writing, the CCX was valued 0,10\$US per ton of tco2 much lower than years before. (CCX, 2010)

²⁴ Members of UNEP-Risoe were pointing the fact that the release of the CDM-pipeline data had important effects on the markets.

The currencies of carbon

To understand how carbon currencies constructed, we have to first look at the development in the construction of other currencies. McNamara (1998) has for example looked at the power of ideas in the construction of the Euro. She notes that the importance of the changes in the international economic environment and the development of ideational factors among the elite was key in the adoption of the European monetary integration. The process of policy failure, paradigm innovation and policy emulation were also three conditions for such development (McNamara, 1998 : 5). The development of the Euro is particularly relevant as an integration of monetary policy is not always in line with integration in work or fiscal policies. How can we have a global carbon currency in that sense if the systems are so different?

The evolution of the Euro also gives us some clues to understand the evolution of carbon currencies and the dilemma between enlargement and reinforcing the carbon currency zone. As with the Euro, there are certainly probable unforeseen consequences in the long term²⁵. The creation of ET systems can also act as a form of regulation-lite (Baldwin, 2008) or as a progressive steps towards the liberalization of certain markets. The arbitrage aims to take advantage of those discrepancies between different carbon currencies.

The CERs are also somehow deterritorialized at the moment as the CDM executive board (EB) possesses the ability to *battre monnaie* (create money). But this carbon currency is not created *ex nihilo* and has to follow a lengthy bureaucratic process that has been criticized for its high transaction costs (Michaelowa and Jotzo, 2005)²⁶. The environmental integrity of the system is vital for high value credits. VAT fraud and other scandals recalls the necessity of considering the security implications of such a massive amount of money transiting²⁷.

Even if the first years of the market has shown a preference for a conception of carbon that relies on the commodity, considering carbon as a form of currency can have some advantages. In fact in a currency, the role of the State is central to guarantee the value²⁸. In the case of normal commodities (wheat, oil, etc.) they can have a value of their own (Button, 2008).

To understand how different currencies might coexist, we have to understand the functioning of the systems and what are the possibilities of linking them together. The linking between systems has to take into account different features between systems. For

²⁵ Of course we cannot simply translate the causes and consequences of the Euro into carbon currencies but we can draw some analogies in the process of monetization and integration at the international level but the sovereign debt crisis might be an example of unforeseen consequences.

²⁶ While those transactions costs are seen by some as inefficient, Paterson and Descheneau (2009) suggest that the process itself is the creation of value.

²⁷ ENDS estimate the money lost to €5bn over the past 18 months (ENDS, 2009: 8).

²⁸ There is a parallel to draw with fiat vs credit money. In this case, fiat money would represent the allowances and the offset the credit money. Thanks to Matthew for pointing this out.

Ellis and Tirpak, six factors are crucial : “How targets are expressed (e.g. fixed or indexed), the presence of price caps, non-compliance provisions, banking / borrowing provisions, commitment period lengths and starting points, eligibility of offsets and permit allocation methods in different countries” (2006 : 6). Linking can be direct or indirect via the inclusion of offsets. It can also be unilateral or bilateral, where both systems accepts the credits of each other (Ellis and Tirpak, 2006: 8). The limited exchanges that have occurred so far concerns indirect and unilateral linkages such as the inclusion of the CER in the EU ETS. But some organizations are pushing towards a truly global market. IETA for example states that the development of a global trading regime as one of the elements of his work programme.²⁹

There is still a considerable work of integration to do as the carbon trading systems are sometimes of a different nature. We can classify them in categories; the voluntary or the mandatory, the Kyoto or non-Kyoto, the project-based or allowance based. The voluntary markets are generally systems where corporations and governments accept voluntary but legally binding reductions of GHG (see table 4). The CCX, one of the biggest voluntary markets, has attracted critics because of the quality of credits and the low price of the ton. The voluntary markets may however offer innovations that the mandatory markets can use (Bayon, Hawn and Hamilton, 2009). The mandatory systems usually have credits of a better quality and can claim to have a better certainty about the reductions as they are fixed by the government.

But the leakage issue and the fears of carbon trading as a potential commercial disadvantage is pushing for a better integration. Ellis & Tirpak (2006) describes the issues at stake with linking:

“There are several technical and non-technical (i.e. policy/political) issues that could affect the speed at which systems are linked. Elements that are important include: target types (i.e. fixed or indexed limits); accurate monitoring and reporting; banking/borrowing provisions and the length and starting point of the commitment periods. In addition consideration needs to be given to differences in carbon prices in different ETS, price caps, allocation methods, and policies relating to “offsets”. Linking different emissions trading schemes can also have distributional impacts if entities within a sector in one ETS are treated more stringently or leniently than their competitors in a different ETS.” (Ellis & Tirpak 2006: 29)

Table 4. The main types of emissions trading systems

	Mandatory Kyoto	Mandatory non-Kyoto	Voluntary
Cap-and-trade	EU ETS	RGGI	CCX
Baseline-and-credit (or project based)	CDM	New South Wales	

²⁹ A critical element in IETA's work remains the linking of trading regimes among Annex I countries, and its significance for the GHG market (IETA, 2010).

The Kyoto and the non-Kyoto markets make also a big difference given the uncertainties surrounding the post-Kyoto agreement. Indeed, some credits are not completely fungible under the non-Kyoto systems such as RGGI³⁰. Some limits such as price ceiling or floors in the proposed Australian ET might also complicate things. The number of offsets and the provenance of offsets are also problematic in linking systems.

Table 5. Main ET systems

Emissions trading around the world

Mandatory greenhouse gas emission trading schemes in place, under development or proposed.

Name	Acronym	Country	Start date	Annual	Type	Name of unit
New South Wales greenhouse gas abatement scheme	NSW GGAS	Australia	2003	51	Baseline-and-credit	NGAC
EU emissions trading scheme	EU ETS	EU-27 (+3)	2005	2,100	Cap-and-trade	EUA
New Zealand ETS	NZ ETS	New Zealand	2008	62	Cap-and-trade	NZU
Swiss federal ETS	CH ETS		2008	4 (est.)	Cap-and-trade	CHU
Regional greenhouse gas initiative	RGGI	US	2009	170	Cap-and-trade	RGA
<i>Proposed schemes</i>						
National emission trading scheme	NETS	Australia	2010	368 (est.) 2)	Cap-and-trade	-
Large final emitters/federal ETS	LFE	Canada	2010	370 (est.)	Baseline-and-credit	-
US: Climate Security Act, revised	US ETS	US	2012	5,200	Cap-and-trade	-

1) Allocation of current year, or for first year of operations if scheme has not started yet.
2) Based on a cap covering 70 per cent of emissions (2005).



Source: Carbon Market Monitor, page 13, 8 April 2008

Source: Buen, Jorund (2008) Linking: Is CDM up to it? Point Carbon

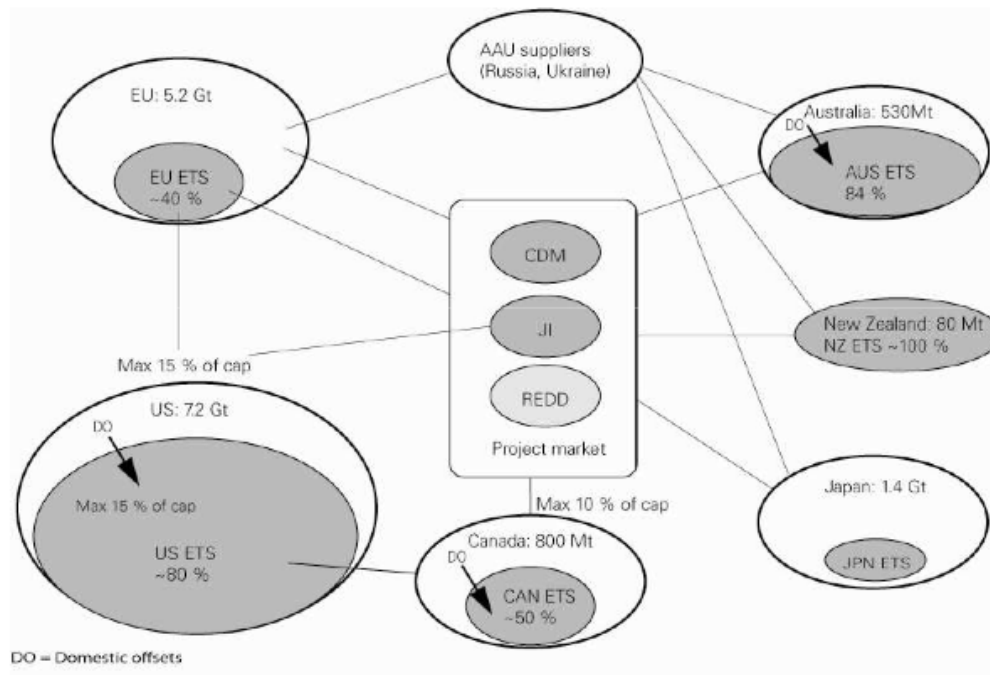
The exchange between mandatory and voluntary systems is possible but rather limited at the moment. Even if there has been an exchange of 100 Gtco2e between the EU ETS and CCX (2006), the linking between each system is unlikely to be stronger given the differences in price and standards of quality. It does in fact look more like a public relations (PR) deal than a commitment to fungibility.

³⁰ RGGI has also a different unit (the short ton) that renders it harder to be exchanged.

The CER remains to date, the most used currency in different systems. Despite criticism about the additionality and the neocolonialism of such mechanism³¹, it remains one of the most important market. Project credits and in particular CDM credits can thus be considered as the glue of carbon markets (see fig 6). There are however some important restriction on the CDM such as nuclear and long term credits for forestation. The admissibility of REDD projects also remains debated.

Fig 6. Link between proposed and current ET systems

Project credits are the glue of the carbon markets



There are also other proposed carbon units that go a little further than cap-and-trade and project mechanism credits. For example, some institutions such as the International Institute of Monetary Transformation have proposed a carbon-based reserve currency, the Tierra (International Institute of Monetary, 2010). The idea that we can fix the amount of

³¹ An other recurrent criticism regards the conflict of interests of the actors in the CDM Banks that own equity stakes in carbon offset projects may also be carbon brokers or sector analysts, creating a temptation to bid up carbon prices to increase the value of their own carbon assets. (FOE, 2009: 6). See also Michaelowa, Michaelowa and Flues (2008)

money in function of a natural elements have some merit and can somehow recall the idea of the gold standard and offer stability³².

Many proposals for personal currencies such as personal carbon allowances show the potential and the interest for the treatment of carbon as a currency³³. But that possibility remains far in sight as its practical application and its equity dimension is questionable. This also shows as Paterson and Stripple (2010) suggest, a individualization of the fight against climate change.

To be able to link different systems, it is important to look at a number of considerations that are both technical and political in essence. To ensure the environmental integrity of credits, there has to be harmonization on different aspects. The registries and inscriptions have for example to be standardized to avoid double-counting and leaks. Measurement, reporting and verification of emissions (MRV) is also a crucial in the linking of the systems. But innovation stems also from new methodologies and ways of monitoring that might be hindered by a single unified system. But how can we address these problems if there are too many layers of finance? How would accountability of market actors and verifiers be addressed in such a system?

Currencies and financial instruments

So far, there has been an important financialization of carbon markets (Paterson and Descheneau, forthcoming; FOE, 2010) with various financial products that allow actors to hedge risks. But has this development gone too far? And how is the currency model reconcilable with the financial aspect of markets?

As financial products become more and more complex, there seems to be a lack of understanding of the nature of emission reduction, as if prices would be able to contain all signal needed for the actors to take an environmentally sound decision. The market is marked by uncertainties and the commensuration of tons throughout crediting activities can badly translate too many diverse dimensions into the same system of intelligibility. Furthermore, tying a financial product to a reduction would have just the effect of adding a layer of complexity to it and risking a collapse altogether.

The currency model³⁴ offers in turn a greater stability provided that it is guaranteed by a State or an International Organization. It could give the State a more direct power of regulation and a control of the credits in circulation. However, such regulations are not going to be accepted easily by the actors. The possibility identified by Button (2008) of

³² However, the gold-standard has had profound political consequences as shown by Polanyi (1957).

³³ « Imagine a country where carbon becomes the new currency. We carry bank cards that store both pounds and carbon points. When we buy electricity, gas and fuels we use our carbon points, as well as pounds ». (Milliband 2006 quoted in Paterson and Stripple, 2010: 356-58)

³⁴ The currency model is a theoretical model that is different from monetization which is a social process in the context of commodification

having the IMF supervising a currency akin to the special drawing rights (SDR) might be a little far fetched. Even so, currencies would still be possibly the target of speculators without proper regulation³⁵. Button also suggest that it might be harder to commodify carbon with the commodity model³⁶. Commodification has somehow to be assumed in the currency model which is problematic as the debate is far from over and the resistance to it is important.

This leads to the question of what the value that is given to the credit themselves. For one, carbon is a fictional commodity par excellence and does not repose on any concrete product. It remains largely on the plausible scenarios of real, verifiable and additional reductions which are sometimes questionable.

The commensurability of reductions between different gases and specific contexts is also perhaps the biggest step, not the fungibility between systems. The unit of value has to be interiorized and has to be linked to a system of value and environmental and social benefits. Zelizer (1994) has shown in “The social meaning of money” that even if money is the most fungible item in exchange, people still create social usages that associate certain activities with certain revenues³⁷.

Even if carbon money becomes a completely fungible means of exchange (which might take some time if it ever happens), there will be always social strategies to earmark it to certain meanings³⁸. In a sense that may be preferable than entering into a unique system of exchange. After all, if we are to combat climate change, we must also acknowledge the different contexts in which it takes place. Also, the question of international equity remains. Why it is so in the CDM that decision and project developers come mainly from the developed countries? Could we envisage a system that would be more equitable and democratic?³⁹

In the social construction of climate change (Pettenger, 2007), we can also understand carbon currencies as a construction involving devices and actors. The process in the carbon market that we are witnessing is a progressive translation from a negative externality to a carbon currency. That process requires a complex assemblage and is always dynamic. To move this inertial system, the more important energy demand comes more from the initial translation from an abstract ton to a monetary carbon unit than the

³⁵ The Waxman-Markey bill did contain such regulation for controlling financial speculation.

³⁶ « Ironically, we find that the commodity mindset, which adheres to the use of weight as a standard, can act to restrain the *restrain* the commodification of carbon rather than facilitate it » (Button, 2008 : 587). That might be an argument to preserve the diversity of methodologies under a multiplicity of systems.

³⁷ For instance, money that comes from a less serious work would be used for fun as more serious money would be used for children.

³⁸ « In their everyday existence, people understand that money is not really fungible, that despite the anonymity of dollar bills, not all dollars are equal or interchangeable. We routinely assign different meanings and separate uses to particular monies. » (Zelizer : 1994 : 5)

³⁹ Why not do an inverted CDM where reduction in the developed countries would finance community projects in the South?

fungibility of carbon currencies altogether. This process is akin to the fetishism of commodity that Marx has described and that would allow us to forget all the social relations needed to produce a commodity. In the same manner, market devices and carbon units that have the properties of money tend to obscure all the problems and the abstractions necessary to see it as money. For market actors, the « appearance » of carbon credits in technology that they know is presented as something magical and sometimes almost theological:

"A purchase can be completed in seconds - a process that can take weeks or months OTC. The 'mystery' of price or quality of VERs is taken away." (...) "For Brokers, finally the answer to their prayers - a web based user friendly trading screen, and a continuous trading contract with easy access for them and their clients." (Carbon Trade Exchange, 2010)

While there is still debates about the status of a carbon unit (commodity, currency or financial product), there is a possibility to accept that the carbon ton is the same reality that changes according to the eyes of the observer⁴⁰. The hardest limits to fungibility is then not so much the integration between the systems but rather the social limits of translating the emissions reductions into money. We can see those limits in four important regards.

First, there is different objectives concurring to the creation of the credits. The development and environmental objectives of the CDM are not always taken into account to determine what an acceptable project is. Second, the fate of the currency is only determined by some actors that are well positioned structurally and that have the possibility to have financial leverage. The currency has also not been developed and interiorised as its future is uncertain and it is sometimes hard to know what hides behind it. And finally, the currency is contested by organizations such as Carbon Trade Watch and others on the ethics of carbon trading.

Conclusion

The construction of markets has been characterized by many different systems, standards and units. Despite the calls for a truly global market, the possibility of linking completely the systems is still remote at this time. Conceptualizing the commodification of carbon as a process allows us to better understand the dynamics at play in the market. The monetization is a key part of that dynamic where an emissions reduction is transformed into a monetizable credit.

There is still a debate about the nature of carbon unit as a currency, commodity or financial instrument. The currency model have some advantages but has also its limits. It also seems that there is a competition to impose a model onto others that represent the interests of a certain group. Certainly the financiers would like a model more closely associated with their conceptualisation of carbon as a financial product.

⁴⁰ This is certainly a thing that has been accepted in physics where properties of both waves and particles can be shown depending on the instruments that are used to observe it.

But can we live with such uncertainty on the nature of credit? As the carbon market experiment puts new elements to light and the contestation of carbon markets change, there is certainly a need for flexibility and a true learning-by-doing process. The balance between regulatory certainty and credit uncertainty still however proves uneasy. While linking systems has failed to materialize completely, the CER still represent the glue between different systems and an interesting model that has to be reformed.

Following the currency model, it also seems that the problems with fungibility are less due to a neo-realist clash of the strenght of currencies than the social limits of the fungibility of carbon money. Different objectives concur into the carbon markets and those must be acknowledged. Furthermore, only a few structural dominant actors can decide at this time on the fate of the currency that has not been fully developed and interiorised. In such a context, the carbon money will be difficult to stabilize and will always be contested (Buen, 2008).

The fungibility of carbon credits between each other ultimately poses the question of the fungibility of the carbon in the economic system. As we are increasing the integration of the international economy, will it be the same for carbon? And how can we pose social limits to the fungibility of carbon (or environmental) money and the limits to the commodification of the environment.

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