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Voluntary Carbon Markets: What the Standards Say...

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Abstract

Although still accounting for a small segment of the global carbon market, the voluntary carbon market is a place for innovation where original solutions are proposed to deal with some challenges faced by the regulatory market, including efforts to value the occasional ancillary benefits of climate action, to simplify methodologies, or to guarantee the permanence of forestry assets. These innovations are reflected in the different standards used for voluntary offset projects and may provide some valuable lessons for on-going post-2012 negotiations. This study analyses two aspects of these standards: the type of projects they attract, and the transaction costs entailed by their procedures.

Projects certified by "basic carbon standards" such as the VCS, the VER+ and the CCX are very similar to regular CDM projects, albeit for their size which can be smaller. Projects certified by "multiple benefits carbon standards" such as the GS and the CCB Standards however tend to be more diverse than CDM projects, both in terms of project location and technology.

For large-scale projects, transaction costs can differ by up to 100% between standards, although they remain small compared to credit prices. For small-scale projects however, they can represent a real burden with costs around 2-3 €/tCO_2e. The analysis of the internal rate of return (IRR) of hydro projects leads to a similar conclusion: as overall project costs dwarf certification costs, the choice of the standard has little influence on the IRR. However, for projects that require lower initial investments, such as biogas capture or manure management, the conclusion could be very different.

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Note

The euro/dollar conversion rate used in this study is 0.69 dollar per euro.

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1. Introduction

As consensus is growing on the necessity to mitigate future climate change by reducing current emissions, some companies, institutions, and individuals have taken steps to reduce their carbon footprint, even though they are not required to do so by regulation. This "voluntary" demand for carbon offsets, generated by projects that reduce emissions, is driving the "voluntary carbon market". In their reference publication on the topic, Hamilton et al. (2008) distinguishes between the Over The Counter (OTC) market, which corresponds to the definition we just mentioned, and the Chicago Climate Exchange (CCX), a voluntary cap-and-trade system (see Box 1). Although the voluntary OTC market remains about 15 times smaller than the compliance offset market (CDM and JI), it has recently grown very rapidly. Hamilton et al. (2008) estimates that volumes transacted have grown almost five-fold since 2005 reaching 41MtCO_2e in 2007, while value grew almost seven-fold over the same period, to US$258million.

This spectacular growth was not taken for granted in 2007: journalistic investigations and reports by NGOs unearthed projects of doubtful environmental integrity. Companies make up about 80% of total voluntary demand for carbon offsets. As one of their leading incentives is to communicate on their environmental responsibility, they are very sensitive to the risk of unfavorable press. The fact that their demand grew so much despite the concerns raised about offset quality hints that some progress has been made on that end to reassure buyers. The emergence of credible standards relying on robust methodologies and monitoring plans to guarantee emissions reductions, and sometimes other social and environmental benefits, has probably been instrumental in building the confidence of prospective buyers.

Ecosystem Marketplace lists 13 offset project standards[4] on the voluntary market, and referred to 2007 as "the year of the standard". These standards can be classified in two categories, serving two types of needs. "Basic carbon standards", such as the Voluntary Carbon Standard (VCS) or the Verified Emission Reductions plus (VER+), certify carbon accounting methods and guarantee that each credit they issue corresponds to an emission reduction of one ton of CO_2e. "Multiple-benefit carbon standards", such as the Gold Standard or the CCB Standards, also include broader environmental and social aspects. A carbon credit that has been awarded this type of standard includes an emission reduction of one ton of CO_2e, but also the guarantee that the project generating this reduction provides additional benefits, to local communities or to ecosystems. "Basic carbon standards" are aimed at buyers focused on carbon accounting while multiple-benefit carbon standards" meet the demand of

[4] The California Climate Action Registry's Climate Action Reserve, CarbonFix Standard, Chicago Climate Exchange, Offsets Program , Climate, Community, and Biodiversity Standards, Greenhouse Friendly, The Gold Standard, ISO 14064 Standards, Plan Vivo, Social Carbon , Voluntary Carbon Offset Standard , VER + Standard , the Voluntary Carbon Standard. The main features of those highlighted in green are detailed in Table 1; for more details on the others refer to Hamilton et al. (2008), p 48-51.

buyers who also need to "tell a beautiful story" (high contribution to sustainable development) about the offsets they use.

Out of the 13 offset project standards existing on the voluntary carbon market, we chose to focus on only five of them, not including the CDM which is also widely used to certify emissions reductions sold on the voluntary market, and which we use here as a benchmark for comparison. The five standards are the Voluntary Carbon Standard (VCS), the Gold Standard (GS VER – GS CDM)[5], the VER+, the Climate, Community and Biodiversity (CCB) Standards and the Chicago Climate Exchange offset program (CCX). They are the most commonly used standards on the voluntary market, totaling 56% of all voluntary certified projects in 2007 (Hamilton et al., 2008) and market participants often cite them as the most promising. Moreover, they provide an exhaustive coverage of standard types: three of them are basic carbon standards (VCS, VER+ and CCX), and the two others are multiple-benefit carbon standards (GS and CCB Standards). Four of them allow the certification of forestry projects[6], i.e. the VCS, CCX, VER+ and CCB Standards, while the GS does not. The CCB Standards can only be applied to land-based carbon projects, including agriculture, forestry and other land-use, while the GS can only be applied to renewable energy and end-use energy efficiency projects. The most important features of these standards are displayed in Table 1.

Table 1: Features of the standards studied

Name	Sponsors	Launch date	Project types	Co-benefits	OTC market share
Voluntary Carbon Standard (VCS)	The VCS Association is supported by various carbon market actors	March 2006: VCS V 1.0 Nov. 2007: VCS 2007 Release of new version imminent	All	Basic carbon standard	High: 27% On the rise
Gold standard (GS VER, GS CDM)	The Gold Standard Foundation is supported by 60 NGOs and charitable organizations (including WWF)	2003: GS CDM V 1.0 2006: GS VER V 1.0 Sep.2008: GS V 2.0	Renewable energy, end-use energy efficiency	Multiple-benefits carbon standard	Small: 9% On the rise
Verified Emission Reduction + (VER+)	The VER+ is administrated by the german auditing company Tüv Süd	April 2007: VER+ V 1.0 May 2008 VER+ V 2.0	All, except large hydro	Basic carbon standard	Small: 9% Stable
Climate, Community, and Biodiversity Standards (CCB Standards)	The Climate Community, and Biodiversity Alliance is supported by NGOs (incl. CI, TNC, CARE) and companies (BP, Intel, SC Johnson)	May 2005: CCB Standards V 1.0 Dec. 2008: CCB standards V 2.0	Land Use, Land Use Change and Forestry (LULUCF)	Multiple-benefits carbon standard. Does not verify quantified carbon credits but validate that the project design achieves climate, community and biodiversity benefits. Must come on top of a carbon accounting standard to generate genuine VERs.	Very small: 2% On the rise
CCX Offsets Program (CCX)	The Chicago Climate Exchange counts more than 350 CCX members (capped emitting industries,market actors)	2003	Agricultural, coal mine and landfill methane, carbon soil, forestry, renewable energy, ozone depleting	Basic carbon standard	Small: 7% Declining

Source: Mission Climat of Caisse des Dépôts.

[5] Both the Gold Standard and the CCB Standards can come on top of the CDM label, or certify purely voluntary projects. As the procedure is slightly different in these two cases, we chose to separate them and treat each case as an independent standard: GS VER, GS CDM, CCB Standards and CCB CDM.

[6] As opposed to the CDM compliance market, forestry projects have always been high in demand in the voluntary markets. They were the source of 37% of the credits sold on the OTC in 2006, and 15% in 2007.

This study aims to analyze whether or not these different standards attract different types of projects and understand what are, from the project sponsor and developer point of view, the relative benefits of developing a project along a specific standard among those in existence in the voluntary market. In particular, we examine the financial implications (transaction costs and operating time) of this choice; this study may therefore also help identify lessons at a time of intense discussions and propositions about re-thinking and reforming the CDM as a helpful tool for the challenges lying ahead.

2. The standards viewed from the projects they certify

This section analyzes, for each of the above-listed standards, several characteristics of candidate or registered projects, including their size, their location, and the technology they use to reduce emissions. As most standards exist only since one or two years, we chose to include their "pipeline" in the analysis in order to increase sample size. The "pipeline" of a standard consists of projects that have applied for certification under a standard, but have not yet been certified. In this analysis we also include the CDM pipeline for comparison (UNEP RISØ as of July 2008); to make the CDM project portfolio comparable to those of young standards and thus capture any changes in CDM application trends, we only kept CDM projects that requested registration after January 1st, 2007.

2.1. Material and methods

All standards must keep track of the projects they certify. Most often, they maintain a project database or a registry which are available online. The pipeline however is seldom listed. Moreover, some interesting characteristics are sometimes lacking. We therefore completed these databases with several other sources:

- Information provided by the standards administrators,
- Project Design Documents (PDDs) available online from the standards' project databases,
- PDDs displayed online by Designated Operational Entities' (DOEs),
- Project portfolios displayed online by several project developers.

The information gathered from these different sources allowed us to compile a database of 415 offset projects, either certified by or in the pipeline of one of the five standards we selected for this study. Given the difficulty of accessing information and the heterogeneity of certification processes among standards, we do not guarantee that it constitutes an exhaustive list of their respective portfolios and pipelines. Nevertheless, for each standard we presented the projects sample to the standard's administrator. After a check of the sample and the characteristics we drew from it, all administrators reckoned that it was representative of the projects they certify.

In this section, we also look at the demand side of standardisation. We tried to determine whether carbon credits are sold at a premium price if and when they are certified. This market analysis is based on existing data published on the subject by Hamilton 2008, WWF 2008, and New Carbon Finance 2008, completed with direct interviews of market participants (9 offset retailers, and 3 carbon asset managers).

Box 1: What about CCX offsets?

The CCX is a voluntary cap-and-trade system. Its "full members" are U.S-based emitting industries that have committed to reducing their GHG emissions. At the beginning of the year, they are allocated a number of Carbon Financial Instruments (1 CFI=100tCO_2e) corresponding to their reductions commitments. Every year, they must surrender enough allowances to cover their emissions. Offset project developers (so-called "providers" or "aggregators") can also get enrolled as "participant members" and provide the trading platform with CCX verified offsets. Once on the platform, these CCX project-based credits and the CCX allowances are commoditized into Carbon Financial Instruments (CFIs) that can be purchased by Members or Liquidity Providers for compliance or other purposes.

Such offsets are more akin to CDM credits used for compliance than to voluntary offsets purchased as part of a voluntary decision to offset emissions, for example to offer "carbon neutral" products or services. The CCX global offset portfolio is, therefore, not comparable to the portfolio of other standards. However, some CCX participant members provide an offset retailing service to individuals and companies that are not members to the CCX and yet want to offset some or all of their emissions with CCX project-based credits. In that case, the CCX offset program is used as a standard for the voluntary OTC market. It is this use of CCX offsets that we intend to survey here. We therefore restricted our analysis of CCX projects to those intended to be sold on the OTC market.

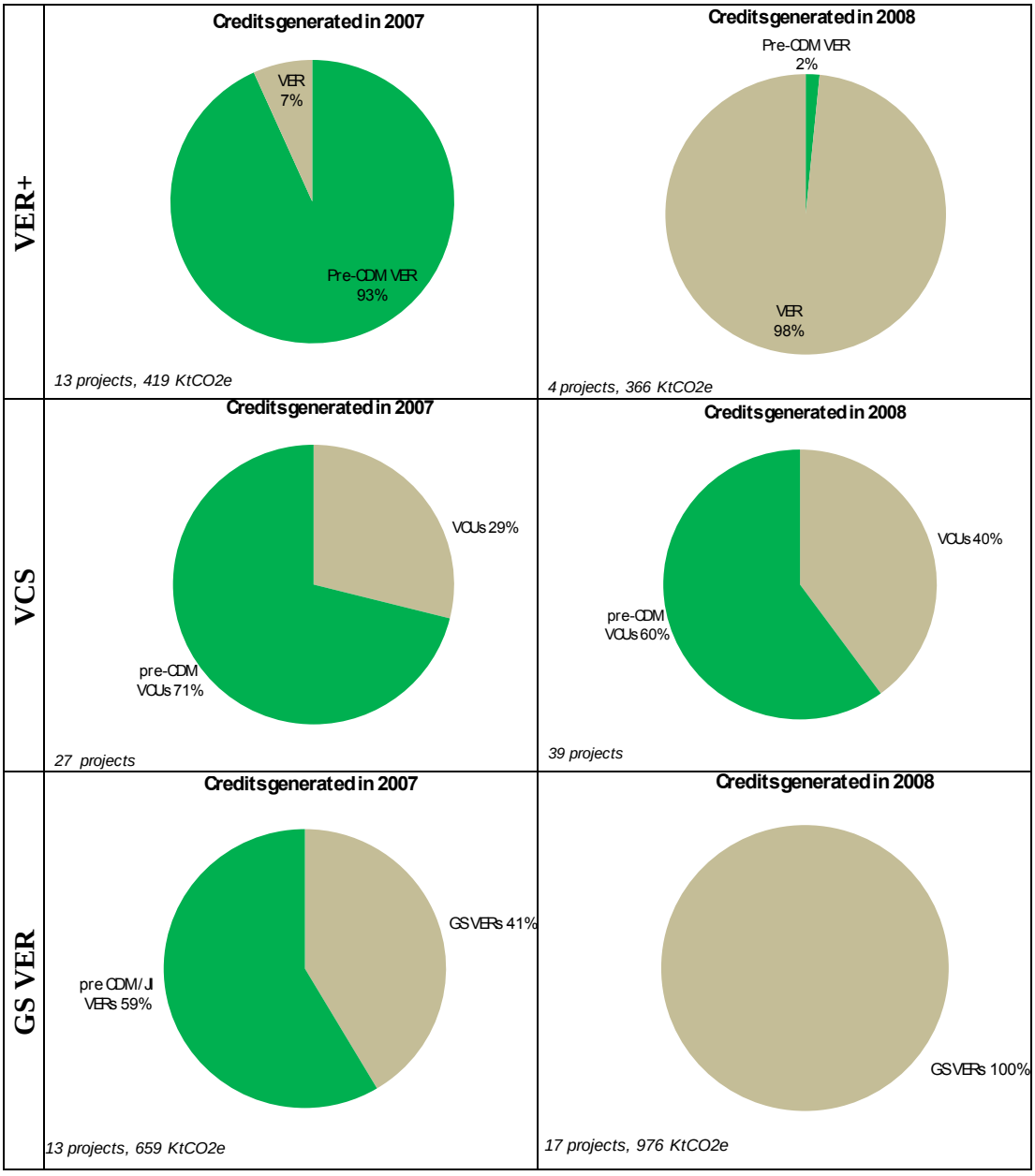
Dozens of organizations are registered as "offset providers" or "offset aggregators" in the CCX. We identified those who were selling offsets on the OTC market – that is to non-CCX members – by scanning their website. This was confirmed by interviewing these offset providers. This way, we were able to confirm that offsets directed to the OTC market came only from four offset retailers offering credits from a total of 18 CCX verified projects. In 2007, only 0.5 MtCO_2e/year of emissions reductions they generated were sold on the OTC, which is 13% of the estimate of Hamilton et al. (2008) for CCX credits transacted the same year. As CFIs are standardised contracts that incorporate a variety of products, the remaining 87% may therefore consist in CCX allowances, and not in project-based CFIs.

2.2. Pre-CDM credits: an ebbing wave?

"Retro-active crediting" is no longer allowed for CDM projects registered after March 31st 2007. This means that only reductions occurring after project registration can be credited. While they are awaiting registration by the CDM Executive Board, some offset projects seek certification under a voluntary standard. Because they allow

CDM methodologies, the VCS, VER+, and GS VER are interesting ways for these so-called "pre-CDM" projects to start generating carbon credits before their CDM registration date. In our database, we distinguish between strictly voluntary projects and pre-CDM projects if the latter present an official UNFCCC PDD and appear in the UNEP RISOE CDM pipeline. Figure 1 shows, for each relevant standard, the share of pre-CDM credits within their portfolios of projects generating credits in 2007 and 2008.

Figure 1: Share of pre-CDM credits within VER+, VCS and GS portfolios (% of credits)



By way of example, our database consists of 13 VER+ projects generating credits in 2007 (11 pre-CDMs and two VERs) while we have only four VER+ projects for 2008 (one pre-CDM and three VERs). Consequently, among the 13 pre-CDMs crediting in 2007, 12 passed UNFCCC registration over 2007 and the one left continued to generate pre-CDM credits in 2008 with the latter two strictly VERs and one new entrant to the pipeline.

Source: Mission Climat of Caisse des Dépôts.

In 2007, pre-CDM credits produced under the VCS, VER+, and GS VER accounted for respectively 71%, 93% and 59% of their portfolios. In their 2008 pipeline, these shares drop to 60%, 2%, and 0%, as many projects have successfully registered over 2007. Most pre-CDM projects certified under the VCS and VER+ became CDM projects, while those certified under the GS CDM all switched to generating GS CERs after passing UNFCCC registration over 2008. As the first commitment period of the Kyoto protocol begins, 2008 is also the first year when pre-JI projects have an opportunity to be registered, to generate JI credits, and thus be removed from the pre-JI projects category.

These figures show that in 2008 the supply of these standards started to diverge towards "strictly" voluntary projects. As the delays in the CDM registration process tend to grow, this sharp drop is rather counter-intuitive. This may however be explained as follow:

Claiming pre-CDM credits is no longer allowed under the GS. Only projects that have been submitted for CDM validation prior to January 31st, 2008 can indeed apply for the GS VER and only if they can prove they have been facing unexpected delays in the CDM registration process. For projects coming on line later on, pre-CDM VERs cannot be verified along any standard if they wish to apply for the GS CDM.

In the early stages of their existence, the VER+ and VCS may have seen pre-CDMs over-represented within their portfolios as project developers would tend to prioritise them since they used to command a higher price on the voluntary market (see section 1.6) and are developed along the CDM standard and thus offer more information available for over-booked DOEs (see section 2.5).

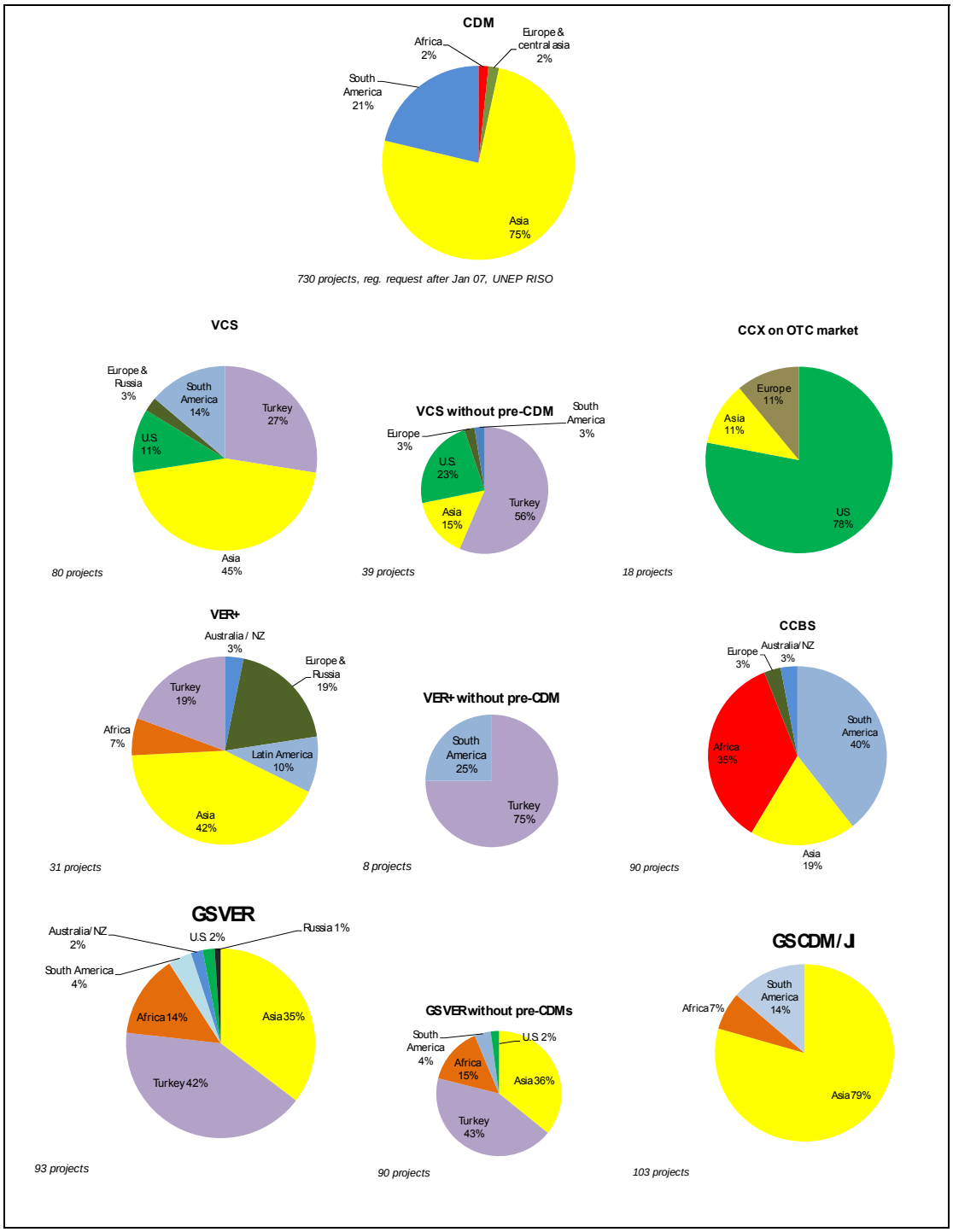
However, the full pipelines of the VCS and VER+ are not readily available, as projects are directly approved by auditors. For these two standards, projects can also claim credits retro-actively. Given the increasing bottlenecks along the UNFCCC registration process and subsequent delays incurred by many projects applying for CDM registration, this possibility of faster and/or retroactive crediting could be attractive to project developers. Therefore, other pre-CDM waves on the voluntary market cannot be ruled out.

Moreover, with persisting uncertainties on the post-2012 front, some project developers are seeking a double certification CDM-Voluntary Standard as a risk mitigation strategy: should the CDM market loose momentum in the running up to 2012, they could try selling their credits on the voluntary market. This may however oversupply the voluntary market causing significant effects on the price of VER credits.

Due to the preponderance of pre-CDM projects in the full portfolios of the VCS, VER+, and, to a lesser extent, in that of the GS VER, it will thus be important to distinguish them from "strictly" voluntary projects in the rest of this section. This distinction leads to more limited sample sizes, especially for the VER+ whose number of projects in our database drops to 8.

2.3. Geographical distribution of projects: multiple-benefit carbon standards reach outside of the CDM traditional range

Figure 2: Geographical distribution
(percentage of the number of projects in the sample)[7]



Source : Mission Climat of Caisse des Dépôts.

[7] The samples sometimes include projects that are no more generating credits in 2008. This is the case of pre-CDM projects which were registered in 2007.

The VCS and VER+ have a large share of Asian projects, accounting respectively for 45% and 43% of their full project portfolios. On the contrary, projects in Africa are under-represented; to date, we have been able to track only 2 VER+ projects and no VCS project in Africa (both are pre-CDMs) and 3 in South America. For the VCS, our database only has one project registered in Africa.

These results highlight the similarities that these two "basic carbon standards" have with the CDM in terms of project geographical distribution. This is probably due to their large share of pre-CDM projects. Indeed, when these are removed, mainly Turkish and/or U.S. projects remain in their portfolios. The specific Annex 1 – non-Annex B status of Turkey means that even these projects, while not being officially pre-CDM, may be ultimately directed to the compliance market (see Box 2). Indeed, there are no projects in the Middle East outside of Turkey. This tends to show that the VCS and the VER+ are essentially pre-compliance standards and the relatively high representation of "voluntary" projects based in US, Europe and Turkey in the VCS pipeline suggests that the VCS, in addition to being used to value emissions reductions prior to CDM registration, is also used to anticipate future climate change legislation such as a federal Cap & Trade in the U.S..

Unlike the GS CDM/JI whose 100% CDM portfolio compares to that of the CDM, the GS VER has a significant share of African projects (14%), yet a share of South American projects smaller than the VCS and the VER+. Turkey is here again well represented with 42% of the GS VER projects.

With 35% of CCB Standards projects in Africa and 40% in South America, AFOLU (Agriculture, Forestry, and Other Land-Uses) projects confirm their strong potential for development out of Asia, and especially in Africa. As many projects are currently seeking the double accreditation VCS+CCB Standards, the VCS portfolio may soon become more diversified, with more projects in Africa and South America. The Plan Vivo System[8], another standard solely dedicated to forestry and land-use projects, confirms this trend with three operational projects in Mexico, Uganda and Mozambique and two others under development in Rwanda and Malawi.

The presence of pre-JIs diversifies several portfolios towards Europe and Russia, and the GS VER has 2 of them in New Zealand.

Multiple-benefit carbon standards (GS VER and CCB Standards) thus attract projects outside of the CDM traditional range. In that respect, they can be seen as complementary to the CDM.

Although the CCX allows the enrolment of projects out of the U.S. ground, 78% of the CCX projects whose credits are for sale on the OTC are U.S domestic projects. The remaining 22% are two Asian and two German projects. Since the CCX no longer enrols projects in EU ETS countries because of double-counting issues, this confirms that some old-vintage credits (before 2005) are still for sale on the OTC.

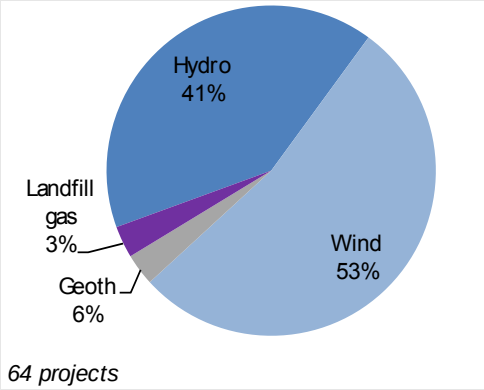
[8] www.planvivo.org

We can finally note that Australia is almost absent in our database, as the CCB Standards is the only standard to have Australian projects (two) in its pipeline. This may be due to the dominating position of the "Greenhouse Friendly" standard managed by the Australian government. This "process standard" certifies both the quality of offset projects and the way companies measure the emissions they want to offset. The use of New South Wales Greenhouse Abatement Certificates[9] (NGACs) to voluntarily offset GHG emissions has also lately gained increasing interest from individuals and companies in Australia.

Box 2: The Turkish niche

Turkey officially became the 189th Party to the UNFCCC in 2004; as an advanced developing country with lower GHG emissions per capita compared to other OECD and Annex-I countries, it was granted recognition of "its position that is different than other Annex I Parties". By that time, the Kyoto protocol had been adopted by the other Parties to the UNFCCC (1997), leaving Turkey out of the Annex B. Turkey thus has a unique status of "Annex I non Annex B" country, keeping it from hosting either CDM or JI projects. In such a context, Turkey rapidly became a niche for the voluntary market.

We were able to track 64 Turkish projects, all to be operational by 2010. 34 of them are wind projects, 22 hydro, two geothermal and two landfill gas. This highlights Turkey's strong potential for renewable energy sources. As a matter of fact, the GS VER is predominantly used in this market with 45 projects. Our database also lists 6 VER+ projects and twelve VCS, the 5 remaining are hydro projects that have not applied any standard. We only have emission reductions information for 54 projects. Should these 54 certified projects deliver as expected, they would generate 5.1 $MtCO_2e$/year by 2010, and a total of 19.7 $MtCO_2e$by 2012. Taking account of the 64 projects, we can estimate the latter figure to reach 22.6 $MtCO_2e$.



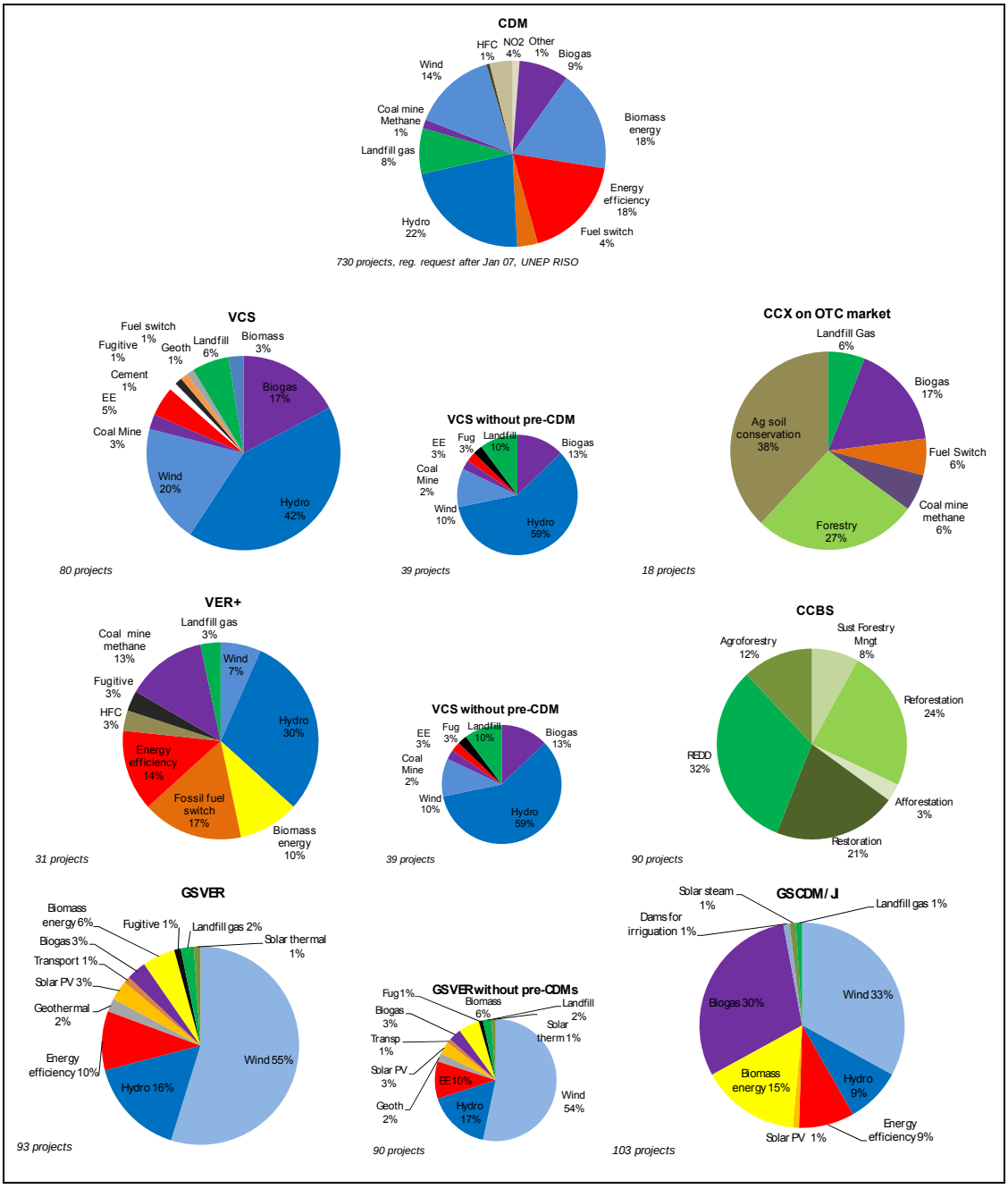
Source: Mission Climat of Caisse des Dépôts.

Arikran *et al.* (2008) sees Turkey's preponderant role in the voluntary market as a strong commitment to accessing post-2012 global carbon markets. The talks between the Turkish Government and Parliament led the country to ratify the Kyoto Protocol in February 2009. It now remains to be seen to what extent these "early" projects may integrate post-2012 flexibility mechanisms.

[9] NGACs are energy efficiency certificates traded by large electricity suppliers and users under the New South Wales Greenhouse Gas Abatement Scheme implemented in 2003. Participants must meet mandatory emission reductions target by purchasing and surrendering NGACs created from activities that reduce electricity consumption.

2.4. Project technology: towards more visible co-benefits and innovation

Figure 3: Project technology (percentage of the number of projects in the sample)[10]



Source: Mission Climat of Caisse des Dépôts.

[10] The samples sometimes include projects that are no longer generating credits in 2008. This is the case of pre-CDM projects which were registered in 2007.

Besides the preponderance of wind projects (55%), the GS VER also has significant shares of energy efficiency (10%), hydro projects (16%) and a wide variety of other project types. Despite having a scope of project types narrower than the other standards, the GS demonstrates a great capacity to attract innovative technologies such as biodiesel for transport from waste cooking oil recycling[11], solar steam, photovoltaic, efficient cook stoves and geothermal energy.

The CCB Standards distinguishes 6 types of forestry projects, with several projects using a combination of technologies. Reducing Emissions from Deforestation and Degradation (REDD) is the most common component, used in 32% of CCB Standards projects. According to the standard's administrator, this dominance was triggered by the Bali COP/MOP in December 2007. Mounting interest in the possible role of REDD in a future climate regime seems to have dramatically stimulated the number of REDD applicants. As the feasibility of a direct link between REDD and compliance markets, in the form of tradable REDD credits, is being debated, the experience gathered by these standardised REDD projects developed on the voluntary market will provide highly valuable material to negotiators.

To date, no forestry project has yet been certified under the VCS AFOLU since AFOLU was only integrated into the VCS from the release of the VCS AFOLU Guidelines in late 2008. According to some market participants and standard administrators however, a significant number of projects are currently awaiting the standards to endorse methodologies so to seek the double certification CCB Standards-VCS AFOLU. This double certification is aimed to combine the rigorous carbon accounting and permanence rules of the VCS to the broader social and environmental dimension of the CCB Standards. Should this preliminary finding be confirmed by the upcoming VCS projects, it would be a genuine difference with the CDM which has so far been largely unable to attract forestry projects.

The CCX pattern is interesting: 65% of projects come from either agricultural soil carbon enhancements or from the forestry sector, two technologies largely ignored[12] by the CDM and the VER+, and not covered by the Gold Standard. Unlike methane or other gas capture projects where direct measurement is required by the CCX, agricultural soil sequestration projects can generate CCX offset credits for the verified use of technologies or practices that are known to reduce emissions at rates that are scientifically proven and discounted for conservativeness. These projects also account for a large part of the CCX global offsets portfolio, with respectively 35% and 12% of the offsets and early action credits issued as of 09/07/2008[13]. This may therefore show the positive effect of the use of practice and performance-based methodologies on the development of agricultural soil sequestration projects (see section 2.3).

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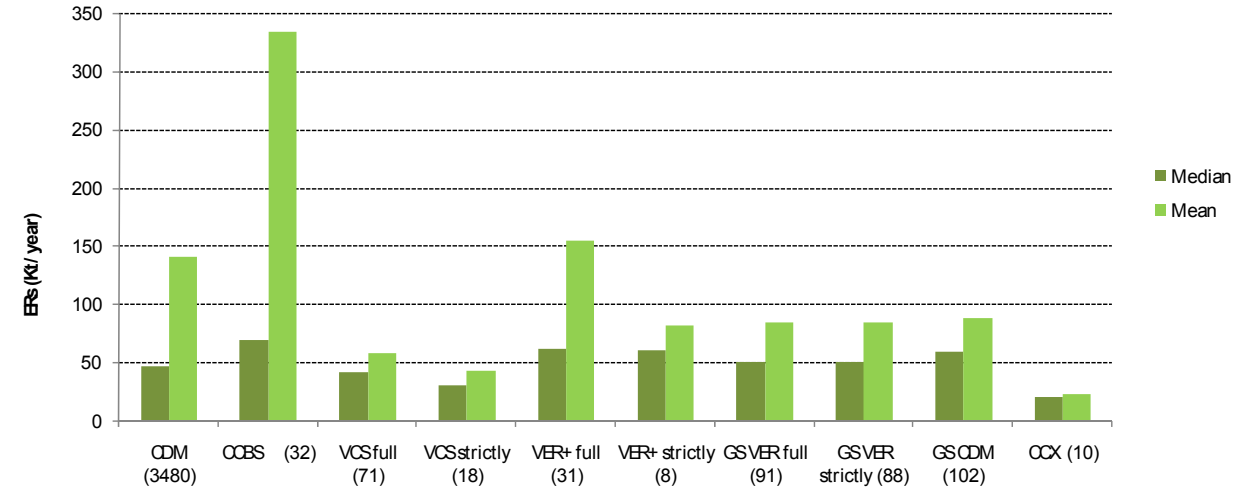
[11] To date, no methodology for biodiesel from dedicated crops has been developed.

[12] Debates over the additionality and sustainability of these projects are still on-going.

[13] See the CCX Registry Offsets Report: http://www.chicagoclimatex.com/offsets/projectReport.jsf

2.5. Projects size: related to transaction costs?

Figure 4: Project size in $ktCO_2e$/year emission reductions



(number of projects in the sample)

Source: Mission Climat of Caisse des Dépôts.

In terms of project size, the CCB Standards clearly stands out with an average project size of 334 $ktCO_2e$/year. This large average is due to a few projects with a large REDD component. Some of them are forecasting emission reductions up to 3.4 $MtCO_2e$/year. The median size, around 50 $ktCO_2e$/year is more comparable to other standards.

The CCX seems to attract more small-scaled projects with a median project size of only 20 kt CO_2e/year, less than half the figure for CDM projects. The figure was 30kt CO_2e/year for the VCS. If one focuses on small-scale projects (defined here as projects that generate less than 60 $ktCO_2e$/yr)[14], CCX and VCS "strictly" projects are still smaller than CDM projects, though the difference is narrower. The median size of the first two gets down to 20 and 15 $ktCO_2e$/year respectively, while the median size of CDM small-scale projects is 26 $ktCO_2e$/yr. Again, a possible explanation for the CCX could be the difference in requirements that make some farm-scale projects profitable, a possibility totally unthinkable for CDM projects (see section 2). The VCS allows the development of performance-based methodologies to demonstrate additionality: the projects beating a given performance baseline, are considered to be additional. This could also greatly lower the critical size to ensure project profitability. However, no such methodology has so far been approved by the VCS board. The current figures are thus more likely explained by lower transaction costs.

[14] The CDM definition of small scale, though often approximated to the less than 60 $ktCO_2e$/year definition, is more complicated: renewable energy projects with a maximum output capacity of 15 megawatts, energy efficiency improvement projects reducing energy consumption by up to the equivalent of 60 gigawatt hours per year, and other project types emitting less than 60 $ktCO_2e$/year (decision 17/CP.7., paragraph 6(c), amended by 1/CMP.2, paragraph 28.) or less than 16 $ktCO_2e$/year for forestry projects.

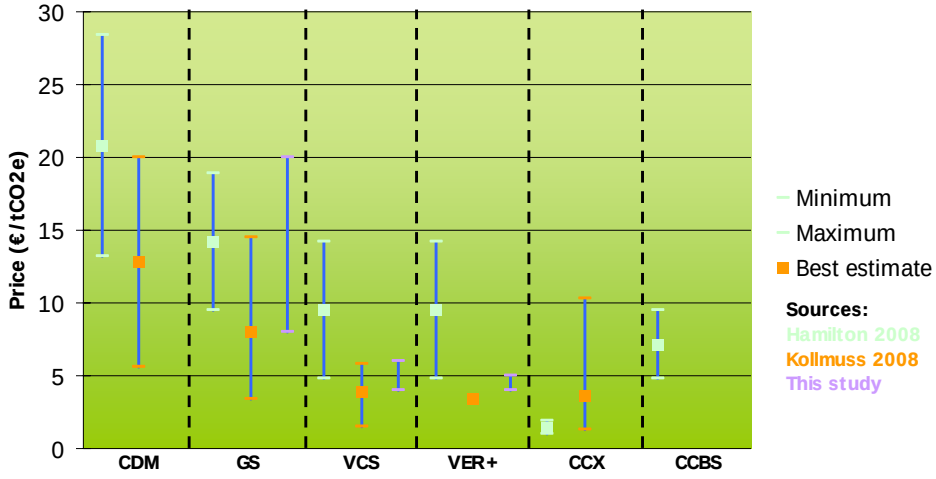
They could also simply be an artefact due to small sample sizes. The "strictly" VER+ projects have a higher average size (61 $ktCO_2e$/year), very similar to that of the CDM.

Although the GS CDM and GS VER attract projects of various sizes, the average size of their projects is driven up by the predominance of large wind projects within its portfolio. This pattern in a "multiple-benefit carbon standard" is consistent with the findings of Dechezleprêtre *et al.* (2007) which show that large projects and those involving wind power are more likely to deliver co-benefits from technology transfer (knowledge and equipment).

2.6. The puzzling market for standards

Two studies[15] provide some insights on credit prices for the different standards on the OTC. As there have only been few tenders for voluntary carbon credits on market exchanges so far, both studies rely on interviews of market participants. As shown in Figure 5, they obtained very different results with wide price ranges. This is in part due to small sample sizes: for the standards we consider here, the estimates of Hamilton *et al.* (2008) are based on 21 data-points[16] and those of Kollmuss *et al.* (2008) rely on a single carbon trading and project facilitation business. Nevertheless, both studies show no conclusive price differentiation across standard in 2007. Though an update of the State of the Voluntary Carbon Markets (Hamilton's study) indicates clearer price separation across standards by mid-2008, many other show the price other project characteristics, such as size, type and location are probably also important in determining the credit price that a given project can command. Moreover, the lack of transparency and access to information on prices as well as market fragmentation contributes to the heterogeneity of credit prices (Bellassen and Leguet, 2007).

Figure 5: Credits prices[17] for the different standards on the OTC



Sources: Hamilton 2008, Kolmuss 2008, Mission Climat of Caisse des Dépôts.

[15] Hamilton *et al.* (2008) and Kollmuss *et al.* (2008).

[16] Seven for the GS, six VCS, one VER+, seven CCX, and zero CCB Standards. Each data-point corresponds to a survey response of one retailer indicating that more than 90% of its volume was verified by one particular standard.

[17] Prices for verified credits (not forward transactions).

We tried to refine explanations to the absence of price standardization through direct interviews with a dozen of worldwide voluntary carbon market players (9 offset retailers, 3 carbon asset managers). From these, we gathered two important elements on voluntary carbon credit prices.

The first key element pertains to the "maturity" of the OTC market, which varies considerably among countries. According to most market participants interviewed, the UK demonstrates the furthest "maturity", meaning that customers have become more familiar with the voluntary carbon market and are now demanding that the credits they buy be certified. It now seems almost impossible to sell offsets that are not certified by one of the existing third party standards. Certification has therefore become indispensable for accessing the market. Offset retailers often participate in the choice of the standard, although the decision is ultimately made by the project developer. In most other European countries, offset buyers are less demanding, although recognition for standards is gaining ground. The Netherlands and the Scandinavian countries are regarded by professionals as places where this phenomenon is quickly occurring. Conversely, some of the market players interviewed reckon that the French, and to a lesser extent the German customers pay little attention to third party certification and concentrate on investing in charismatic projects rather than in dematerialised credits. In the US, the CCX has long been the only standard available for domestic projects which was the most appealing one to American customers (Bellassen and Leguet, 2007). However, this has changed over 2008: market participants increasingly show interest in projects abroad providing visible development benefits, and for domestic projects, other standards, such as the VCS and the CCAR[18] (California Climate Action Registry) are gaining ground as pre-compliance buyers bet on their validity in a future U.S. federal Cap & Trade.

One key element to understanding the absence of price standardization in the OTC therefore lies in the different levels of market "maturity" from country-to-country. If most retailers declare that the global context pushes them to seek certification for their projects, the recognition standards get from buyers is nonetheless very variable among countries. This geographical differentiation (level of education) combined to the buyer segmentation (different types of buyers for different types of needs: flight offsetting for individuals, Corporate Social Responsibility or pre-compliance strategies for businesses) therefore affects the price premium that can be commanded by certification.

The second key element that does not appear in recent relevant studies is that despite the price heterogeneity, multiple-benefit standards manage to command price premiums. Co-benefits and the associated "luxury" mark are a likely explanation for this. Another much cited reason is the shortage in credit supply: to date, the CCB Standards has only certified 7 projects, and the Gold provides the market with very small supply (to date, there are 31 registered GS projects delivering

[18] US projects meeting CCAR standards have been recognized by the VCS Association, and can generate VCUs.

2.5 $MtCO_2e$/year). Most of the professionals we interviewed said that a Gold Standard credit is commonly worth 50% to 100% more than its CDM or voluntary equivalent (VCS or VER+) because the limited availability of these credits contrasts with a strong corporate demand. However, increasing supply of GS credits is expected and may impact prices significantly. As of April 2009, there were 159 projects publicly posted in the GS Registry as awaiting registration (listed or validated status) with 15 million high-quality CERs/VERs to deliver each year. In this context, the large supply of pre-CDM credits may soon struggle to find buyers.

3. Third party standards and transaction costs

Having a project certified by a third-party standard means respecting a certain number of criteria and proving this compliance through an external audit. Each criterion implies either additional fees or work at several steps of the project cycle. This section aims to provide a quantitative evaluation of these transaction costs, using an assessment tool designed for this purpose (see matrixes in appendix 1 and 2). It concludes by looking at the time necessary to certify a project along the different standards according to their respective requirements.

3.1. Material and methods

This tool draws up the list of the standards' features along the project cycle, and links them to the subsequent costs incurred by the project developer.

In this section, we distinguish two types of costs:

- Direct fees, whose levels are fixed and established by the standards' administrations or registries. Such fees can be demanded for project registration, credit issuance, and account opening or transactions.

- Structural costs occurring along the certification process, which are relative to the standards' respective requirements and special provisions. In order to assess them and obtain reliable figures, we conducted direct interviews with a number of project participants, i.e. Designated Operational Entities (DOEs, independent auditors accredited by the CDM Executive Board), consultants, and offset project developers, with notable experience in project implementation and certification. These quantitative estimates are expressed in "man-day", i.e. the work one person can produce in a day, which is a unit they commonly use to evaluate and charge services. The price of a man-day was set at 1,000€/man-day in our estimates of these structural costs, as it is representative of the price that can be charged by a consulting or an auditing firm. One must bear in mind however that this price is subject to variations depending on the pricing policy, experience and expertise of the firm. In the current context of DOE shortage, several interviewees reported a recent increase of auditing fees above 1,000 €/man-day. On the other hand, some of the structural costs (such as writing the Project Design Document) need not necessarily be externalised. When the project developer possesses the skills to have this work done by its own employees, the price of a man-day can be much lower than 1000€.

This methodology was deemed relevant by most of the professionals interviewed, some of them having developed a similar approach in their own project feasibility studies.

Nevertheless, they highlighted several limitations that must be taken into account:

- Forestry and non-forestry projects cannot be compared on a same basis. There is moreover very little experience on forestry projects other than Reforestation and Afforestation. We therefore distinguish non-forestry and forestry offset projects, with a second matrix only focusing on Afforestation and Reforestation projects. However, as project development methodologies and guidelines now tend to be streamlined, our results may also be applicable for other project types within the LULUCF such as REDD.
- Experience shows that transaction costs are technology and scale dependant. While it makes sense to estimate the average difference in transaction costs between standards, the absolute results are not very meaningful. Our matrixes therefore take the CDM project as a benchmark and set values by default for a typical project. Drawing on these fixed figures, the professionals were able to provide relative estimates for the voluntary standards.
- Auditing costs or those charged by the standards and their registries, are different from those relative to project development and general management as they may not be out-sourced and remain internal. Some project developers indeed benefit from in-house expertise, work with NGOs familiar to the project area, or hire graduate students for the data collection which give rise to substantial savings.

3.2. Offset project cycle: the CDM benchmark

To date, the literature available on offset project transaction costs only looks at the CDM scheme (UNEP 2007, Ellis & Kamel 2007, Michelowa 2003, Ahonen & Hämekoski 2005, Chadwick 2006, Neeff et al. 2007). Table 2 provides a comparison of our results for CDM projects with the empirical estimates of UNEP 2007, the most comprehensive and most widely quoted study on the subject.

Our paper goes further in that it intends to estimate the internal or assistance costs along the project cycle due to the management of the project certification process. However, unlike UNEP 2007, we estimate neither the costs related to the initial project search and assessment, nor those related to the development of a new methodology. Initial project search and assessment was assumed to vary little between standards, and developing a new methodology remains a rare phenomenon in the voluntary market[19].

[19] Two methodologies have been specifically developed for the GS VER: improved cook-stoves and small-scale biodigesters. No specific VCS methodology has been yet accepted by the VCS Board. As for LULUCF, the first methodologies are currently being developed for REDD projects under the VCS AFOLU guidelines, and the American Carbon Registry (Winrock Int.) released a Forest Carbon Project Standard in March 2009.

Table 2: CDM project transaction costs: our estimates vs. UNEP 2007

	PROJECT STAGES	Costs[1] (CDM large-scale, €)		Costs[1] (CDM small-scale, €)	
		This study[2]	UNEP 2007[3]	This study[2]	UNEP 2007[3]
Up Front Costs	**Project search and assessment**	variable	3 426-20 561	variable	1 371-5 140
	New methodology				
	.Development	variable	13 707-68 535	variable	13 707-34 268
	.Assessment & approval				
	Auditing (DOE)	6 000		2 000	
	Consultancy/internal	14 000		4 000	
	Standard (UNFCCC)	685		0	
	PDD development				
	Consultancy/internal	40 000	10 280-68 535	30 000	6 854-17 134
	Validation				
	Auditing (DOE)	13 000	5 483-20 561	9 000	4 455-6 854
	Consultancy/internal	5 000	not estimated	5 000	not estimated
	Registration/Advance on first credit issuance				
	Consultancy/internal	13 000	not estimated	13 000	not estimated
	Standard (UNFCCC)	0,068/CER for the 1st 15kt and 0,137/CER for the rest		No fee if < 15kt, same as large-scale otherwise	
	First verification and monitoring				
	Auditing (DOE)	8 000	3 427-20 561	6 000	3 427-10 280
	Consultancy/internal	5 000	not estimated	5 000	not estimated
Recurring Costs	**Periodic verification and monitoring**				
	Auditing (DOE)	6 000	3 427-17 134	5 000	3 426-6 853
	Consultancy/internal	5 000	not estimated	5 000	not estimated
	Credit issuance				
	Standard (UNFCCC)	0,068/CER for the first 15kt and 0,137/CER for the rest		No fee if < 15kt, same as large-scale otherwise	
	Other administrative costs				
	Standard (UNFCCC)	2% of CER		2% of CER	

[1] Calculated on the base of €1000/man-day

[2] Excuding LULUCF

[3] UNEP (2007) *Guidebook to Financing CDM projects*

This table compares the results of the current study to those of UNEP 2007. We separate three types of costs, depending on who the proceeds go to: consultancy/internal costs which can be either internalized or paid to an external consultant, auditing costs which go to the auditor, standard costs (the fees paid to the standard) and registry costs (the fees paid to the standards' registry holder)

Source: Mission Climat of Caisse des Dépôts.

Globally, our results are consistent with the costs estimated by UNEP 2007. Our estimates for small-scale projects are, however, higher than UNEP 2007, especially at the stages of PDD development and project validation. This could be due to the very recent project development costs increases that mentioned some of the market players we interviewed. This trend is mainly attributed to the DOEs whose work entails higher costs for the project developer. This is caused by the reinforced severity of the CDM EB (more time spent on the project) as well as higher honoraries (DOE shortage).

3.3. Transaction costs for certification: light on the differences

Reducing the transaction costs relative to the CDM has been the objective of several voluntary standards. The two matrixes in appendix 1 and 2 describe the standards' features for non-forestry and forestry projects respectively, and assess to what extent they may impact costs along the project lifecycle. Tables 3 and 4 aggregate these

quantitative results, and highlight cost differences relative to the CDM (Δ). The apparent precision must not be taken for granted and be rather regarded as estimates that roughly quantify these cost differences along the project cycle.

This assessment only looks at the project origination side and does not take account of expected carbon revenue that can vary from standard-to-standard. Premium credit prices can indeed make up for greater up-front costs.

Table 3: Comparison of transaction costs for VER and CDM non-forestry projects

Comparison of VER and CDM projects transaction costs[1]

				GS CDM		GS VER large		GS VER small		GS VER micro		VCS		VER+		CCX	
	TRANSACTION COSTS[2]	**CDM (€)**	**CDM SSC (€)**	**cost[1] (€)**	**Δ (%)**	**cost[1] (€)**	**Δ (%)**	**cost[1] (€)**	**Δ (%)**	**cost[1] (€)**	**Δ (%)**	**cost[1] (€)**	**Δ (%)**	**cost[1] (€)**	**Δ (%)**	**cost[1] (€)**	**Δ (%)**
Up front costs	**Auditing (DOE)**	21 000	15 000	27 000	29	27 000	29	23 000	10	0	-100	18 000	-14	19 000	-10	13 000	-38
	Consultancy/internal	63 000	53 000	81 000	29	66 000	5	66 000	5	64 000	2	45 000	-29	50 000	-21	15 000	-76
	Standard	**Regist.:** 0-15kt: 0,068/CER 15kt+: 0,137/CER	**Regist.:** No fee if < 15kt, same as large-scale otherwise	**Regist.:** 0-15kt: 0,068/CER 15kt+: 0,137/CER **+** 0,033/CER	N/A	**Regist.:** 0,068/VER	X	**Regist.:** 0,068/VER	X	**Regist.:** 0,068/VER **Vld. Fund:** 3427 **Vrf. Fund:** 1713	N/A	**Regist.:** 0,04/VCU	N/A	X	X	X	X
Recurring costs	**Auditing (DOE)**	6 000	5 000	9 000	50	8 000	33	8 000	33	0	-100	6 000	0	6 000	0	6 000	0
	Consultancy/internal	5 000	5 000	5 000	0	5 000	0	5 000	0	5 000	0	5 000	0	5 000	0	5 000	0
	Standard	**SOP:** 0-15kt: 0,068/CER 15kt+: 0,137/CER **Adapt:** 2% CERs	**SOP:** No fee if < 15kt, same as large-scale otherwise **Adapt:** 2% CERs	**SOP:** 0-15kt: 0,068/CER 15kt+: 0,137/CER **Adapt:** 2% CERs **+ Cdt iss:** 0,033/CER	N/A	**Cdt iss:** 0,068/VER	N/A	**Cdt iss:** 0,068/VER	N/A	**Vrf. Fund:** 1713 **Cdt iss:** 0,068/VER	N/A	**Cdt iss:** 0,04/VCU	N/A	X	X	**Mbership: Associate** 1371 **Off. Prov** 3427	N/A
	Registry	X	x	X	X	0,034/VER	N/A	0,034/VER	N/A	0,034/VER	N/A	0,068/VCU	N/A	550	N/A	Registration/cancellation: Project in: Annex1 Non-Annex1	0,1/t 0,08/t
	EXPLANATION[3] OF THE COST DIFFERENCE	↗		.GS Sustainable Development matrix .Cumulation of GS and CDM fees .Transactions with the CDM EB and the GS		.GS Sustainable Development matrix		.GS Sustainable Development matrix		.GS Sustainable Development matrix		X		.Registry fees		.Only for CCX members after payment of the membership fees	
		↘		X		.Financial plan not required in the PDD .DNA's approval not required .Lower fees related to the standard administration		.Same as large GS VER .Same auditor for validation and 1st verification		.Same as large GS VER .Environmental Impact Assessment (EIA) not requiered in the PDD .If elected, validation/ verification can be done through special GS funds		.Same auditor for validation and 1st verification .Approval delivered directly by theauditor .DNA's approval not required .EIA if required by host country law .No global consultation required .Lower fees related to the standard administration		.Same auditor for validation and 1st verification .Approval delivered directly by the auditor .DNA's approval not required .Lower fees related to the standard administration		.Projects' baselines already determined .Project-specific assessment already incorporated in the project eligibility .No distinction between validation and 1st verification .DNA's approval not required .EIA and local stakeholder consultation if requiered by host country law	

[1] Calculated on the basis of €1000/man-day
[2] Excluding project finding and new methodology development
[3] See appendix for quantitative details
[4] Share of proceeds

Cost increase
Cost reduction

Source: Mission Climat of Caisse des Dépôts.

3.3.1. No host country's approval required

Unlike the CDM, voluntary standards do not require the approval of the host's country's Designated National Authority (DNA) to implement an offset project[20].

[20] The DNA approves hosted CDM projects and sets guidelines for project implementation. The approval of CDM projects is made official in a Letter of Approvals confirming the project's contribution to sustainable development in the host country.

Project developers interviewed say this process requires 7 to 8 man-days at the stage of PDD development, though according to some others it is sometimes even more as DNAs now get increasingly involved in the process. In some cases, DNA involvement may also decrease transaction costs through helpful guidelines and framework. This seems to be the case for small-scale hydro projects in China and small-scale wind projects in India (Elabed & Leguet 2008).

3.3.2. Same auditor for validation and verification

Another simplification common to the schemes of a number of standards, i.e. CDM SSC, small GS VER, VCS, and VER+, is to allow a project to hire the same auditor for conducting both validation and verification. We estimate this leads to about 25% reduction of the auditing costs (2 man days) for the 1st verification as the auditor is already familiar with the project and does not need as much time to understand its details. Besides lowering transaction costs, some auditors reckon this provision is important in the case of the VCS, and VER+, as these two standards rely solely on auditors to approve projects: a project validated by the auditors is automatically approved, whereas in the case of the CDM, the Executive Board checks the work of auditors (DOEs). In the absence of this check, some auditors are reluctant to verify a project whose validation has been conducted by another auditor, as they have no control on the quality of the work that has been done at the validation stage.

3.3.3. An Environmental Impact Assessment is not required but is almost always undertaken

An environmental impact assessment (EIA) identifies and evaluates the environmental impacts (other than carbon) of a project, and proposes mitigation measures when relevant. We estimate that this entails about 5 man-days in terms of resources. The GS VER Micro, VCS, CCX, and VER+ only require an EIA to be conducted if prescribed by the relevant local or national law. However, given that many countries have now developed EIA regulations and the large number of pre-CDM projects in the voluntary market, EIA are almost systematically undertaken.

3.3.4. Micro GS projects benefit from special validation and verification funds

Some measures specific to certain standards can also yield cost savings. The GS exempts eligible micro-scaled projects (< 5 $ktCO_2e$/year) from validation and verification. Instead, these projects contribute to two dedicated funds, the validation and verification funds, which are used by the GS Foundation to pay for random validation and verification of the micro-scaled projects it has certified.

3.3.5. Practice-based and performance based methodologies for the CCX and VCS

For project developers using a standardized methodology of the CCX, the CCX does not require a validation stage in advance of verification (called “project verification and enrolment”). This is because the CCX performs the validation in developing the

methodology and project developers must then abide by it. We estimate this reduces auditing up-front costs by about 40% compared to the CDM scheme. Furthermore, baseline determination, additionality demonstration, and monitoring are often simplified in CCX methodologies: these methodologies define an uncommon practice (e.g. no-till farming), and determine the average reductions achieved when the practice is implemented. The only monitoring consists in checking that the practice has been indeed put in place. We estimate this kind of benchmarking allows further reduction in up-front costs of about 50% for the PDD developed for the CCX, when compared to those developed for the CDM. The VCS allows performance-based methodologies, that is methodologies which consider all reductions under a sectoral performance benchmark to be additional. These could lead to costs savings similar to CCX methodologies. To date, however, no such methodology has been approved by the VCS board.

3.3.6. Ensuring co-benefits for the GS

As a multiple-benefit carbon standard, the GS has implemented special provisions to go further than the CDM in ensuring the sustainable development component of offset projects. These include the GS Sustainable Development Matrix and monitoring plan, as well as tougher requirements on the organisation and reporting of the local stakeholder consultation. Compared to the CDM, these provisions of the GS VER entail more work along the project lifecycle with associated cost increases of about 20% for PDD development, 30% for auditing at validation and first verification, and 33% for following verifications,.

The new GS version (GSV2)[21] includes rule changes but mainly intends to give project participants further guidance along the certification process. However, some project developers believe that the GSV2 could increase the certification costs up to a 10% as it appears more stringent on reporting.

The fees charged by standards administrators and registries for project registration, credit issuance or account opening also vary from standard to standard[22]. Tables 4 and 5 summarize this information and compare the transaction costs associated with the different standards. In order to account for the costs that depend on project size and verification schedule, we take two examples. Table 4 presents the transaction costs for a "typical voluntary project": emissions reductions of 50 $ktCO_2e$/year, verified every year during the first seven years. Table 5 is based on a smaller project with emissions reductions of 5 $ktCO_2e$/year, verified every two years over seven years.

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[21] GSV2, applicable from August 2008

[22] The VCS association appointed 4 organizations to run its registries. As they are not yet operational, their pricing policies are still unavailable. However, the VCS wishes account fees to be affordable for small project developers. Market players therefore anticipate the registries to set their fee proportionally to the number of credits registered rather than to charge a fixed account fee. In our calculations, we assume a charge of €0.10/VCU for project registration into VCS registries.

Table 4: Transaction costs (in €/VER) for a non-forestry large scale project* (50 ktCO$_2$e/year, verified every year during 7 years)

	CDM**	GS CDM**	GS VER	VCS	VER+	CCX***
Total certification: validation, verification, registration and registry fees	0,58	0,68	0,32	0,26	0,17	0,23
Total incl. Consultancy/internal: PDD development and management of certification	0,85	1,00	0,59	0,48	0,40	0,36

*located in a non-annex I country (CCX offset registration fees differ depending on where the project is located)

**to include the 2% share of CERs issued to projects for the UN adaptation fund, we assume that CERs trade at 15€. This adds €15 000/year of forgone carbon revenues to the transaction costs of this project.

***Given that we listed the "offset providers" as "associate members" among CCX offset retailers, we use the average membership fee. This fixed transaction cost is diluted over the projects of the retailer. To account for this dilution, we divide it by the average number of projects per retailer (4,5).

Source: Mission Climat of Caisse des Dépôts.

For a large scale project, one can see the impact of the different provisions discussed earlier on the global certification costs. Again, it is more meaningful to concentrate on the difference between standards rather than on the absolute value of the estimate. Roughly compared to the other basic carbon standards, the VER+ benefits from the absence of registration fees as well as a fixed registry fee only consisting of an account opening charge of €550. Conversely, the GS CDM appears to be the most costly certification scheme as it accumulates the work and fees imputable to both CDM and GS VER. Eventually, transaction costs are shown to differ significantly between standards: both external and overall costs are more than halved in the cases of the CCX and VER+ when compared to the CDM or GS CDM. This difference mainly comes from the 2% levy that feeds the adaptation fund (0.3 €/VER). Nevertheless, the price premium that the CDM or the GS can command compared to the other standards (see part 2) is a lot higher than these differences. When possible, it is therefore more profitable for large-scale projects to seek CDM or GS certification.

Table 5: Transaction costs (in €/VER) for a non-forestry small scale project* (5 ktCO$_2$e/year, verified at years 1, 3, 5, and 7)

	CDM SSC**	GS VER Micro	VCS	VER+	CCX***
Total certification: validation, verifications, registration and registry fees	1,16	0,35	0,94	0,94	1,07
Total incl. Consultancy/internal: PDD development and management of certification	3,10	2,60	2,37	2,51	1,93

*located in a non-annex I country (CCX offset registration fees differ depending on where is localised the project)

**to include the 2% share of CERs issued to projects for the UN adaptation fund, we assume that CERs trade at 15€. This adds €15 000/year of forgone carbon revenues to the transaction costs of this project.

***As we listed as many "offset providers" as "associate members" among CCX offset retailers, we use the average membership fee. This fixed transaction cost is diluted over the projects of the retailer. To account for this dilution, we divide it by the average number of projects per retailer (4,5).

Source: Mission Climat of Caisse des Dépôts.

The special provisions the CDM and GS allow their respective small and micro-scaled projects to lower considerably the external certification costs compared to their large-scale schemes. Conversely, the VCS, VER+ and CCX make no difference for the size of projects and do not show significant cost-cuts with changing project sizes. Nevertheless, the cost per credit remains much higher than in the large-scale case, except for the GS VER whose provisions for micro-scale projects maintain external certification costs per credit at the level of a large-scale project. When costs of PDD development and project management are included, the CCX, and to a lower extent the VCS, are the only standards to significantly decrease transaction costs. This may explain the smaller median size of CCX and VCS projects we previously noted.

Table 6: Comparison of transaction costs for VER and CDM forestry projects (Afforestation/Reforestation)

				VCS AFOLU		CCBS (V.2)		CDM CCBS (V.2)		VER+		CCX	
	TRANSACTION COSTS[2]	CDM A/R (€)	CDM A/R SSC (€)	cost[1] (€)	Δ (%)	cost[1] (€)	Δ (%)	cost[1] (€)	Δ (%)	cost[1] (€)	Δ (%)	cost[1] (€)	Δ (%)
Up front costs	Auditing (DOE)	21 000	14 000	18 000	-14	18 000	-14	28 000	33	18 000	-14	10 000	-52
	Consultancy/internal	87 000	77 000	73 000	-16	83 000	-5	99 000	14	81 000	-7	22 000	-75
	Standard	**Regist.** 0-15kt: 0,0685/CER 15kt+: 0,1371/CER	x	**Regist.:** 0,04/VCU **Buffer:** 5-60%	N/A	X	X	**Regist.:** 0-15kt: 0,0685/CER 15kt+: 0,1371/CER	X	**Buffer:** at least 20%	N/A	**Buffer:** 20%	X
Recurring costs	Auditing (DOE)	6 000	5 000	6 000	0	6 000	0	10 000	67	6 000	0	6 000	0
	Consultancy/internal	5 000	5 000	5 000	0	5 000	0	5 000	0	5 000	0	5 000	0
	Standard	**SOP:** 0-15kt: 0,0685/CER 15kt+: 0,1371/CER **Adapt:** 2% CERs	X	**Cdt iss:** 0,04/VCU	N/A	X	X	**SOP:** 0-15kt: 0,0685/CER 15kt+: 0,1371/CER **Adapt:** 2% CERs	N/A	**Vrf. Fund:** 1713 **Cdt iss:** 0,0685/VER	N/A	**Mbership: Associate** 1371 **Off. Prov** 3427	X
	Registry	X	x	0,0685/VCU	N/A	X	X		N/A	550	N/A	Registration/cancellation: Project in: Annex1 Non-Annex1	0,1/t 0,08/t
		↗		.Non-Permanence Risk Analysis .Buffer		.Biodiversity and community information in the project description .Baseline to take account of biodiversity and communities .Management and knowledge dissemination plan		.Same as the stand-alone CCB Standards .Transactions with the CDM EB and the CCB Alliance		.Non-Permanence Risk Analysis (similar as VCS) .Buffer .Registry fees		.Buffer ("Forest Carbon Pool Reserve") .Higher level of sampling at verification .Only for CCX members after payment of the membership fees	
	EXPLANATION[3] OF THE COST DIFFERENCE	↘		.Same auditor for validation and 1st verification .Approval delivered directly by the auditor .DNA's approval not required .No global consultation required .No transboundary environmental and socio-economic impact assessments .No monitoring of environmental and socio-economic impacts .Project description less detailled		.Same auditor for validation and 1st verification .Limited requirements on carbon accounting .DNA's approval not required .Project directly approved by the auditor .No credit issuance .Lower fees related to the standard administration				.Same auditor for validation and 1st verification .Approval delivered directly by the auditor .DNA's approval not required .Lower fees related to the standard administration		.Projects' baselines already determined .Project-specific assessment already incorporated in the project eligibility .No distinction between validation and 1st verification .DNA's approval not required .EIA and local stakeholder consultation if requiered by host country law .No analysis needed to determine the buffer level (fixed)	

[1] Calculated on the base of €1000/man-day

[2] Excluding project finding and new methodology development

[3] See appendix for quantitative details

Cost increase

Cost reduction

Source: Mission Climat of Caisse des Dépôts

As shown in table 6, the VCS, VER+ and CCX offer forestry projects the same flexibility provisions as for non-forestry. These also give rise to equivalent transaction costs reductions along the project cycle.

3.3.7. Ensuring co-benefits for the CCB Standards

The CCB Standards certification has extra requirements that ensure additional sustainable development benefits with regards to communities and biodiversity. We estimate that these special provisions require about 12 extra man-days for PDD development, three for validation, and four, at each verification. Conversely, it has fewer requirements regarding carbon accounting and the risk of non-permanence than the other standards. Eventually, if undertaken alone, the CCB Standards reduces up-front costs by about 15% for auditing and 5% for consultancy/internal costs compared to the CDM.

However, to improve the quality of certification with regards to carbon accounting and the risk of non-permanence, and to allow project developers to market their emission reductions as "true" carbon assets, the CCB Standards administration encourages its users to also apply to a carbon accounting standard such as the CDM, VCS or VER+. Compared to the CDM alone, the combination of their respective requirements gives rise to an approximate 30% cost increase for up-front auditing and 70% cost increase for periodic verifications.

The new version of the CCB Standards[23] only adds the "adaptative management and knowledge dissemination plan" to its basic requirements. A project developer estimated that this should not burden the process by more than a person-day since it is only about reporting and documenting on a procedure that was usually done by CCB Standards project developers anyway.

A notable difference between forestry and the other types of projects stands in how standards deal with the risk of non-permanence.

3.3.8. Addressing non-permanence of forestry carbon assets

CDM A/R projects address it through the generation of two types of temporary credits CERs (tCERs) and long-term CERs (lCERs). These credits are both temporary (5 and 20-30 years respectively) and must therefore be replaced every so often. The project proponent must opt for one of them depending on its financial needs and on the stream of credits to be generated by the project.

A second option to deal with the risk of non-permanence is to establish buffer reserves of non-tradable carbon credits, in order to cover up for unexpected project failure. For the VCS AFOLU and the VER+, the buffer level (5-60% of the credits generated annually) is determined from a risk analysis of the potential for future carbon loss. The VCS intends to keep track of every project for 70 years and use the "buffer credits" pooled in a common VCS reserve to replace all credits coming from

[23] CCB Standards version 2, applicable from December 2008.

failing projects or projects which have stopped verifying their reductions. The CCX establishes a fixed buffer level (20%) without preliminary risk assessment.

Table 7 illustrates project certification costs and carbon revenues after five years of crediting, for a small scale A/R project generating 5ktCO_2e/year of emission reductions. In our calculations, we use a 30% buffer under the VCS AFOLU and VER+, which corresponds to the medium risk class.

In this example, the CDM SSC appears to offer the least costly certification scheme while a CDM seeking CCB Standards certification doubles the certification costs. A project developer choosing the standards subject to a buffer withholding, i.e. VCS AFOLU, VER+ or CCX, commits to renouncing to substantial carbon revenues in the early age of the project. For the VCS however, the credits initially withheld are distilled back to the project developer during subsequent verification, in order to give him an additional incentive to keep verifying the project. In our example, 5% of the 30% initially withheld are given back to the project developer at the second verification (year 10).

These buffers push transaction costs up, especially for the VCS AFOLU and the VER+. The Forest Carbon Project Standard of the American Carbon Registry offers, apart from contributing to a buffer, two other options to address the risk of non-permanence, i.e. an insurance based solution guaranteeing for replacement price for offsets or a replacement by non-forest offsets that meet the Registry Standards. This may offer project proponents with more flexibility in their investment decisions.

However, one must bear in mind that this comparison is somehow unfair: permanent VCS forestry credits will probably command a higher price on the voluntary market than their temporary CDM counterparts. Thus, higher transaction costs may be balanced by higher carbon revenues.

Table 7: Transaction costs (in €/VER) for a small-scale AR project*
(5 ktCO_2e/year, verified every 5 year during 10 years)

	CDM SSC	VCS AFOLU	CCBS	CCBS CDM	VER+	CCX***
Total certification (3€/credit)	0,38	1,42	0,48	0,76	1,42	1,11
Total incl. Consultancy/internal (3€/credit)	2,02	2,98	2,24	2,84	3,14	1,65
Total certification (10€/credit)	0,38	2,95	0,48	0,76	2,95	2,51
Total incl. Consultancy/internal (10€/credit)	2,02	4,51	2,24	2,84	4,67	3,05

*located in a non-annex I country (CCX offset registration fees differ depending on where is localised the project)

*** As we listed as many "offset providers" as "associate members" among CCX offset retailers, we use the average membership fee. This fixed transaction cost is diluted over the projects of the retailer. To account for this dilution, we divide it by the average number of projects per retailer (4,5).

The forgone carbon revenue due to buffer witholding is added to transaction costs assuming a credit price (3 or 10 €/VER). The initial buffer is 30 % for the VCS and the VER+, and 20 % for the CCX.

Source: Mission Climat of Caisse des Dépôts.

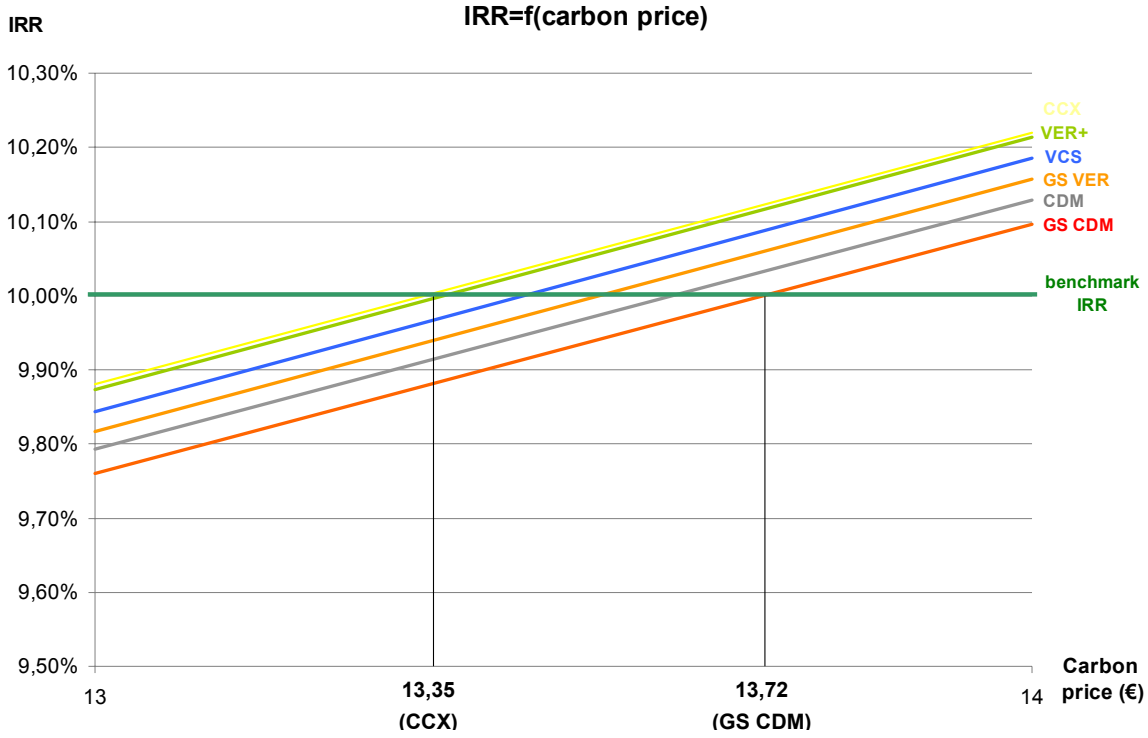
There is growing interest in the VCS AFOLU among project developers. However, some of them claim they would only use it for projects fitting in the least risky category so as to avoid too large buffer and renounce to a substantial part of the credits generated in the first crediting years. Some also think large buffers may prevent the implementation of risky projects that have nonetheless strong potential for co-benefits.

3.4. Transaction costs: do they matter?

The transaction costs related to certification occur at each stage of the project cycle, from pre-implementation to the end of the crediting period. Relying on the financial features of a recently registered CDM[24], we assess their impact on the global returns of the project and the origination cost of a carbon credit (1 tCO_2e).

The Internal Rate of Return[25] (IRR) is a financial indicator assessing the viability of an investment as it defines an investment decision threshold; if the IRR of the investment is higher than a certain value, then the investment should be realised. As for the CDM, UNFCCC rules require a proponent to demonstrate that the project needs to generate carbon credits to reach a benchmark IRR. The latter may vary from country-to-county, within country, or even be specific to a company according to its cost of capital.

Figure 6: IRR as a function of the carbon price: case of a CDM hydropower project (50 $ktCO_2e$)



Source: Mission Climat of Caisse des Dépôts.

Figure 6 describes the price at which the carbon credits of this specific project must be valued to reach the IRR benchmark defined at 10%. Depending on the standard, the cost of a credit ranges from €13.35 (VER+) to €13.72 (GS CDM).

[24] Chinese hydropower project generating 50 $ktCO_2e$ of emission reductions per annum.

[25] Vernimmen *et al.* (2005) defines the IRR as the discounting rate that makes the preset value of the expected flows equal to zero.

As shown in the table 8, in this very case, the GS CDM is the only standard to require a higher carbon price than the CDM in order to reach the 10% threshold (+€0.1/tCO_2e), whereas under the CCX the project becomes worth undertaking with a carbon price €0.27/tCO_2e below the CDM threshold.

The IRR analysis thus leads to the same conclusion as the transaction costs per credit: based on the insights we have of market prices, the most profitable option for this project is therefore to seek CDM and GS certification if possible.

Table 8: Carbon price needed to reach the profitability threshold: case of a CDM hydropower project (50 $ktCO_2e$)

Standard	GS CDM	GS VER	VER+	VCS	CCX
Credit price threshold difference relative to CDM (€/tCO_2e)	0,10	-0,09	-0,21	-0,17	-0,27

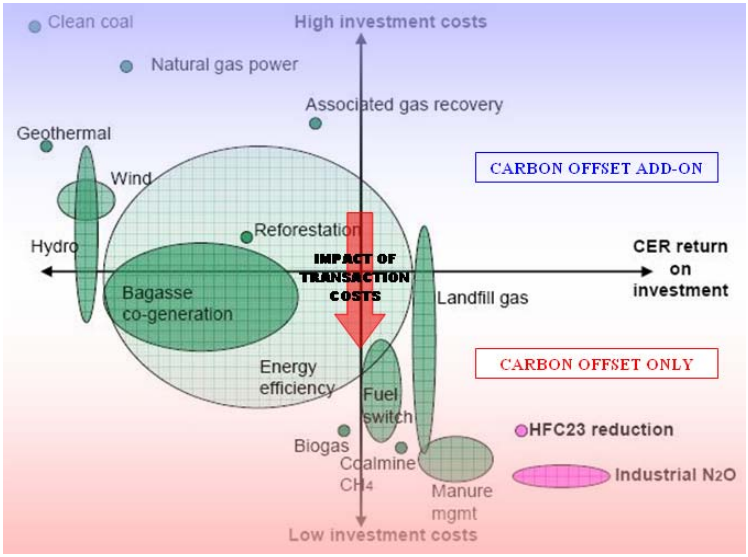
Source: Mission Climat of Caisse des Dépôts.

If we conduct the same analysis for a similar project, but lower-scaled (15 $ktCO_2e$), the largest difference in carbon price threshold we find between standards is €0.43/tCO_2e.

From these two case studies, we can conclude there is no significant transaction costs difference for hydro projects from standard-to-standard, with low sensitivity to the scale of the project. Due to a lack of data, we were unable to conduct a similar analysis for other types of projects. However, we can intuit that the difference of transaction costs among standards have a growing impact on the project profitability when they represent a higher share of total project costs.

Ellis *et al.* (2007) highlight the large disparity in the level of investment from project type-to-type. As shown in Figure 8, they distinguish projects entirely dedicated to the CDM whose economic benefits are CERs only (e.g. manure management, landfill gas), and those using the CDM as an add-on whose income also comprises the selling of other outputs (e.g. electricity for hydro and wind power, or timber for forestry).

Figure 8: Impact of transaction costs on the IRR, a function of investment costs and CER returns



Source: adapted from Ellis et al. 2007.

If we have shown the transaction costs differences from standard to standard do not matter much to the IRR of hydro projects, they may matter for the IRR of projects whose investment, operating, and monitoring costs are entirely dedicated to the carbon offsetting activity such as biogas or manure.

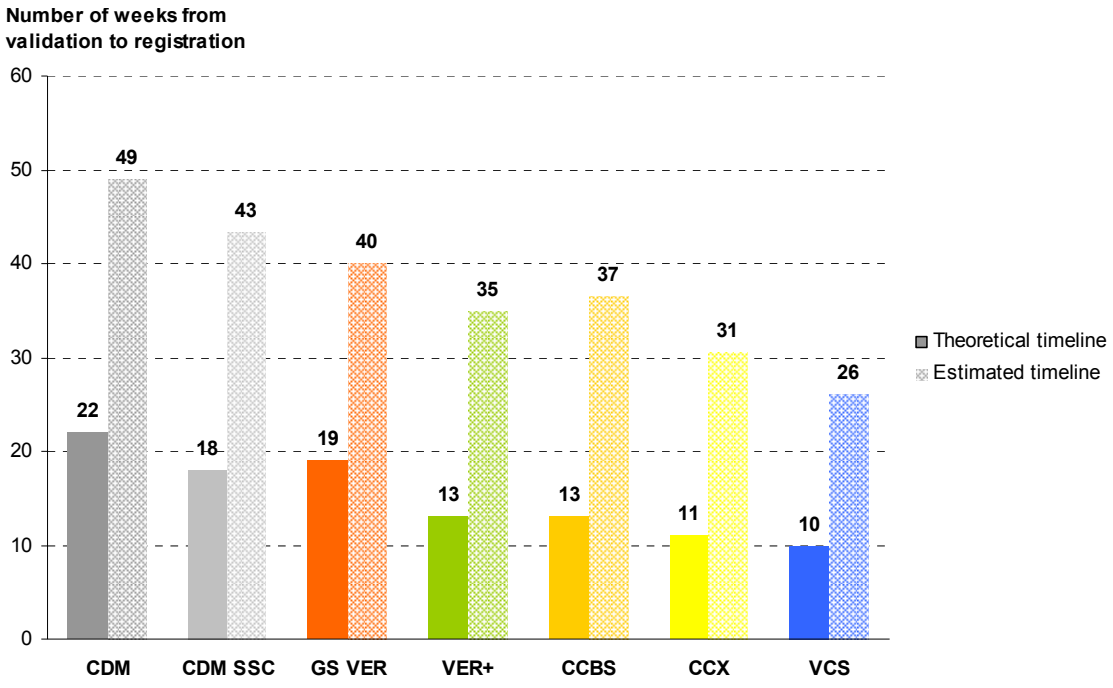
In any case, it seems that setting certification requirements and rules similar to those of the CDM, although costly, is the price for the voluntary carbon market to recover its credibility.

3.5. The certification timeline: voluntary standards demonstrate valuable flexibility features in the actual context

As project developers have to bear high up-front costs, the time necessary to have their project certified and generating carbon credits can be an important element that determines their choice of a given standard.

The different standards feature specific requirements that have direct impacts on the certification timeline. Figure 9 shows the theoretical number of weeks necessary for a project to be validated and registered under each standard. Appendix 3 gives further details on these aggregated figures. Because the development of new methodologies remains rare in the voluntary market (see section 3.2) we did not take it into account in these figures.

Figure 9: Theoretical and estimated timeline for certification



Source: Mission Climat of Caisse des Dépôts.

The validation stage is relatively similar among standards. In any case, auditors say they need at least 7 to 8 weeks to review the project documents, conduct an on-site review, and write the final determination report after resolution of the corrective actions by the project proponent. However, the CDM, VER+, and CCB Standards

require the project documents to be displayed on the standard's or auditor's website at the early stages of validation in order to take into account public comments. This lengthens the validation process of respectively 4, 4, and 3 weeks. As for the GS, this can be done in parallel with the validation process. The most significant differences come from the registration step. While CCB Standards, VER+ and VCS projects are directly approved by the DOE, the CDM requires that a request for registration is made available online for 8 weeks (3 for the CDM SSC) and the GS gives its technical committee the same amount of time to review the project documents. In the end, the theoretical timeline for project certification varies from 10 weeks for the VCS to 28 for the GS VER.

However, all the professionals we interviewed argued that this ideal timeline is seldom respected, and certification turns out to require much more time in practice. Based on an analysis of the UNEP Risoe CDM pipeline, Elabed *et al.* (2008) assesses that 246 days[26] (about 35 weeks) are necessary for CDM project validation, and 96 days (about 14 weeks) for the CDM EB to register a validated project. To explain these figures, the authors point to human resources shortages in the staff of both DOEs and the CDM Executive Board. To estimate the effective certification timeline of each standard, we assumed that the delay in each stage is proportional to that observed for CDM in the corresponding stage (validation or registration). The results are also displayed in Annex 3.

If the DOE shortage may also affect the projects developed along voluntary standards, other delays due to the EB at the registration stage may be more specific to the CDM. As registration takes little time in most voluntary standards, this does not affect much our results. The only exception is the GS VER: should the GS board be more diligent than the CDM EB, we would be overestimating the real GS VER timeline.

According to some project developers, the GS CDM certification process can indeed be completed within that of CDM, although it theoretically requires as much time. Given this actual context, some CDM applicants may have started to generate credits while still awaiting UNFCCC registration. As retroactive crediting is no longer permitted under UNFCCC rules[27], these projects may value these emissions reductions as "pre-CDM VERs" thanks to the voluntary standards' retroactive crediting provisions. According to Table 5 all the voluntary standards allow retroactive crediting, back to 2 years before enrolment and up to 2003 under the CCX for certain types of projects.

[26] Average figures.

[27] A CDM project registered after 31 March 2007, can only claim credits for emission reductions that occurred after its UNFCCC registration

Table 9: Retro-active crediting provisions of the standards

Standard	CDM	GS	VCS	VER+	CCX
Retroactive crediting period	*no longer allowed*	*2 years prior registration*	*2 years prior registration*	*2 years prior registration*	*back to 2003 for certain types of offsets**

*for Rangeland soil carbon management offsets, Agricultural soil and Forestry carbon offsets.

Source: Mission Climat of Caisse des Dépôts.

To fully benefit from this opportunity, the VCS allows DOEs to verify pre-CDM retroactive credits and CERs at the same time. This may considerably lower the auditing costs for the project proponent.

4. Conclusions

This study distinguishes between two types of third party standards in the voluntary market. The projects certified by multiple-benefit carbon standards, such as GS and CCB Standards, display characteristics that differ from those of CDM projects. They indeed use with a more diverse set of methodologies, thus spreading the benefits of carbon finance over different sectors. They also appear to attract projects located in countries where the CDM is not very developed. The strong demand for their "gourmet" credits, combined with a supply shortage, has allowed them to capture and maintain price premiums on the market for carbon credits.

Basic carbon standards, such as VCS, VER+, and CCX, are more similar to the CDM in terms of project characteristics. Although the credits they issue trade at lower prices, these standards have nonetheless attracted numerous projects. In particular, they have been used by project proponents to mitigate the delays inherent to the CDM registration process, since their respective portfolios have consisted so far of a majority of pre-CDM projects. They also include projects in niche markets like Turkey where projects cannot apply to the CDM. The CCX is different in that it has historically certified the lion's share of domestic U.S offset projects.

It is also important to look at the transaction costs these different standards entail. We find a difference of up to 100% on the transaction cost per credit between standards. However, when these costs remain small compared to the overall costs of a project, we also show that the choice of the standard does not make a significant difference on the Internal Rate of Return (IRR). This is the case of projects using the CDM as an add-on to the production of other outputs (electricity for hydro or wind, wood for forestry). Given the price difference on the market, it seems more interesting to develop such projects along a multiple-benefit standard, if eligible. We however expect higher differences on the IRR for projects whose investment capital is entirely dedicated to generating carbon credits such as biogas or manure management.

As projects developers have to bear significant upfront costs, the choice for a standard can also come from the time required to get their project certified. Given the DOE shortage that carbon markets are experiencing at the moment, it seems hard to

conclude if the shortcuts allowed by the voluntary standards offer substantial gains of time compared to the CDM. Again, their special provisions allowing retro-active crediting are however a good opportunity to mitigate the risk of delay in the certification of the project, and have benefited to numerous CDM projects that have thus valued their emission reductions while awaiting UNFCCC registration

As the future of the CDM is currently being discussed, studying the voluntary standards helps identify interesting lessons on project-based emissions reductions. It is probably too early to evaluate some innovations of these standards: no performance-based methodology has yet been approved by the VCS, let alone be used. The CCX has proven its ability to reduce transaction costs and to attract smaller projects, but the additionality of its certified emissions reductions has not been questioned in this study. Regarding multiple-benefit carbon standards however, this study shows that certifying ancillary benefits needs not necessary entails much higher costs.

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Annex 1: Matrix of transaction costs for non-forestry offset projects (part 1)

LEGEND: C / I Consultancy/internal costs (man-day); A Auditing costs (man-day); S Standard costs (€/$); R Registry costs (€/$); Cost increase ↑; Cost reduction ↓; Same as CDMs

	PROJECT CYCLE	CDM (benchmark)	CDM SSC		GS CDM		Large GS VER		Small GS VER	
		Consultant and DOE Honorary (man-days) / **Fee ($)**	Differing requirements from CDM	Costs	Differing requirements from CDM	Costs	Differing requirements from CDM	Costs	Differing requirements from CDM	Costs
C / I	**Project finding and assessment**	Fixed for a given project								
	New methodology						**2 accepted to date**		**2 accepted to date**	
C / I	Development	Fixed for a given project								
A	Voluntary pre-assessment ° Audit by DOE	1 10	No voluntary pre-assessment by DOE	0			No voluntary pre-assessment by DOE	0	No voluntary pre-assessment by DOE	0
C / I	° Assistance						Directly to the GS TAC	0	Directly to the GS TAC	0
C / I	Submission to UNFCCC (DOE) ° Assistance	1	No fee to the EB	1						
S	° Application Fee	**$1,000**		**$0**			Methodology review. To the GS	**$500**	Methodology review. To the GS	**$500**
A or S	Expert Desk Review (2 experts)	5	1 expert	2						
C / I	Dealings with the EB approval	3								
	PDD development									
C / I	Project description	5								
C / I	Baseline scenario: baseline methodology, assumptions in calcultations, project specific basis, treatment of national or sectoral policies	10	Use of simplified baseline, deemed representative of what would occur in the absence of the project. No other requirements	4-6						
C / I	Assessment and demonstration of the additionality: "the additionality tool" (4 step-approach)	10	No "additionality tool" but only the barrier analysis (step 3) is required	4-6			No detailed financial plan needed (as an ODA cannot be used for the purchasing of credits)	8	No detailed financial plan needed (as an ODA cannot be used for the purchasing of credits)	8
C / I	ERs and monitoring: Emissions and sources of potential increase, baseline, quality assurance and control procedure, ERs and periodic procedure	5	Use of a simplified monitoring methodology: no identification of potential increases of emissions, no quality assurance and control procedure, no procedure for periodic ERs	4-6						
C	Sustainable Development: .EIA: including transboundary impacts	5			EIA	5	EIA	5	EIA	5
C / I					GS Sustainable Development Matrix and Monitoring plan	5	GS Sustainable Development Matrix and Monitoring plan	5	GS Sustainable Development Matrix and Monitoring plan	5
C / I	Local stakeholders' consultation	4-5			More structured and stricter rules	8	More structured and stricter rules for the local stakeholders consultation	8	More structured and stricter rules for the local stakeholders consultation	8-10
	Validation									
A	Desk review	4	Simplified baseline, monitoring, additionality tool	2	GS Sustainable Development Matrix and Monitoring plan, stakeholder consultation	5	GS Sustainable Development Matrix and Monitoring plan, stakeholder consultation	5	GS Sustainable Development Matrix and Monitoring plan, stakeholder consultation	5
A	Global Stakeholder process	1								
A	On-site visit	4	Simplified baseline, monitoring, additionality tool	2	GS Sustainable Development Matrix and Monitoring plan, stakeholder consultation	6	GS Sustainable Development Matrix and Monitoring plan, stakeholder consultation	6	GS Sustainable Development Matrix and Monitoring plan, stakeholder consultation	6
A	Pre-report with CARRs	2								
A	Final report	1								
A	Validation approval by the certification body	1								
C	Assitance with DOE	5								

Source: Mission Climat of Caisse des Dépôts.

Annex 1: Matrix of transaction costs for non-forestry offset projects (part 2)

	PROJECT CYCLE	CDM (benchmark)	CDM SSC		GS CDM		Large GS VER		Small GS VER	
		Consultant and DOE Honorary (man-days) / **Fee ($)**	Differing requirements from CDM	Costs	Differing requirements from CDM	Costs	Differing requirements from CDM	Costs	Differing requirements from CDM	Costs
	Registration									
C / I	DNA's approval	7-8					Limited to a letter of communication to the DNA	0	Limited to a letter of communication to the DNA	0
S	Registration fee	Estimate of the number of credits to be generated the 1st year: **$0.10/CER** for the first 15,000t **$0.20/CER** above 15,000t	No fee is ERs<15kt otherwise same as large scale	**$0**	Credit for the anticipated amount of Ers certified after the 1st verification (anticipation of the 1st label issuance fee). To the GS.	**IDEM CDM + $0,05/CER**	Credit for the anticipated amount of Ers certified after the 1st verification (anticipation of the 1st issuance fee). To the GS.	**$0,10/VER**	Credit for the anticipated amount of Ers certified after the 1st verification (anticipation of the 1st issuance fee). To the GS.	**$0,10/VER**
C / I	Dealings with EB	5			Dealings with EB Dealings with the GS Foundation (pre-assessment+registration)	5 5+5	Dealings with the GS Foundation (pre-assessment+registration)	5+5	Dealings with the GS Foundation (pre-assessment+registration)	5+5
C / I	**Knowledge capitalization and dissemination**	Fixed for a given project								
	Monetization of ERs									
C / I	Assistance with ERPA	5								
C / I	Assistance with strategy	5								
	First verification									
A	Desk review	3	Same DOE for validation and verification	2	GS Sustainable Development Matrix and Monitoring plan	4	GS Sustainable Development Matrix and Monitoring plan	4	Same DOE for validation and verification	2
A	On-site visit	3	Same DOE for validation and verification	2	GS Sustainable Development Matrix and Monitoring plan	4	GS Sustainable Development Matrix and Monitoring plan	4	Same DOE for validation and verification	2
A	Final report	1			CDM + GS reports	2				
A	Verification statement by the certification body	1								
C / I	Assitance with DOE + Monitoring	5								
	Credits issuance									
S	Issuance fee to the EB	Admin Share of Proceeds: **$0.10/CER** for the first 15,000t **$0.20/CER** above 15,000t (As registration fee the 1st year)	**None**	**$0**	Admin Share of Proc GS CER label issuance (year 2+) . To the GS.	**IDEM CDM +$0,05 / CER**	GS VER credit issuance. To the GS.	**$0,10 / VER**	GS VER credit issuance. To the GS.	**$0,10 / VER**
	Other administrative costs									
S	Adaptation fund fee	**2% of the CERs** issued each year					**None**	**$0**	**None**	**$0**
	Registry									
R or S	Account fee	None			No issuance of CERs in the registry. The GS Foundation only tracks serial numbers		Registry use	**$0,05/VER**	Registry use	**$0,05/VER**
R	Transaction fee	None					None	None	None	None
	Periodic verification (same DOE) and monitoring									
A	Desk review	2			GS Sustainable Development Matrix	3	GS Sustainable Development Matrix	3	GS Sustainable Development Matrix	3
A	On-site visit	2	Less work on the field due to the simplified monitoring	1		3		3		3
A	Final report	1			CDM + GS reports	2				
A	Verification statement by the certification body	1								
C / I	Assitance with DOE + Monitoring	5								

Source: Mission Climat of Caisse des Dépôts.

Annex 1: Matrix of transaction costs for non-forestry offset projects (part 3)

LEGEND: C / I Consultancy/internal costs (man-day); A Auditing costs (man-day); S Standard costs (€/$); R Registry costs (€/$); Cost increase ↑; Cost reduction ↓; Same as CDMs

	PROJECT CYCLE	CDM (benchmark)	Micro GS VER		VCS		VER+		CCX	
		Consultant and DOE Honorary (man-days) / **Fee ($)**	Differing requirements from CDM	Costs	Differing requirements from CDM	Costs	Differing requirements from CDM	Costs	Differing requirements from CDM	Costs
C / I	**Project finding and assessment**	Fixed for a given project								
	New methodology				0 accepted to date		0 accepted to date			
C / I	Development	Fixed for a given project								
A	Voluntary pre-assessment ° Audit by DOE° Assistance	1 10	No voluntary pre-assessment by DOE	0	Assessment by auditor I Dealings with auditor I	5 10	**No methodology**		**No methodology**	
C / I										
C / I	Submission to UNFCCC (DOE) ° Assistance	1	Directly to the GS TAC	0	Auditors	0				
S	° Application Fee	**$1,000**	Methodology review. To the GS	**$500**	No Fee	**€0**				
A or S	Expert Desk Review (2 experts)	5			Assessment by auditor II Dealings with auditor II	5 10	(No further information given on the new methodology approval process: 1 round approval. Main message: go for existing CDM methodologies)		(CCX accepts 8 defined project types)	
C / I	Dealings with the EB approval	3			Approved directly by the 2 auditors	0				
	PDD development								**PDD = "proposal" or "questionnaire"**	
C / I	Project description	5								
C / I	Baseline scenario: baseline methodology, assumptions in calcultations, project specific basis, treatment of national or sectoral policies	10							Baselines by project type already determined by the CCX	0
C / I	Assessment and demonstration of the additionality: "the additionality tool" (4 step-approach)	10	No detailed financial plan needed (as an ODA cannot be used for the purchasing of credits)	8					No project-specific assessment (incorporated in the project type eligibility)	0
C / I	ERs and monitoring: Emissions and sources of potential increase, baseline, quality assurance and control procedure, ERs and periodic procedure	5								
C / I	Sustainable Development: .EIA: including transboundary impacts	5	EIA: if required by host country laws	0	EIA: if required by host country laws	0	Projects shall not cause substantial negative social and environmental impacts. Potential impacts shall be analyzed and documented in the PDD	5	EIA: If requiered by national laws	0
C / I			GS Sustainable Development Matrix and Monitoring plan	5						
C / I	Local stakeholders' consultation	4-5	More structured and stricter rules for the local stakeholders consultation	8			needs to be carried out. If justified and documented that project does not	4-5	If requiered by national laws	0
	Validation									
A	Desk review	4	Fee to the "Validation Fund"	**$5000**					No distinction between validation and verification: review by the CCX Committee on Offsets	0
A	Global Stakeholder process	1			No global consultation required	0				
A	On-site visit	4								
A	Pre-report with CARRs	2								
A	Final report	1								
A	Validation approval by the certification body	1								
C	Assitance with DOE	5	With GS TAC							

Source: Mission Climat of Caisse des Dépôts.

Annex 1: Matrix of transaction costs for non-forestry offset projects (part 4)

LEGEND: C / I Consultancy/internal costs (man-day); A Auditing costs (man-day); S Standard costs (€/$); R Registry costs (€/$); Cost increase ↑; Cost reduction ↓; Same as CDMs

	PROJECT CYCLE	CDM (benchmark)	Micro GS VER		VCS		VER+		CCX	
		Consultant and DOE Honorary (man-days) / **Fee ($)**	Differing requirements from CDM	Costs	Differing requirements from CDM	Costs	Differing requirements from CDM	Costs	Differing requirements from CDM	Costs
	Registration									
C / I	DNA's approval	7-8	Limited to a letter of communication to the DNA	0	Not required	0	Not required	0	Not required	0
S	Registration fee	Estimate of the number of credits to be generated the 1st year: **$0.10/CER** for the first 15,000t **$0.20/CER** above 15,000t	Credit for the anticipated amount of ERs certified after the 1st verification (anticipation of the 1st issuance fee). To the GS.	**$0,10/VER**	To the VCS Board	**€0,04 / VCU**	**None**	**$0**	**None**	**$0**
C / I	Dealings with EB	5	Dealings with the GS Foundation (pre-assessment+registration)	5 +5	Project directly approved by the auditor	0	Project directly approved by the auditor	0		
C / I	**Knowledge capitalization and dissemination**	Fixed for a given project								
	Monetization of ERs									
C / I	Assistance with ERPA	5								
C / I	Assistance with strategy	5								
	First verification								**"Project verification and enrollment"**	
A	Desk review	3	Fee to the "Verification Fund"	**$2500**	Same DOE for validation and verification	2	Same DOE for validation and verification	2		
A	On-site visit	3			Same DOE for validation and verification	2	Same DOE for validation and verification	2		
A	Final report	1			If the project has already started to generate credits, validation and verification can be done at the same time (only 1 on-site visit for both)					
A	Verification statement by the certification body	1								
C / I	Assitance with DOE + Monitoring	5	With GS TAC							
	Credits issuance									
S	Issuance fee to the EB	Admin Share of Proceeds: **$0.10/CER** for the first 15,000t **$0.20/CER** above 15,000t (As registration fee the 1st year)	GS VER credit issuance. To the GS.	**$0,10 / VER**	To the VCS Board	**€0,04 / VCU**	**None**	**€ 0**	**Offset registration and cancellation fees:** Project in: -Annex1 -Non-Annex1 (Africa)	**$0,15/t** **$0,12/t** **(no regist.fee)**
	Other administrative costs									
S	Adaptation fund fee	**2% of the CERs** issued each year	**None**	**$0**	**None**	**€ 0**	**None**	**€ 0**	**None**	**$0**
	Registry									
R or S	Account fee	None	Registry use	**$0,05/VER**	To be set by VCS registries	Anticipated to be €0,068/VCU	Registraion to Blueregistry	**€550/year**	Membership fee: Associate member Offset provider Offset agregator	**$2,000** **$5,000** **$5,000**
R	Transaction fee	None	None	None	To be set by VCS registries	N/A	Transaction fee variable	**€150 + €0,03/t if >1,000t**	Trading fee on the CCX platform	**$0,05/t**
	Periodic verification (same DOE) and monitoring								**"Project verification and enrollment"**	
A	Desk review	2	Fee to the "Verification Fund"							
A	On-site visit	2								
A	Final report	1								
A	Verification statement by the certification body	1								
C / I	Assitance with DOE + Monitoring	5								

Source: Mission Climat of Caisse des Dépôts.

Annex 2: Matrix of transaction costs for forestry offset projects (part 1)

LEGEND:

C / I	Consultancy/internal costs (man-day)
A	Auditing costs (man-day)
S	Standard costs (€/$)
R	Registry costs (€/$)
	Cost increase ↑
	Cost reduction ↓
	Same as CDMs

	PROJECT CYCLE	CDM AR (benchmark)	CDM AR SSC		VCS AFOLU		CCBS (V2)	
		Consultant and DOE Honorary (man-days) / **Fee ($)**	Differing requirements from CDM	Costs	Differing requirements from CDM	Costs	Differing requirements from CDM	Costs
C / I	**Project finding and assessment**	Fixed for a given project						
	New methodology							
C / I	Development	Fixed for a given project	No specific procedure outlined by the EB in the interim, same as large scale				**No methodology**	
A	Voluntary pre-assessment				Assessment by auditor I	5		
C / I	° Audit by DOE	1			Dealings with auditor I	10		
C / I	° Assistance	10						
C / I	Submission to UNFCCC (DOE)							
C / I	° Assistance	1			auditors	0		
S	° Application Fee	**$0**			No Fee	**$0**		
A or S	Expert Desk Review (2 experts)	5			Assessment by auditor II	5	CDM or IPCC methodologies accepted. VCS AFOLU methodologies likely to be accepted in the future.	
C / I	Dealings with the EB approval	3			Dealings with auditor II	10		
					Approved directly by the 2 auditors	0		
	PDD development							
C / I	Project description (incl. a description of climate, hydrology, soils, ecosystems, endangered species)	7			No compulsary description of climate, hydrology, soils, ecosystems, endangered species	5	+ .Biodiversity information .Community information	3 3
C / I	Baseline scenario: baseline methodology, assumptions in calcultations, project specific basis, treatment of national or sectoral policies	10	Use of simplified baseline, deemed representative of what would occur in the absence of the project. No other requirements	4-6			+ Description of how the "without project" scenario would affect: local communities, biodiversity, water and soil ressources	5
C / I	Assessment and demonstration of the additionality: "the additionality tool" (4 step-approach)	10	No "additionality tool" but only the barrier analysis (step 3) is required	4-6				
C / I	ERs and monitoring: Emissions and sources of potential increase, baseline, quality assurance and control procedure, and periodic procedure for Ers calculations	5						
C / I	Sustainable Development: .EIA: incl. impacts on biodiversity and natural ecosystems, and transboundary impacts .Socio Economic impacts: incl. Transboundary impacts .Remedial measures and planned monitoring	7 7 5			.No transboudary impact assessment .No transboudary impact assessment .Mitigation of both impacts, no monitoring	5 5 3	+ Adaptative management and knowledge dissemination plans	1
C / I	Local stakeholders' consultation	10						
C / I	Adressing non-permanence: statement describing the approach (tCERs or lCERs)	3			Non Permanence Risk Analysis and Buffer Table	10	**NA:** Project design standard: no quantitative carbon certification	
	Validation							
A	Desk review	4	Simplified baseline, monitoring, additionality tool	2				
A	Global Stakeholder process	1			No global consultation required	0		
A	On-site visit	4	Simplified baseline, monitoring, additionality tool	2	Non permance Risk Analysis and Buffer table to validate	5		
A	Pre-report with CARRs	2						
A	Final report	1						
A	Validation approval by the certification body	1						
C / I	Assitance with DOE	5						

Source: Mission Climat of Caisse des Dépôts.

Annex 2: Matrix of transaction costs for forestry offset projects (part 2)

LEGEND: C / I Consultancy/internal costs (man-day); A Auditing costs (man-day); S Standard costs (€/$); R Registry costs (€/$); Cost increase ↑; Cost reduction ↓; Same as CDMs

	PROJECT CYCLE	CDM AR (benchmark)	CDM AR SSC		VCS AFOLU		CCBS (V2)	
		Consultant and DOE Honorary (man-days) / **Fee ($)**	Differing requirements from CDM	Costs	Differing requirements from CDM	Costs	Differing requirements from CDM	Costs
	Registration							
C / I	DNA's approval	7-8			Not required	0	Not required	0
S	Registration fee	Estimate of the number of credits to be generated the 1st year: **$0.10/CER** for the first 15,000t **$0.20/CER** above 15,000t	**None**	**$0**	To the VCS Board	**€0,04 / VCU**	The CCBS is a project design standard	**$0**
C / I	Dealings with EB	5			Project directly approved by the auditor	0	Project directly approved by the auditor	0
C / I	**Knowledge capitalization and dissemination**	Fixed for a given project						
	Monetization of ERs							
C / I	Assistance with ERPA	5						
C / I	Assistance with strategy	5						
	First verification + monitoring				**5 years**			
A	Desk review	3	Same DOE for validation and verification	1	Same DOE for validation and verification	1	Same DOE for validation and verification	1
A	On-site visit	3	Same DOE for validation and verification	2	Same DOE for validation and verification	2	Same DOE for validation and verification	2
A	Final report	1						
A	Verification statement by the certification body	1			If the project has already started to generate credits, validation and verification can be done at the same time (only 1 on-site visit for both)			
C / I	Assitance with DOE + monitoring	5						
	Credits issuance							
S	Issuance fee to the EB	Admin Share of Proceeds: **$0.10/CER** for the first 15,000t **$0.20/CER** above 15,000t (As registration fee the 1st year)	**None**	**$0**	None	**€0**	**No credit issuance**	
S	Non-permanence	tCERs or lCERs			Buffer: 5-60% depending on the risk level		Project design standard: no quantitative carbon certification	
	Other administrative costs							
S	Adaptation fund fee	**2% of the CERs** issued each year	**None**	**$0**	**None**	**€ 0**	**None**	**$0**
	Registry							
R or S	Account fee	**None**			To be set by VCS registries	Anticipated to be €0,068/VCU	**No credit issuance**	
R	Transaction fee	**None**			To be set by VCS registries	N/A	Project design standard: no quantitative carbon certification	
	Periodic verification (same DOE) + monitoring				**5 years**			
A	Desk review	2						
A	On-site visit	2	Less work on the field due to the simplified monitoring	1				
A	Final report	1						
A	Verification statement by the certification body	1						
C / I	Assitance with DOE + monitoring	5						

Source: Mission Climat of Caisse des Dépôts.

Annex 2: Matrix of transaction costs for forestry offset projects (part 3)

LEGEND: C / I Consultancy/internal costs (man-day); A Auditing costs (man-day); S Standard costs (€/$); R Registry costs (€/$); Cost increase ↑; Cost reduction ↓; Same as CDMs

	PROJECT CYCLE	CDM AR (benchmark)	CDM + CCBS (V2)		CCX		VER+	
		Consultant and DOE Honorary (man-days) / **Fee ($)**			Differing requirements from CDM	Costs	Differing requirements from CDM	Costs
C / I	**Project finding and assessment**	Fixed for a given project						
	New methodology							
C / I	Development	Fixed for a given project						
A	Voluntary pre-assessment ° Audit by DOE	1			**No methodology**		**No methodology**	
C / I	° Assistance	10						
C / I	Submission to UNFCCC (DOE) ° Assistance	1						
S	° Application Fee	**$0**						
A or S	Expert Desk Review (2 experts)	5			(CCX accepts 8 defined project types)		(No further information given on the new methodology approval process: 1 round approval. Main message: go for existing CDM methodologies)	
C / I	Dealings with the EB approval	3						
	PDD development							
C / I	Project description (incl. a description of climate, hydrology, soils, ecosystems, endangered species)	7	+ .Biodiversity information .Community information	 3 3				
C / I	Baseline scenario: baseline methodology, assumptions in calcultations, project specific basis, treatment of national or sectoral policies	10	+ Description of how the "without project" scenario would affect: local communities, biodiversity, water and soil ressources	5	Simplified baselines	0		
C / I	Assessment and demonstration of the additionality: "the additionality tool" (4 step-approach)	10			No project-specific assessment (incorporated in the project type eligibility)	0		
C / I	ERs and monitoring: Emissions and sources of potential increase, baseline, quality assurance and control procedure, and periodic procedure for Ers calculations	5						
C / I	Sustainable Development: .EIA: incl. impacts on biodiversity and natural ecosystems, and transboundary impacts .Socio Economic impacts: incl. Transboundary impacts .Remedial measures and planned monitoring	7 7 5	+ Adaptative management and knowledge dissemination plans	1	EIA: If requiered by national laws	0	Projects shall not cause substantial negative social and environmental impacts. Potential impacts shall be analyzed and documented in the PDD	
C / I	Local stakeholders' consultation	10			If requiered by national laws	0	Local stakeholder process needs to be carried out. If justified and documented that project does not impact the vicinity negatively, no local stakeholder process needs to be carried out	
C / I	Adressing non-permanence: statement describing the approach (tCERs or lCERs)	3			Forest Carbon Pool Reserve 20%	0	Non Permanence Risk Analysis and Buffer Table	10
	Validation							
A	Desk review	4	Biodiversity and Community (information, baseline, adaptative management)	5	No distinction between validation and verification: review by the CCX Committee on Offsets	0		
A	Global Stakeholder process	1						
A	On-site visit	4	Biodiversity and Community (information, baseline, adaptative management)	5				
A	Pre-report with CARRs	2						
A	Final report	1	CDM + CCBS report	2				
A	Validation approval by the certification body	1						
C / I	Assitance with DOE	5						

Source: Mission Climat of Caisse des Dépôts.

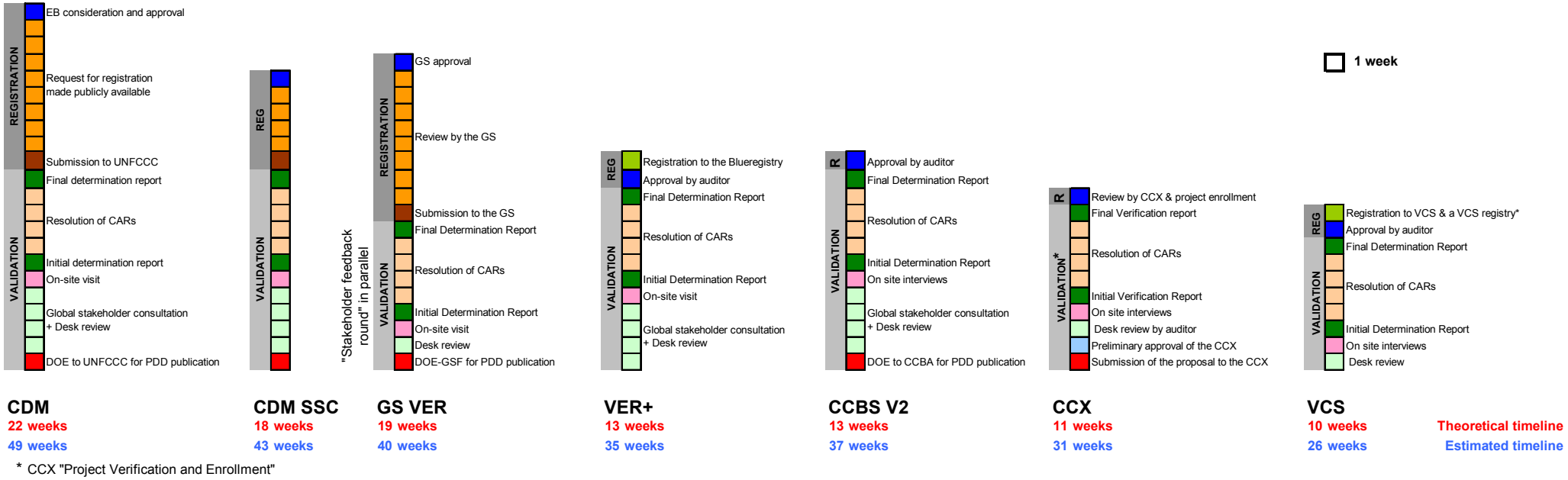
Annex 2: Matrix of transaction costs for forestry offset projects (part 4)

LEGEND: C / I Consultancy/internal costs (man-day); A Auditing costs (man-day); S Standard costs (€/$); R Registry costs (€/$); Cost increase ↑; Cost reduction ↓; Same as CDMs

	PROJECT CYCLE	CDM AR (benchmark)	CDM + CCBS (V2)		CCX		VER+	
		Consultant and DOE Honorary (man-days) / **Fee ($)**			Differing requirements from CDM	Costs	Differing requirements from CDM	Costs
	Registration							
C / I	DNA's approval	7-8			Not required	0	Not required	0
S	Registration fee	Estimate of the number of credits to be generated the 1st year: **$0.10/CER** for the first 15,000t **$0.20/CER** above 15,000t			**None**	**$0**	**None**	**$0**
C / I	Dealings with EB	5					Project directly approved by the auditor	0
C / I	**Knowledge capitalization and dissemination**	Fixed for a given project						
	Monetization of ERs							
C / I	Assistance with ERPA	5						
C / I	Assistance with strategy	5						
	First verification + monitoring							
A	Desk review	3	Biodiversity and Community (information, baseline, adaptative management)	4			Same DOE for validation and verification	1
A	On-site visit	3		5	Higher level of sampling regime	6	Same DOE for validation and verification	2
A	Final report	1	CDM + CCBS report	2				
A	Verification statement by the certification body	1						
C / I	Assitance with DOE + monitoring	5						
	Credits issuance							
S	Issuance fee to the EB	Admin Share of Proceeds: **$0.10/CER** for the first 15,000t **$0.20/CER** above 15,000t (As registration fee the 1st year)			Issuance fee: from non-Annex1 from Annex1	**$0,12/t** **$0,15/t**	None	**€0**
S	Non-permanence	tCERs or lCERs			Forest Carbon Pool Reserve 20%		Buffer: similar approach to VCS. At least 20% buffer	
	Other administrative costs							
S	Adaptation fund fee	**2% of the CERs** issued each year			**None**	**$0**	**None**	**€0**
	Registry							
R or S	Account fee	**None**			Membership fee: Associate member Offset provider Offset agregator	 **$2,000** **$5,000** **$5,000**	Registraion to Blueregistry	**€550/year**
R	Transaction fee	**None**			Trading fee on the CCX platform	**$0,05/t**	Transaction fee variable	**€150 + €0,03/t if >1,000t**
	Periodic verification (same DOE) + monitoring							
A	Desk review	2	Biodiversity and Community (information, baseline, adaptative management)	3				
A	On-site visit	2		4	Higher level of sampling regime	6		
A	Final report	1	CDM + CCBS report	2				
A	Verification statement by the certification body	1						
C / I	Assitance with DOE + monitoring	5						

Source: Mission Climat of Caisse des Dépôts.

Annex 3: Theoretical and estimated certification timeline



* CCX "Project Verification and Enrollment"

Source: Mission Climat of Caisse des Dépôts.