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## **Analysis and evaluation of forest carbon projects and respective certification standards for the voluntary offset of greenhouse gas emissions**

### **Summary**

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## Executive Summary

Forest based CO<sub>2</sub> sequestration projects, regardless of their methodological approach, are always defined by the interaction of two carbon pools: a) the CO<sub>2</sub> stored in the forest ecosystem and b) the CO<sub>2</sub> present in the atmosphere. Forests are sinks for atmospheric carbon. This holds especially true for young or immature forests, if they are not disturbed and are not yet at equilibrium of increment, harvest and/or decay and harvest. This positive net sequestration of CO<sub>2</sub> can be traded via emission reduction certificates, e.g. to offset emissions from industrial production, travelling and energy consumption.

In contrast, the atmospheric pool increases if forests are destroyed leading to the release of the stored CO<sub>2</sub>. This occurs if forest lands are converted into other land uses such as agriculture, or through forest management activities like harvesting or natural disturbances like forest fires or pests. In all these cases forests become sources of CO<sub>2</sub>.

### Forest carbon project types

There are three major types of forest-based carbon projects that either sequester CO<sub>2</sub> or reduce CO<sub>2</sub> emissions.

- Afforestation/Reforestation (AR) projects increase the amount of carbon in living biomass and soil by establishing forests on non-forest land. Typical examples are afforestation and reforestation of protected areas, agricultural land and degraded or eroded land. This category of projects includes classical forest plantations with high yielding and fast growing tree species such as eucalyptus or pines.
- Reducing Emissions from Deforestation and Forest Degradation (REDD) projects: According to the IPCC 4<sup>th</sup> assessment report, emissions from the clearance of forests are responsible for about 17% of global CO<sub>2</sub> emissions. Reducing high deforestation and degradation rates is considered to be a very cost-effective way to decrease global greenhouse gas emissions and to support developing countries in better managing their natural resources. The reduction of emissions from deforestation and forest degradation via protection, carbon stock enhancement as well as improved and sustainable forest management in developing countries has gained importance in the current debate on climate change.
- The project type Improved/Sustainable Forest Management (IFM / SFM) includes all activities that increase the carbon storage potential through modified forest management. Forest management practices can be improved and altered depending on the scope of the project, provided the net carbon benefits of the improved management practices are well documented.

### Forest carbon credits

Forest carbon credits represent the “commodity” traded on the carbon market. They are traded as certificates. One certificate is equivalent to one ton of CO<sub>2</sub>. Three general categories of forest carbon credits are currently traded in the market:

- Ex-ante certificates: These certificates are traded as futures on the assumption that a given amount of CO<sub>2</sub> will be sequestered through a forestry project within a certain period in the future.
- Ex-post certificates: This type is traded only after verification attesting that a certain amount of CO<sub>2</sub> has been sequestered.

- Non-certified sequestration benefits: Climate benefits that have not been certified by any recognized standard and no independent audits have been conducted.

### **Certification standards**

Certificates for forest carbon credits are traded a) on the compliance market e.g. according to the Kyoto protocol, which applies for large sections of the economies in industrialized countries that have ratified the Kyoto Protocol, and b) on the voluntary carbon market, which extends to private individuals, for-profit and not-for-profit businesses that want to offset their CO<sub>2</sub> emissions on a voluntary basis.

Carbon credits originating from forest projects are traded predominantly on the voluntary market. In recent years different carbon standards have evolved. These standards are supposed to guarantee that climate benefits are truly delivered and that projects do have sustainable development benefits. However, none of the available standards has taken a clear lead amongst their competitors. The following standards have been identified as being relevant for forestry projects that generate carbon offsets for clients on the German market:

- Carbon Fix Standard (CFS),
- Clean Development Mechanism (CDM),
- Climate, Community and Biodiversity Standard (CCBS), i.e. only a project design standards,
- PRIMAKLIMA-Standard,
- Plan Vivo-Standard and
- Voluntary Carbon Standard (VCS).

### **Providers of forest carbon credits**

A multitude of providers for emission reduction certificate are operating in the market. According to UBA there were about 90 offset providers active worldwide in 2006. This number has to be deemed very conservative in the current market.

In order to gain an overview of providers that cater to the German market, a survey was conducted that was comprised of:

- providers that are registered or have a subsidiary within German speaking countries (Germany, Switzerland or Austria), and
- providers that have forestry projects in their portfolio

With regards to the data collection, exact numbers on the amount of projects, turnover and transaction volumes were not available. Important providers in terms of their market presence and visibility in Germany are PRIMAKLIMA, CO<sub>2</sub>OL, globalwoods AG and Co<sub>2</sub>mpense.

The results of the survey showed a clear picture of preferences regarding project types and project locations.

North America as well as Latin and South America were preferred project locations. Forest carbon credits originating from North America are traded mainly in the domestic market. Therefore, these forestry projects are currently not very relevant for the German market.

Forest carbon credits from Latin and South American projects are mainly traded in Germany. At the same time, the number of projects from Asia is increasing. Some carbon sequestration



projects from Africa feature also in the portfolio of offset providers operating in the German market.

Afforestation/Reforestation (A/R) projects are the dominant project type but sustainable forest management projects are gaining in importance. Projects that reduce emissions from deforestation and forest degradation are not highly visible in the market, yet.

Standards that set a framework on the generation of forest carbon credits are mainly VCS and CFS. Additionally, CCBS is frequently applied to recognize and certify community and biodiversity benefits. In Germany, also PRIMAKLIMA has a relevant market share.

## **Comparison of carbon offset standards for forest-based projects**

The standards for forest-based projects can be categorized in the following manner:

1. standards that use methodologies and market strategies oriented towards the CDM criteria and the compliance market; partly, these standards aim to be accepted in the potential compliance markets (VCS and CFS); these standards issue forest carbon credit certificates
2. standards that certify projects that generate positive effects on climate change, but do not issue forest carbon credit certificates comparable to the compliance market (CCBS, PRIMAKLIMA-Standard)

In light of these two different approaches all standards, nonetheless, have the objective to certify forest based projects that deliver climate benefits.

Within the scope of this study, the standards relevant for the German voluntary CO<sub>2</sub> offset market were analyzed. CDM criteria were used for benchmarking. Furthermore, socio-economic and ecologic sustainability criteria were incorporated. Thus, the analysis of the standards considered the following list of criteria:

### **Additionality**

This criterion is one of the core criteria for quality assurance of offset and sequestration activities. The proof of additionality explores whether the original intent of the project is primarily to mitigate climate change. Therefore, it discourages project activities that were designed for other purposes and honors projects that clearly can prove the additional climate benefit from their outset. This ensures that certificates are only issued by projects that would not have taken off without the anticipated income from the sale of these certificates.

### **Permanence**

Forests are either sources or sinks of CO<sub>2</sub>. Permanence refers to the timeframe in which carbon is stored in the forest ecosystems. The risk that carbon is released prematurely is determined by factors such as sustainability of project activity, biotic and abiotic natural disturbances and anthropogenic risks (political instability, encroachment, and illegal timber extraction). Project developers can minimize the risk of reversing the CO<sub>2</sub> sequestration by applying sustainable forest management practices and integration of the local population into the project. However, complete risk exclusion is not possible due to force majeure such as fires or storms. Standards should try to ascertain these risk profiles and apply due diligence processes to projects. A standard can address risks by issuing temporary certificates, by insuring against



risk, holding certificates in a risk buffer and release or erase the buffer depending on the actual performance of projects.

### **Leakage effects**

Forestry projects are often implemented in the context of large scale land use changes and are often situated in an intricate socio-economic and environmental setting. Therefore their implementation is governed by complex interactions and leakage effects between project entities and user groups. Consequently there is the possibility of emissions being displaced from the project area to the surrounding areas. If this effect is directly linked to the project activity the project has to account for it. Standards should clarify which mechanisms are eligible to avoid leakage and how the project has to account for leakage.

### **Sustainability and co-benefits**

Sustainably designed projects may generate co-benefits along the actual sequestration benefits. Among these co-benefits are social and economic development of livelihoods of local populations, protection of biodiversity, soil and water. The study evaluates the standards against the inclusion of criteria on co-benefits into project design and project implementation.

### **Methodology**

Standards have the options to develop own methodologies, accept methodologies of other standards or let the project developer suggest methodologies. The level of detail of a methodology determines the level of certainty in the calculations of the relevant emission and emission reduction parameters for baseline and project scenarios, leakage, risk/buffer, and project emissions. The Good Practice Guidelines (GPG) of the IPCC describes a framework for the methodological process from the initial feasibility study up to the registration through the standard.

### **Certification Process**

The process of certification follows the same steps in all standards:

- Validation: Experts evaluate the project design against the requirements set out by the respective standard. This includes the confirmation of the estimated carbon sequestration or emission reduction potentials.
- Verification: Each project is verified regularly after a certain period of time, which is set by the standard. Independent auditors verify the amount of CO<sub>2</sub> sequestered over the past period.
- Registration: Issued forest carbon credits are registered.

### **Registry**

Forest carbon credits are registered in the database of the provider and optionally in third-party registries. In case projects are realized in Annex-I countries of the Kyoto-protocol, the issued forest carbon credits that have been traded on the voluntary market have to be considered in the national GHG accounting of the respective country in order to avoid double ac-

counting. The standards should prescribe the independent registration of the certificates and accounting procedures in the national GHG inventory of the host countries.

### **Transparency**

The criterion transparency involves the availability of information about the source and the status of certificates. Project planning, implementation and certification processes should be open for comment and understandable for other independent parties and for local stakeholders. Information on the project documentation and on the auditors should be available as well as the type of certificates (ex-ante / ex-post) and registration formalities.

### **Summary of certification standards**

The main advantages of the CDM standard are its detailed methodology and the versatile toolbox for development of project designs and validation of carbon projects. Thus, the resulting assumptions and calculations are transparent and comprehensive. The drawbacks of this standard are the high scientific input needed to apply the tools and methodologies, resulting in high project development and implementation costs and long project registration timeframes. CDM is limited to Afforestation /Reforestation projects. Another weak point (from the perspective of emission reduction certificate buyers) is that certificates are temporary and have to be replaced after a few years.

The Carbon Fix Standard has its main advantages for project developers in the fact that development and practicability is straightforward. The standard issues certificates for forest project types that convert non-forest land to forests. Main drawback is the fixed buffer of 30% which could be understating risks and might be insufficient to cover losses.

The Plan Vivo Standard is the most sophisticated standard in terms of project design. On the other hand, validation is not outsourced to independent third party auditors. Ex-ante certificates are sold without clear risk buffers and security to the buyers. Advantages are 1) the individually created methodology for each single project and 2) a strong inclusion of the local population in projects and in depth stakeholder interactions.

The major advantage of the VCS is that it incorporates a multitude of project types and uses similar predefined toolbox as the A/R CDM standard. The toolbox provides the methodologies for a systematic and transparent auditing of the main project criteria like additionality, permanence and leakage possible. The main drawbacks for this standard are its low transparency of the validation process and minimal incorporation of co-benefit criteria in the project design focusing only on GHG accounting.

CCBS does not issue certificates and therefore does not take into account fundamental quality criteria for carbon projects in terms of processes like registration, verification, monitoring and GHG accounting. An add-on certification with CDM, CFS, or VCS is necessary to generate forest carbon credits from CCBS projects. The CCBS has a different goal focusing on the certification of additional socio-economic and ecological benefits of a project. The standard has a wide range of tools and auditing procedures available to ascertain those co-benefits.

Projects using the PRIMAKLIMA standard are not validated externally. The standard does not issue certificates comparable with CDM, CFS, VCS and Plan Vivo. Furthermore, its projects can be implemented in Annex I countries with an inherent risk of double accounting (valid for certificates issued since 2008). Advantages of the standard are the simple and transparent accounting method for sequestration benefits and a risk buffer in form of a pool of permanently

held forest areas accounting for enough CO<sub>2</sub> sequestration capacity to safeguard the marketed offsets.

## Comparison of forestry projects

The comparison of forestry projects done as part of this study included four projects validated according to the VCS, CFS, CDM, and CCBS-standards as well as two projects reviewed under the PRIMAKLIMA standard. The projects were located in Africa (2), Asia (1), South America (1) and Europe (2). Some projects were certified according to the CCBS and/or the Forest Stewardship Council (FSC) as add-on standards. For all projects, the available project documentation (project design documents, validation reports, management plans) was reviewed in order to analyze the projects' main characteristics and their approaches of implementing the respective standard requirements. If project documentation was not complete, project developers were directly contacted and questioned.

Two of the projects (those reviewed under the VCS and CCBS standards) were co-certified under the FSC (Forest Stewardship Council). Furthermore, the VCS and CFS-certified projects were co-certified according to CCBS.

All projects have been validated according to the respective standards' requirements. Thus, all projects showed a high level of quality and transparency.

The evaluation of the projects revealed that project developers under CCBS and the PRIMAKLIMA standards have significantly higher flexibility when designing and implementing a project than project developers for CDM, CFS and VCS. They are not bound to use standardized tools and may draw on qualitative arguments to prove and test additionality, leakage or permanence risks. On the other hand the verification of criteria in CDM, CFS and VCS projects was more comprehensive and transparent due to the systematic documentation and supporting quantitative analysis which makes it easier to validate and verify the projects by independent third-party auditors.

The following sections highlight the main characteristics of the analyzed projects with regard to the project design criteria.

### Additionality of forestry projects

Proof of additionality was adequate for all projects. The comparison revealed advantages of standardized tools for attesting additionality. These tools provide transparent and comprehensive results e.g. support through discounted cash flow analyses with and without the project scenario. Qualitative tests also led to correct conclusions, but the traceability was not fully warranted in these cases. The CDM additionality tool has been used by the CDM, CFS and VCS project developers. The CCBS and PRIMAKLIMA projects delivered qualitative arguments to support project additionality.

### Permanence of forestry projects

Permanence risks have been tested in all projects (except for the CDM project). The two CFS and VCS projects provide the most transparent and comprehensive tests and results. Both quantify the risk of damages or loss and apply a risk buffer in their project design. CFS sets a fixed buffer of 30% which can be regarded as appropriate regarding the identified risks such as pests and fire. The VCS project calculates the buffer level (in this case: 40%) based on its tool





for non-permanence. This buffer, too, can be regarded as appropriate. Both projects adopted risk mitigating measures (e.g. fire lines).

The CCBS and PRIMAKLIMA projects evaluate the permanence risks qualitatively. These qualitative descriptions are appropriate (e.g. in the CBBS project). However, detailed technical risk management plans are not provided by these projects.

PRIMAKLIMA covers the risk of damage and loss through its security pool, while the CDM project is issuing temporary forest carbon credits only. The CCBS, CFS and VCS projects integrate risk mitigating activities in their project design that include adjacent population and other stakeholders, while the other projects refer to proper sustainable forest management as being the only activity to address permanence risks.

### **Leakage in forestry projects**

The CDM, CFS and VCS projects delivered comprehensive tests and partly quantified leakage effects caused by the respective projects. Only the CFS and VCS projects identified significant leakage and addressed it in the project design (included in risk buffer, GHG accounting and monitoring).

The other projects examined potential leakage at qualitative level. The argumentation of PRIMAKLIMA projects was sound and comprehensive (afforestation on abandoned agricultural lands). In contrast the CCBS project did not address some open questions. For example, the project reduced harvesting activities within the project area, but it remained unclear whether these activities have been shifted to other regions outside the project area.

### **GHG accounting in forestry projects**

Four of the six projects (namely: the CDM, CFS, VCS and CCBS projects) drew on CDM based methodologies to calculate the GHG balance. Since none of the projects has been implemented long enough, accuracy of the calculations could not be verified. Methodological approaches of these projects were realized according to IPCC tier 2 procedures (e.g. realization of forest inventories and use of regional growth tables for the planted tree species). The fact that most of the scrutinized projects utilized the methodological approaches of CDM A/R and that the CDM also provides simplified methodological approaches for small-scale projects leads to the conclusion that the CDM A/R methodology can be regarded as good common practice for GHG accounting in forest carbon projects. With respect to monitoring, all six projects have adopted common forestry monitoring practices, i.e. permanent sampling and inventory methodologies, which have been adjusted to the specific needs of the respective project region and forest types.

### **Ecological and social co-benefits in forestry projects**

The CCBS, CFS and VCS projects aim at ensuring ecological and social co-benefits through add-on certification: the CFS project was co-certified according to the CCBS, the VCS project according to FSC and CCBS project, and the CCBS according to FSC. The certified co-benefits refer to improvements of livelihoods, conservation of biodiversity and protection of soils and watersheds. These co-certified projects provide detailed documentation, set monitoring and comply with third party auditing requirements. The other projects also aim at delivering co-benefits, but it was not fully possible to verify these co-benefits solely from the available project documentation.

### **Institutional setting in forestry projects**

The project documentation of all projects provided the necessary basic information on land tenure, ownership of forest carbon credits, and benefit sharing. Stakeholders and communities have been involved in all projects during project planning and implementation. Especially the CDM and CCBS projects rely on active participation of the land owners (small holders). The CFS and VCS projects are located on large scale plantation areas. Therefore, cooperation with neighboring communities is crucial for the success of the projects. Thus, detailed participation procedures are described in the project documentation. The PRIMAKLIMA project partners are state entities. However, community issues are addressed adequately in the project design. Only two of the project documents mention conflict resolution mechanisms.

### **Forest management planning**

All six projects developed basic forest management plans. Highly detailed management plans are provided by those projects that are co-certified according to the FSC (the VCS project and the CCBS project; the CFS project is currently in the process of being FSC certified). Under the FSC, forest management must include the ecological and socio-economic benefits. Therefore, the FSC certification can be regarded as best practice for forest carbon projects. The CFS project also provides a detailed management plan based on the standard's guidelines. The projects under PRIMAKLIMA standard developed management plans in line with the regulations of the projects' host countries.

## **Guidelines for planning and implementing forest carbon projects**

The following paragraphs summarize recommendations for guidelines on design and implementation of forest based carbon projects. The guidelines are based on the analysis of forest projects and the results of the standards' comparison.

### **Additionality**

- In the project development phase it is recommended to use the step wise CDM additionality tool in its versions for small scale and large scale project designs. This tool can be used for all project types. The threshold between small and large scale should be set at 16,000 tCO<sub>2e</sub>/year.

### **Permanence**

- The potential shortfalls in planted or protected areas comprise a financial loss for project developers, for buyers of forest carbon credits and also for the local population and other stakeholders involved. Minimizing the risk via a buffer with the option of putting the pooled certificates back on the market at a later stage if risk is reduced encourages the project developers to take risk mitigation actions at an early stage in the project design. Furthermore, the buyers of forest carbon credits are insured against delivery shortfalls. The VCS "AFOLU Non-Permanence Risk Analysis and Buffer Determination Tool" provides the most flexible and detailed possibility to calculate risk and buffer size and should therefore be used for forest carbon projects. The determined risk buffer percentage should be



incorporated into the GHG accounting and withheld in a buffer account. The test is viable for all project types and sizes.

- A buffer system, with the option to sell buffered credits after successful risk mitigation, is recommended for all project types. For projects with sequestration rates less than 16,000 t CO<sub>2e</sub> / year a fixed buffer of e.g. 30% is recommended. Otherwise the cost effectiveness of small-scale projects could be jeopardized.
- The long term sustainable forest land use should be proven over the lifetime of the project and beyond. The timeframe for project related permanence of forests and the validity of forest carbon credits should be communicated to the buyer. A plan to ensure the security of forested land beyond the project lifetime should be verifiable.

### Leakage effects

- During project implementation potential significant leakage effects (>5% of the gross emission reduction potential) should be monitored through control plots and socio-economic appraisals. Negative leakage effects have to be accounted for in the applied GHG accounting methodologies. In order to account for displacement of grazing animals or other agricultural activities the CDM tools are recommended. This approach is advisable for all project types and sizes.
- Leakage effects have to be put into the national context and framework. In case of the existence of a national GHG accounting system or inventory, leakage effects have to be incorporated into the overall accounting. In case a REDD-regime will become operational in the future and will comprise national GHG accounting inventories for the forest sectors in developing countries, leakage effects have to be considered in these inventories, too.

### Methodology

- In regions with good reference data for increment and carbon storage capacity, the input information for the calculation of baseline and project scenarios as well as subsequent GHG accounting can be derived from secondary scientifically-based information. In regions without such data secondary information reference data has to be gathered. There are significant differences between A/R, IFM and REDD projects owing to the structural diversity and dynamic of forest ecosystems. The methodological intricacies are lower in A/R projects with few tree species. Also few tree species increase the possibility of high reference data availability. Projects occurring on forested land (IFM and REDD) are methodologically more challenging. The monitoring calls for permanent sample plots with additional remote sensing and GIS mapping. The input for REDD projects is coupled with higher costs in view of the variability of parameters that have to be monitored.
- For the overall project duration a management plan should be drawn that takes timing and costing of planting, maintenance and harvesting operations into account. A short term detailed plan (5 years) for forest management operations should also be available. REDD projects will again need higher inputs to fulfill this criterion.
- For small scale projects (in reference to CDM threshold 16,000 t CO<sub>2e</sub>/year) a simplified methodology for GHG accounting should be used. This methodology should be based on average values and default parameters which do not need a survey of primary data sources or initial sampling.

### **Sustainability and co-benefits**

- Forest based projects aiming to generate certified forest carbon credits should be validated by independent auditors and preferably provide a co-certification with internationally recognized forest certification standards such as FSC or the Programme for the Endorsement of Forest Certification Schemes (PEFC). For small scale projects (up to 16,000 t CO<sub>2e</sub>/year) this may not be economically viable. However, they may opt for group certification together with other small scale projects or at least apply voluntarily the standards' principles and criteria.
- Ecosystem services (e.g. watershed protection, erosion prevention, biodiversity conservation) and socio-economic co-benefits (e.g. improvement of livelihoods, education, and infrastructure) should be an integral component of forest based carbon projects. These co-benefits should be third party controlled and certified. The CCBS offers certification schemes for a wide range of co-benefits. Similarly to the forest certification with FSC or PEFC, small scale projects may only opt for applying voluntarily the standards' principles, when costs for a full certification are prohibitively high.

### **Registration**

- All forest carbon credits issued by forest based projects should be kept in independent third-party registries. Origin of the certificate and buyers shall be identifiable.
- All forest based projects should be recognized by the designated national authority (DNA) in order to assess the project's contribution to national sustainable development and avoid double accounting of the project's certificates, if the host country has established a national GHG inventory. The project should be assessed against the respective country's national sustainability criteria and the national environmental impact assessment criteria.
- Issued and transacted forest carbon credits have to be retired in the respective standard registries as well as from the national GHG inventory (if issued in Annex-I countries).

### **Transparency**

- Land owners and land use rights as well as emission reduction certificate ownership and related benefit sharing should be clearly earmarked in the project documentation. Assessing the institutional setting and related issues can be guided by the respective VCS tool (VCS Program Update, 21 January 2010). Conflict resolution mechanisms and stakeholder participation in planning and implementation should be mandatory for all projects.
- The full project documentation (PDD, validation reports, verification reports, management plans etc.) should be publicly available for buyers and other stakeholders.
- The institutional setting of forest carbon projects is usually highly complex. Thus, flexibility in project design is an advantage in order to address variable and dynamic conditions. However, in order to design the institutional setting of a forest based project, the safeguard standards of the International Finance Corporation (IFC) should be applied as a guideline to ensure social equity and participation in the project.



## Marketing

- Ex-ante forest carbon credits must be seen critically since permanence of the future carbon sequestration can only be ensured to a limited extent. These certificates bear high risks for the buyers. In case ex-ante certificates are sold a sufficient risk buffer or similar risk management tools must be established. The contractual arrangements must clearly address these issues and define a clear vintage (e.g. 5 or 10 years) for the verification of the certificates. Furthermore, project developers may draw on specified ex-ante credits, such as “futures” in order to obtain financing capital.
- The buyer of the forest carbon credits must be informed about the type of certificate (ex-ante or ex-post), the certificates’ origin and the registry, where the certificates are administered.
- Small scale projects (i.e. up to 16.000 t CO<sub>2</sub>e/year), that may not run a fully scoped GHG accounting, monitoring and certification process due to economic restrictions, may opt for group certification (in case the respective standards provide the methodology for it) in order to issue forest carbon credits. Other opportunities for small scale projects to participate in the market are over-the-counter (OTC) contracts or the financing project activities through donations of private donors or companies, independent of third-party auditing.