Commodification and resistance in carbon markets and the CDM[1]

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Abstract

The carbon markets and the clean development mechanism (CDM) have grown rapidly since Kyoto. The commodification of carbon is a key process that takes place in this context. But as Polanyi (1944) would anticipate, this commodification doesn't go without resistance. Resistance has to be understood as a moment along others in the creation of markets (invention, monetization, financialization). The resistance to carbon markets has been expressed differently and the discourse changed according to the evolution of markets. Some NGOs have for example been really favorable to carbon markets (Greenpeace) while others have been radically opposed to it (Carbon Trade Watch). But this resistance also makes markets (Paterson, 2009) in defining acceptable projects and criteria for environmental additionality (with Gold Standard for example).

The moments of commodification and evolution of the carbon markets alters the resistance towards carbon markets and command a different strategy with each development. The financialization for example commands a strategy that is focusing on the financial crisis (FOE, 2009). Every dysfunction in the production of carbon money can also be used to fuel resistance towards commodification. The CDM projects in the South have received different responses while some have been criticized by grassroots organizations that have been directly affected. The resistance can also be conceptualized from the point of view of non-humans that unconsciously resist the commodification and their inclusion into (ac)counting systems. Accounting carbon involves a social factor and a black boxing of scientific knowledge that is sometimes contested (Mackenzie, 2009).

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Introduction

The clean development mechanism of the Kyoto Protocol is one of the most important parts of the carbon markets both in terms of geographical reach and the extent of the actors involved. With more than 3000 registered projects and 2,7 billion expected Co2 equivalent reductions (CER certified emissions reduction) before the end of 2012, it is also one of the most important mechanism to achieve emissions reductions. Behind this important growth, hides a rapid and contested construction of a carbon market.

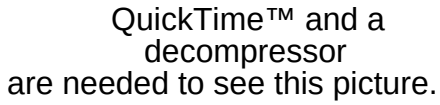
The creation of such a global market is possible with the contribution of market institutions and devices relying partially on existing but also new ones. Looking at a particular market trough the devices and the controversies allows us to better understand the political economy of the market and to put in context the claims on efficiency and environmental effectiveness.

We first conceptualize the commodification of carbon by identifying four moments in the creation of markets (invention, monetization, financialization, resistance). We then look at four particular market devices that can be situated in those moments (global warming potential, project design document, financial products and stakeholder consultations). We also look at how critiques have looked at the CDM in four regards (subsidy, offsets, regulation and commodification) according to different theoretical approaches (neo-marxist, neo-liberal, neo-realist, neo-colonial, actor-network theory) and how they articulate the discourses. We conclude that the controversies can become more important than as we approaches the technical devices but that they can reverberate and contribute to the political evolution of the market.

1.Commodification and the CDM

The clean development mechanism of the Kyoto Protocol allows credits for GHG-reducing projects in developing countries on the basis of the additionality of these reductions. The project cycle of the CDM involves many steps: design, validation/registration, monitoring, verification/certification and issuance. Each stage involves different actors: project participants (PP), Designated Operational Entities (DOE), Designated National Authorities (DNA), the CDM's Executive Board and Methodology Panel. First, a participant proposes a project that has to gain the consent of the DNA in the host country. A PDD (Project design document) is developed and must be approved by a DOE and then registered with the CDM Executive Board. The project must either use existing approved methodologies (to predict emissions reductions) or go through a separate process of first getting the methodology approved by the CDM Methodology Panel. After the project is registered and put into operation, the emissions reductions must be verified (by a different DOE to those who approved the design document) before the CDM EB will award credits (Certified Emissions Reductions or CERs) (Descheneau and Paterson, 2011).

Table 1. The CDM project cycle



As the CDM evolved over the years, it changed from a mechanism for the sake of developing countries to a tool where carbon finance is of a primarily importance. The article 12.2 of the Kyoto in fact states: “The purpose of the clean development mechanism shall be to assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention”. While there has been a diversification of business models (Schneider, Heinrichs and Hoffman,

2010), the sustainable development component is left to the member states (designated national authority), which tend to give an easy approval in order to attract financing.

The process can be also understood as a semiotic shift in the commodification of carbon involving four non-mutually exclusive and non-necessarily chronologic moments: invention, monetization, financialization and resistance.

Fig 2. Moments of carbon commodification

Invention (tools: project design document)
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Monetization (tools: registries)
////
Financialization (tools: financial products)
////
Resistance (tools: discourses)

We can better understand the commodification of carbon by tracing the symbolic transformation of carbon through these moments. But the tension between the moments highlights the instable nature of the market and the social resistance accentuates that tension. The development of carbon markets is possible by an actor-network that constructs both materially and discursively a carbon currency. Through these moments, we can identify obligatory passage points (OPP) that are defined by actors and that determines the evolution of the carbon market (Callon, 1986). Those points of passage are inscriptions (Walters, 2002) that are determined by structurally powerful actors.

These reductions can be understood as a form of commodification of the carbon that involves a process of invention illustrating a feature of virtual commodities in global capitalism (Thrift, 2005). Based on economic sociology and actor-network theory literature, we study the co-creation by market actors of the carbon commodity in the context of CDM projects. The reductions are always in tension between a narrative that allows the project to fulfill the environment and development objective and an abstraction that allows efficiency in the reductions.

The process of invention requires a form of creative accounting and a virtualization of carbon so it can be made commensurable in the market. But that commensurability between reductions in different projects, countries and GHG homogenizes the reductions (Mackenzie, 2009) and reduce the scope of projects to their only carbon dimension even tough it induces a problematization that goes well beyond this dimension (Callon, 2009). The financial and social uses of these credits is then crucial for the future use of this « inventive » mechanism.

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. The financial dimension has become an important part of the Carbon markets and the CDM. The economic model of the CDM has thus changed considerably from the original intent where it was supposed to allow more space to the developing countries (Paulsson, 2009). The carbon markets have also interestingly been temporarily not that much touched by the financial crisis but fears have been raised by some of a « sub-prime carbon » (FOE, 2009). The financial innovations in carbon markets (or elements borrowed from traditional financial markets) have also developed even when the phases of invention and commodification where not stabilized.

The resistance to carbon markets has been expressed from different manners and the discourse changed according the evolution of markets. The moments of commodification alters the resistance towards carbon markets and command a different strategy. The

resistance can also be conceptualized from the point of view of non-humans that should resist the commodification and their inclusion into market devices. Every dysfunction in the market devices can thus be used to fuel resistance towards commodification.

2.CDM and Market devices

The CDM and carbon markets have been put in place rapidly creating and adapting market institutions. While some authors argue that this relies on an infrastructure and a Financial-legal expertise that could lead to more efficiency (Knox-Hayes 2009), we have to also see whether it does interfere with others economic spheres and whether it can achieve its environmental goals. The market can be understood as an assemblage of actors and devices always in reconfiguration. Those market devices, that are defined as « the material and discursive assemblages that intervene in the construction of markets » (Muniesa et al, 2007 : 2) are central for the functioning and legitimacy of markets[2].

The actor-network inspired economic sociology has looked at the way many of devices are constructed. Inventories must for instance be created[3] to track the carbon. One of the most reasons is to avoid double counting and make sure to track the carbon from where it is produced. The carbon market also develops accounting tools that have the performative effect of enclosing carbon into registries[4].

Registries are a crucial part of the carbon markets to ensure the integrity of reductions and to avoid double counting. The hacking of some accounts reminds us of the importance of that data for the market and how fragile it is (IBS, 2010). The development of new tools allow to speed things up in the market. Some firms such as Carbon flow wants to give a more user-friendly experience by allowing project members to access the data on the project online.

[2] On the question of legitimacy see Paterson (2010).
[3] As Lövbrand et Stripple note in the case of carbon sinks : « The step form ‘making inventories’ to ‘inventing’ is a short one » (Lövbrand et Stripple, 2006 : 226).
[4] « Not only do accounting tools contribute very largely to the performation 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).

The creation of market devices to render the market operational has been done at a rapid pace thanks to the existing devices in other markets. But the use of these devices is nothing can have profound impacts on the market and the legitimacy of those markets (Paterson 2010). We look here at four devices and show how those can create controversies. Those controversies have a feedback effect on the politics of carbon markets.

2.1 Inventing conversion rates

The inclusion of six greenhouses gases[5] in the CDM created an acute problem of how to account them in project. The conversion rates between CO_2 and the five others gases had to be decided:

> "A global carbon market encompassing more than CO_2 (as the Clean Development Mechanism does) thus rests on 'black boxed' science: the figures for global warming potential that form the 'exchange rates' between gases. These figures cannot be read directly off nature, as the changing estimate, and large error band, for the global warming potential of HFC-23 reveals. A 'social' factor – the authority of the Intergovernmental Panel on Climate Change – is thus an essential part of 'making things the same' in carbon markets" (Mackenzie, 2009 : 12).

This gave a perverse incentive to claim reduction for HFC-23 and was criticized by many (Pearse 2010; Wara 2008; NOE 2008):

[5] There is 6 GHG used in the CDM: carbon dioxide (CO_2), methane (CH_4), nitrous oxyde (NO_x), hydrofluorocarbons (HFC), perfluocarbons (PFCs) and sulphur hexafluoride (SF_6).

> "manufacturers in the developing world have discovered that holding off on installation allows them to keep their baseline values high. In so doing, they earn generous clean development mechanism credits with prices set at the high European levels--prices that are not connected to the actual cost of the upgrades for remaining HFC-23. As a result, investors in these projects will reap up to a total of $12.7 billion through 2012, according to attorney Michael Wara, our colleague at Stanford University, when only $136 million is needed to pay for the HFC-23-removal technology." (Victor and Cullenward, 2007)

In spite of these critiques, the projects have been accepted and defended by many, including the International emissions trading association (IETA). China has also made some efforts to green those credits by imposing a 65% tax on the certificates that would go to green projects. But no mechanism has been in place to verify those green investments.

2.2 Additionality and the Wind Farms

Many have criticized the additionality tool that is central in the adoption of CDM projects. Even before the entry into force of CDM, some people criticized the inapplicability of the additionality criteria. Schneider (2007) for example evaluated that less than 40% of the projects were additional. As one critic put it: 'Offsets are an imaginary commodity created by deducting what you hope happens from what you guess would have happened.' (Welch, 2007).

The rejection of wind farms projects in China reminds us of the fragility of claims on additionality. The CDM executive board eventually rejected those otherwise popular

projects. Glauchet et al. (2009) concludes that the additionality is hard to prove given the coexistence of CDM and non-CDM projects:

> « CDM wind projects co-exist with wind farms that are not registered under the mechanism. It is safe to assume that non-CDM farms are not additional as they have been implemented without the CER revenue. This implies that, if additional, CDM projects cannot but differ from non-CDM projects » (Glachant et al, 2009 : 4)

That created some discontent within investors that want to have a better certainty: "investors will continue to discount for unmanageable regulatory risk, and fewer emissions reductions will be achieved". David Lunsford, policy leader for emissions trading at IETA. “ (Murray, 2010). As this example shows, the valuation tools that are contained in the project development documents can be contested both by investors and NGOs.

2.3Financial products

The importance of finance in carbon markets in general and in CDM has grown. Given the size of finance needed for those many project, many financial actors and banks were involved. We can also see the importance of carbon finance in the number and size of carbon funds administered by public and international actors such as the World Bank and governments and by the involvement of actors that have important activities in finance such as energy trading.

To reduce the risk and the waiting lists for the CDM approval process some banks have developed financial products:

> “ in November 2008, Credit Suisse announced a securitized carbon deal in which they bundled together carbon credits from 25 offset projects at various stages of UN approval, sourced from three countries, and five project developers. They then split these assets into three tranches representing different risk levels and sold them to investors, a process known as securitization. Carbon-backed securities sound hauntingly close to mortgage-backed securities because they are indeed very similar in structure” (Szabo quoted in FOE, 2009:6).

But the financialization of carbon markets has also created some fears of sub-prime carbon (FOE 2009).

2.4Shareholder consultations

Shareholder consultations are an important component of the CDM projects. In the design of the projects, formal consultations with the members of the community have to take place to make sure that the project does not create harm and that it can provide benefits to the community. Those consultations have been criticized as either cosmetic or non-representative. Gold standard, an organization committed to enhance the quality of greenhouse-reducing project in developing countries has for example developed a protocol for consultations that go beyond CDM requirements. Reflecting the premium price given to more sustainable projects, Gold standard has changed from a NGO to a more professional business organizations.

The CDM process requires formally a global and local consultation process. “The Global Stakeholder Process is conducted by displaying the PDD on the UNFCCC or designated operational entity's website for a period of 30 days” (CDM rulebook 2011). The local requirement has been the target or organizations like Gold standard. For example, Gold standard asks for:’ the ‘Do No Harm’ Assessment and the Sustainable Development Matrix; clear requirements for transparent public stakeholder consultations; and the application of environmental and social assessment procedures’ (GS, 2009). An other organization, Social carbon, also asks for more involvement of the parties and multiple

dimensions in the project: “Six aspects of project sustainability are individually measured using the Social Carbon hexagon: carbon, biodiversity, social, financial, human and natural.”

3.Resistance to CDM

The resistance to carbon markets has been articulated differently over the years as the carbon markets developed with different discourse and actors. We can identify five main theoretical influences in the critiques of CDM, four different critiques and we can also identify the main themes of the discourses by looking at NGOs like Carbon trade watch, GAIA and CDM watch.

Some authors have noted the governance problems within the CDM procedure such as the dysfunctional delegation (Lund, 2010) and the political economy of the executive board (Michaelowa, Michaelowa and Flues, 2008). But the political economy goes far beyond the board. It could be argued that the CDM rests on a certain conception of the functioning economy where the technical expertise and the structural power of certain actors such as financial banks have guided the evolution of the mechanism. This in turn has created many critiques.

3.1 Categories of critiques

The CDM been studied both from an environmental effectiveness and a political and economical perspective. Most of those studies have focused on the efficiency and environmental effectiveness. It has been criticized early on as potentially difficult to operationalize specially with regards to the additionality. In Kyoto negotiations, it has been viewed as a surprise (Werksman 1998) and an important element in the development of the negotiations. Despite those early critics, it has been up and running for many years.

The range of critiques can be summarized in five main theoretical approaches. The first criticize the inefficiency of the mechanism like high transaction costs (Jotzo and Michaelowa, 2005) or the difficulty to apply the additionality criteria (Schneider 2007). Na other critique has pointed the neocolonial dimension of the mechanism (Bachram,

2004; Lohmann, 2005). A third one focuses on its inclusion in a regime of accumulation (Matthew and Paterson, 2005). For Bumpus and Liverman (2008), the CDM can be understood in the context of accumulation by decarbonization. A fourth critique could be labeled a strategic one that stresses the competitive disadvantage for developed countries (Wara and Victor, 2007). A fifth one look at the sociology markets and the assemblages necessary to create such a market, notably the role of commensuration (Mackenzie, 2007)

Table 3 Theoretical background and object of critique

	Theoretical background				
Object of critique	Accumulation	Neo-colonialism	Strategic	Efficiency	Assemblage
Subsidy	X		X	X	
Offsets	X	X	X	X	X
Regulatory		X	X	X	
Commodification	X	X			X

3.2 The object of critiques

The critiques also target specific aspects of the carbon markets or the CDM. Michaelowa et al. (2008) for example targets the CDM EB and the possibility of some conflicts of interest. The regional dimension and the distribution of projects are also criticized as it allows for a restricted number of projects and methodologies excluding most of small-scale projects. The CDM tends to favor certain regions where large projects can be made leaving aside countries in Africa[6].

[6] 74% of the registered projects are in China, India, Brazil and Mexico (UNFCCC, 2010a) and 91,12% of the issued CER are China, India, Brazil and Korea (UNFCCC, 2010b).

The object of critiques can thus be summarized in four categories. One is targeted at the subsidy that is created by the CDM. The richest developed countries are favorites under the CDM as shown by the regional distribution of projects. Countries such as Mexico, South Korea that are both part of the OECD and recipient of CDM projects are particularly favored[7].

A second category is the critique that reject partially or completely the principle of offset. Offsets, they argue, delays action in the developed countries. Carbon trade watch has for example compared the offsets to indulgences in the middle ages.

A third critique relates to the institutional shortcomings in the administration of the CDM. This critique is not only made externally (actors outside the market), but also internally by such actors as IETA that have an interest in the better functioning.[8]

A fourth critique is more profound and targets the commodification of carbon. The commodification of carbon is seen as an inappropriate way of dealing with climate change and especially climate justice. Via campesina, one of largest peasants organizations criticize this form of commodification:

> "False and dangerous solutions that the neoliberal system implements like the REDD+ initiative (Reduction of Emissions for Deforestation and Forest Degradation), the CDM (Clean Development Mechanisms), and geoengineering (sic). These promote the commercialization of natural resources, and the purchase of permits to pollute, or "carbon credits", with the promise of not cutting down forests and plantations of the South. (Via Campesina 2010)"

[7] The problem of hot air which does not target the CDM per se could also fit in that category

[8] Question and answers sessions in the excutive board meetings or in the margins of the COP/MOP are often dominated by members of IETA.

Table 4 Market devices and object of critique

	Market devices			
Object of critique	GWP	Additionality	Financial products	Stakeholder consultation
Subsidy		x	x	
Offsets	x	x		x
Regulatory	x	x		
Commodification		x	x	x

3.3. Market devices and discourses against carbon markets

The market devices reveal also different objects of critiques but can reveal or trigger more important questions. The creation of the CDM market is an “in vivo experiment” (Callon, 2009) that has to follow many adjustments. As a flagship example of carbon markets and the involvement of developing countries, CDM create many hopes. As many agree to reform it, the consequences are exposed and recuperated from the left in Latin America to the right in the US.

A more organized group has developed over the years against the commodification of carbon. This shows that the market devices are not neutral and can have consequences beyond their deemed technical use. The resistance has also grown towards projects that were seen to be more sustainable “better projects”.

For example the landfill incinerators have been criticized:

> "The CDM is funding incinerators and landfill gas projects that compete with recycling for recyclable materials," said Silvio Ruiz, who represents the Colombia National Association of Recyclers, with 35,000 people and 105 grassroots organizations. "This competition puts at risk the livelihoods of about 60 million economically vulnerable individuals around the world who make a living from recycling." (GAIA 2009)

The hydro projects are also not immune to critique and even wind farms are rejected. This resistance can fuel some discourses on such themes as: "Carbon markets will reinforce injustice, Climate change doesn't exist and Carbon Markets are not the most efficient way to act". More over those discourse can reverberate in political systems and hinder the efforts to develop the carbon markets around the world:

> "Congress may wish to consider the following lessons from the CDM: (1) that it may be possible to achieve the CDM's sustainable development goals and emissions cuts in developing countries more directly and cost-effectively through a means other than the existing mechanism; (2) that the use of carbon offsets in a cap-and-trade system can undermine the system's integrity, given that it is not possible to ensure that every credit represents a real, measurable, and long-term reduction in emissions; and (3) that while proposed reforms may significantly improve the CDM's effectiveness, carbon offsets involve fundamental tradeoffs and may not be a reliable long-term approach to climate change mitigation." (GAO, 2008)

Conclusion

The carbon markets have to create and translate many devices and institutions to make it function. The commodification of carbon can be understood trough different moments: invention, monetization, financialization and resistance. In these, the four market devices studied here can help us understand how the CDM relies on constructions and subject to contestations. The global warming potential, project design documents, financial products and stakeholder consultations can evolve in many unforeseen ways and can trigger resistance. This resistance can be articulated around theoretical critiques but also objects such as subsidies, offsets, regulations and commodification. The reverberation of the critique can also affect the evolution if the CDM and carbon, especially with the perspective of the end of the Kyoto Protocol in 2012.

The control of the market devices is not neutral and is contested. If, in a certain way, "resistance makes markets" (Paterson, 2009), we have also to understand how the devices create and fuel that resistance. As Latour say : "The more we come close to the places where facts and machines are made, the more the controversies become acute" (Latour, 1987: 102)[9].

This is also why market devices are relevant to political economy. Because they operate within a financialized economy where technical expertise is paramount, the governance of the CDM reflects a certain vision of management that may want to ask more than just a do no harm assessment. If reducing greenhouse gas reduction is to be taken seriously is has to take into account more views and issues than a simple annex technicized account of how are reductions are made. It must engage a people towards a more profound transformation of the economy and social relations.

[9] (Author's translation) "Plus nous nous rapprochons des lieux où se font les faits et les machines, plus les controverses deviennent aigües"

Bibliography

Bachram H (2004) Climate Fraud and Carbon Colonialism: The New Trade in Greenhouse Gases. Capitalism, Nature, Socialism 15:5-20

Bumpus A and Liverman D (2008) Accumulation by Decarbornization and the Governance of Carbon Offsets. Economic Geography 84: 127-155

Callon M (2009) Civilizing markets: Carbon trading between in vitro and in vivo experiments Accounting, Organizations and Society 42 (3-4): 535-548

Callon M (ed) (1998) The laws of the markets. Oxford: Blackwell

CDM rulebook Global Stakeholder Process (2011) http://www.cdmrulebook.org/761 Accessed 2/2/11

Commission Prada (2010) La régulation des marchés du CO2. Rapport de la mission confiée à Michel PRADA, Inspecteur général des Finances honoraire. Paris: République française.

Friends of the Earth [FOE] (2009) Subprime Carbon? Re-thinking the world's largest new derivatives market. Washington DC: Friends of the Earth

Global alliance for incinerator initiatives [GAIA]. 2009 CDM Waste Projects Undermine Poor And Increase Emissions 9 june http://www.no-burn.org/article.php?id=727 Accessed 2/2/11

Glachant M, De la Tour A, Leguet B and Feng C (2009) A Note on the Additionnality of Chinese Wind Power Projects. Cerna Working Paper 2009-10. Paris: MINES tech.

Gold standard [GS] (2009 The Gold Standard Briefing for Potential Supporters. http://www.cdmgoldstandard.org/fileadmin/editors/files/5_GS_legal-documents/GS_NGO_Supporter_Form.pdf Accessed 2/2/11

International Business Times [IBS] (2010) Hacking shuts down global carbon trading markets. http://www.ibtimes.com/articles/20100203/hacking-shuts-down-global-carbon-trading-markets.htm Accessed 9/2/10

Knox-Hayes J (2009) The Developing Carbon Financial Service Industry: Expertise, Adaptation and Complementarity in London and New York. Working Papers in Employment, Work and Finance. Oxford: School of Geography and the Environment

Lohmann L (2005) Marketing and Making Carbon Dumps: Commodification, Calculation and Counterfactuals in Climate Change Mitigation. Science as Culture 14:203-235

Lövbrand E and Stripple J (2006) The climate as political space: on the territorialisation of the global carbon cycle. Review of international studies 32: 217-235.

Lund E (2010) "Dysfunctional delegation: why the design of the CDM's supervisory system is fundamentally flawed » Climate policy 10: 277–288

Mackenzie D (2009) Making Things the Same: Gases, Emission Rights and the Politics of Carbon Markets. Accounting, Organizations and Society 42 (3-4): 440-455

Matthews K and Paterson M (2005) Boom or Bust? The Political-economic Engine behind the Drive for Climate Change Policy" Global Change, Peace and Security 17: 59-75

Michaelowa A, Flues F and Michealowa K (2008) UN Apprval of greenhouse gas emission reduction projects in developing countries: The political economy of the CDM Executive Board. CIS Working paper 35. Zürich: ETH Zürich

Michaelowaa A and Jotzo F (2005) Transaction costs, institutional rigidities and the size of the clean development mechanism. Energy Policy 33: 511–523

Murray, James (2010) Updated: CDM crackdown continues as board rejects fresh Chinese wind projects, 15 feb. http://www.businessgreen.com/bg/news/1806084/updated-cdm-crackdown-continues-board-rejects-fresh-chinese-wind-projects/page/2 accessed 5/7/11

Noe 21 (2008) No more perverse incentives and windfall profits for HCFC22 production under CDM ! Press release. Poznan, Saturday 6th of December http://www.noe21.org/docs/Press%20release%20Noe21%20HFC23%20methodology.htm accessed 5/2/11

Paterson M and Descheneau P (2011) "Between Desire and Routine: the assemblage of finance and the environment". *Antipode* vol 43, no 3: 662-681.

Paterson M (2009) "Resistance makes markets" in in Böhm, Siddhartha Dabhi (eds) Upsetting the offset. Upsetting the Offset The Political Economy of Carbon Markets, Mayfly books: London.

Paterson, Matthew (2010) Legitimation and Accumulation in Climate Change Governance New Political Economy, Volume 15, Issue 3, Pages 345 – 368

Paulsson, Emma (2009) A review of the CDM literature: from fine-tuning to critical scrutiny? *International Environmental Agreements: Politics, Law and Economics* 9 (1): 63-80

Pearce, Fred (2010) Carbon trading tempts firms to make greenhouse gas New Scientist 16 dec. http://www.newscientist.com/article/dn19878-carbon-trading-tempts-firms-to-make-greenhouse-gas.html accessed 5/2/11

Schneider L (2007) Is the CDM fulfilling its environmental and sustainable development objectives? An evaluation of the CDM and options for improvement. Berlin: Öko Institute.

Schneider Malte, Hendrichs, Holger and Volker H. Hoffmann (2010) « Navigating the global carbon market An analysis of the CDM's value chain and prevalent business models » *Energy Policy* 38 (2010) 277–287

Social Carbon (2010) Social carbon standard. Version 4.1 february. http://www.socialcarbon.org/uploadDocs/Documents/SOCIALCARBON_STANDARD_v.4.1.pdf acessed 5/11/11

UNFCCC (2010a) Number of registered project by host party. http://cdm.unfccc.int/Statistics/Registration/NumOfRegisteredProjByHostPartiesPieChart.html Accessed 9/2/10

UNFCCC (2010b) CERs Issued By Host Party. http://cdm.unfccc.int/Statistics/Issuance/CERsIssuedByHostPartyPieChart.html Accessed 9/2/10

UNFCCC (2011) CDM in numbers. http://cdm.unfccc.int/Statistics/index.html accessed 5/5/11

United States Government Accountability Office [GOA] (2008) Lessons Learned from the European Union's Emissions Trading Scheme and the Kyoto Protocol's Clean Development Mechanism. http://www.gao.gov/new.items/d09151.pdf. accessed 5/3/11

Via Campesina (2010) Via Campesina Declaration in Cancún: The people hold thousands of solutions in their hands. http://www.viacampesina.org/en/index.php?option=com_content&view=article&id=1010:via-campesina-declaration-in-cancun-the-people-hold-thousands-of-solutions-in-their-hands&catid=48:-climate-change-and-agrofuels&Itemid=75 accessed 5/5/11

Victor, David G., Cullenward, Danny (2007) Making Carbon markets work. Scientific American , Dec2007, Vol. 297, Issue 6

Wara M (2007) Is the global carbon market working? Nature 445 (8) : 895-6

Wara M W and Victor D G (2008) A Realistic Policy on International Carbon Offsets. PESD Working paper #74. Stanford: Stanford University

Welch, Dan (2007) 'A Buyer's Guide to Offsets', Ethical Consumer, no. 106, May/June

Werksman J (1998) The clean development mechanism: unwrapping the 'Kyoto surprise'. Review of European Community and International Environmental Law (72) : 147-158