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Abstract

The purchase of Verified Emission Reductions through the voluntary carbon market has become a mainstream practice across business and individuals who aim to offset their greenhouse gas emissions. This voluntary market relies on offset projects which may or may not follow the standards of the Kyoto Protocol's Clean Development Mechanism. In this article, we review the international policy context in which the voluntary market has developed, its institutional structure, including general procedural rules, existing registries, actors involved, volume of emission reductions transacted, and its methodological and certification standards. We then conduct an analysis of project typologies and their potential sustainable development benefits. With all this information, we compare the voluntary market with the Clean Development Mechanism, we trace their differences, and we identify what the voluntary carbon market is good for and where its weaknesses lie.

1. Introduction

It may be argued that, by definition, the CDM and voluntary offset schemes have different objectives, although they share a number of similarities and continually influence each other. On the one hand, the CDM is a market mechanism aimed at facilitating compliance with emissions reduction objectives under the Kyoto Protocol by reducing the overall mitigation cost whilst promoting the sustainable development of developing countries - according to their own perception of what sustainable development is. On the other hand, voluntary offset schemes are not compliance instruments but a means for individuals and entities to reduce greenhouse gas emissions over and above mitigation goals set by regulations. In principle then, achieving low mitigation costs is not a priority of voluntary offset initiatives which instead often pursue wider environmental and social benefits. Consequently, one could assume that the CDM, as a market mechanism, would seek first to reduce emissions where mitigation costs are lower, whereas voluntary offset schemes would focus on projects where the overall benefits are higher and visible, or on sectors that the CDM cannot reach due to its current rules and market conditions.

Moreover, being a compliance mechanism, emissions reductions generated through the CDM should achieve the highest possible quality to ensure the integrity of the international mitigation regime represented by the Kyoto Protocol – which has so far implied high transaction costs and lengthy bureaucratic processes. On the other hand, voluntary schemes should ensure that the service they provide is also real, but making sure that transaction costs do not become an obstacle for the development of projects where other social and environmental goals may be considered more important and where the carbon component is merely a co-benefit and a potential source of additional funding (although this concept seems to be changing). The CDM is not fulfilling its sustainable development objective, in part as a result of an uneven distribution of projects around the world and the prioritisation of emission reduction activities which do not necessarily have a wider environmental benefits or a strong social component (Lohmann, 2006; Wara, 2007). For this reason, advocates of voluntary carbon offsetting argue that projects implemented under this scheme often achieve significant social and environmental benefits with a different geographical distribution (i.e., with more participation from African countries) (Hamilton et al., 2007).

Finally, in the case of the CDM, demand drivers are obvious (complying with the emissions reduction targets of developed countries) and such demand is expected to continue in the coming decades, subject to the continuation of the international climate regime and the establishment of further stringent emission cuts in a new regime post-2012. In fact, the uncertainty about future targets has currently limited CDM investments beyond 2012. In contrast, the drivers of the voluntary market are diverse and depend upon the interest and circumstances of offset buyers.

In the following sections, we attempt to compare the CDM with voluntary offset markets in order to shed light over a number of questions concerning these two institutions for climate mitigation: do they support different emissions reductions projects and sectors?; do these projects provide distinct overall environmental and social benefits?; have CDM and voluntary markets distinct geographic coverage?; do they provide the same quality of offsets; And finally, what is driving the voluntary offset market and how sustainable such demand may be into the future? We start providing a brief introduction to the origin and institutional structures of both regulated and voluntary offset schemes. In section three we analyse the evolution of these markets and in section four we provide a comparison in terms of numbers and project typologies, distribution, contribution to sustainable development, offsets quality and demand

drivers. This analysis permits to highlight that these two instruments may not be as different as they are often supposed to be and we challenge the idea that voluntary markets may perform better than the CDM in terms of local sustainable development.

2. An overview of regulated and voluntary carbon offset schemes

2.1. The Clean Development Mechanism

2.1.1 Origins and fundamentals

Collaborative efforts between two or more countries (or entities in two or more of them) to reduce greenhouse gas (GHG) emissions and increase and/or maintain carbon stocks in land use activities under the United Nations Convention on Climate Change (UNFCCC) were first introduced as a part of the provisions related to Annex I country commitments. Indeed, Article 4.2 of the Convention states that these Parties may implement policies and measures on climate change mitigation by limiting their anthropogenic emissions of greenhouse gases and protecting and enhancing its greenhouse gas sinks and reservoirs "jointly with other Parties". Accordingly, the Conference of the Parties to the Convention (COP), at its first session (1995), agreed to start a pilot phase of Activities Implemented Jointly (AIJ) – both among Annex I Parties and between such Parties and developing countries – and established a set of indicative criteria for the implementation of such activities (**Box 1**). These criteria served as the basis for subsequent collaborative project-based mechanisms to mitigate GHG emissions under the Kyoto Protocol, although AIJ activities could not be used for the fulfilment of the emission limitation and reduction commitments set out by the Convention[†] under the Protocol. However, these activities could contribute to achieve Annex I Parties' commitments regarding the promotion, facilitation and financing required to transfer environmentally sound technologies and know-how to other Parties, particularly developing countries.

Box 1. Criteria for AIJ projects

Activities must be supplemental, and should only be treated as a subsidiary means of achieving the objective of the Convention,

Activities in no way modify the commitments of each Party under the Convention,

Activities should be compatible with and supportive of national environment and development priorities and strategies, contribute to cost-effectiveness in achieving global benefits and could be conducted in a comprehensive manner covering all relevant sources, sinks and reservoirs of greenhouse gases;

Activities require prior acceptance, approval or endorsement by the Governments of the Parties participating in these activities;

Activities should bring about real, measurable and long-term environmental benefits related to the mitigation of climate change that would not have occurred in the absence of such activities;

AIJ shall be additional to the financial obligations of Parties included in Annex II to the Convention within the framework of the financial mechanism as well as to current official development assistance (ODA) flows;

No credits shall accrue to any Party as a result of greenhouse gas emissions reduced or sequestered during the pilot phase from AIJ activities; through project-based approaches.

Source: own elaboration

The first COP also launched a process to "take appropriate action for the period beyond 2000, including the strengthening of the commitments of the Parties included in Annex I to the

[†] Under Article 4.2, Annex I countries are committed to return to their 1990 levels of anthropogenic emissions of carbon dioxide and other greenhouse gases not controlled by the Montreal Protocol by the year 2000.

Convention (…) through the adoption of a protocol or another legal instrument"‡, which resulted in the adoption of the Kyoto Protocol in 1997. The Protocol establishes an overall emission reduction and limitation commitment of six greenhouse gases of 5.2% over 1990 emissions levels for Annex I Parties - distributed among them through individual quantified mitigation commitments - which must be achieved in the period 2008-2012. At the same time, the Protocol defines three "flexibility mechanisms" – two of them project-based, the Clean Development Mechanism (CDM) and Joint Implementation (JI), and the third one, Emissions Trading (ET), based on the "cap and trade" concept -, aimed at reducing the cost of fulfilling such commitments.

The CDM, as defined by Article 12 of the Kyoto Protocol, has the dual objective of assisting Parties not included in Annex I to contribute to the ultimate objective of the Convention and to achieve sustainable development goals, and assisting Parties included in Annex I to meet their quantified emission limitation and reduction commitments. CDM projects shall generate Certified Emission Reductions (CERs) additional to any that would occur in the absence of the project and provide real, measurable, and long-term mitigation benefits. Participation in the CDM is voluntary and limited to Parties to the Protocol, which shall designate a national authority for the CDM. Private and/or public entities may participate both in the implementation of projects and in the acquisition of CERs. Annex I Parties are eligible to use CERs for compliance if it has calculated and registered its assigned amount, has in place a national system to estimate its emissions and a national registry. Additionally, Annex I Parties must have submitted their most recent required emissions inventory, as well as information on their assigned amount. Drawing on the Brazilian proposal, a share of the proceeds from CDM projects is used to assist developing country Parties that are particularly vulnerable to the adverse effects of climate change to meet the costs of adaptation, as well as to cover administrative expenses. Moreover, CERs obtained during the period from the year 2000 up to 2008 can be used to assist in achieving compliance in the first commitment period (2008-2012).

2.1.2. Institutional structure and project cycle

The operation of the CDM implies the participation of a number of actors, namely the Conference of the Parties serving as the meeting of the Parties (COP/MOP), the supreme body of the Kyoto Protocol; the CDM Executive Board, in charge of supervising the CDM, under the authority and guidance of the COP/MOP, which implies, e.g., approving new baseline and monitoring methodologies, accrediting operational entities and making recommendations to the COP/MOP for their designation (as well as for the suspension and withdrawal of this designation), registering projects and issuing CERs; Designated Operational Entities (DOEs), which validate proposed CDM projects and verify and certify emissions reductions resulting from such projects; Designated National Authorities for the CDM (DNAs), established by each Party willing to participate in the Mechanism to assess the environmental and social impacts of projects and, if applicable, issue letters of approval of voluntary participation, including confirmation that the project activity assists the host Party in achieving its sustainable development; and project participants.

The process leading to the issuance of CERs by the CDM-EB is described in the Marrakech Accords –the rulebook of the Kyoto Protocol– and is known as the CDM project cycle. This cycle starts with the validation of the proposed project by a DOE based on the information submitted by the project participants in a Project Design Document (PDD). During this

‡ Decision 1/CP.1, also known as the"Berlin Mandate".

process, the DOE carries out an independent evaluation of the project against the requirements of the CDM, particularly regarding consultations with local stakeholders, environmental impacts, additionality and the adequacy of applied baseline and monitoring methodologies. Additionally, at the validation stage the DOE must receive from the project participants the letters of approval issued by the DNAs of all Parties involved in the project. If the DOE determines the proposed project activity to be valid, it submits a request for registration to the CDM-EB, who then registers the project unless a review is demanded.

Once registered, the project's performance is monitored by its developers following the plan submitted at validation. Then, a DOE carries out the ex post verification of the monitored reductions in emissions that have occurred as a result of the implementation of the project activity during the verification period. The DOE shall, based on its verification report, certify in writing that the project activity achieved the verified amount of reductions in emissions that would not have occurred in the absence of the CDM project. The certification report constitutes a request for issuance to the EB of CERs equal to the verified amount of emissions reductions. The issuance of CERs is considered final 15 days after the date of receipt of the request for issuance, unless a Party involved in the project activity or at least three members of the EB request a review regarding issues of fraud, malfeasance or incompetence of the DOE. Upon being instructed by the Executive Board to issue CERs for a CDM project, the CDM registry administrator forwards the issued CERs – after discounting the share of proceeds to cover administrative expenses and to assist in meeting costs of adaptation – to the registry accounts of Parties and project participants involved. Each CER issued has a unique serial number.

In order to ensure the credibility, transparency and accuracy of the mechanism, the operation of the CDM is supported by a centralized registry and a number of publicly accessible databases – e.g., for methodologies, projects, issued CERs, DNAs, DOEs and EB decisions – the international transaction log and standards for the accreditation of operational entities. Additional guarantees are provided by the fact that, if an operational entity ceases meeting the accreditation standards or applicable provisions of the COP/MOP, it may be suspended, or its designation may be withdrawn. Moreover, if significant deficiencies are identified in the relevant validation, verification or certification report for which the entity was responsible and a review reveals that excess CERs were issued, such entity shall acquire and transfer an amount of reduced tonnes of carbon dioxide equivalent (tCO_2e) equal to the excess CERs issued.

2.2. Voluntary offset schemes

2.2.1. Origins and fundamentals

Voluntary offset schemes can be defined as those aimed at generating GHG emissions reductions not required by Kyoto Protocol's derived regulation. Through these schemes, industries and individuals voluntarily compensate their emissions or provide an additional contribution to mitigating climate change. These schemes had their start on the desire of conservation organizations to find new ways of financing their projects (Hamilton et al., 2007). The first project developed under this concept was carried out in 1989 - long before the creation of the CDM in 1997 and even before the adoption of the UNFCCC in 1992 - when AES Corp, a US electricity facility invested voluntarily in an agro forestry project in Guatemala. The idea was to pay Guatemalan farmers to plant 50 million trees, which would sequester carbon dioxide and thus compensate the GHG emissions arising from the generation of electricity and thus improve the image of the company (Corbera and Benet, 2007). Offset

schemes gained popularity a few years later, when, in 1995 the AIJ pilot phase was launched by the UNFCCC. A total of 159 projects, of which 20 were carbon sequestration (forestry) projects, were implemented in developing countries and countries with economies in transition with the support of Annex I governments and entities. These initial efforts under the UNFCCC are also considered voluntary given that, as mentioned above, none of the emissions reduced or the carbon sequestered can be accredited to any of the Parties involved in such projects (ibid.). Since then, a voluntary offsets market has been operating at different levels of activity, as will be shown later in this article.

Voluntary offset schemes have been praised for their flexibility vis-à-vis the regulated schemes regarding eligible project types –the wide inclusion of forestry projects being the most notable difference-, their focus on social and environmental benefits and their relatively low transaction costs (which have been linked to lower quality controls compared to the regulated mechanisms). Further, these schemes arguably provide insights into public interest in climate change, as well as where the broader market may be heading towards (Hamilton et al., 2007).

2.1.2. Institutional structure and project cycle

Unlike the Kyoto project-based mechanisms, voluntary offset schemes do not have a unique overseeing authority, a common set of rules, procedures and standards, or a centralized registry. Instead, a number of independent protocols, standards, verification procedures and registries have emerged trying to guarantee the quality of the offsets traded in the market. These include, for example, the Voluntary Carbon Standard (VCS), TÜV Süd´s VER+ Standard, the Gold Standard, the Climate, Community, and Biodiversity Standard (CCB), and the ISO 14064/65 standard (**Table 1**). Even though voluntary offset schemes are defined by a lack of regulatory drivers, they are heavily influenced by the regulated mechanisms explained above (i.e., CDM, JI), particularly concerning basic rules, processes and actors. Consequently, projects developed through voluntary schemes must prove that they reduce emissions against an established baseline and that such reductions are additional. Moreover, under many of the existing standards, projects must demonstrate sustainable development benefits and, in some cases such as the CCB program, the latter is the main objective of the standard.

Likewise, the most complete existing standards include a project cycle similar to the one in place for the CDM, encompassing validation, monitoring, and verification. Project registration is also a requirement under many voluntary offset programmes. Following the example of the CDM, third party verification is widely used in voluntary market. According to a survey carried out by New Carbon Finance and The Ecosystem Marketplace in 2007, there is an overwhelming use of third party verifiers in the voluntary market (77% of the offset sellers interviewed), rather than the customer's and seller's own verification procedures (Hamilton et al., 2007). Additionally, in many cases, validators and verifiers approved by these standards are those designated by the CDM Executive Board.

Many of the existing standards issue a particular type of credit or logo at the end of the verification process, although many aspects surrounding them (e.g., issuing body, crediting period, issuing fees) are not harmonized between standards. Instead of a unique credit accounting system, the voluntary market relies on a number of registries, some of which are independent whilst others are linked to specific standards, programmes or verifiers (**Table 2**). The aforementioned survey found that registries are several steps behind standards as priorities for the voluntary offset markets. In summary, out of a total of 64 suppliers surveyed, 25% indicated that holding credits in a registry was not applicable to them. Of the 48

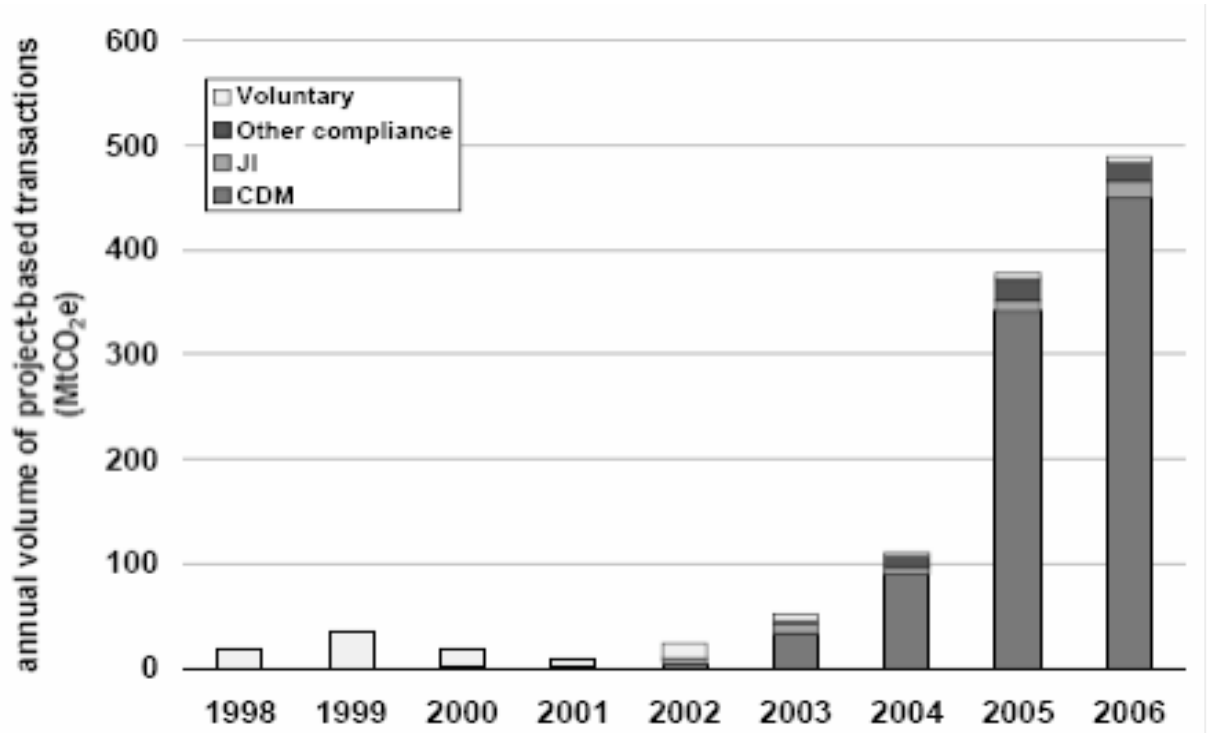
organizations that indicated that their credits were listed in a registry, 21% of suppliers indicated they were listed under their organization's own specific registry. Reponses indicated that credits listed in organizations' own registries were in some cases third party audited and in others unaudited. This is the most popular holding account for Verified Emissions Reductions (VERs) with the CDM/JI registry being the next most used but only representing 15% of respondents listing their credits in a registry. The fact that most suppliers cited to use one of their own, rather than an independent registry, is most likely because very few independent credit accounting registries were in existence in 2006 (Hamilton et al., 2007). Furthermore, it must be noted that in addition to the standards, processes and actors involved in the generation of VERs, the voluntary carbon market also comprises the certification of offset sellers, products, services, and/or the claims of carbon neutrality being made by individuals and institutions. These include the Green- e for GHG Product Standard, DEFRA's Guidelines, and the Climate Neutral Network. The Australian Greenhouse Friendly program, meanwhile, certifies both offset projects and greenhouse neutral products and services and therefore fits in both categories (ibid.).

3. Market evolution and project typologies

3.1. The regulated market

According to the World Bank, from 2002 to 2006 about 920 $MtCO_2e$ from CDM project activities were transacted. A strong majority (about 91%) of primary transactions for project-based credits in 2006 came from CDM activities that reduced 450 $MtCO_2e$, representing an increase of 32% from 2005 volumes, which in turn were around three times as much the volume of emission reductions traded under the CDM in 2004 (374 million tCO2e) (**Figure 1**). The market also transacted about 16.7 $MtCO_2e$ from JI transactions valued at US$141 million in 2006 or € 108 million. The overall value of the project-based market for primary credits was US$5 billion in 2006 (€3.9 billion) (World Bank, 2007; 2006).

Figure 1. Annual volume of project-based transactions ($MtCO_2e$)



Source: World Bank, 2007. pp. 21

Table 1. Features of some of the main standards in the voluntary offset market (2007)

	Description	Focus on Env. & Social Benefits	Reporting/ Registration	Certification & Logo?	Includes LULUCF Method'y?	Geographical Reach	Start
Gold Standard	Certification for offset projects & carbon credits	Yes	VER registry in development	Yes	RE & EE projects	International	1st project validated 2006, 1st credits verified 2007
The VCS	Certification for offset projects & carbon credits	No	Use Bank of New York; other registry TBD	Yes	Yes, Methodologies TBD	International	Launched Nov. 2007
CCB Standards	Certification program for land-use offset projects	Yes	Projects on Website	Yes	Only LULUCF	International	1st project certified in 2007
CCX	Internal system for CCX offset projects & CCX carbon credits	No	Registry Incorporated w/ trading platform	No	Yes	International	2003
Plan Vivo	Guidelines for offset projects	Yes	No	No	Community based agro-forestry	International	2000
Climate Neutral Network	Certification program for offset sellers & carbon neutral products	No	No	Yes	Yes	Primarily North America	1st project certified 2001
WBCSD/ WRI Protocol	A set of guidelines for projects & corporate GHG accounting	No	Does not include registry	No	Protocol created for LULUCF	International	2001
CCAR	A Registry Protocol	No	Reporting protocols used as standards	No	Yes, first protocol	Currently California	1st protocol in 2005
VER+	Certification program for offset projects, carbon credits & carbon neutral products	No	TÜV SÜV Blue Registry	Yes	Includes JI and CDM meth's	International	Expected launch mid-2007
ISO 14064	Certification program for emissions reporting offset projects, carbon credits	No	No	No	Yes	International	Methodology released in 2006
VOS	Certification for offset projects & carbon credits	No	TBD	No	Follow CDM or JI meth's	International	TBD
Social Carbon	Certification for offset projects & carbon credits	Yes	Creating its own registry system	Yes	Reforestation & Avoided deforestation	South America & Portugal	1st Methodology applied in 2002

Source: adapted from Hamilton et al., 2007. pp. 43

Table 2. Characteristics of some of the existing registries in the voluntary market

	Bank of New York	**Environmental Resources Trust**	**Blue Registry**	**CCX Registry**	**Triodos Climate Clearing House**	**California Climate Action Registry**	**Asia Carbon Registry**
Serial Numbers	Yes	Yes	Yes	Yes	Unknown	Yes	Yes
Standard / Verification Requirements	Voluntary Carbon Standard	ERT Approved	VER+ Standard, Plans to incorporate other standards	CCX Board Approved;	Unknown	CCAR Protocols	Approved standards available on the market
Transparency	Accepted standards public; Account information not disclosed	Standards used unclear; Account information public	Accepted standards public; Account information public	Uses CCX Standards; Exchange data public; Account information not disclosed	Standards unclear; Account information not disclosed	Accepted standards public; Account information public	Accepted standards public; Unclear if account information public
Start Date	2006	1997	Expected launch mid-2007	2003	2001	Reduction Registry running. certified credit registry 2007	2007
Total Credits Registered	Unknown	345,346,812t; of which 17,173,624 offset credits	Upcoming Registry	345,356,812t registered, of which 12,865,500t offset credits	2,033,707t offset credits	2001 emissions reductions registered; registered credits upcoming	Upcoming

Source: Hamilton et al., 2007. pp. 47

The average price of CERs during 2006 was US$10.90 (€8.40), representing a 52% increase over 2005 levels, and $8.70 per ERU, or € 6.70, for JI (+45% over 2005). Unlike Phase I EUAs, CERs prices were stable over 2006, at least partly due to the market power of China, which maintained an informal pricing policy by raising the minimum price floor in the US $10.40-11.70 (€ 8-9) range (World Bank, 2007). As of January 2008, 895 CDM projects have been registered by the Executive Board, 1,849 projects are at validation and 61 have been rejected or withdrawn by project participants, for a total of 2,944 projects proposed so far (UNEP/RISOE, 2008) (**Table 3**). The size of most (85%) of the projects submitted to the EB to January 2008 (including those at validation, rejected and withdrawn) ranges between 10,000 and 500,000 ktCO2/yr, being those around 100,000 and 500,000 the most common (**Table 4**).

Table 3. Status of CDM projects as of December 2007

Status	Number
At validation	**1849**
Request for registration	40
Request for review	36
Correction requested	53
Under review	10
Total in the process of registration	**139**
Withdrawn	9
Rejected by EB	52
Registered, no issuance of CERs	614
Registered. CER issued	281
Total registered	**895**
Total number of projects (incl. rejected & withdrawn)	**2944**

Source: UNEP/RISOE, 2008.

Table 4. Size of CDM projects submitted (Dec. 2007)

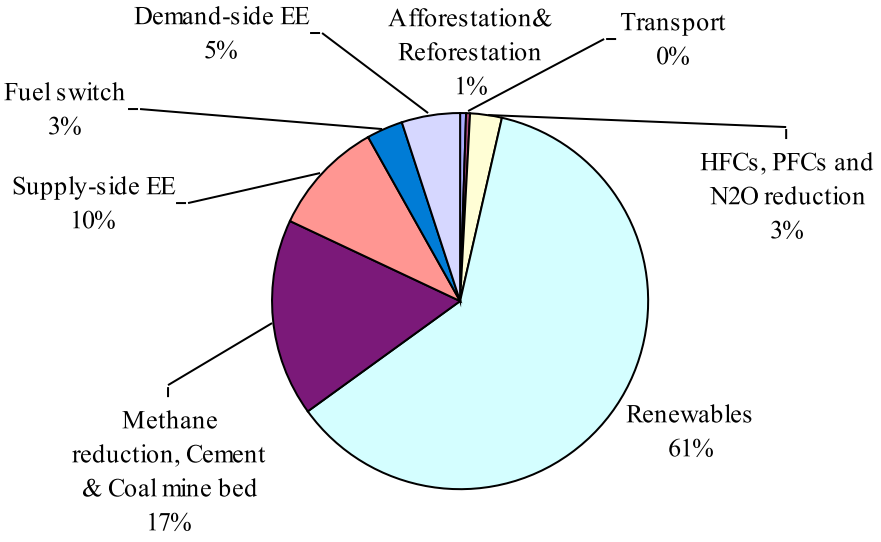
Size in KtCO2/year	Projects*	
	Number	in %
0 – 5	142	4.8%
5 – 10	196	6.7%
10 – 25	541	18.4%
25 – 60	635	21.6%
60 – 100	581	19.7%
100 – 500	741	25.2%
500 – 1000	55	1.9%
1000 – 5000	45	1.5%
5000 – 10000	5	0.2%
> 10000	3	0.1%
Total	2944	100.0%

*Total number of projects submitted (incl. rejected & withdrawn).
Source: UNEP/RISOE, 2008.

To date, the majority (62%) of projects registered by the CDM-EB involve the generation of renewable energy. Methane reduction and cement and coal mine bed projects are the second most common type of registered projects (17% of the total), followed by energy efficiency projects on the supply side (10%) and on the demand side (5%), fuel switching projects (3%) and projects mitigating emissions of HFCs, PFCs and N2O (3%). Afforestation and

reforestation and projects in the transport sector have so far been almost inexistent, representing 0.5% and 0.2% of all the projects registered (**Figure 2**). CDM projects have focused mainly on Asia and Latin America (96% of the projects reside in these two regions), and particularly on four countries: India, China, Brazil and Mexico In both regions, renewable energy and methane mitigation projects prevail (in that order); in Asia, most of the CERs until 2012 also come from renewable energy projects (41%), but in the case of Latin America, the biggest amount of credits is expected from the reduction of emissions of industrial gases (35%). Africa hosts only 52 projects - most of them (23) in South Africa - representing less than 2% of the global total (UNEP/RISOE, 2008). On the other hand, according to the information publicly available (projects that have requested registration and projects with a PDD), the UK is - by far - the most active Annex I counterpart in the CDM with entities participating in 744 projects, more than the other four most important buyers together: Japan (255), the Netherlands (232), Sweden (109) and Germany (103).

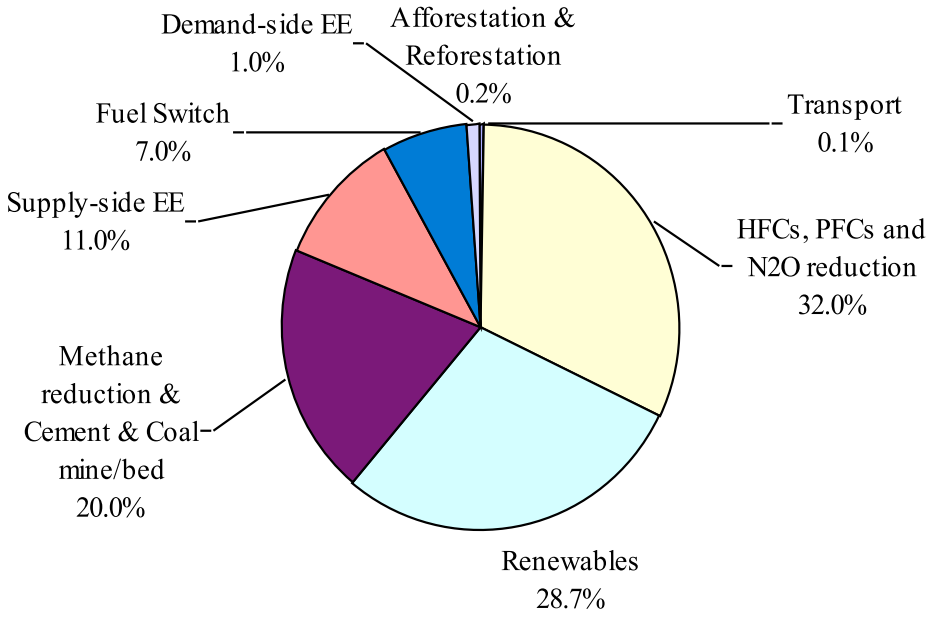
Figure 2. Number (%) of CDM projects in each category



Source: UNEP/RISOE, 2008.

The CDM market – which has been growing linearly with about 1,000 million per year since June 2005 - is projected to reach 2,423 Million CERs before the end of 2012. Projects reducing emissions of industrial gases are expected to represent about 32% of the market - mostly due to the large global warming potentials of such gases. The projected contribution of renewable energy to the CER market until 2012 is around 29%, followed by methane reduction activities with 20% of the total, energy efficiency projects in the supply side with 11% and fuel switching with 7%, whilst energy efficiency on the demand side, afforestation and reforestation and transport would have an insignificant participation (**Figure 3**) (UNEP/ RISOE, 2008). Moreover, the analysis of the historical trend of the contribution of different project types to the generation of CERs until 2012 reveals that the generation of credits from HFC23 destruction projects has already peaked, which may be the result of the exhaustion of these “low-hanging fruits” and/or the consequence of the lack of a decision of the COP/MOP regarding the eligibility of new HCFC-22 facilities (this issue has been discussed by the COP/ MOP since 2005, and no agreement has been reached to date).

Figure 3. CERs generated until 2012 by project type



Source: UNEP/RISOE, 2008.

3.2. The voluntary offset market

At present, the voluntary carbon market is divided into two main segments: the voluntary, but legally binding, cap-and-trade system that is the Chicago Climate Exchange (CCX); and the broader, non-binding, over the counter (OTC) offset market, commonly referred to as the voluntary offset market. Almost all carbon credits purchased in the OTC market originate from project-based transactions. Credits from the OTC market are often generically referred to as Verified Emissions Reductions (VERs). A recent survey carried out by the Ecosystems Marketplace and New Carbon Finance, which can be considered one of the most comprehensive and up to date analysis of the voluntary market, asked offset suppliers to share transaction volume information for the years 2002 through 2006, and also compile data on any pre-2002 volumes. Given that the survey grouped all pre-2002 transaction volumes into one question, it was unable to track earlier market patterns. However, since 2002 the voluntary market has experienced annual ups and downs, but in 2006 the growth of the market was unprecedented. According to data from the survey, the Environmental Resources Trust registry, and the Chicago Climate Exchange, a total volume of 23.7$MtCO_2e$ was transacted in the voluntary carbon market in 2006. A little less than half of this volume (10.3$MtCO_2e$) was exchanged on the CCX, whilst 13.4 $MtCO_2e$ were transacted as VERs (Hamilton et al., 2007). The significance of 2006 is clearly reflected by the fact that the volume traded in that year alone represents about 30% of the historic volume exchanged in the voluntary market (estimated at 86.8 $MtCO_2e$). Moreover, the growth seen in 2006 was expected to continue in 2007 (ibid.).

The origin of the offsets traded in the market has varied over time. Until 2004, transactions by conservation organizations using carbon finance for forestry projects dominated the market. Since these sequestration projects take longer to generate credits, this pattern suggests that these may have been “ex- ante” deals, where buyers pay for credits before the sequestration has actually occurred. In 2004, the arrival of CCX supposed a significant development for the voluntary markets. In 2006, 43% of the total recorded volume of 23.7 $MtCO_2e$ took place through the CCX. The exchange itself has grown rapidly, especially in 2006, with average

growth of 590% per year since 2003 (Hamilton et al., 2007). In and before 2002, as well as in 2004, transactions by several non-governmental conservation organizations utilizing carbon finance for forestry projects were major contributors to total market volume. Since these projects take longer to generate credits, this pattern suggests that these may have been "ex-ante" deals, where buyers pay for credits before the sequestration has actually occurred. In 2004, the CCX was established, having an immediate and significant impact on the market. Since then, the CCX has seen a vertiginous evolution, with an average growth of 590% per year since 2003. This figure is comparable to the volumes traded in the CDM secondary market and is higher than the JI market; however, it only represents about 2% of the volumes exchanged in the EU ETS in 2006 (ibid.).

Projects currently found in the voluntary market are usually large; 56% of the offsets in the market in 2006 came from projects generating over 100,000 tCO_2e/year (**Table 5**). Small and micro projects, arguably those with the highest potential to bring about sustainable development benefits, contributed only to 12% of the voluntary market. Nevertheless, micro projects were the most common offset suppliers in the market, being almost three times as numerous as very large projects (19 projects versus 7, respectively). This could be explained by the fact that micro projects are usually forestry activities carried out by small landowners or communities with relatively reduced offset generation, whilst very large projects commonly imply the mitigation of industrial gases with large global warming potentials.

Table 5. Size of projects in the voluntary offset market

Project size	Percentage of total transacted volume, 2006	Number of projects
Micro (less than 5,000 tCO2e/year)	4%	19
Small (5,000 to 15,000 tCO2e/year)	10%	12
Medium (20,000 to 100,000 tCO2e/year)	22%	14
Large (over 100,000 tCO2e/year)	22%	12
Very large (over 500,000 tCO2e/year)	34%	7

Source: adapted from Hamilton et al., 2007. pp. 30

The number of projects registered under programmes and certifications systems is relatively small, particularly considering that the voluntary market has existed for more than a decade. This may be attributed to the lack of such systems until very recent times. In 2006, only 21 projects had been registered in total by the CCB Standard (the Plan Vivo, Social Carbon and the Voluntary Gold Standard, but 138 more were already waiting for approval in their pipeline (**Table 6**).

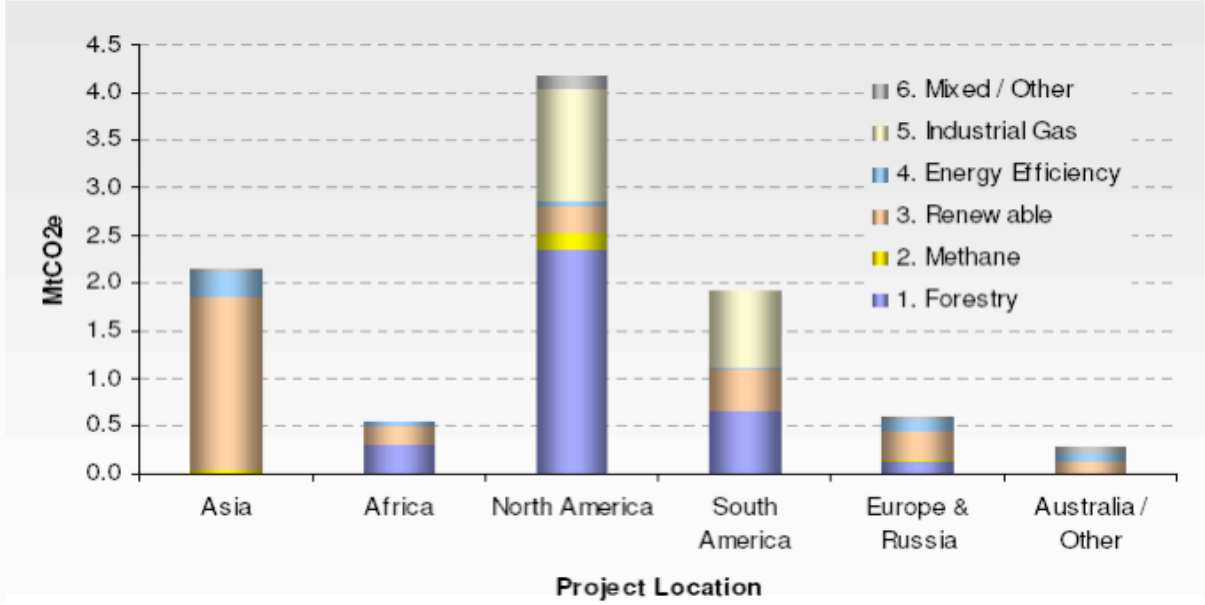
Table 6. Current Status of Standards and Certification Systems

Standard/programme	Projects registered/certified/ validated	Projects in the pipeline	Amount of offsets generated
CCB Standard	2	24	-
Plan Vivo	3	-	-
Social Carbon	10	29	350,000 tonnes of VERs and 150,000 tonnes of CERs
Voluntary Gold Standard	6	85	170,000 VERs and 72,000 CERs issued
Total	*21*	*138*	*742,000 tCO2e*

Source: adapted from Hamilton et al., 2007. pp. 49

As regards project location, roughly 43% of carbon offsets sold in the OTC market is found in the US, thus representing the single most important source of projects in that market. Asia, with around half the offsets generated by the US, leads developing country suppliers followed closely by South America. Africa occupies a distant fifth place (even behind Europe and Russia), with about a quarter of the offsets supplied by Asia, however, its contribution is greater than that of Australia. (**Figure 4**). The demand in the voluntary market in 2006 came mostly from the US. According to the survey mentioned above, 68% of the buyers in the market are located there, whilst Europe accounts for 28% and acquisitions in Canada amount to merely 3% (Hamilton et al., 2007).

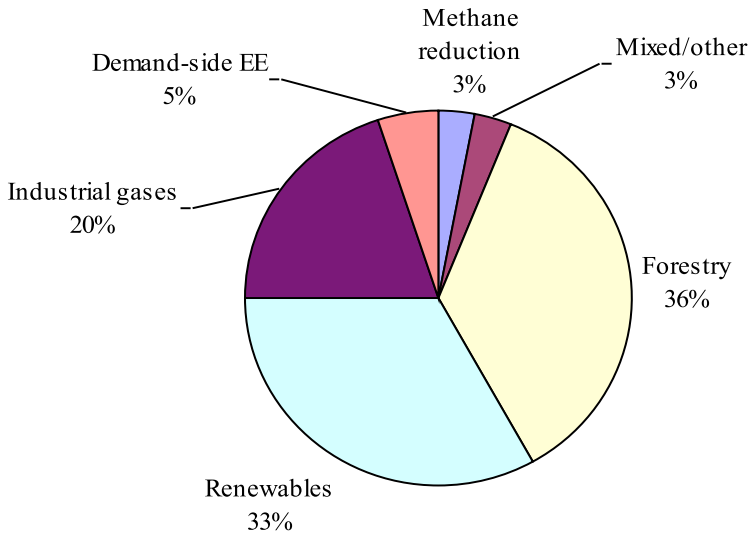
Figure 4. Transactions by project location, 2006 (9.7Mt total)



Source: Hamilton et al., 2007. pp. 7

In 2006, the OTC market was dominated by offsets generated through forestry projects, accounting for 36% of the total VERs traded. Renewable energy projects were the second most important source of offsets, with 33%, whilst projects mitigating industrial gases with high global warming potentials provided 20% of the offsets in the market that year. On the other hand, projects reducing methane emissions had a marginal contribution, with around 3% of the total VERs transacted, even less than the volume of offsets from energy efficiency projects (5%) (**Figure 5**). The analysis of the regional distribution of offsets by project type in 2006 reveals that Asia comprised most of the emissions reductions from renewable energy commercialized in the voluntary market, and that the market received more offsets from forestry projects implemented in the US than from any other region. Actually, the US generated more forestry VERs in 2006 than all developing countries together, and reduced emissions from methane projects were also generated exclusively in the US.

Figure 5. Transactions of CO_2e by project type in the voluntary OTC market in 2006 (from a total of 9.7Mt)



Source: Hamilton et al., 2007. pp.26

4. How do regulated and voluntary offset schemes compare?

4.1. Project types/sectors

As mentioned before, being the CDM a market mechanism aimed at reducing global mitigation costs, it is not surprising that during its first years of existence its associated market has preferred cheap and immediate mitigation options over other relatively more expensive and complicated alternatives. This is reflected by the significant portion of the CDM market covered by CERs from reduction of emissions of industrial gases and methane (32% and 20% of the total CERs until 2012, respectively) (Boyd et al., 2007; Wara, 2007). The exception to this rule may be illustrated by the almost inexistent market share of forestry projects -assumedly cheap and with high sustainable development benefits–, which responds partially to their late start, the limitations set for these projects under the Marrakech accords, their complexity and possibly most of all, to the decision of the European Union of excluding forestry CERs from the European Union Emissions Trading Scheme. Comparing the situation of the CDM market to the sectoral distribution of emissions reductions in the voluntary offsets market, the most striking difference is the share of forestry and methane mitigation credits between the two markets. These two exceptions made, the share of the remaining sectors is more or less similar in both markets (**Table 7**).

Table 7. Comparison of market shares by project type

Project type	Share of the CDM market (%)*	Share of the voluntary market (%)**
Industrial gases	32	20
Renewable energy	29	33
Forestry	0.2	36
Energy efficiency	12	5
Methane mitigation	20	3
Transport	0.1	-
Fuel switch	7	-
Other	-	7

*CERs until 2012.

**Considering offset volumes transacted in 2006.
Source: Hamilton et al (2007) and the World Bank (2007).

In the case of forestry projects, it could be argued that their remarkable contribution to the voluntary market may be due to the inertia of the initial focus of voluntary schemes on that sector, the potential of such projects to produce social and environmental benefits and the possibility of generating offsets from a wide range of activities (including, e.g., avoided deforestation). Moreover, project developers in developing countries may be looking for buyers in the voluntary market to avoid the methodological complications, low-priced temporary credits and high transaction costs of the CDM, and most of all, to compensate for the limited demand of these credits from Europe –although the great majority of carbon forestry offsets from the voluntary market are generated in the US.

Nevertheless, the share of forestry projects in the voluntary market seems to be shrinking. As pointed out by Hamilton and colleagues (2007: 21), it appears that carbon forestry deals do not enjoy the same level of support that they had in the early years of these markets and ex-ante deals may also be falling out of favour. Due to concerns about permanence and further investments in abatement technologies, the percentage of forestry credits provided to the market has decreased rapidly, especially in the EU, and especially in the retail sector. The future role of forests in the voluntary market will be dictated in part by how the main methodological issues (additionality, measurement, and permanence) are addressed in specific projects. Another relevant factor will be the outcome of the ongoing negotiations under the UNFCCC regarding the inclusion of activities to Reduce Emissions from Deforestation and Degradation (REDD) in developing countries in the climate regime post-2012, which could influence both the regulated and the voluntary market. The decision by the 13th Conference of the Parties (December 2007) to start demonstration (pilot) activities, together with the recent establishment of international funds to support initiatives to reduce emissions from deforestation (e.g., the Forest Carbon Partnership Facility of the World Bank) may boost the development of projects to reduce emissions from deforestation in the short term (Corbera et al., 2008).

Emission reductions from methane mitigation are provided mainly by developing countries, which use the CDM due to its average higher carbon prices, whilst the US is the major provider of these credits in the voluntary market. Furthermore, it is worth noting the high proportion of offsets from industrial gases projects in the voluntary market (32%),which is even higher than the contribution of such projects to the CDM market (20%), since these projects hardly match with the traditional profile of activities in the voluntary market (i.e., with emphasis on social and environmental benefits). This may be explained by the exclusion to date of HFC-23 incineration projects in new HCFC-22 facilities in developing countries within the framework of the CDM, which may be leading project developers towards the voluntary market. However, this argument applies to less than half the reductions from this source in the voluntary market -those achieved in developing countries, particularly in South America-, but cannot explain the remaining offsets from this type of projects generated in the US.

It may thus be argued that the proliferation of offset projects dealing with emissions of greenhouse gases with high global warming potentials (i.e., HFCs and methane) in the US may be the consequence of the recent boom of proposals to regulate greenhouse gas emissions in that country, including the numerous state and regional–level initiatives, which may be leading a segment of American market players to concern about mitigation costs and thus act more and more like their counterparts in the regulated market (**Box 2**). If this assumption holds true, and taking into account the specific weight of the US as an offset provider, the

sectoral distribution of the voluntary market could increasingly resemble that of the CDM (with the possible exception of the forestry sector).

Box 2. The GHG regulatory context in the US

To compensate for the lack of national CO2 regulation, several states have initiated their own regulatory processes, alone or in conjunction with others. Legislation is quickly evolving at the national and multi-state level as more states step up to the plate on climate legislation and members of Congress announce new legislative proposals on a monthly basis. As of May, 2007, legislators in the 110th US Congress introduced more than 70 bills, resolutions, and amendments addressing climate change. Currently, GHG emissions markets exist or may soon exist under the following regimes.

In 1997, Oregon enacted the **Oregon Standard**, the first CO_2 emissions regulation in the United States. The Oregon Standard requires that new power plants built in Oregon reduce their CO_2 emissions to a level 17% below those of the most efficient combined cycle plant, either through direct reduction or offsets. Plants may propose specific offset projects or pay mitigation funds to The Climate Trust, a non-profit created by law to implement projects that avoid, sequester or displace CO_2 emissions.

On the East Coast, ten states are developing the **Regional Greenhouse Gas Initiative (RGGI)**, a regional strategy to reduce CO_2 emissions using a cap and trade system. This is set to be launched in January, 2009, and will initially focus on power plants that use fossil fuels to generate over half their electricity and have energy production capacity above 25 MW. The program may be extended to include other GHGs and offsets from projects and project-based transactions. The scheme has a sliding scale that permits the use of flexible mechanism credits based on market prices: the lower the price of emission reduction credits, the more restrictive the use of those credits. If the average price of credits across the United States remains under $US7, then the scheme only allows participants to cover up to 3.3% of their emissions –or about half their mandated reduction– using credits from emission reduction projects, which must be located within the United States. If that price goes above $US7, then offsets can be used for up to 5% of emissions, and if prices rise above $US10 per ton, participants can use offsets for 10% of their emissions and those offsets can come from the US as well as from the EU ETS and the Kyoto Protocol's CDM.

California's **Global Warming Solutions Act (AB 32)** is the first US state-wide program to cap all GHG emissions from major industries that includes penalties for non-compliance. Under the Act, the California's State Air Resources Board (CARB) is required to create, monitor and enforce a GHG emissions reporting and reductions program. CARB is authorized to establish market-based compliance mechanisms to achieve reduction goals. There is a strong possibility to include other US States in the future. California has also joined five other states (New Mexico, Oregon, Washington, Arizona, Utah) and two Canadian provinces (British Columbia, Manitoba) in the **Western Regional Climate Action Initiative (WRCAI),** which formed in February 2007, and is expected to achieve an aggregate reduction of emissions of 15% below 2005 levels by 2020.

In mid- 2007, thirty-one US states signed onto **The Climate Registry**. Like the California Climate Action Registry, this Multi-State-and-Tribe Registry was created to "provide an accurate, complete, consistent, transparent and verified set of greenhouse gas emissions data from reporting entities, supported by a robust accounting and verification infrastructure". This registry was developed to facilitate regulatory or voluntary reporting. While the Registry is not currently being used by a US cap-and trade system, it will likely become part of such likely future initiative. Moreover, the popularity of this initiative signals that such registries will likely continue to play a key role in the US, not only in potential regulatory markets but also on the voluntary front. States which have signed on to the Registry have agreed to a series of goals which include establishing and endorsing a voluntary entity-wide greenhouse gas emissions reporting and verification system.

Source: Hamilton et al., 2007

4.2. Offsets quality

As a compliance mechanism, emissions reductions generated through the CDM need to achieve the highest possible quality to ensure the integrity of the Kyoto Protocol. This has implied the creation of uniform procedures and rules, as well as the establishment of an institutional structure within the CDM EB dealing specifically with the methodological issues

of different types of projects. This structure is complemented with the work, capacities and know-how of private consultants, which usually develop and propose methodologies for the estimation of emissions reductions from CDM projects, and of DOEs, in charge of reviewing projects during validation –including the appropriate application of methodologies- and of verifying and certifying emissions reductions before they can generate CERs. The methodologies approved by the CDM Executive Board have reached levels of detail and stringency never seen before in the history of offset schemes. Moreover, the documentation and supervision of projects and emissions reductions are also unprecedented. On the down side, ensuring the quality of CERs has implied lengthy processes and high transaction costs, specifically for projects which need to design a new methodology for their development (Ellis et al., 2007; Michaelowa, 2005).

Even though traditionally projects in the voluntary market had as their main objective the promotion of environmental and social goals, the quality of offsets has recently become an issue of similar importance for buyers in the voluntary market, who have feared criticisms on behalf of civil society (Taiyab, 2006). Consequently, as shown in section 2, the voluntary market has experienced the emergence of a number of standards, programmes and registries to improve offsets credibility. Many of these programmes accept automatically in their systems methodologies and DOEs approved by the CDM EB, and it is to be expected that new methodologies and approved verifiers under such initiatives will have to comply with requirements similar to those established for the CDM. The existence of more solid standards and institutions in the voluntary market will undoubtedly increase the average quality of the offsets traded in the coming years (Peskett et al., 2007). However, given the diversity of offset buyers and their interests, it may be argued that those seeing the voluntary offset schemes as a means to promote sustainable development may prefer to sacrifice offset quality and use the additional resources required to cover transaction costs to increase the social and environmental benefits or the size of projects instead. Therefore, it may be also argued that the overall quality of offsets in the voluntary market may not be comparable to that of the CDM, without this meaning that voluntary schemes are failing to fulfil their objective.

4.3 Sustainable development and equitable distribution

Recent studies suggest that the contribution of the CDM to sustainable development in developing countries has been and is likely to be limited (Boyd et al., 2007; Wara, 2007). Most concerns about the lack of sustainable development benefits in the CDM have arisen from the perception that the mechanism is being used mainly for the implementation of projects in sectors where mitigation actions have limited environmental and social benefits other than the emissions reductions and their associated income. These concerns are based on the large proportion of CERs from industrial gas projects in the CDM market, and the almost total absence of demand-side energy efficiency and forestry projects, usually considered as one of the project types with more direct and evident social and environmental benefits (Lohmann, 2006).

In contrast, the voluntary offset market is traditionally seen as capable of reaching poorer and smaller communities in developing countries, for example, by supporting a wide variety of forestry projects. Likewise, the voluntary market is perceived as being a particularly hospitable climate for smaller offset projects, which are assumed to provide greater opportunities to contribute to sustainable development in smaller communities (Hamilton et al., 2007). However, our review shows that there are several similarities between the CDM and the voluntary market. Assuming that all small projects (below 100,000 tCO_2e/year) regardless of typology provide sustainable development opportunities to low income

communities, both schemes have comparable results, since 70.3% of projects in the voluntary market in 2006 were small-scale, compared to 71.2% of the projects submitted to the CDM until 2007. Not surprisingly, in absolute terms the CDM has by far a greater impact, with 2,095 small projects versus only 45 in the voluntary offsets market (Tables 4 and 5 above). Likewise, considering that the proportion of offsets from industrial gases mitigation projects is greater in the voluntary market (32%) than in the CDM (20%), it is difficult to claim, at least from this point of view, that the proliferation of this type of projects with low sustainable development benefits is only an attribute of the regulated market. Finally, it is worth noting that the majority of forestry offsets from the voluntary market are occurring in the US and not in developing countries.

We acknowledge that assessing the potential contribution to sustainable development of offset schemes based solely on the relevance of some types of projects in their associated markets at a point in time may be rather simplistic and inaccurate. In our view, the contribution of offset mechanisms to sustainable development is more related to the design of projects than to their typology. For example, an HFC-23 destruction project could include a component specifically designed to use a share of carbon revenues in local community development projects or improving employment conditions. Likewise, in a larger scale, a government may establish a national strategy by which the overall contribution to sustainable development of its national project portfolio could be balanced, which would not be reflected in the analysis of specific projects. Further, it may also be argued that the real contribution of offset schemes to sustainable development may only be adequately assessed under a long term perspective, not only because offset projects usually last for decades, but also because their social and environmental effects (either positive or negative) will in most cases take many years to become evident (e.g., a capacity building component of a project will not show results until after some years).

Other important issues to be taken into account when comparing regulated and voluntary schemes are the mechanisms in place to ensure their contribution to sustainable development and the issues affecting their operation. As mentioned earlier in this article, the responsibility for determining if a CDM project promotes sustainable development lies, in theory at least, in the host country government. However, the definition of what sustainable development is in this context varies widely from country to country. For example, social development goals established by Brazil for the CDM emphasize employment and income distribution objectives, while Peru prioritizes more general local community needs and China's objectives have a stronger focus on promoting national economic growth over the local dimension of sustainable development (Boyd et al, 2007; Sutter, 2003). Also, the capacity of developing countries to establish clear sustainable development goals and indicators and to assess and monitor them is an important factor influencing the effectiveness of the CDM. Insufficient capacities are also a concern for NGOs and stakeholders participating in the assessment of projects during their validation. For example, the fact that PDDs are open to public scrutiny only through the internet before their final approval by the CDM Executive Board limits the number of people who can practically participate in such process, as most people in developing countries have difficult access to the internet (Corbera, 2005).

However, circumstances outside the control of developing countries' governments, stakeholders and NGOs may also affect the capacity of the CDM to promote sustainable development. These include, for example, the evolution of offset prices (e.g., low CER prices may discourage the acquisition of temporary (forestry) CERs), the preferences of the buyers in the market (e.g., favouring projects with large reductions over projects with sustainable development benefits) and policy decisions in Annex I countries (e.g. not allowing the use of

forestry CERs in the EU ETS). In the case of the voluntary offset market, there is currently no systematic approach to guarantee the contribution of projects to sustainable development. Existing standards provide different measures to achieve this aim, varying broadly in their level of stringency (**Table 8** for some examples). Approval from the governments of the participants involved in projects or from the host country alone is usually not required, although compliance with applicable regulations is. Some of the standards available (e.g., the Gold Standard or the CCB) are even more strict than many of the conditions established by host countries for the CDM, though they may not reflect the specific development priorities or interests of these countries. Stakeholder consultations are considered by many voluntary schemes, but not applied thoroughly across projects in the market.

Table 8. Sustainable development provisions of some standards in the voluntary market

Standard/programme	SD provisions
Gold Standard	Impacts on SD are assessed using a sustainable development matrix with a score for several variables. If a project scores non-positive in total, negative for subtotals or if some components have severe negative impacts then the project is not eligible for the GS. All projects have to apply an Environmental Impact Assessment (EIA) checklist. If negative impacts are likely, an EIA has to be conducted. EIA has to be performed in any case if the host government requires it or if it is requested during the local stakeholder consultation process. One or two public consultations are required depending on the size of the project. The requirements for a stakeholder consultation include an active invitation, the provision of a non-technical project summary, the usage of local language and the full documentation and dissemination of the consultation process.
VCS	Project participants must submit conclusions regarding requirements for and approval of an Environmental Impact Assessment (if applicable) and the sufficient documentation of environmental impact should be summarised, including stakeholder comments.
TÜV Süd VER+ Standard	Projects shall not cause substantial negative impacts on the environment and potential negative impacts must be mitigated. In case the host country requires an EIA, it needs to be submitted for approval by the end of validation. The project activity shall not cause severe negative social impacts.
Climate, Community and Biodiversity Standard	Positive community and biodiversity benefits are required for a project to become eligible. For the assessment of the net positive, community impacts appropriate methodologies such as "the livelihoods framework" have to be used. In the case of biodiversity impacts, the standards mention key species habitat analysis and connectivity analysis as appropriate methodologies. Stakeholder consultation is required and has to be documented. Additionally, project proponents have to formalize the process for handling unresolved conflicts and grievances arising during project planning and implementation.
WBCSD/WRI GHG Protocol for Project Accounting	Neither sustainable development benefits nor the necessity of stakeholder consultations or public input are addressed in the Protocol.
ISO 14064-2:2006, Part 2	Does not have specific SD provisions but demands guidance by good practice and compliance with relevant legislation for the project development.

Source: own elaboration

Consequently, it could be argued that the measures and institutional structure set up by the CDM have the potential to promote the sustainable development of host countries systematically, whereas the generation of such benefits in the voluntary market may be as different as the provisions of existing standards. However, the use of the most stringent standards in the voluntary market (i.e. CCB, Gold Standard) may provide greater social and environmental benefits than those expectable from CDM projects, particularly in countries with reduced capacities to design solid sustainable development criteria and to evaluate projects.

The contribution of offset projects to sustainable development has frequently been linked to their equitable distribution among developing countries. The CDM has been heavily criticized by the marginal participation of Africa, since it currently represents less than 2% of the regulated carbon market (Pearson, 2007; UNEP/RISOE, 2008). Comparatively, the voluntary market almost doubles its impact in Africa, with 5.7% of the total offsets transacted in 2006. In part, this has been attributed to the high transaction costs and costs of entry associated with creating a CDM credit in comparison to a voluntary offset credit and to the fact that Africa has few industrial carbon credits to provide to the CDM market, whereas it can be a major source of forestry credits (Hamilton et al., 2007). Additionally, it could be argued that this situation may be due to the different focus of the two offset schemes: investors using the CDM as a low cost compliance instrument would be interested in funding projects in areas with low overall risks, whilst buyers in the voluntary market would favour projects in areas where the social and environmental benefits are potentially higher. Leaving aside the particular situation of Africa, it cannot be said that the distribution of offsets in the voluntary market is equitable, considering that 43% of the offsets in the voluntary market is concentrated in the US.

4.4. Demand drivers

In the case of the regulated market, offset demand until 2012 will be driven by the GHG emissions limitation and reduction commitments established by the Kyoto Protocol for Annex I countries. The size of the market after 2012 will be largely determined by the stringency of commitments being negotiated by the Ad Hoc Working Group on Future Commitments for Annex I Parties under the Kyoto Protocol (AWG), a subsidiary body under the UNFCCC established specifically to this aim. Although the size of such commitments is still unknown, the AWG has recognized that achievement of reduction objectives in the range of 25-40% below 1990 levels by 2020 by Annex I Parties would "make an important contribution to overall global efforts required to meet the ultimate objective of the Convention" (UNFCCC, 2007). As part of the survey conducted by the Ecosystems Marketplace on the state of the voluntary market, offset suppliers were asked to identify the sector and location of their customers. Regarding the first question, suppliers classified their customers in 2006 as 80% private businesses, with 12% being government, 5% individuals and 2% NGO. As regards client location, over half of customers cited were based in the United States (68%) with Europe coming in second (28%) with Canada (3%) as a distant third.

In order to understand the driving forces behind the voluntary market, the survey asked suppliers to rank a series of purchasing motivations based on their perceived customer goals. From a seller's perspective, the two most prominent reasons for buying carbon offsets were for general Corporate Social Responsibility (CSR) purposes and being seen to "walk the talk", thus taking responsibility in front of the climate change problem (see also Taiyab, 2006). Interestingly, relatively few respondents saw the main benefit of acquiring carbon offsets through the voluntary market as a means to achieving future regulatory compliance. These results confirm that one of the most important factors affecting the drivers in both the regulated and the voluntary markets is public awareness. Undoubtedly, the fact that climate change has recently become subject of mass media attention –with Al Gore's "Inconvenient Truth" winning movie awards and the IPCC's fourth assessment report occupying newspapers' headlines worldwide and winning the Nobel Prize– has and will continue to strengthen both the international climate regime and the voluntary carbon market. Nevertheless, the outcomes of the survey seem to somehow contradict the recent evolution of the distribution of offsets in the market, given that, as shown earlier in this article, offsets from projects reducing gases with high mitigation potential and low social and environmental

have gained importance in the market, whilst those from forestry projects (arguably, more attractive for CSR and other similar purposes) appear to be increasingly less popular. Taking into account that most of the offset buyers identified by the survey are located in the US, it is also interesting noting that their responses seem to overlook the recent developments regarding GHG regulation mentioned in Box 2.

5. Conclusions

The CDM and voluntary offset schemes are different by definition. Although departing from the same instrument, arguably the AIJ pilot phase, both have evolved different in terms of institutional organisation and their linkages with the UNFCCC and the Kyoto Protocol. Currently, most of the activity in the voluntary market happens in the US and in the forestry sector (although the latter may be changing). We have argued that the current growth of the voluntary offsets market might possibly be reflecting the overlap of at least three different situations. First, an increase in "traditional" voluntary market projects due to an enhanced public awareness on climate change and other social and environmental issues; second, the entrance to the voluntary market of projects currently not allowed in the CDM (e.g. A&R in areas not eligible under the CDM, HFC-23 reduction in new plants) and, third, a "compliance attitude" by entities in the US in view of the imminent legislation on climate change in the country and the uncertainty about the position of the US in the international regime post-2012.

Regarding some common beliefs concerning the voluntary market vis-à-vis the CDM, we suggest that, with the exception of the forestry sector, the share of other project types in both markets is similar. Small scale projects, often assumed to reach communities and small landowners in developing countries, happen almost in the same proportion in both schemes, but in absolute terms the CDM supports more of these projects. The voluntary market might provide greater sustainable development benefits to communities and small landowners through forestry projects, but these happen mostly in the US and not in developing countries. In fact, the contribution of both schemes to sustainable development should be assessed from the "big picture" and in the mid-term to be accurate. We have shown, nevertheless, that the voluntary market allows for a greater participation from African countries (particularly through forestry projects), but the large share of the market by the US makes it difficult to claim that the voluntary market is in fact promoting an equitable distribution of project across the world. Finally, offsets quality is more consistent in the CDM market, but the recent boom of standards in the voluntary market may equalize this situation in the future. However, a lower quality of offsets should not be regarded as voluntary schemes failing to fulfil their objectives.

Overall this paper has contributed to challenge those who sustain that the voluntary market can perform better than the CDM in terms of sustainable development and the equitable distribution of projects worldwide. In fact, we have shown both mechanisms are complementary in terms of project types, participating countries and buyers, and together constitute valuable instruments to fight climate change and promote, albeit with limitations, national and local sustainable development priorities. Nevertheless we have argued that the latter may be more a product of project design and implementation arrangements than the broader institutional structures of the regulated and voluntary offset markets.

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