Transaction costs of forest carbon projects

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Table of Contents

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1 Introduction

To date, research on transaction costs of carbon markets has focused on energy projects and international emissions trading (IET). Limited analysis has been performed on the transaction costs of forest carbon projects, especially regarding the viability of small-scale ventures. Most studies suggest that transaction costs for carbon projects, especially small scale, have been significantly high. Research is therefore needed to determine: (i) the nature and size of the transaction costs, (ii) the stakeholders affected by those costs, and (iii) ways of reducing them through policy or institutional mechanisms.

In this study, the existing literature on transaction costs of carbon projects is reviewed and categories of transaction costs are identified. A number of Activities Implemented Jointly (AIJ) forest carbon projects are selected, and analysed based on the groupings of transaction costs made in section one. In section three, ways to reduce the identified transaction costs for projects and the carbon market, through institutional mechanisms are discussed

2 Methodology

In reviewing the transaction cost literature on carbon projects, a web search was carried out to obtain publications and large amounts of ‘grey’ literature. Where necessary, authors were contacted directly for clarification of findings.

To obtain the actual and expected transaction costs of existing forest carbon projects, a written survey was sent to 11 AIJ forest carbon project teams. A number of the selected projects were found to be no longer operational and for those that were, the concept of transaction costs was not fully understood by way of a written survey. As a result a number of the project managers were interviewed by telephone and, where possible, quantitative estimates of time expended in project activities and financial cost incurred were obtained.

3 Review of transaction costs of setting up carbon-sequestration projects

3.1 Definition and types of transaction costs

Transaction costs refer to the time, effort, and resources needed to search out, initiate, negotiate, and complete a deal (Lile, Powell, and Toman 1999). Transaction costs (i.e. the costs of doing business) increase the costs of the transaction for participants thereby reducing the gains from economic exchange and the size of the market (Dudek and Wiener 1996).

The transaction costs associated with trading most commodities are largely limited to certifying the quality of the commodity offered for sale and matching sellers with buyers at the market price. For project-based instruments such as climate-change mitigation projects, there are pre-implementation requirements that substantially increase transaction costs:

- Identifying a number of partners for project establishment and implementation; project financers, investors, developers, managers and producers of the carbon. An organisation may take on more than one of these functions, but at least two parties need to be matched,
- Baselines need to be established against which emission reductions can be measured. The calculations must provide proof that the emission reductions are incremental (or "additional") to those that would have occurred in the absence of the project, and
- Each project will require monitoring and verification and eventually a certification regime to confirm that anticipated savings are achieved (www.ciionline.org/busserv/climatechange/industry4.htm).

In classifying transaction costs for carbon projects, a number of taxonomies have been developed. In broad terms they have been defined in terms of establishment/development costs and on going/implementation costs. In economic terms they are referred to in terms of fixed and variable costs. Stavins (1995) made three groupings: search and information (which included project development and marketing) costs; bargaining and decision costs; and monitoring and enforcement costs. Dudek and Wiener (1996) comprehensively divided transaction costs of emissions projects into six categories: (1) search (2) negotiation, (3) approval, (4) monitoring, (5) enforcement, and (6) insurance. Each type of cost is briefly described below.

Search costs were defined as the costs of identifying and finding interested partners to the transaction (Dudek and Wiener 1996). They include the price for information services, promotional and brokerage costs and the delay experienced by stakeholders in finding a suitable partner(s) (JIQ 1996).

Negotiation costs were defined as costs involved in coming to an agreement between partners. These costs arise as interested partners meet to discuss details of the project proposal, obligations, assignment of benefits, time schedules, site visits, as well as the hiring of lawyers to draw up contracts (Dudek and Wiener 1996; JIQ 1996).

Approval costs include time delays incurred after submission of project designs for host country and Annex 1 country government endorsement. Depending on how the Clean Development Mechanism (CDM) is eventually designed it may also involve approval and registration costs at the international level. The approval costs were highlighted as a major transaction cost by investors (Lile *et al.* 1998).

Monitoring costs were defined as the costs necessary to ensure that participants are fulfilling their obligations, and to measure the actual greenhouse gases (GHG) abatement. They include technical expertise, training, collecting and analyzing data, and reporting.

The choice of monitoring techniques will influence the level of transaction costs for the project mangers. At this stage the monitoring options are:

1. Modeling
2. Remote sensing – suited to national level
3. Field inventories – permanent plots and ground truthing, biomass surveys or destructive sampling.

Field inventories are generally more precise and accurate than modeling and would allow for the inclusion of communities in monitoring activities to ensure longevity of the project (Vine *et al.* 1999). However field inventories with community involvement are likely to carry higher transaction costs, particularly in the establishment phase.

The overall monitoring costs will essentially be dependent on availability of existing information, duration of the project, resources available, size of the project area and frequency of monitoring (Vine *et al.* 1999).

Enforcement costs were defined as the costs of ensuring that all parties comply with the terms of contracts or agreement. This may take the form of litigation or administrative proceedings (Dudek and Wiener 1996).

Insurance costs are the costs entailed by partners in reducing or compensating for the risk of project failure through natural causes (eg fire) or failure of a partner to meet their obligations.

3.2 Identification of transaction costs in the project cycle

For this study, the transaction costs of carbon projects have been grouped into 10 categories based on the general AIJ guidelines/CDM project cycle model (see Table 1). This incorporates the categories defined by Dudek and Wiener (1996), along with an additional four cost groupings; design, project implementation, verification and certification of the carbon.

Design costs include the development of monitoring techniques and verification protocols, methods for baseline and project scenario measurements, feasibility studies to ensure positive social and environmental benefits result from the project.

Implementation costs incorporate hiring staff and consultants, capacity building/training project staff, selection of local contracts/site, transportation to sites, community meetings, technical, management plans, legalising leases/ registration of land, distribution of funds/subsidy to beneficiaries, distribution of planting material and other inputs.

Verification and certification of the carbon are required to prove to investors that the estimated levels of carbon have been sequestered and can be traded.

The transaction costs outlined above are incurred by a number of stakeholders. In the case of AIJ and CDM-type carbon projects they can involve any combination of the following:

- International regulators (CDMs Executive Board, CDM agencies, United States Implemented Jointly Initiatives(USIJI)
- International and national investors
- Annex 1 governments and host national, provincial and local governments
- Project developers and operators (e.g international and national Non-Governmental Organisations (NGOs))
- Capacity builders (development agencies, NGOs and private sector[1])
- Landholders
- Verifiers and certifiers
- Carbon credit brokers

Table 1: CDM project cycle

Type of transaction cost	**Parties**
1. Information and search	Project developers/financers/producers
2. Design	Project developer
3. Negotiation	Project developers, lawyers, producers
4. Approval	Host and Annex 1 country governments, Operational entities (OEs)
5. Implementation of contracts	Project managers, landholders, NGOs
6. Monitoring	Landholders, project managers
7. Enforcement	Project managers, lawyers
8. Insurance	OEs
9. Verification of emission reductions	OEs
10. Certification of CERS and of sale of credits	OEs

Information, search, negotiation, implementation transaction costs may be incurred twice; in the establishment of the carbon project and again in the setting up and implementation of individual contracts under the project.

[1] EcoSecurities Ltd has experience in capacity building in two major areas: awareness raising and policy development; and the integration of climate change issues into existing institutional systems and technical capabilities. EcoSecurities has been providing advice on the project-based mechanisms to host and Annex 1 governments as well as UN agencies. Workshops have focused on the operational issues of baseline determination in the industrial, energy and forestry sectors and on project cycle and institutional issues.

3.3 Review of studies on the size of transaction costs

Limited research has been carried out on comparing transaction costs between IET, energy projects and forestry projects, to provide an overview of the cost efficiency of the different mechanisms. Project-by-project transactions, the method currently in place, significantly raises the transaction cost of investment in CDM-type projects as compared to the cost of mitigation through other means such as carbon trading. In particular, the project-by-project approach has presented project developers with considerable transaction costs for design, preparation, and defense of baselines (Lazarus *et al.* 2001). The Nordic Council found that the transaction costs for bilateral project-by-project deals are 7% to 30% of the total project cost compared with an average of 8% for Global Environmental Fund (GEF) projects (IEA 1997). Woerdman (2001) considered the transaction costs between IET and projects under the CDM and Joint Implementation (JI) and presented a contrasting argument suggesting that IET may actually have higher transaction costs than CDM and JI projects. He argued that the so-called economists' view that JI and CDM projects produce higher transaction costs because advance approval is required before each trade (verification) is flawed because of the assumption that trading takes place in a perfect world. He also suggested that the current high project transaction costs were only temporary and would fall once procedures and methodologies for establishing, reporting and monitoring baselines were standardized.

The following section is a review of estimated transaction costs for energy projects and forestry projects. Comparable analysis of transaction costs was limited for two reasons. Firstly, authors focused on different types of transaction costs and/or did not define them explicitly (Woerdman 2001). Secondly, the size of the transaction costs for projects were reported in a number of ways; actual amount, percentage of initial investment, percentage of total investment, percentage of total costs, and per ton of estimated carbon sequestered. For comparative purposes, and given that the market is for carbon, we attempted to express transaction costs in terms of tC, where possible.

3.4 Energy projects

A number of studies have been carried out on the transaction costs of existing and simulated AIJ and CDM-type energy projects. These studies are presented below in chronological order. Most studies have considered both the pre-implementation and the implementation costs of the carbon-project cycle. Many have focused on the correlation between project size and transaction costs and shown that there is some degree of positive correlation, given that the pre-implementation costs are fixed for all sized projects (Carrington 2000, Soffe 2000). The estimates vary greatly depending on the type of project, size, location and definition used for transaction costs (see Appendix 1).

JI transaction costs for the five bilateral Nordic energy projects in the Eastern European region were estimated at 12% to 19% of the total costs of the project. This figure consisted of 3% for the project preparation and feasibility study, 8% for administration costs, and between 1% and 8% for the JI acceptance procedure. The latter part included the costs of JI applications, crediting, monitoring and verification. For the smaller and more complex industry projects, the transaction costs were between 15% and 30% of the total costs (JIQ 1997).

The Nordic Council considered the likely impacts of more detailed JI project reporting. On the one hand, it would increase the reliability of the estimates and reduce uncertainty for investors with respect to the amount of carbon sequestered. On the other hand, transaction costs would increase as a result of the stricter reporting guidelines in terms of baseline determination, monitoring and verification.

The Nordic Environment Finance Corporation supports the establishment of a more uniform international criteria for measuring the mitigation effects of the projects in order to minimize transaction costs and maintain JI's cost-effectiveness potential (JIQ 1997).

Dudek and Wiener (1996) reviewed the transaction costs of a number of JI-type projects. They identified search, information, negotiation, monitoring and appraisal costs in terms of financial costs and time required. Atkeson (1997) drew on the results from Dudek and Wiener's study and compiled a set of transaction cost estimates for the same JI projects. There were a number of discrepancies between the two sets of figures, likely to have resulted from the anecdotal way in which they were presented by Dudek and Wiener (1996).

Lile, Powell, and Toman (1998) looked at early USIJI projects and discovered that the major transaction for project developers was in securing USIJI project approval and host country acceptance. A number of actual and interested private-sector partners under the USIJI program considered that the USIJI project review process would result in high quality projects but that it would be too costly and time consuming to consider investing in. In some cases, the approval process was delayed by the bureaucracy and lack of technical capacity in the host country.

Carrington (2000) modeled transaction costs for typical large and small-scale energy projects based on the CDM project cycle. Three different arrangements were considered for the undertaking of validation, verification and certification of the projects: (1) hiring a single OE for all activities, (2) hiring an OE for validation in the pre-implementation phase and a second OE for the verification and certification of the projects, and (3) separate OEs for each activity. The costs were also calculated at both national and international consultancy rates. The results showed that additional OEs in the project cycle would increase the transaction costs for the project developer, based on the assumption that additional OEs would require extra time to familiarise themselves with the project, than if one OE was used throughout the whole project cycle. Transaction costs were given in absolute costs as well as in terms of percent of total capital expenditure. Given that the transaction costs involved in the pre-implementation phase tend to be independent of project size (public consultation, project design, and approval), the transaction costs as a percent of total capital expenditure were much higher for the small-scale projects.

Soffe (2000) provided transaction costs estimates for small and large JI electricity generation projects, according to the CDM project cycle. Pre-operational transaction costs were divided into feasibility assessment, monitoring and verification planning, registration, validation and legal work. These costs were estimated at between US$57,000 and US$90,000. Sensitivity tests were carried out to determine the projects' financial viability under different cost and price scenarios. Setting a transaction cost threshold of 10% to 12% of Net Present Value (NPV) of revenue and conservative up-front cost estimates, they found that small-scale projects would need to sell carbon credits for at least US$6/t$CO_2$ to be viable.

The most comprehensive estimates of pre-implementation transaction costs are provided by Prototype Carbon Fund (PCF) (see Appendix 2). The World Bank established the PCF in January 2000 to carry out the necessary steps for a number of projects to meet CDM approval. They estimated the transaction costs for the establishment of small projects to be between US$200,000 and US$400,000. Small projects were classified as costing between US$8 to US$10 million and producing less than US$2 million of emission reductions. For most developing countries, CDM opportunities are in projects of this size (PCF 2000).

Stronzik (2001) reviewed the transaction costs of a number of studies in order to provide transaction cost estimates on JI and CDM-type projects (PCF 2000, Carrington 2000, Soffe 2000). In calculating the pre-implementation transaction costs for the PCF projects, Stronzik estimated that the negotiation costs represented 60 to 80% of the transaction costs. Negotiation costs were also the most significant transaction cost for the electricity generation projects (Carrington 2000). Where possible Stronzik expressed the transaction costs in terms of costs per tC. In all cases, except for two small-scale wind projects (Carrington 2000), the project transaction costs were below US$2.50/tC. For the small-scale projects the transaction costs were above US$80/tC.

Stronzik (2001) also calculated the transaction costs of a number of AIJ energy projects, based on data from the UNFCCC website. Using the same data source, we calculated the total costs and transaction costs for forest carbon projects and it was found that energy projects were not necessarily a lower cost option (see Table 2). The total costs of forest carbon projects ranged between US$1/tC to US$235/tC but with eight out of the 10 projects costing less than US$15/tC. The transaction-cost component of the total costs was significantly smaller for the forest projects than the energy projects. However, the classification of transaction costs for the energy projects was not available.

Table 2: Comparison of transaction costs between AIJ energy and forestry projects

	AIJ Energy projects in Central and Eastern Europe[a] (US$/tC)	AIJ Forest carbon projects[b] (US$/tC)
Average	120	3.2
Median	80	0.85

Stronzik (2001); b. http://unfccc.int/program/aij/aijproj.html. *NB for both sets of projects, an outlier was removed from the sample to calculate the average costs per ton.

Sutter (2001) considered the size of transaction costs in regard to the viability of small-scale CDM-type projects. The transaction costs of the proposed CDM procedures were simulated resulting in pre-implementation costs of US$200,000 and implementation costs of US$25,000. To improve the viability of small-scale projects, recommendations were made to standardize the measurement of the baseline, simplify monitoring and verification procedures and bundle projects. The suggestion to bundle projects may entice more investors into the market but it would not reduce the pre-implementation costs required for the establishment of each project.

3.5 Forest projects

Two studies have been carried out to calculate the size of the incentive that would induce farmers to convert their land to plantations for carbon sequestration (Tomich *et al.* 2002 and Benitez *et al.* 2001). Tomich *et al.* (2002) estimated the 'farmgate' or 'forestgate' direct payments for carbon sequestration that would be necessary to shift Indonesian smallholders' incentives from privately-profitable but less carbon-rich systems to land use systems that store more carbon. Transaction costs from the trading of carbon credits by the smallholder communities were not accounted for; but instead a maximum level of transaction costs at which the farmer would still convert his/her land to provide the environmental service was estimated.

The second study was a benefit-cost analysis of the carbon sequestration potential of afforestation projects and secondary forests in NW-Ecuador and Patagonia, Argentina. Best sites were located for reforestation and natural regeneration of secondary forest and tree plantation in terms of both carbon sequestration and returns to individual. Transaction costs were incorporated into the analysis and considered to be mainly certification costs born by the landowners, calculated at US$0.5/ha/yr and US$0.5/ CER (Certified Emissions Reductions) (Olschewski pers. com.). Transaction costs were calculated at US$60 to US$80 per hectare (ha) for projects with 20-year rotation cycles (Benitez *et al.* 2001).

In this review, it is evident that research on the transaction costs of carbon forest projects has been limited. Hence, the following section provides qualitative and quantitative data on the transaction costs of five AIJ carbon forest projects.

4 Case studies of AIJ forest carbon projects

AIJ projects were designed as pilot projects to provide lessons for future carbon projects. As a result they have incurred unavoidably high transaction and learning costs for all partners, particularly as the international carbon market is not yet fully operational and uncertainty continues regarding the rules and regulations of the CDM.

High transaction costs also seem inherent in the AIJ and CDM processes. The bilateral arrangements under the current AIJ structure significantly raise the pre-implementation transaction costs of forest carbon projects. At the beginning of each project, developers have allocated significant resources to determine and test the methods for baselines, establishment of monitoring systems, verification and, in the case of CDM projects, identifying criteria and methods of assessing environmental and sustainable development. These establishment costs have been exacerbated by the lack of clarity on definition of baselines and standardisation of AIJ and CDM procedures. To date, standard categories of duration[2] and quality of offsets have not been created. Although these transaction costs are likely to decrease over time as carbon markets develop and processes and procedures are standardized and simplified, the current uncertainty and risk of investment in forest carbon projects has constrained the size of the carbon-project market (Frumhoff *et al.* 1998 and Michaelowa 1995).

There have been considerable delays in the establishment and implementation of approved AIJ projects, predominantly because of funding constraints. This is not surprising given that a carbon market is not yet operational and there is still great uncertainty regarding baselines, permanence, leakage etc. However, it raises the issue of the need for substantial funding, especially to initiate these projects. Lack of establishment and ongoing funding will inevitably lead to higher search costs for each project. In terms of lessons for the CDM and JI, engaging the private sector in CDM project activities at the outset will be crucial to the successful implementation of JI and CDM projects.

Community-based projects carry potentially higher transaction costs. For CDM approval, carbon projects must provide evidence that the projects will contribute to the sustainability goals of the host country. Hence, project developers will need to assess the potential local benefits resulting from the project. In the case of community projects, the sustainable benefits will not just be financial benefits. Consideration must also be given to the impact of the project on factors such as social cohesion, risk, and land tenure (SGS and ECCM 2002). More complex and therefore more costly feasibility studies might therefore be required.

Community-based projects will tend to have higher information and search costs, especially where the project developers meet with the landowners to identify their needs and priorities and formulate land-management strategies. Landholder participation in the pre-implementation phase is not a requirement for the approval of AIJ/CDM carbon projects, so some project developers may choose <u>not</u> to invest their time in collaboration, thereby reducing their transaction costs in this period. However,

2 During the AIJ Pilot Phase, projects have been conducted for a variety of time frames from 20 years to 99 years. This lack of definition has caused uncertainty for all parties involved (http://www.grida.no/climate/ipcc/land_use/267.htm).

lessons learned from outgrower schemes, social forestry projects and integrated conservation and development projects suggests that the involvement of communities from the start of the project cycle will increase the likelihood of a sustainable project, in terms of meeting the objectives of both the project and the landholder (Nawir and Calderon 2001; Wells and Brandon 1992; and Brandon *et al.* 1998).

Transaction costs in the implementation phase are expected to be higher for small-scale projects involving large numbers of smallholders or communities, than for projects with a few large-scale operators (Smith *et al.* 2002). A more participatory and transparent process is likely to increase the number of meetings required within the community and with the project developers thereby increasing transaction costs. If the small-scale farmers and/or communities are dispersed, the transaction costs are likely to be even higher for the project managers. This could reduce the attractiveness of small-scale projects to investors, especially under bilateral arrangements.

In the following section, the transaction costs of a selected number of AIJ forest carbon projects are discussed. Although the current market (or lack of market) conditions may not be representative of the future CDM, the processes required to establish and implement an AIJ project are likely to be similar to a CDM project.

4.1 Selection of case studies

For the case-study analysis of transaction costs of forest carbon projects, all AIJ reforestation and afforestation projects approved by the UNFCCC were initially selected. Of the 11 projects, eight are located in Latin America, one in Asia and two in the Russian Federation. Organisations from the USA are the main Annex 1 partners, with Australia, Norway and the Netherlands each involved in a project.

The AIJ projects are at varying stages of the project cycle. PROFAFOR and Scolel Té are already trading emission reductions whilst the Commercial Reforestation in the Chiriqui Province project and the Reforestation project in Vologda have been approved and mutually agreed to, but are not yet operational. For the case-study analysis, it was decided that projects that were not yet operational would not be included. As a consequence, the sample was reduced to six projects (see Table 3). Projects in this sample range from 1,000 ha to a targeted 75,000 ha, with total costs estimated at between US$146,000 (Rusafor) and US$21 million (SIF). It is interesting to note that under the Rusafor and Virilla projects, about the same size area is to be planted, but the Virilla project, which involves payments to private landholders, will cost 30 times more than Rusafor, which is reforesting state land.

Table 3: Selected AIJ afforestation and reforestation projects

	PROFAFOR	Scolel Té	SIF	Virilla	Klinki	Rusafor
Country	Ecuador	Mexico	Chile	Costa Rica	Costa Rica	Russia
Land under project	Degraded and fallow land in Andean highlands (>2800m)	Degraded, pasture, maize, and fallow in highland and lowlands	Marginal agricultural land and pastures	Pastures	Pastures and marginal farmland	Marginal agricultural land and burned forest stands
Landholders	Communities and individuals	Individuals from indigenous communities	Individuals with small-medium sized land	Individuals with small-medium sized land	Individuals with 10-100 ha	State
Duration (yr)	25 -100	25-100 [e, d]	51 [h]	25 [i]	25 [g]- 46 [f]	55 [j]
Target reforested Area (ha)	75,000 [a]	2,000 [d]	7,000 [h]	1,000 [i]	6,000 [f]	900 [k]
Area planted by 2001 (ha)	22,500 [b]	500 [e]	0	131 [i]	48 [g]	1,000 [l]
Projected additional CO_2 sequestered (kt)	35,000 [a]	1,210 [d]	1,414	848	7,216 [f]	290 [j]
Carbon equivalent (kt)	9,537	330	385 [h]	231 [i]	1,966	79
Average Carbon/ha[3]/yr (kt)	5.09	5.50	1.07	9.24	7.12	1.6
Approved Project development costs ('000)	N/a	381 [d]	440 [h]	N/a	200 [f]	11.50
Approved project implementation costs ('000)	8,810 [c]	3,600[4] [e]	18,760 [h]	3,395 [i]	10,663 [f]	135
Price of carbon ($/tC)	15-20	13	N/a	10	N/a	N/a

(a) Verweij & Emmer (1998); (b) Milne *et al.* (2001); (c) FACE (2001); (d) UNFCCC (1997); (e) Hellier pers. com. (2002); (f) UNFCCC (1998); (g) Barres pers. com. (2002); (h) UNFCCC (2001); (i) UNFCCC (2000); (j) Golub *et al.* (1999); (k) UNFCCC (1996); (l) IEA (1998).

4.2 Quantification of project transaction costs

The transaction-cost data for the selected projects were taken from the AIJ reports submitted to the UNFCCC and from personal communication with the project personnel. Since the first AIJ reports were submitted to the UNFCCC before the start of the project, they are only indicative of expected transaction costs. The reports provide estimates of development and implementation costs and the amount of expected funding to be received for the project. The estimates for number of hectares to be planted and additional carbon sequestered are based on the approved, but not necessarily guaranteed, funding. To date, a number of projects have not met their planting targets and/or varied the length of their contracts. For example, Scolel Té and PROFAFOR have increased the duration of their contracts with farmers from about 25 years to 100 years. The initial data would therefore need to be adjusted

[3] The estimated number of hectares at the start of the project is used, rather than the actual ha to date.
[4] This figure is based on an estimate of the administrative costs and payments to farmers and the average number of tC sold each year.

accordingly, to provide more realistic estimates of the tons of carbon sequestered and project costs over the life of the project.

Project developers are not required to submit reports to the UNFCCC, and (voluntary) project details and calculations are not reviewed by the UNFCCC. Care should therefore be taken in interpreting these figures. Nevertheless, given the lack of available and accessible data on each of the projects, the reports submitted to the UNFCCC serve as useful starting point in considering the expected transaction costs of projects.

There is no standardized framework for reporting the costs of AIJ projects, and hence a great deal of variation exists in the types of costs reported. Since the provision of information is voluntary, some projects have not provided a complete set of costs, leading to a number of data gaps, which limit the extent to which cross project comparisons can be made. Only four of the sampled projects provided both development and implementation costs; Klinki, SIF, Rusafor and Vologda. In the case of Scolel Té, we received implementation data from the project directly. Transaction costs as a percent of total costs ranged from 6% to 45%. No correlation between project size and transaction costs was evident from the small sample of projects.

Table 4: Transaction costs of selected AIJ projects

Project	Total cost (‘000)	Transaction costs (‘000)	TC÷total cost (%)	TC÷tC (US$)
SIF	19160.0	1140.0	6	2.96
Klinki	28557.5	4552.7	16	2.32
Scolel Té	3980.8	1302.0	33	1.08
RUSAFOR	146.0	66.0	45	0.84
Vologda	1375.6	132.6	10	0.57

From the sampled AIJ projects, six reported the project development costs and five provided one to three itemized costs. In four out of the five cases, all the listed development cost could be classified as transaction costs. In terms of total development transaction costs, the costs ranged between US$0.18/tC and US$2.18/tC (see Table 5).

Table 5: Development costs and transaction costs for selected AIJ projects

	Total development cost	Development TC (US$ ‘000)				Development TC ÷ Development costs	Development TC ÷ tC
Project	‘000 US$	Search	Design	Negotiation	Pre-validation	%	US$
Scolel Té	380.8	82			20	27	0.31
Klinki	242.4		21.6	2.64		100	1.02
SIF	840.0				840	100	2.18
Vologda	43.0				43	100	0.18
RUSAFOR	31.5			31.5		100	0.39

Seven of the surveyed projects reported their expected implementation costs and six provided itemized costs. Most projects reported monitoring costs. The implementation transaction costs as a proportion of total implementation costs was low. All estimates were below 30% and four of the six projects were below 10%.

Table 6: Implementation costs and transaction costs for selected AIJ projects

	Total Impl. Costs	Implementation TC (US$ '000)				Implem. TC÷ Implem. costs	Implem. TC ÷ tC
Project	US$ '000	Admin	Contracts	Monitoring	Verific. & certific.	%	US$
Klinki	28,533			29		16	2.30
RUSAFOR	115			31	3.5	24	0.43
Rio Bravo	4,478		60	150	140	8	0.21
Vologda	1,333			90		7	0.38
Scolel Té	3,600	1,200				30	3.64
SIF	18,320			300		2	0.36
PROFAFOR	9,921			550	324	11	0.12

Sources: Benitez et al. (2001)

Estimates of actual project transaction costs were obtained through interviews with a limited number of project managers. Most information collected has been qualitative and is described in the following section, where individual case studies are described. Since the study did not involve site visits, the transaction costs reported are the costs incurred mostly by the project, and were not verified. Only in the case of PROFAFOR we were able to include some examples of landholder transaction costs, based on some previous fieldwork by the author (Milne *et al.* 2000).

4.3 Project goals and partners

AIJ projects have been initiated for different reasons, thereby influencing the size of the transaction costs and the burden of transaction costs by different parties. The CDM stipulates that projects must provide sustainable development benefits for the host country. As a result, a number of pro-community development groups have seen climate change projects as a mechanism to improve the livelihoods of local people, such as in the Scolel Té case. These projects therefore tend to have a stronger focus on local capacity building, to ensure real benefits are received by local people. Their initial transaction costs are higher, but it is hoped that this will result in sustainable projects, in terms of both carbon sequestered and livelihood benefits. Where AIJ projects have been viewed predominantly as a vehicle by which Annex 1 countries can offset their carbon emissions at a lower cost than in their own countries, efforts have been made to minimise transaction costs between landholders and the project managers. More investment is put towards improving the technical efficiency of carbon sequestration.

The process of setting up a carbon project will vary according to the role of the Annex 1 and host countries. Although this will be discussed in more detail in the individual case studies, it is interesting to note the functions of the host and Annex 1 country partners in each of the selected projects. As is evident from Table 7, no standard model has developed for AIJ forest carbon projects. At one end of the spectrum is PROFAFOR, an example of an Annex 1 partner acting as the project financer, developer, implementer, investor and seller of carbon credits. The Annex 1 partner has also established its own office in the host country leaving only the co-implementation and production of carbon to the host country. Scolel Té initially involved Annex 1 countries for the funding, design, development and implementation of the project, but the local host-country organisations are now primarily responsible for the implementation of the project and the sale of credits. The Klinki project has also been designed, developed and financed by Annex 1 country partners, and collaborated with host country partners for the implementation. But unlike the Scolel Té project, the project financing is still the responsibility of the Annex 1 partner. In contrast, the other Costa Rican project in the Virilla Basin has been established within the existing host country's Forestry Environmental Services Programme (FESP). The host country is therefore responsible for implementing and selling the credits to the Norwegian investors. The SIF project is basically a unilateral arrangement, since the project is funded by host-country partners, developed and implemented by a host-country organisation and will seek future project funds in the national capital markets.

Table 7: Institutional arrangements

	PROFAFOR	Scolel Té	Klinki	RUSAFOR	Virilla	SIF
Funding	A1	A1	A1	A1/H	A1	H
Development	A1	A1/H	A1	A1/H	A1	H
Implementation	A1/H	A1/H	A1/H	A1/H	H	H
Trading credits	A1	H	-	?	H	?

A1 = Annex 1 partners; H = Host country partners

Where AIJ projects have been financed, designed and developed by Annex 1 country partners, the pre-implementation costs have been borne predominantly by the Annex 1 country. As the project develops and the capacity of host-country partners increases, such as in Costa Rica, and they take on more of the project implementation functions, the proportion of transaction costs incurred by the host country is likely to increase. In addition, as national climate-change offices develop in host countries and the CDM market and rules become more certain, we may see more projects developed by host countries. In the future, pre-implementation transaction costs may therefore be shared more amongst Annex 1 and host countries.

In the following section, six AIJ project case studies are discussed in terms of the types of transaction costs that occur throughout the AIJ project cycle and the stakeholders who incur these costs from financing, developing and implementing the projects. Where possible, the transaction costs are quantified, either in terms of time required to carry out the activity or in actual costs.

4.4 FACE-PROFAFOR

The Dutch non-profit organisation, Forests Absorbing Carbon Dioxide Emission (FACE) Foundation, was established by the Dutch Electricity Generating Board (Sep) in 1990 to promote the sequestration of atmospheric carbon dioxide (CO_2) through afforestation and reforestation activities. The "climate-neutral" Foundation works independently and through third parties including timber companies, small farmers, and national parks (Arquiza 2000). FACE receives 100% of the credits from their projects (listed in Table 8), of which *Programa Face de Forestación de Ecuador S.A.* (PROFAFOR), in Ecuador, is currently the largest.

PROFAFOR began in Ecuador in June 1993, supported and funded by the FACE Foundation and the Ecuadorian Ministry of Environment.[5] FACE, through the resident engineer at PROFAFOR, directly acquires the exclusive right to sequester and offset CO_2 by means of afforestation and/or reforestation carried out by the local landholders. The project supports the Ministry of Environment's Forest Plan in the Andean region (Milne *et al.* 2001).

At the start of the project, PROFAFOR aimed to reforest 75,000 ha in the Andean region (*páramo*)[6] with exotics and native species, at a rate of 5,000 ha per year. The project drew up 15 to 20-year contracts with rural indigenous and *mestizo* (mixed Indian and Spanish) communities as well as private landowners to lease at least 50 ha of their land for plantations. PROFAFOR's new management has become more focused on growing indigenous species and promoting the environmental and intergenerational benefits of plantations. As a result, an increasing number of participants are growing a combination of exotic and native species. In 2000, the project decided to make new contracts for 99 years, an attempt to increase the duration of the carbon sequestered. To date, PROFAFOR has implemented around 162 contracts (Milne *et al.* 2001).

Table 8: Estimated CO_2 sequestration from FACE projects

Country	Target area (ha)	Start date	Area planted (ha)	Rotation period (years)	CO_2 fixing (t/ha)	Final amount CO_2 fixed (mt)	USD[a]/t CO_2
Ecuador	75,000	6/93	22,500	25,100	473	35	4.56
Uganda	27,000	7/94	1,855	70	759	20	2.08
East Malaysia	14,000	6/92	2,420	70	918	13	0.42
Central Europe	14,000	10/92	2,446	120	708	10	0.42
Netherlands	5,000	3/92	324	100	650	3	0.20
In preparation	35,000	-	-	-	963	34	-
TOTAL	170,000	-	29,545	-	-	115	-

Sources: FACE (1997) cited in http://www.ieagreen.org.uk/aij13.htm; Verweij and Emmer (1998).
(a) exchange rate of 1NLG=US$0.42

[5] Formerly the Ecuadorian Institute for Forestry and Natural Areas (INEFAN).

[6] The high altitude lands of the *páramo* are found at elevations of 2,800 to 4,800 metres, composed principally of native grasses and a few low shrubs and trees.

In discussing the transaction costs of the PROFAFOR project, we distinguished between FACE and PROFAFOR, since they incur different transaction costs. FACE has borne most of the establishment transaction costs in establishing the PROFAFOR project. However, by implementing projects in a number of countries, FACE has been able to reduce the transaction costs per project in setting up monitoring systems and setting baselines.

Out of all the case studies, PROFAFOR is currently working with the greatest number of OEs. For most activities, the Project has contracted or worked with another party. The Project stakeholders are summarised in Table 9.

Table 9: Stakeholders in the FACE-PROFAFOR project

Stakeholders	Country	Function
FACE Foundation	Netherlands	Project investing entity Programme coordinator- technical and financial inspections to assess project implementation and cost-effectiveness in order to determine whether FACE's financial contribution meets the condition of additionality.
BV NEA[7]	Netherlands	Project financial backer/client until at least the end of December 2003.
Consultants	Netherlands	Site inspections of FACE projects with FACE personnel
NEO	Netherlands	Working on improving remote sensing techniques with FACE
Forestry and Nature Research (IBN-DLO)	Netherlands	Establishing baseline and project scenarios using a CO2FIX model
IFER	Czech Republic	Modification of the monitoring system MONIS and FieldMap, a ground-based system for plantation monitoring
SGS International	Netherlands	Verification and certification of CO_2 credits for all of FACE's projects
Business for Climate[8]	Netherlands	Buying and selling CO_2 credits from FACE's sustainable forestry projects.
Triodos Climate Clearing House	Netherlands	Buying and selling certified CO_2 credits from FACE.
Utrecht Provincial Government and Private companies	Netherlands	Investors in carbon credits from FACE projects
UNFCCC	Multilateral	Registration of FACE projects for AIJ status
Ministry of Environment	Ecuador	Signing of PROFAFOR Project memorandum of understanding (MOU) and registration of Project plantations
PROFAFOR	Ecuador	Project implementation and management of FACE's project in Ecuador. This includes technical assistance and forest monitoring, modifications of management plans, Environmental Impact Assessments (EIAs), Social impact assessments (SIAs), promotion, and project reporting.
Consultants- Economists and geographers	Ecuador	Working in PROFAFOR's interdisciplinary team to carry out EIAs and SIAs
Proyecto de Investigaciones en Ecosistemas Tropicales (Ecopar)	Ecuador	Ecological studies
Community and private tree nurseries	Ecuador	Production and distribution of seedlings to PROFAFOR beneficiaries
Perez, Bustamante and Ponce (PBP)	Ecuador	Legal representation and advice to PROFAFOR. Approval of contracts and drafting of the respective forestation plans. Evaluation of land titles and property registration. Settling contract disputes
PriceWaterhouse (PWC)	Ecuador	Financial advice- budgetary, administrative and accounting management for activities carried out by PROFAFOR.
Communities and individual landholders	Ecuador	Producers/beneficiaries- ensure sustainable forest and forestry practices of PROFAFOR plantations over 25 to 99 years

[7] BV NEA is FACE's biggest client and legal successor to Sep, the Foundation's instigator.
[8] The company was set up by FACE, Triodos Bank and Kegado.

4.4.1 Design

FACE and PROFAFOR have contracted a number of organisations to help in the project design. In all FACE projects, a monitoring and information system called MONIS has been installed to determine the amount of carbon sequestered. The system links alphanumeric and graphic information of the forestation contract sites, and allows for the entering of administrative, financial and technical information for each forestation plans, production of seedlings and technical assistance. MONIS was updated in 2000 by the Investigation of Ecosystem Forest Institute in the Czech Republic. For establishing baseline and project scenarios, FACE has chosen the CO2FIX calculation model for its projects. The project partners have collaborated with national and international research institutes to acquire the necessary measurements (FACE 2001). For designing the terms of the plantation and mortgage contracts FACE hired a team of legal advisors in Ecuador.

4.4.2 Approval

Host country authorisation was received by Ministry of Environment (formerly INEFAN) and registered as an AIJ project with UNFCCC.

4.4.3 Information and search (local participants)

In terms of information costs, the project has funded research on the possibilities for usage and methods of cultivation of native species and the best options for increasing the number of native species planted under the project.[9]

Contacting community organisations in regard to their interest in joining the project has been the responsibility of PROFAFOR's promotional staff. Information campaigns have been organised to:

- explain what PROFAFOR is; its goals, objectives and scope,
- outline economic, social and environmental benefits of joining PROFAFOR,
- explain contract conditions, duties, timeframes, and
- provide assessment regarding the documents to be presented in order to be considered as beneficiaries.

Overtime, more communities and private landholders have approached PROFAFOR to join the project, reducing the promotional costs to PROFAFOR.

4.4.4 Pre-validation

PROFAFOR has hired and trained forest engineers to prepare visits and evaluate potential beneficiary sites for PROFAFOR forestation contracts, qualify and measure the designated forestation area by Global Position System (GPS), identify suitable species depending on site conditions, and assess and develop Forestation and Management Plans for beneficiaries supported by PROFAFOR.

[9] Ecopar, a project based in Quito, was contracted by PROFAFOR to undertake the ecological studies. A Dutch graduate researcher, Irene van Winkel, also conducted her research in conjunction with PROFAFOR on the potential of native tree species for implementation in forest plantations.

PROFAFOR uses its local consultants to implement social and environmental impact assessments to ensure the project will have positive or neutral social and environmental outcomes. With the completion of the management plans SIA and EIA of the 156 contracts in the sierra, the transaction costs for PROFAFOR are expected to fall considerably (Jara pers. com.).

4.4.5 Contract negotiation and approval

In the case of community contracts, PROFAFOR approaches and negotiates directly with Community Boards to lease communal land for establishing plantations. No contracts have been established with individuals within a community. Many communities have selected areas with low opportunity cost; steep slopes and degraded sites. Others have planted on former grazing land. Beneficiaries are expected to register their plantations with the Land Registrar and prepare progress reports, aided by the project forest engineers, in order to receive establishment payments from the project.

To legalise the project contracts a number of steps are required. These steps are outlined below along with the parties who bear the transaction costs.

Table 10: Costs of negotiation

Transaction costs	Parties bearing the cost
Obtaining the deed accrediting ownership of land and land registration certificate from the property registry showing ownership of 15 years	Potential beneficiaries (private landholders and community groups)
Submission of PROFAFOR application form signed by the necessary authorities including a map or drawing of the proposed plantation site	Potential beneficiaries
Review of legal status of potential beneficiaries documentation	Legal advisers
Technical inspection of proposed plantation site. If it meets technical requirements, qualification and measurement of the proposed plantation takes place	PROFAFOR coordinators and engineers
Drawing up Management and Forestation Plans	PROFAFOR staff and beneficiaries
Modification and revision of mortgage document	Legal advisers and PROFAFOR
Negotiating financial arrangements and signing of contracts with beneficiaries	Legal advisers, PROFAFOR and beneficiaries
Sending Memo to the Municipality Property Registrar to formalize the contract	Municipality Property Registrar and the Beneficiary present
Recording the mortgage memo to the name of PROFAFOR	Municipality Property Registrar

Source: PROFAFOR (2002).

4.4.6 Contract implementation

In April 2002 PROFAFOR had 162 contracts with private landholders and communities. The project provides establishment and maintenance subsidies and technical assistance for the first three years of the project, and in return the beneficiaries are obligated to maintain the plantations under a selective cutting regime (Table 11). The project beneficiaries are entitled to all the revenues from firewood, pulpwood and timber and non-timber products from the plantation but they will not earn revenues from the trading of carbon offsets. FACE will receive 100% of the CERs.

Table 11: PROFAFOR incentives

Species	Reforestation subsidy	Nursery management and seedlings	Technical assistance
	US$/ha	US$/ha	US$/ha
Exotics	97	92	15
Natives	107	(seed) 150 (asexual) 222	15

Source: PROFAFOR (2000)

PROFAFOR has hired and trained 26 forest engineers and four Technical Coordinators to manage and supervise the plantation contracts and nurseries in the Sierra and coastal regions. Their primary responsibilities are to organize the distribution of funds to beneficiaries through local banks, provide technical assistance for each contract regarding plantation establishment and maintenance, and supervise activities carried out by beneficiaries. Some community groups have requested more meetings with the Project and information on forest management, production of mushrooms and marketing of timber.

PROFAFOR engineers contract and train tree nursery workers and monitor plant production in PROFAFOR established and/or contracted nurseries. Three courses were provided between 2000 and 2001. So far, 24 private nurseries have been contracted to establish and transport seedlings and other inputs to PROFAFOR contract sites.

To save on PROFAFOR engineers' time and the project's financial resources, visits to each contract area will involve both monitoring activities and technical assistance. Recently, the project also decentralized their activities, hiring a coordinator for the southern sierra region, thereby reducing the amount of staff travel time and allowing for an increase in contracts in the southern-most provinces, constrained previously by distance (Jara pers. com.).

4.4.7 Monitoring

Field monitoring has been implemented by PROFAFOR engineers. The on site monitoring costs are likely to fall as the MONIS system becomes operational.

4.4.8 Enforcement

If landholders violate the contractual conditions, legal advisors are initially responsible for settling the dispute. PROFAFOR's contracts also include a number of financial disincentives to encourage landowners to meet their contract obligations, without the need to call on a third party. Some of these conditions are listed below:

1. Under 15 to 20-year contracts, if trees are felled before the end of the contracts, the beneficiary is obligated to meet the cost of replanting.
2. If beneficiaries decide to convert the plantation back to cattle farming or any other land use during the contract period, the project retains 30% of the timber revenues.

3. Beneficiaries may clear-cut after 20 years, but PROFAFOR retains 30% of the timber revenues. If the beneficiary decides to renew the contract, the 30% is reinvested into replanting.
4. Under a 99-year contract, it is assumed that after 20 years some trees will be cut and replanting will occur. Beneficiaries are obliged to invest part of the income from timber in new plantings and in this way retain the capacity to absorb CO_2 for 99 years.

4.4.9 Insurance

According to the contract agreement, in the event of fire in the plantation or other *force majeure* (hurricanes, frost, drought, volcanic eruptions etc.) the beneficiary must submit a written report to the project to demonstrate that the fire was not their fault. The report must be accompanied by reports from the Ministry of Environment and the Municipality, a Civil Defence report and, if applicable, a legal document that provides evidence that a process of prosecution has started against known offenders. If beneficiaries can demonstrate that they were not guilty, an addendum is made to the contract, reducing the contact area to the plantation area remaining. Otherwise, the beneficiary must meet the costs. If the fire burns down the whole plantation, the contract is terminated and the lease removed. There is no compensation or insurance provided to the beneficiaries (Jara pers. com.). Under these circumstances, the transaction costs are greater for the landowners than for the project and investors.

4.4.10 Internal verification

FACE requires its project partners to report on the planting and maintenance of the forests, as evidence to financial backers that the intended amount of CO_2 has been sequestered. In turn, the contract stipulates that the project partner is obliged to provide regular and accurate reports of planned and executed activities. During the planting phase, the party implementing the project must provide half-yearly reports on activities carried out, in terms of quantity, quality and financial aspects. FACE officials, external forestry consultants and financial experts, visit each project at least twice a year, to inspect and discuss its progress. Further inspections take place upon the conclusion of each three-year planting and establishment phase.

4.4.11 Certification and sale of credits

In 1999, FACE commissioned *Société Générale de Surveillance* (SGS) International to verify and certify the CERs and sustainable forest management of all its projects. According to SGS, the cost of validating and verifying projects depends greatly on the size and complexity of the project (Lubrecht pers. com.). In their experience, most emission-reduction projects do not need a site visit for validation. However, carbon sequestration projects usually do require a site visit because of the environmental and social requirements, and the difficulties in defining baselines. This increases the travel costs, although local affiliates are hired where possible (Lubrecht pers. com.). A validation assessment and risk and uncertainty assessment provide the project with a Certificate of Project Design and Schedule of Projected Emission Reduction Unit. The verification of emission reductions or sequestration entitles the project to GHG credits or a verification statement (SGS and ECCM 2001).

To reduce verification costs, FACE has applied to the Forest Steward Council for a group certificate. Under the scheme, the certifying authority assesses the circumstances, background and criteria of the plantations, testing them in a number of the contracted sites. The subsequent checks and assessments can then be conducted on a random basis.

Certified stored CO_2 is purchased from FACE by the Tridos Bank,[10] the founder of the Tridos Climate Clearing House. The Bank sells a percentage of the credits to interested companies.

4.4.12 Estimation of project transaction costs

The data on transaction costs for the PROFAFOR project are only available for the implementation phase. According to Table 12, the contract obligations for planting are greater than the expenditure because initially the project was trying to meet planting targets, which are no longer being enforced. However, since the investors have provided money for these activities, the money will be invested in future projects. PROFAFOR's monitoring certification and supervision costs for 2000 are likely to continue for the first few years of the project. SGS charges between US$15,000 and US$30,000, plus travel costs, for project validation and US$7,500 for verification plus travel costs in the second year onwards (Lubrecht pers. com.).

Table 12: PROFAFOR implementation costs

	Contract obligations US$ ('000)	Expenditure 2000 US$ ('000)	Total Expenditure US$ ('000)
Contract obligations- planting phase	6,439	730.4	3,732
Contract obligations- management phase	2,371		2,694
Monitoring, certification and supervision		22	22
Total	8,810	752.4	6,448

Source: FACE (2001); costs were converted to US$ at an exchange rate of 1 Euro = US$0.88

4.4.13 Factors influencing the size of transaction costs

Implementation transaction costs were found to be less where landholders or communities had received former assistance in plantation establishment or development projects. In general, the Sierra region, where most of PROFAFOR'S beneficiaries are situated, is poorly serviced by government extension officers.

Although it was not possible to quantify all the transaction costs, this case study highlights the many types of transactions required for implementing a small-scale forest-carbon project. PROFAFOR has been able to establish a large number of community contracts, predominantly due to the financial support from FACE to maintain a national office of full-time local project staff.

[10] Tridos Bank has offices in the Netherlands, Belgium and the UK and finances projects demonstrating a green or social nature, describing itself as one of Europe's 'leading ethical banks'. It claims to have a proactive policy with regard to development, not only of sources of sustainable energy, but also of organic farming, culture, wildlife and nature conservation (IEA 2001).

4.5 Scolel Té carbon sequestration project

The Scolel Té forestry and land-use pilot project was initially established to assess the workability of carbon trading at the farmer/community level (ie bottom-up approach as opposed to a top-down approach). The main objective of the first phase of the project (1995-1998) was to develop a prototype scheme for managing the supply of carbon services from sustainable forest and agricultural systems in a way that would promote sustainable rural livelihoods. The project originally aimed to forest 2,000 ha over 27 years with *Pinus oocarpa*, *Pinus michoacan, Cupressus sp*., *Cedrela ororat, Caloophylum brasiliense,* and *Cordio alliodora* (UNFCCC 1997). In its second phase (1998-2001), the model was scaled up to a regional level.

The project stakeholders who incur the transaction costs, through financing, developing and implementing the project, are summarised in the table below. The number of local partners has increased over time and hence there has been a shift of transaction costs from Annex 1 country partners to host-country partners.

Table 13: Stakeholders and their functions in the Scolel Té project

Stakeholders	Country	Function
Funding agencies		
UK DFID Forestry Research Program	UK	Major funding institution for development of project methods
International Energy Agency	England	Research funding for large-scale sequestration potential
UK Darwin Initiative	UK	Funding for research into biodiversity benefits of project
Commission for Environmental Cooperation	Multilateral	Funding to assist with USIJI application
FIA and FIPIC	Belgium/France	Purchasers of Voluntary Emission Reductions (VERs)
Future Forests	UK	Broker of VERs
INE National Institute of Ecology	Mexico	Signing of Project MOU Research funding
UNFCCC	Multilateral	Registration of project for AIJ status
Project implementation		
ECOSUR El Colegio de la Frontera Sur	Mexico	Research on CO_2 sequestration potential and baseline calculations. Provision of technical support to project technicians working for the farmers' organisations and the Trust Fund Monitoring and verification
IERM University of Edinburgh's Institute of Ecology and Resource Management	Scotland	Project design and development Seeking investment funds Development of community forestry planning and monitoring systems Establishment of provisional guidelines and standards for assessing project
ECCM The Edinburgh Centre for Carbon Management	Scotland	Administration and technical assistance Training of technical team to assess project viability and impact Promotions
Ambio (environmental consultants)	Mexico	Administration Project implementation; technical support to farmers in implementing plan vivo system, monitoring and evaluation Farmer training Advisers and co-managers of the FBC and to communities interested in participation
FBC *Fondo BioClimatico*	Mexico	Project promotion Training of community technicians Registering viable management plans Financial and technical assistance to farmers Buyer and seller of Voluntary Emission Reductions
Community technicians	Mexico	Technical support to individual farmers Monitoring activities (site inspections, data collection for biomass).
Farmer representatives	Mexico	Intermediaries between the FBC, Ambio and farmers' groups Social assessments/screening of participants
Farmers' Associations and Organisations	Mexico	Network contact points with farmers and communities
Local farmers/communities	Mexico	Providers of the environmental service Development and registering of management plans Monitoring and reporting
SGS	The Netherlands	Review of project management systems

4.5.1 Design

The IERM and ECCM in the United Kingdom, together with ECOSUR and Ambio in Mexico, were the principal researchers and project designers of the Scolel Té project. DFID's Forestry Research Programme provided three years of funding to establish the pilot project, provide evidence of positive impact on rural livelihoods, and provide local training to increase the likelihood of sustainability (DTZ 2000).

The first phase essentially involved designing the monitoring systems and socio-economic impacts of the project. In the second phase, complementary research activities were carried out alongside the pilot project, related to the feasibility of large-scale carbon sequestration programmes. These include studies on:

- carbon fluxes associated with land use change, involving direct measurement of biomass in different types of vegetation (funded by the US EPA and the Mexican Government);
- research and development of appropriate protocols for community forestry planning and administration of carbon sequestration schemes (funded by DFID's Forestry Research Programme);
- cost and potential for large-scale carbon sequestration in southern Mexico, using economic models and geographic information such as satellite images (funded by the International Energy Agency - Greenhouse Gas Research and Development Programme) (http://www.eccm.uk.com/scolelte/).
- Regional carbon baselines for land use change through a GIS based analysis of predisposing and driving factors affecting deforestation (funded by DFID's Forestry Research Programme);
- Development of transparent carbon accounting protocols for use in projects involving many small-scale participants (Hellier pers. com.).

4.5.2 Search

The idea for the Scolel Té forestry and land-use pilot project was borne by Richard Tipper, University of Edinburgh, during his PhD fieldwork in Chiapas, southern Mexico. In terms of selecting farmers for the scheme, it began with small groups, covering two distinct bio-climatic and cultural regions: highland Mayan Tojolobal communities and lowland Mayan Tzeltal communities (www.eccm.uk.com/scolelte). As information about the project spread through the farmer organisations, farmers approached FBC to join the Project.

Initially the project began working with individual farmers within selected communities but the Project is beginning to operate on whole community projects. FBC began with one community group and neighbouring communities have become interested in joining the project. FBC and social assessors initially screened the communities, assessing their degree of commitment, technical and organisational capacity, experience in land-use management and social stability.

The UK DFID Forest Research Programme has provided approximately US$760,000 for research both at the project and regional scale, development of technical and administrative systems used by FBC, training of FBC staff, project running costs in the early years and a verification report carried out by SGS (www.eccm.uk.com/climafor; Hellier pers. com.).

In terms of searching for buyers of VERs, Tipper successfully sort out funding from FIA early on in the project, minimising the initial investor search costs. IERM has actively marketed the project to leverage funds from public and private sources within the UK and from multinationals. The FBC has also begun selling emission reductions (Hellier pers. com.).

4.5.3 Negotiation

In negotiating agreements with farmers, at least three meetings are held with each community to explain the concept of carbon trading, the *Plan Vivo* system (explained in more details in the project implementation section) the terms of the agreement, responsibilities and rights, process of payments and identifying suitable land use systems (SGS and ECCM 2001). Given the history of development projects in the area, the Scolel Té project team has had to continually reinforce the environmental-service concept. The length of time required to negotiate and implement a contract has differed between highland Mayan Tojolobal communities and lowland Mayan Tzeltal communities. It has taken longer to establish agreements with Tzeltal farmers due to different culture, policies, and historical factors (Hellier pers. com.).

The FBC is now working with four communities on afforestation and forest management activities on about 500 ha of communal lands (Hellier pers. com.). The pre-implementation phase has taken about one year with the first community, involving about six site visits (Hellier pers. com.). Although the community level plans are more complex than the individual farmer plans, the larger areas under the community management plans has resulted in costs per tonne of carbon being similar to individual contracts.

4.5.4 Validation

INE, the host country signatory, were involved in the project development. The waiting period for project approval was therefore minimal.

In terms of signing agreements with the farmers, community members have been required to sign a collaborative agreement, stating the participants involved and the nominated community representatives (SGS and ECCM 2001). The time required for collecting all signatories varies between communities.

4.5.5 Project implementation

The Project has adopted a *Plan Vivo* System involving Ambio, FBC, farmers' groups, and communities of small farmers, in managing and monitoring the carbon sequestration activities. The system is designed to be technically and administratively flexible, transparent, simple, cost effective and verifiable (SGS and ECCM 2001). The host organisation and the farmers together establish management plans (*Planes Vivos)* to identify and map reforestation, agroforestry and forest-restoration activities that are both financially beneficial, hold potential to sequester or conserve carbon and reflect the farmers' needs, priorities and capabilities. The FBC technical team then assesses the plans for technical feasibility, social and environmental impact and carbon sequestration potential. Viable plans have been registered with FBC and are eligible for financial and technical assistance (http://www.eccm.uk.com/scolelte/).

A farmers' holding averages about five hectares, of which one to two hectares can be signed up for the project. The project agreements are drawn up for 100 years (about four to five rotations). FBC and Ambio seek initial interest from the farmers before purchase orders are made, and have created a reserve of carbon suppliers with unsold carbon and a waiting list of potential FBC participants (SGS and ECCM 2001). In 2002, the project was working with 400 farmers in 20 villages, over an area of about 400 to 500 hectares (Hellier pers. com.).

To set up *Plan Vivo* system, transaction costs were incurred by ECCM and IERM in training staff and farmers. The project hired and trained one full-time and two part-time technical assistants, an accountant, two social assessors, and two community technicians. Capacity building of local counterparts was also required (social assessors, farmer representatives and individual farmers).

The ongoing transaction costs are now incurred by Ambio, FBC, local farmer organisations (e.g. *Union de Credito Pajal*, CODESMAC and UREAFA), community technicians, farmer representatives and farmers affiliated to the local farmer organisations. The use of community technicians for training and monitoring activities has helped to increase community involvement and reduce operational cost for FBC (SGS and ECCM 2001). FBC holds two meetings per year with farmer representatives to discuss general planning, reporting, use of account books, administration and other project topics they want to raise.

4.5.6 Monitoring

Monitoring represents the largest implementation transaction cost, involving community technicians, FBC and Ambio staff (Hellier pers. com.). Research on measuring the offsets is ongoing, with continual modifications to the original conservative estimates. If new forestry systems are established new data will need to be collected and analysed.

4.5.7 Enforcement of contracts

FBC works through the farmer organisations and community technicians to ensure that people remain in their agreements. A couple of farmers have chosen to break their agreements and have returned the project payments to FBC.

4.5.8 Insurance

There is no insurance for individual plantations. About 10% of the calculated VERs are put in a contingency fund in case of loss of carbon stores. As an extra insurance for the project, farmers are required to lodge 5% of the revenues from the sale of the trees with FBC, which is then repaid to the farmer after replanting of the next rotation (SGS and ECCM 2001).

4.5.9 Verification

At this stage, the offsets are internally verified but not externally verified (or certified). The transaction costs are therefore wholly borne by the farmers, farmer organisations, FBC and Ambio staff.

The *Plan Vivo* system, developed and tested through the Project, was subjected to a trial verification by SGS in December 2001 (www.eccm.uk.com/climafor/verification.html).
According to the SGS report the FBC has successfully established a number of forestry and agroforestry systems with farmers and rural communities. The FBC systems and procedures were found to meet most of the requirements of the *Plan Vivo* System, but further work was required to make them cost-effective and transparent for independent verification. It was recommended that more written documentation be made on decisions taken and meetings with farmers to allow for a clearer audit trail thereby increasing the transaction costs for local stakeholders (www.eccm.uk.com/climafor/verification.html).

4.5.10 Registration and administration of carbon credit sales

In 1997, the Project began trading in VERs through the FBC. FBC currently buys about 12,000 tC per year from the farmers at US$8/tC and sells at US$13/tC (equivalent to the average cost of carbon sequestration by the project) (Hellier pers. com.). The FBC's running costs are about US$5/tC and covered by the sales of VERs. FBC costs include administration, technical support to communities for planning and implementing forestry activities, evaluating management plans and monitoring activities (Hellier pers. com.). FBC has introduced carbon account books for each farmer to record carbon transactions. A sales agreement has been drawn up in each account book that specifies the amount and price of carbon that can be sold. The payments are made to the farmers on a carbon sales basis, and received in five equal instalments in years 1,2,3,5 and 10 (Hellier pers. com.).

FIA made an initial commitment to provide US$55,000/year, increasing to US$66,000/year for CO_2 credits. Future forests in the UK and Econergy International Corporation[11] in the US are brokering the VERs (Montoya 1995).

[11] Econergy is referred to as 'a technical, financial and policy consulting firm serving clients in the energy and environment industries worldwide (http://www.eic-co.com). They offer their consulting services to support governments, corporations, and institutions in managing their energy consumption and carbon emissions and to identify ways to capitalize on new energy related business opportunities (http://www.eic-co.com). Econergy also designed the PCF.

4.5.11 Estimation of project transaction costs

The development costs of the Scolel Té project are predominantly research costs to establish a prototype carbon project that can be scaled up to a regional level. Most of the funding for the development phase has been provided by the DFID.

Project development costs	**US$**
Feasibility study (including networking with farmers, ID partners, information disseminated to other projects)	82,000
Phase one: community forestry planning and monitoring systems for CO_2 project	213,200
Phase 2: research into scaling up of model; regional baselines, dissemination of findings, setting standards	348,108
Training in plantation maintenance	65,600
Establishment of permanent sample plots and baselines	20,000
TOTAL	**728,908**

4.5.12 Reduction of transaction costs

The Scolel Té project has benefited from the initial research funding from DFID and the assured future funding of a relatively large investor from the start of the project. The combination of host and Annex 1 country partners has also allowed for the project to be run by host country partners in the implementation phase.

4.6 Klinki Forestry Program

The Klinki Forestry Program was developed by Reforest the Tropics, Inc. (RTT), a US non-profit organisation, to offset carbon emissions through tropical farm forestry and provide a model for future carbon-offset projects. It initially aimed to convert 6,000 ha of pastures and marginal farmland to commercial plantations with fast-growing Klinki pine trees (*Araucaria hunsteinii*) and other tree species such as *E. deglupta* hybrid, Gallinazo (*Jacaranda* sp.) Chancho (*Vochysia guatemalensis*), Almendro (*Dipteryx panamensis*) and Pilon (*Hyeronima* sp.) (Barres pers. com.; UNFCCC 1998; Dutschke and Michaelowa 2000).

The Program is made up of a number of projects, designed to be financially profitable long-term investments for the farmer while sequestering and storing carbon for at least the duration of the project. RTT is the major US partner and CACTU is the only active local partner in Costa Rica (Table 14). No project activities are likely to be contracted out to NGOs or directly involve government in the near future. The Program has been approached by a fundraiser but at this stage the funds are too limited to hire additional staff.

Table 14: Stakeholders in the Klinki Program

Stakeholder	Country	Function
CACTU/ ASOFORES Cantonal Agricultural Center of Turrialba	Costa Rica	Project development Administration Technical assistance and site inspections Measurements Thinning of plantations
CATIE Tropical Agriculture Research and Higher Education Centre	Costa Rica	Technical assistance
Ministry of Natural Resources, Energy and Mines	Costa Rica	Host country acceptance of the AIJ project
RTT Reforest the Tropics, Inc	USA	Program finance, marketing Program development Project implementation (contracting farmers, administration)
CEDARENA (Lics. Castro & Chacon)	Costa Rica	Revision of legal project contracts
Emitters (incl. businesses, schools and churches)	USA	Project finance
Yale School of Forestry and Environmental Studies	USA	Project finance and research on soil carbon
USDA United States Department of Agriculture	USA	Initial review of Program (no longer actively involved)

4.6.1 Design of the Program

The Program took two and a half years to design and receive USIJI approval (1993-1995). Additional improvements have taken place during the Program's implementation.

The Klinki Matrix Forest Design has been adopted for each project. This refers to the establishment of a three-level forest, using trees of different growth rates, crown closure and shade tolerance. Certain trees are expected to be cut during the 25-year contract for farmer income while others, notably the Klinki, is left in place for the potential of century-long carbon sequestration and storage (Barres pers. com.).This design is the result of 40 years of experience by the Program manager with different tree species in farm forests in Costa Rica. The model is still in an experimental phase, with farmers, RTT and CACTU working together to establish forests that maximize carbon sequestration and storage while yielding salable products for the farmer.

In the USIJI approved Program design, a number of research projects were proposed. Partners such as the USDA Forest Products Laboratory were to carry out studies on the wood quality of different tree species, and chemical treatments to store carbon in wood products. These research activities are being done on an ad-hoc basis with the chemical treatment plant owned by CACTU. Yale and CATIE were to carry out research projects on changes of soil carbon content from a pasture to forest conversion. These research activities have been delayed due to lack of funding.

4.6.2 Search costs for Program partners

The major host partner, CACTU, is an NGO established by the RTT manager in the 1960s to establish farm forestry in Costa Rica. Hence, no significant transaction costs were incurred in finding a host country partner. In the U.S., the Program manager sought out other partners, and all agreed to participate, given available funding.

In the Program development phase, a survey was carried out with farmers to gauge their interest in the Program. Those surveyed were taken from a list of farmers already working with CACTU and many had already planted Klinki trees (Barres pers. com.). A reported 40 farmers indicated their willingness to establish trees on their land (ELI 1997). The telephone survey involved minimal transaction costs.

4.6.3 Negotiation

The Program was developed at the request of the EPA of the U.S. Government. The establishment of the program required no negotiations, other than the basic preparation and review of the USIJI document (Barres pers. com.).

Initially, RTT was able to experiment with the market price to see what people were willing to pay to offset their emissions. Now, U.S. emitters fund the projects based on a written proposal by RTT.

Negotiations with farmers initially focused on the length of the contracts, but now the 25-year agreements have been accepted as the norm. RTT agreed to pay CACTU for technical assistance and the farmers for planting and maintaining the trees on their land.

4.6.4 Approval

The Program design was revised a number of times before it was approved by the USIJI. Once approved, USIJI sought host country approval. RTT obtained formal approval from the U.S. and Costa Rican governments in November of 1995. The approval and authorisation of the Klinki Forest Project involved no time delays or financial cost to the Program.

4.6.5 Information and search costs for donors

Under an approved budget of US$10 million, a trust fund was to be set up and provide sufficient capital to manage the project for 25 years, the length of the contracts with farmers. However, the funding was not guaranteed and the Program had to be scaled down. An additional year and a half was then required to establish RTT, through which funds could be raised as donations from emitters. The Program manager personally provided an initial funding of US$40,000 to start the Program. Because of the lack of funding, plantings were delayed by almost two years.

RTT initially approached the US business sector for funding. Around 180 companies were contacted by mail, requesting support or participation in the Program, but this was also unsuccessful. The Program finally sought donations directly from US emitters through lectures at schools, rotary clubs, church meetings, foundations, universities and small businesses. These types of institutions were only able to provide relatively small donations (between US$100 and US$900) to support small carbon offset projects. To date, 38 donors have offset their emission by giving nearly US$100,000 to the planting of 48 ha of mixed species forests in Costa Rica (Barres pers. com.). A 40 ha project worth US$120,000 is planned for May 2002 to offset fuel cell emissions of a US business (www.reforestthetropics.org).

Funding arrangements are based on two different plans. A married couple are charged US$2,053/ha to offset their per capita emissions and larger projects are paying US$3,000/ha (Barres pers. com.). The initial price was set at US$988/ha but with no formal market for the offsets, RTT tested the market and was able to increase the rate to the current levels. At this stage, the donations cover farmer payments, soil carbon measurements, sample plot establishment and measurements, travel, technical assistance, nursery costs and reporting for the first four years (Barres pers. com.). It is hoped that the donors will provide for future monitoring activities.

Given the lack of initial Program funding, the Program manager is wholly responsible for the administration of existing offset projects, leaving only about 10% of his time to disseminate information about the Program and seek new donors. The search costs incurred by the Program manager will be ongoing until some substantial Program funding can be found. With greater funding, the need for additional funds will fall, thereby reducing these search costs.

4.6.6 Search (program to farmer)

The Program reportedly held meetings with the local community to discuss the program components and benefits (ELI 1997). Farmers were initially selected based on past experience with them. The Program is currently working on six large farms and two smaller ones. RTT plans to work with no more than 10 farmers in the research and development phase in order to keep technical assistance costs to a minimum.

The Program is concerned about the risks of project failure, so they initially establish two to five ha trials on the farms to carefully select farmers with sound management skills. Some farms have had to replant because of unsuccessful initial management, especially due to damage caused by the leaf-cutting ants.

By setting a goal to reforest 500 to 2,000 ha per farm, the farmers should be able to generate a continual stream of income from the sale of regular thinnings and eventually the harvested wood. If the larger landholders find the projects profitable, it is expected that smallholders will follow (Barres pers. com.).

Farmer selection is an on-going process. When a US emitter agrees to fund a project, the manager and his associates in Costa Rica review the status of the existing farm participants and decide which one should be offered the new project. Given the restrictions in current funding, the Program is not actively seeking new farmers. Some interested farmers have approached the Program.

With increased funding, RTT plans to expand the Program to 30 farmers, whereby all potential project farmers will be subjected to a FIT (See-If-The-Farmer-Fits the program) trial, using the 2.5 ha trial areas. If the farmer is successful in managing this smaller area, they are invited to participate in larger projects. This system allows the Program staff to train the farmer and his/her workers, thereby reducing the risk on emitter funding.

4.6.7 Negotiations of projects

For the small projects, a written witnessed agreement is prepared without a lawyer, so transaction costs are kept low. In the case of larger projects, a 25-year legally contractual agreement with a conservation easement[12] is required (Chacon *et al.* 1998; Barres pers. com.).

The contractual agreement covers (a) the responsibilities of RTT (payments to farmers over a three to four-year period, and technical assistance) and (b) those of the farmer (providing their land for 25 years for carbon sequestration, ceding to RTT in the name of the donors the rights to register the carbon sequestered, establishing and managing the forest free of cattle and competing weeds while maintaining a fully and completely stocked plantation).

A lawyer is hired at about US$200/contract to record the signing of the contracts into the legal registry. Donors do not sign the contracts and many prefer not to become involved in legal matters in Costa Rica. For both agreements and contracts, the rights to register the carbon sequestered belong to the emitters through the Program, but the forest and its products belong to the farmer. Management is to be decided jointly, according to a standard simple management plan contained in the contract.

[12] Conservation easements are inscribed in the public land registry, restricting land use of one property to the benefit of another, in the case in favour of RTT (Chacon *et al.* 1998).

4.6.8 Project administration

The Program is jointly managed and monitored by RTT and CACTU. The program manager is based in the USA and works part-time on the project on a voluntary basis. CACTU provides a forester who works about 40% of his time on the project. RTT pays CACTU US$250 per month for his and other support services. RTT also provides the forester with travel expenses and pays for other project costs such as seed collections, signs, support staff and computer services.

Each donation for an offset project has a separate bank account from which withdrawals are made for direct costs such as farmer payments, technical assistance and travel. The remainder will be used over 21 years for monitoring activities. In some cases, about 40% of the original donation is left over for this purpose. Interest earnings in these accounts, although relatively small, are maintained in the same accounts for future project activities.

Under the current funding levels, most people are involved on a voluntary basis. RTT has a board of directors of five people, a manager, and a forester in Costa Rica. The forest establishment requires the involvement of the farmers and their farm managers, crew chiefs and workers. Altogether, about 30 people are actively involved in the Program. However, with increased funding, the Program would employ more administrative staff, thereby reducing the Program manager's time in administration and allowing him to develop more projects.

4.6.9 Establishment of projects

The first four years of the latest project has a cost of about US$3,000/ha. This covers project preparation and approval, farmer contracts and payments, establishing nurseries, site preparation, planting, insect control, cleanings, replanting and office overheads.

As payment for the sequestration services and as a contribution to the investments in the establishment and maintenance of the plantation, RTT gives the farmer cash grants for a total of US$1,000/ha planted over the initial three-four years of the contract. From this amount, the farmer pays all establishment costs, including seedlings (see Table 15). The payments are likely to rise by 25% due to the doubling of the recent cost of nursery stock (Barres pers. com.).

A typical payment schedule for a farmer is as follows: 20% upon signing for nursery production and site preparation; an additional 20% when planting has begun; 20% when planting is finished, losses are replanted and inspected; 20% one year after planting is finished; and 20% two years after planting has finished. This schedule of payments may be modified in conformance with the progress of the work in the field or for nursery production. All other costs of establishment and management will be assumed by the farmer.

Table 15: Farmer payment schedule

Year	4.6.9.1.1 Activity	US$/ha
0	Payment at signing of contract	200
4 months	Site ready for planting	200
6 months	Site planted, replanted, inspected	200
18 months	Payment to farmer	200
30 months	Payment to farmer	200
Total		**1,000**

The distribution of funds takes about 5% of the Program Manager's time in preparing the paperwork and delivering cheques to farmers. At each payment, the farmer personally receives a cheque from the Program Manager with an account of the past and future payments. RTT retains receipts of all payments for review by donors.

4.6.10 Technical assistance

The Program works closely with each landholder and CACTU is expected to make frequent visits to all project farmers to increase the likelihood of the project's success. The technical assistance provided by the Program emphasizes the importance and requirements for careful planting, intensive cleaning, insect control and replanting during the three to four year establishment phase. However, the lack of program vehicle in Costa Rica and full-time staff has reduced the level of technical assistance to farmers.

The Program manager travels between Costa Rica and USA every two months to spend one week with the farmers and CACTU (equivalent to 12% of his time). With greater funding, he would make the visits monthly.

4.6.11 Monitoring

12 measurement plots of 20 × 50 meters will be established per project, requiring two weeks work by RTT and CACTU for each project.

The four-year establishment stage is to be followed by a 21-year measurement period. Every five years, CACTU plans to carry out carbon monitoring together with thinning activities. The methods for monitoring and measurement are not yet finalised but were due for completion in 2000. The determination of the total carbon may require further research activities to relate the stem volume and wood density to the total carbon content in the crown, stem and roots.

It is hoped that the Program will eventually develop enough offset projects to create financial reserves for monitoring activities, but at this stage additional funding will be needed. The amount required has been estimated at about US$750/ha, whereby a one-off payment is made into an interest-earning trust fund at the beginning of this second phase. Interest earnings would fund inspections, the determination of sequestered carbon, and reporting. CACTU will be contracted to carry out inspections and carbon measurements in the long-term.

4.6.12 Enforcement

The conservation easements allow RTT to secure an immediate injunction in case of a violation of the easement terms (Chomitz *et al.* 1998). According to the contract, if RTT considers that there has been a partial or total violation of the present easement, RTT will provide the contracted farmer with written evidence of the violation. If the complaint is justified, the farmer is expected to cease the activities that are in breach of the contract and respond in writing to RTT within 30 days. Where an agreement cannot be reached between the two parties, a third party can be hired to resolve the conflict or the complaint can be taken to court.

Where a farmer is found to be in breach of his/her contract, the farmer must pay the legal expenses and return to RTT the financial contribution they have made towards plantation and maintenance costs. Where the land is sold before the end of the contract, the landholder is legally contracted to return the project funds, unless the new landowner wishes to continue with the contract (Chacon *et al.* 1998).

Although the farmers and Program enter into legally binding contracts, the Program manager is doubtful he would seek legal aid if a farmer violates the contract conditions, due to the additional expense and ineffective outcome. Instead he tries to ensure the farmers' long term commitment to the project by working closely with them and providing timely incentives. Project signs have also been established on all farms, stating the objectives of the project, and further emphasizing the commitment of all partners.

4.6.13 Insurance

The Klinki forestry Program was an early AIJ project and as a result had no formal insurance policy. Since the Program does not want to bear the risk and responsibility of accepting investor money, it accepts funds only as donations.

4.6.14 Reporting to donors

About 50% of the Program manager's time is spent on regular reporting to donors on the status of their projects. After each trip, digital photos of the young forests are transferred to a CD for use in reports. Lack of secretarial staff have made it difficult to keep all 38 donors informed six times each year, but that is the goal.

4.6.15 Verification and certification

Since the Program is a carbon-offset project rather than a carbon-credit project, external verification or certification is not required at this stage. The Program has developed its own model on which they calculate the amount of emissions of the US investor and the required offset. This project places great emphasis on bringing emitters and farmers together to mitigate and learn about climate change. Donors can visit 'their' forests in Costa Rica and meet the farmers. In this sense, the Klinki Forestry Program is seen very much a *grassroots* carbon-offset program.

The amount of carbon sequestered in the initial years is small, and members of the Costa Rica Office of JI (OCIC) visit the plantings periodically and could therefore verify their existence. If in the future, the offsets needed to be documented as credits, then verification and certification would be deemed necessary.

4.6.16 Estimates of transaction costs

Using the original budget approved by the USIJI and the Costa Rican Government (UNFCCC 1998), Dutschke (2000) estimated the transaction costs for the Klinki Forestry Program at 30% of the total project costs (US$10,663,017). Inventory, monitoring and project management costs were classified as transaction costs (see Table 16). The Program costs were based on expected US funding which never eventuated (Barres pers. com.).

Table 16: Transaction costs of Klinki forestry Program

Type of transaction cost	% of initial Program investment
Inventory	9.1
Project management	11.8
Monitoring	8.6

Source: Dutschke (2000)

The project costs of establishing and implementing the existing size of the project are outlined below. Although the project manager is volunteering his time to the project, his costs of labour are priced at his previous employment level.

Table 17: Transaction costs of Klinki project

Development/ pre-implementation	Unit	Quantity	Price	Total
Travel to Washington, Costa Rica, telephone, fax, electricity, photos, setting up the office computer, etc.				40,000
RTT- design of project	months	2.5	60,000	150,000
RTT- drawing up contract	months	0.17	60,000	10,000
Total development costs				**200,000**
Implementation of contracts				
cost of lawyer to legalise contracts	contract	6	200	1,200
CACTU- technical assistance	year	25	3,000	75,000
RTT-Visits to farmers (for 1st 5 years)	% time * 4 years	1	60,000	48,000
RTT- administration	% time * 4 years	0.40	60,000	24,000
RTT-Airfares (6 flights /yr for 1st 5 years)	flights	30	1,000	30,000
Incentives to farmers	ha	88	1,000	88,000
Nursery production- contracted out				
search and information	% time	50	60,000	30,000
monitoring	ha	88	750	66,000
reporting to donors	50% * 25 years	1250	60,000	750,000
Total implementation costs				**1,111,000**
TOTAL				**1,311,000**

The project manager is currently allocating his time between donors and farmer activities. After the establishment phase is completed, the time required by the Program manager in visiting farmers will be less. After three to four years the forest is established and requires minimal site visits and payments to farmers will cease.

Unless new projects are started, RTTs work in Costa Rica will require only the checking of the measurements.

The Klinki project highlights the problem of establishing projects without initial funding for research and development. The search for donors continues, but their contribution covers only the establishment of the plantations. The transaction costs, in terms of time, are high for the project manager. Much of this is the result of the objectives of the project. The project manager is attempting to link the emitter with the farmer, to increase the awareness of the American public and Costa Rican farmers of their personal contribution to climate change. It is also questionable whether linking donors directly to the plantation will be sustainable. If something happens to that particular plantation, such as a fire, or a farmer breaks his/her contract there is no insurance to protect the grower or the donor.

4.7 Costa Rica/Norway Reforestation and Forest Conservation Project

The Costa Rican and Norwegian partners signed an MOU in 1996 to implement an AIJ reforestation and forest conservation pilot project in the upper Virilla River Basin of Costa Rica. Of the targeted 4,000 ha, 1,000 ha of pastures are to be reforested with native species and 3,000 ha of primary and secondary forest areas are to be conserved. Local benefits include the protection of aquifers, reduction in the rate of soil erosion, improvement in water quality and the stabilisation of the hydrological regime in the watershed. This is also expected to enhance the efficiency of four CNFL hydroelectric plants that are now seriously affected by erosion and sedimentation (DEFRA 2001).

The AIJ project is part of a US$53.7 million integrated project that also includes an energy conservation project and the reconstruction and expansion of the Brasil Hydroelectric Plant (JIQ 1996). The US$3.4 million AIJ project is initially funded by the Norwegian Ministry of Foreign Affairs and the Norwegian private sector consortium, *Consorcio Noruego*.The institutional actors responsible for financing, developing and implementing the project are summarised in the table below.

Table 18: Stakeholders and their functions in the Virilla River Basin project

Stakeholders	Country	Function
Norwegian Ministry of Foreign Affairs and the Norwegian Consortium	Norway	AIJ Project funding AIJ project review missions every two years
CNFL *Compania Nacional de Fuerza y Luz*	Costa Rica	AIJ Project funding Development of monitoring protocol Project administration Recruitment of participant farmers Development of management plans Supervision of planting activities
OCIC Costa Rican Office on Joint Implementation	Costa Rica	Executor of the National AIJ Program Administration of the GHG Fund Issues, certifies and guarantees carbon offsets
FONAFIFO National Fund for Forestry Finance	Costa Rica	Receives AIJ project funds from OCIC Financial administration of the AIJ project Develops reforestation and conservation contracts with farmers Monitoring of forestry activities
FUNDECOR[13] Foundation for the Development of the Central Volcanic Range	Costa Rica	Development of monitoring model Recruitment of participant farmers Development of management plans Supervision of planting activities
CATIE, ITCR and UNA	Costa Rica	Development of model to estimate project CO_2 benefits from reforestation
Small and medium landowners	Costa Rica	Producers of environmental services

[13] FUNDECOR negotiates with the Ministry of the Environment and Energy (MINAE) and with FONAFIFO so that they can be included in the system of Payment for Environmental Services (PSO), and grants the green seal of the Forest Stewardship Council which certifies that the forests in question have been managed according to the highest world standards of sustainability (http://www.fundecor.or.cr/EN/tecnologias/financieras/proyectos.shtml).

4.7.1 Pre-implementation transaction costs

Limited information was available on the pre-implementation transaction costs of the Virilla Basin project. Given that the AIJ project was incorporated into the legal, financial and institutional framework of Costa Rica's FESP program, the negotiation, validation and approval process would have involved minimal transaction costs between host and Annex 1 parties.

4.7.2 Design

Under FESP, the AIJ project is classified as a 'Private Forestry Project' (PFP), which compensates farmers for their conservation and reforestation efforts on private lands**.** The Costa Rican GHG Fund, administered by OCIC, receives the funds for AIJ investments from foreign investors and transfers them to FONAFIFO, the financial administrator of the projects. FONAFIFO is responsible for distributing the payments to the farmers for the provision of environmental services. OCIC can also legally issue Certifiable Tradable Offsets (CTOs) to the project's foreign investors.
The model for establishment of baselines and project scenarios has been developed by FUNDECOR, using satellite images. The monitoring protocol for the entire project is developed by CNFL (JIQ 1996).

4.7.3 Implementation of contracts

Under the FESP program, FONAFIFO enters into the legally binding contracts with landowners for 20 years. Although the contracts are stipulated for 20 years, the AIJ Project has been set up for 25 years for purposes of quantification of benefits, costs and monitoring (UNFCCC 2000). Subak (2000) observed that in the Virilla Basin, the plantation contracts have only been made for five years and 10 years in the case of forest management contracts.

Landholders receive annual payments over five years, with rates differing between forest activities as shown in Table 19. The plantation rates are higher as landowners are expected to provide some of their own labour. In addition, the opportunity cost of the land converted to plantation is expected to be higher than the land under forest protection and forest management.

Table 19: PFP's Environmental Services Payment Schedule

Year	Plantation Establishment (US$)	Forest Protection (US$)	Forest Management (US$)
1	300	60	45
2	120	60	45
3	90	60	45
4	60	60	45
5	30	60	45
6-20	*	*	*

Source: Subak (2000); *Not-determined

Initially, it was estimated that 900 landholders in the Virilla Basin area would participate in the Project. However, by 1998 less than 30 landowners had signed agreements with FONAFIFO (see Table 20). By 1999, only 131 ha had been planted in the project area (UNFCCC 2001). The high opportunity cost of predominantly dairy farming land, together with the drought conditions caused by *El Nino*, may have deterred many landowners (Subak 2000).

Table 20: Carbon offset goals and achievements

	AIJ Project target[a]	Status of AIJ Project, 1998 [b]	Status of AIJ Project, 1999[b]
AIJ project area	4,000 ha	1,170 ha	2,390 ha
% area under plantation	25%	5%	5%
Number of landowners	> 900	12-30	na
Carbon offsets	231,000 tC	~2,000 tC	~4,800 tC
Carbon offset value	US$2.00 million	US$0.02 million	US$0.05 million

a. UNFCCC 1997, b. UNFCCC 2000.

In the upper Virilla Basin, CNFL and FUNDECOR, is responsible for carrying out technical studies on the landowner's property, choosing the tree species, location, organising the planting schedule and carrying out the planting activities. The forestry component includes education and outreach activities and information on silviculture techniques to individual farmers and community organisations (UNFCCC 2000).

4.7.4 Monitoring and verification

FONAFIFO uses satellite imagery to implement monitoring every three years, along with ground verification.

4.7.5 Enforcement

If landowners breach their contracts, the funds must be repaid to the State (Subak 2000).

4.7.6 Verification of emission reductions

An external verifier will be contracted by CNFL as well as involving local NGOs in the verification of the execution status and GHG emissions mitigation levels of the AIJ Project (JIQ 1996).

4.7.7 Certification of CERS and of sale of credits

Each CTO is guaranteed by the Costa Rican Government for a period of 20 years at a rate of US$10/tC or US$2.72/ton CO_2. The Costa Rica/Norway reforestation and forest conservation AIJ pilot project provided the first international financial contribution to the FESP program (UNFCCC 2000). According to the 1996 MOU agreement for the AIJ project, Norway's offsets were to fund carbon fixation activities in a 4,000 ha area over the 20-year life of the project. However, when the PFP took effect in 1997, the Government of Costa Rica, through OCIC, issued US$2 million worth of CTOs to Norwegian AIJ investors (equivalent to 231,000 CTOs) from PFP forest sequestration activities estimated to have already occurred during 1996 and 1997 (Subak 2000; UNFCCC 2000).[14]

4.7.8 Estimates of transaction costs

The cost data submitted to the UNFCCC do not provide a break down of cost categories. Only total implementation costs are provided over a 10-year contract period.

This unilateral project structure reduces the transaction costs for the Annex 1 country and reduces the learning costs for project developers. Whether the Costa Rican model can be transferred to other countries is still questionable. Costa Rica was able to take advantage of their existing institutional framework for the payment for forest environmental services in the establishment of the carbon project, significantly reducing the learning and transaction costs incurred by most new carbon projects. Although the rate of planting in the project area has been slower than expected, OCIC has credits available to sell from other projects. This contrasts with the Klinki project whereby funding is provided for a designated stand of trees.

[14] This level of sequestration is based on 382 separate legally-binding contracts, applying to 72,000 ha of land throughout the country.

4.8 SIF Carbon Sequestration Project

Sociedad Inversora Forestal S.A. (SIF) was created by Fundaciòn Chile to overcome the financial obstacles facing small and medium land owners (average plot size of 60 to 100 ha) in the establishment of new plantations http://www.fundch.cl/viewfull.cfm?ObjectID=244). The project aims to plant between 3,000 and 7,000 ha of *Pinus radiata* and *Eucalyptus globulus* with about 30 land owners on marginal agricultural land, utilized primarily as pastureland for sheep and goats (UNFCCC 2001). The land conversion is also hoped to reduce the rate of soil erosion.

Project costs are estimated at US$6 million; US$1 million for Project design and implementation, US$3 million for afforestation and silviculture activities of 7000 ha and US$2 million for working capital costs (UNFCCC 2001). Planting is scheduled to begin in June 2003.

The transaction costs of the SIF project are discussed below in relation to the proposed CDM project cycle. The Project stakeholders who have incurred the transaction costs, through financing, developing and implementing the Project, are summarised in the table below.

Table 21: SIF project stakeholders and their functions

Stakeholders	Country	Function
SIF *Sociedad Inversora Forestal S.A*	Chile	Project development, administration, government oversight, financing, monitoring and verification
Ministry of Agriculture	Chile	Financers of project development and implementation
Fundación Chile	Chile	Financers of project development and implementation
CORFO *Corporation for the Promotion of Production*	Chile	Financers of project pre-implementation
Ministerio de Relaciones Exteriores	Chile	Designated National Authority to approve AIJ projects
Forestal Mininco S.A	Chile	Management of forests Buyers of timber
Forestal Millalemu	Chile	Management of forests Buyers of timber
CFix LLC	USA	Project development
SGS International	The Netherlands	Verification and certification

4.8.1 Search for funding

The project has received initial funding of US$4.3 million; US$1.3 million from the Ministry of Agriculture and Chile Fundaciòn, and a long term loan from CORFO of US$3 million (http://www.fundch.cl/viewfull.cfm?ObjectID=244). The funds were used to set up the entire project and acquire land-use rights to forests valued at US$12 million and contracts to establish forests of 3,000 to 5,000 hectares. The shortfall of required funds is expected to come from the local capital markets (Golodetz pers. com.).

4.8.2 Design

It took approximately a year to design the project (Golodetz pers. com.). Unlike other AIJ case-study projects, the SIF project was designed by the host country partner. SIF, in conjunction with its board of directors was responsible for the project design. By accessing the local capital markets, SIF is attempting to overcome the funding limitations faced by both project developers and landholders in establishing plantations. The financial structure, management system, contractual arrangements and financial incentives are adaptable and transferable to other Annex 2 countries and it is hoped that this model can be replicated in Chile and other countries in Latin America to increase afforestation activities (UNFCCC 2001). The project design and proposal was planned to take about two years at a cost of US$440,000 (UNFCCC 20001).

4.8.3 Negotiation with project partners

SIF spent six weeks negotiating with CFIX regarding the carbon aspect of the project and one year to negotiate the administrative contracts with the forestry companies. It has taken over two years to sign contracts with owners of standing forests and 1.5 years with owners of lands to be planted (Golodetz pers. com.).

4.8.4 Validation and approval

USIJI required a technical revision of the project, which created a six-month delay for approval of carbon credits (Golodetz pers. com.).

4.8.5 Contracting

The project has entered into contracts with small and medium farmers. Three to five meetings are required with each farmer to negotiate and sign a contract. The contracts give SIF the use rights of the land for a defined period of time, allowing farmers to retain land ownership. There are two schemes under the project:

(1) leasing 3,000 ha from small landholders to grow forest for carbon sequestration benefits, and
(2) leasing about 5,000 to 6,000 ha of standing forest to act as a forestry asset and future revenue source for ongoing project expenses (Golodetz pers. com.).

For both schemes, two forestry companies, *Forestal Millalemu* and *Forestal Mininco S.A*, are responsible for managing the forests and buying the timber at harvest time. Generally, the landowners do not have forestry experience so the forestry companies are in charge of all the management in the first cycle.

The Project has nearly completed the contracting process, and will seek to raise funds of about US$12 million from a 10-year securitised bond issue in the Chilean capital markets, backed by the acquisition of forest assets (ie mortgage backed securities). A major part of these funds will go towards completing the purchase of standing forests that can be economically harvested in the next 10 years to repay the bond holders and finance the costs of the forestry management on newly planted lands. (Golodetz pers. com.). The bond is also expected to cover the reforestation activities of the lands owned by small and medium farmers prior to returning the land-use rights to the original owners (UNFCCC 2001).

The operational model of SIF strives to balance cash flow produced from harvesting mature forest assets, with the cash flow required for bond payments and managing newly planted and existing forests. The standing forests leased under the Project will not qualify for carbon credits, as they do not meet the additionality criteria set by Kyoto Protocol (UNFCCC 2001).

4.8.5.1 Contracts with small landowners for carbon sequestration benefits

For the contracts with small landowners, farmers will receive an annual payment of US$40/ha for the lease of their land during the initial growing cycle and a 10% of the revenues from the first harvest (http://www.fundch.cl/viewfull.cfm?ObjectID=244). SIF is contractually obliged to return the property to the owner at the end of the contract in a reforested or regenerated state. The farmer retains 100% of the revenues from future harvests (UNFCCC 2001).

4.8.5.2 Contracts for standing forest

The contracts for standing forest will be of six to 12 years duration. Landowners receive 20% of the lease payments up-front and the remaining 80% within 18 months of the start of the contract. These forests will be harvested between 2006 to 2012 to repay the bond holders (http://www.tramitefacil.gov.cl/ficha1.php?Id=218).

4.8.6 Monitoring

SIF will be primarily responsible for measuring the inventory of the Project plantations every three to four years, as part of its ongoing silviculture activities. *Forestal Mininco* S.A. and *Forestal Millalemu* S.A. will also be involved in monitoring project activities and technical assistance. Monitoring activities are due to start in 2003 (UNFCCC 2001).

4.8.7 Enforcement

In Chile, afforestation activities are subjected to Decree Law 701 that states that felling or exploitation of forest by the landowner should be followed by reforestation of an area of equivalent size. If these obligations are not met within a period of three years after felling, the landholder will be subjected to heavy fines, more than double the cost of reforestation. In December 1999, inflation-adjusted fines ranged from US$487 to US$1,461 per ha. Although SIF does not own the afforested lands in this project, the legal obligations for reforestation remain with the landowners (UNFCCC 2001).

SIF's contractual arrangements with landholders are likely to further reduce the risk of future loss of forest. For all land afforested, SIF will make a land-use contract that will exceed the harvest cycle by two to three years. During that period, SIF is contractually obligated to reforest or regenerate the land according to the legal requirements of DL701 before it is returned to the original owner. Once the reforested property is returned to the landowner they will have complete ownership of future potential profits from the reforested land. At subsequent harvests, the landowner retains 100% of the timber revenues. While legal procedures and the management procedures of SIF cannot guarantee reforestation in perpetuity, it is hoped that potential plantation profits will be a sufficient incentive to farmers to continue reforestation or regeneration activities (UNFCCC 2001).

4.8.8 Insurance

The Project has an insurance policy that covers them for the costs and risks associated with forest management. The use of forestry companies to establish and maintain the plantations in the first cycle is expected to increase the likelihood of capturing the estimated tons of carbon.

4.8.9 External verification

SGS International Certification Services will be responsible for the external verification.

4.8.10 Certification of CERS and of sale of credits

Certification will be undertaken once a qualified buyer expresses serious interest in buying carbon credits from the project (Golodetz pers. com.).

4.8.11 Estimates of transaction costs

Based on data submitted to the UNFCCC, we classified the pre-implementation, project preparation and monitoring costs as transaction costs (shaded grey in Table 22). Transaction costs were only 6.1% of total project costs (or US$3/tC). This is likely to be an underestimate of the transaction costs since it does not include a number of activities such as contracting farmers, verification and certification.

Table 22: Costs of SIF project

Years	Project Costs	Projected Amount (US$)	%
Pre-implementation			
1999-2001	Technical Assistance with Project design	400,000	2.1
1999-2000	Preparation of Project Proposal for USIJI	40,000	0.2
Total		**440,000**	2.3
Implementation			
2001-2002	Project Preparation	400,000	2.1
2002-2026	Afforestation	2,900,000	15.5
2002-2026	Annual Payments to Land owners	6,720,000	35.8
2002-2026	Overhead	5,000,000	26.7
2002-2026	Silviculture Expenses	3,000,000	16
2002-2026	Monitoring	300,000	1.6
Total		**18,320,000**	**97.7**
Grand total		**18,760,000**	**100**
Transaction costs (%)			**6.1**

Source: UNFCCC 2001

Although the success of this project still depends on a number of factors, not least the approval of US$12 million in bonds from the Chilean capital markets, the institutional arrangement of the SIF project may provide host countries with a model for initiating their own forest carbon projects and improving the well being of farmers and the local and global environment.

4.9 RUSAFOR: Saratov Afforestation Project

The Rusafor project was designed before the Conference of the Parties (COP 1) as a pilot project to evaluate the opportunities (biological, operational, and institutional) of managing Russian forest plantations as carbon sinks. Between 1993 and 1994, around 450 ha of marginal agricultural land and 450 ha of burned pine plantations in Saratov oblast have been reforested with broadleaf and pine seedlings respectively (UNFCCC 1996 and IEA 1998). Other benefits include prevention of soil erosion, establishment of a new recreational area and enhancement of biological diversity (Golub *et al.* 1999).

The project has six project partners four of which are providing project funding (Table 23). In the development phase, 53% of the funding is coming from the host country and 47% from the Annex 1 country. In the implementation phase, 55% is financed by the Russian Federation and 45% by the USA (UNFCCC 1996). Funding is available for all activities except the future monitoring, verification and attendance at USIJI meetings (UNFCCC 1996).

Table 23: Stakeholders and their role in the Rusafor project

Stakeholder	Country	Function
SFMD-RFFS Russian Federal Forest Service	Russian Federation	Project development, management, administration, financing and monitoring
International Forestry Research Institute	Russian Federation	Project development, technical assistance financing and verification
State Committee of Russian Federation for Environmental Protection	Russian Federation	Host country acceptance of AIJ project
Ministry of Natural Resources of Russian Federation	Russian Federation	MOU
Ministry of Fuel And Energy of Russian Federation	Russian Federation	MOU
Oregon State University	USA	Project development, financing and monitoring
Sustainable Development Technology Corporation	USA	Project development, liaison, monitoring and marketing
U.S. Environmental Protection Agency	USA	Project development and financing

4.9.1 Information and search

Information dissemination and exchange has occurred on a regional national and international level, including articles in national and international newspapers (ELI 1997). Project participants also promoted the project through attendance at environmental conferences throughout the country (ELI 1997).

4.9.2 Design

Russian forestry associations were involved in the project design (ELI 1997). No detailed information was available on the actual design or length of time taken in the design phase.

4.9.3 Negotiation

Arranging and travelling to pre-project meetings in Moscow and Saratov, preparation of all project reports, negotiations and signing of the agreement were estimated to cost US$31,500 over two years (UNFCCC 1996).

The project agreement reportedly outlines the responsibilities of project partners in terms of project activities. These activities include seedling protection, plantation maintenance, replanting, re-establishment in the event of loss from fire, pests and disease, and with and without project baselines.

4.9.4 Monitoring

SFMD-RFFS is responsible for the monitoring of 53 sampling plots at the project sites. Monitoring of tree survival, stocking density and growth rate was scheduled to begin in 1998 (UNFCCC 1996). Regular measurements of stocking densities, tree heights, stem diameters, ratios of aboveground to below ground biomass, and soil carbon contents will be used for updating projections of project greenhouse-gas benefits (UNFCCC 1996).

4.9.5 Enforcement

The project sites have been classified as regional parks and/or soil-erosion protection areas. The project participants therefore believe that the likelihood of timber harvesting in these areas is low. The establishment of project signs at the site has provided the local communities with a sense of ownership and pride in the project, thereby further reducing the immediate threat of timber harvesting (ELI 1997).

4.9.6 Verification and certification

All project partners have agreed to external verification of emissions reductions. The OE responsible for the verification will either be the USIJI Evaluation Panel, or a party to be named at a later date by the project participants (UNFCCC 1996). Travel and compensation for external verification, future monitoring, and participation in USIJI meetings and workshops were estimated to cost US$31,000 (UNFCCC 1996). External auditors were costed at US$3,500 each. The project developers have requested the USIJI Secretariat to provide additional funding for these expenses.

4.9.7 Estimation of transaction costs

The Rusafor project is not a smallholder forest carbon project. The plantations are on state land, managed by the Russian Federal Forest Service. It has been included in the sample because a very comprehensive set of transaction costs was submitted to the UNFCCC. As a result, the project has the highest transaction costs amongst the selected case studies, in terms of percentage of total costs. Other projects did not account for meetings, travel, monitoring, certification, preparation of meetings, which can all be classified as transaction costs.

Based on data from the initial project report submitted to the UNFCCC (1996), we estimated the transaction costs for the Rusafor Project at about 45% of the total costs (or US$0.23/tC). We classified most of the reported costs as transaction costs except for the site establishment and plantation maintenance costs (see shaded areas in Table 24). Transaction cost estimates of the Rusafor project were also provided by Golub *et al.* (1999). They calculated that from a cost budget of US$120,000, US$25,000 would be spent on transaction costs (20% of the total project costs). As Golub *et al.* (1999) did not itemise the transaction costs, we were not able to analyse whether the initial UNFCCC estimates were overstated.

Table 24: Costs of Rusafor project

Project development	**US$**
Travel: pre-project meetings	7000
Travel: agreement negotiation and signing meeting	4500
Facilitating arrangements and meetings	10000
Preparation of report and meetings with partners	10000
Total pre-implementation costs	***31500***
Project implementation	
Site preparation, seedling planting, plantation maintenance and preservation	80000
External verification, monitoring, participation and travel to USIJI workshops	31000
External audit	3500
Total implementation	***114500***
Total project costs	**146000**
Total transaction costs	**66000**
Transaction costs ÷ Total costs	**45%**
Transaction costs/ton Carbon (US$)	**0.84**

4.10 Summary

Given that AIJ forest carbon projects are relatively young, experimental by nature, and few in number, it is difficult to reach definite conclusions on the likely impact of transaction costs on the role of forest carbon projects in the carbon market. The above case studies show that there are a large number of transaction costs involved in establishing the projects and implementing the projects. As the carbon market becomes operational there will be added transaction costs in trading credits. However, on the positive side, there is likely to be a reduction in existing transaction and learning costs facing pilot projects once the rules and regulations of the CDM are standardised.

In the establishment and implementation phase, a number of the AIJ projects have suffered from lack of funding. Since the CDM is not yet operational and there is still great uncertainty over issues such as permanence, leakage and baselines regarding land use, land use change and forestry (LULUCF) projects, few investors have been willing to make long-term investments in forest-carbon projects.

On the other hand, the costs incurred by projects in searching for landholders to participate in the project have reduced over time. In the case of PROFAFOR and Scolel Té, word of mouth and the successful establishment of project plantations on nearby lands, has led to interested farmers approaching the project managers.

In terms of negotiation and enforcement costs, most project managers have made legally-binding contracts with the farmers, stipulating the amount of project payments and conditions of payments. Most of the projects are still in a plantation-establishment phase where farmers continue to receive project payments and technical assistance, so enforcement of contract conditions has not been necessary. It is yet to be tested whether contract conditions can be legally enforced, and at what cost to the project managers.

Monitoring costs are expected to be high in the initial establishment of measurement plots and then fall overtime. In the case of PROFAFOR, they have made an initially high investment in a remote sensing monitoring system that is expected to reduce future monitoring costs, especially in terms of the number of site visits to isolated communities. Scolel Té has also invested heavily in setting up its monitoring systems, but in terms of local capacity building rather than technology. Its emphasis on building the project from the 'bottom-up' is hoped to reduce the risk of project failure and enforcement costs later on. The Klinki Forestry Program is also working closely with farmers and hopes that this high initial investment of their time in establishing the plantations will maximise the carbon sequestered.

Although the CDM market is still not operational, both Scolel Té and PROFAFOR are selling carbon offsets. Scolel Té is buying and selling VERs and PROFAFOR has had their carbon offsets certified by a third party for sale to he FACE foundation. The project implementation costs of the Scolel Té project are now funded by the sale of the VERs.

In the following section we consider institutional mechanisms that would minimize the transaction costs discussed in reference to the AIJ projects. Whether these reductions will be sufficient to make small-scale forest projects a more viable and attractive option to investors, is yet to be seen.

5 Institutional arrangements

The size of transaction costs for carbon projects will be influenced greatly by the institutional framework and administrative processes established at the international, national and local levels. In terms of defining strategies to minimise transaction costs, it may be useful to look at who incurs them as well as considering whom they deter from entering the market. In this section we discuss how existing institutional arrangements can increase transaction costs and reduce investment in CDM-type projects as well as how institutional arrangements can be designed to minimise transaction costs for players in the carbon market. As strategies for the reduction of transaction costs are implemented, the overall carbon market is expected to expand. However, in some cases, operational entities created to reduce costs to the project may only lead to a redistribution of the transaction costs within the carbon market.

5.1 Institutional capacity and policy environment

Although carbon projects, particularly carbon forest projects, were initially viewed as a low-cost potential to investors, the limited informational, institutional and infrastructural capacity in some host countries may create barriers to international investment (Karani 1997). Cumbersome regulatory approval processes for foreign investment in host countries have the potential to cause delays that will almost inevitably reduce the realized return on investment. Complex, nontransparent processes for approval and implementation of investments can invite opportunistic rent-seeking by participants (Woerdman 2001). A number of National Strategy studies have recommended the development of domestic and international capacity of validation, certification, monitoring and verification systems. If the institutional arrangements in host countries are not conducive to establishing carbon projects and encouraging foreign investment, attempts to reduce transaction costs at the project level will be fruitless.

Based on Indonesia's experience in afforestation and reforestation projects, Boer (2001) outlined a number of barriers to the implementation of forest carbon projects in the country. Major factors included lack of law enforcement, political instability, insecure land tenure, fires, illegal logging and lack of investors, labour and infrastructure. These institutional, technical and socio-economic constraints impose significant transaction costs on project developers, managers and investors.

The World Bank has created the PCF*plus* program to supplement the PCF. The objectives of the program are to build capacity of host countries and the PCF participants through outreach, research, and training activities as well as enhance the operations and activities of the PCF and its partners, and reducing risks and transaction costs (http://www.prototypecarbonfund.org/router.cfm?show=/html/pcfplus.htm&Item=15).

5.2 Minimising transaction costs

This section looks at the role of operational entities and institutions in minimising transaction costs in the carbon market. The case of reducing transaction costs for smallholder forest carbon projects is also discussed.[15] Although the discussion focuses on the proposed structure of the CDM, it is recognized that other institutional arrangements could be developed to operate a project-based carbon market. In Table 25, institutions and their functions are identified in terms of the type of transaction cost that would be minimized through their establishment in the carbon market. They will not directly reduce the transaction costs for all parties, but will essentially reduce the transaction costs in the carbon market.

[15] It should be kept in mind that reducing transaction costs to the investor and host organisation through the establishment of operational entities (OEs) is likely to increase the administrative costs to the overall system. The size of this trade off is not calculated.

Table 25: Minimising transaction costs through institutions

Transaction cost	Institution	Function
Information	Information brokers Project exchange-Bulletin Board Investors NGOs, multilateral and national institutions Development projects	Provide information on potential investors and project developers/hosts in annex 1 and annex 2 countries. Dissemination of knowledge on carbon markets, climate change etc. Provide information on the needs and priorities of large numbers of smallholders
Search	Information brokers Host government bodies, NGOs, development agencies and banks Brokers Aid organisations, NGOs	Bring project financers and project managers together Bring producers, project managers and carbon buyers together Bring buyers and sellers of carbon credits together
Project design	International-CDM Executive Board Public and private intermediaries, consultants, universities, NGOs, aid organisations International research institutions	Standardize and simplify procedures on GHG abatement performance Provide clear guidelines for project Provide technical, legal, financial, social, environmental and management expertise in project design and development Disseminate scientific knowledge on, for example, forest dynamics and carbon storage capacity and develop low-cost monitoring methods
Validation	Approval authorities- national and international	Determines whether project meets stipulated criteria and guidelines
Negotiation	Financial intermediaries- NGOs, Host government	Negotiation of compensation Offer projects as investment instruments or bundle projects into portfolios, setting the price investors pay for participation
Capacity building *Enforcement*	Development projects, NGOs Dispute settlement authority, NGOs, local organisations	Identify and develop host country capacity needed to attract project investment Coordinating carbon projects with development projects to reduce costs that do not directly relate to carbon sales such as supporting local capacity building Use of NGOs to carry out needs assessment Mediation, conciliation and sanctions
Monitoring	Community, NGOs and centralized monitors	Monitor and report ongoing project performance
Insurance	3rd party insurer	Safeguard the reduction and assume responsibility for failed projects
Verification and Certification	3rd party verifier and certifier- NGO, private company	Verify and certify the carbon offsets
Sale of carbon credits	Local trust funds Private sector NGOs Brokers	Buying and selling of carbon credits and/or project portfolios

Sources: Wexler *et al.* (1994), Michaelowa (2000) and http://www.cifor.org/news/Carbon3.htm#C-b

5.2.1 Search and information costs

Since stakeholders in the carbon market are not necessarily known to each other, a mechanism to link potential project developers, financers and project hosts was suggested early during the climate treaty negotiations. For example, a 'bulletin board' or an information clearing house could act as a point of access to information about CDM/JI projects and financing opportunities where potential stakeholders could post and/or elaborate their project interests. This would help to reduce search and information costs for individuals and thereby reduce barriers to entry. Consequently, a greater number of both hosts and investors may enter the market, particularly those interested in small projects where search and information would constitute a larger percentage of their total costs (Wexler *et al.* 1994).

Institutions could also be established to seek out and facilitate matches between potential investors and project hosts. This would reduce search costs to individuals and open the market to a wider class of entities for which participation would not have been cost-effective if these costs were borne individually (Wexler *et al.* 1994).

Under AIJ, some national governments have covered the transaction costs of information dissemination. In Costa Rica, considerable information exists about carbon projects, available on a national website and through public meetings (ELI 1997). In the case of the Rusafor project, in Russia, information on projects was publicized in national and international newspapers. Project participants also promoted the project through attendance at environmental conferences throughout the country (ELI 1997)

Already emerging are a number of on-line CDM information boards which provide efficient ways to obtain listings of proposed projects, hosts and interested investors (http://www.northsea.nl/jiq/3-1996.doc).

CDM Marketplace.com[16] allows emitters, project sponsors and developers, host country partners, investors and the CDM-services industry to access information on project management, financial due diligence, verification, certification, corporate finance, insurance trading, tax and legal issues. In addition, stakeholders can begin forming CDM projects together online.

CDM Online promotes the involvement of the private sector in the CDM and provides up-to-date information on CDM project development, key players, emission markets, potential investors and potential projects by country. CDM Online also has set up discussion groups, training activities and specific information for climate change negotiators.

International development banks may be good locations to list potential project partners because countries already meet there to discuss projects. Private brokers or agents are a likely mechanism to reduce project-investor search costs, though the brokers' fees would need to be included as a component of search costs (http://www.northsea.nl/jiq/3-1996.doc).

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[16] The on-line service is currently operated by Arthur Andersen, JLT Risk Solutions, DNV, Credit Lyonnais and SGS

Search and information costs are also incurred in identifying producers of the environmental services (i.e. smallholders). Local NGOs and other local organisations could play a key role in providing local knowledge about communities.

5.2.2 Design

5.2.2.1 Standardisation and simplification of CDM procedures

Many parties have called for a simpler design and a standardization of procedures and rules of the CDM to reduce transaction costs. One of the roles of the newly elected CDM Executive Board (EB) is to provide recommendations on simplified modalities and procedures for small-scale CDM project activities to COP 8 (http://www.ief.co.za/downloads/). In their third meeting in April 2002, it was decided that the EB would develop recommendations on the modalities and procedures for energy efficiency, renewable energy and agriculture projects. Forest carbon projects were not included (unfccc.int/cdm/ebmeet03.htm).

Inherent within the proposed CDM rules are predominantly higher transaction costs (see Table 26). However, increased transaction costs do not necessarily mean negative outcomes for project participants. According to Michaelowa (2000), increased transaction costs through CDM rules may also increase project positive externalities and the duration of projects. What needs to be calculated, is whether the benefits outweigh the transaction costs. Although there are still many uncertainties regarding the design, governance and implementation of the CDM, it has the advantage of being able to build on the infrastructure established during the AIJ phase (Michaelowa 2000).

Table 26: Analysis of CDM rules

CDM Rules	Transaction costs	Size of positive project externalities	Attractiveness of long-term projects
Early CDM credit	Decreased	No impact	Increased
Stricter CDM supplementarity rules	Increased	Increased	Decreased
Restricted trade in CDM credits	Increased	Increased	Decreased
CDM adaptation tax and administration fee	Increased	No impact	No impact
Compulsory CDM structure	Increased	Increased	Increased
CDM credit certification	Increased	Increased	Increased

Source: Michaelowa (2000)

5.2.2.2 Baselines

Standardization of baselines has been advocated as a means to both decrease transaction costs for project managers and increase predictability. A multi-project approach has been proposed to create consistent benchmarks or algorithms that can be applied to broad categories of projects, thereby greatly reducing the scope and need for project-specific analysis (Lazarus *et al.* 2001).

A major challenge with multi-project baselines is in defining methods to aggregate across geographical areas and project types. The grouping will need to be broad enough to encompass a significant number of CDM projects to reduce individual project transaction costs, but narrow enough that baseline accuracy is not compromised, excessive credits are not awarded, or significant investment opportunities are lost (Lazarus *et al.* 2001).

Table 27: Comparison of baseline methodologies

Unstandardized Approach	Highly Standardized Approach
Different baseline for each project	Same baseline for each project
Tailored, ad hoc	Uniform, rigid, consistent
Based on site-specific information	Based on category-wide information
Aims to be credible for individual projects	Aims to be credible for a bundle of projects
Limited transparency	Increased transparency
Review process for each project	Single, upfront review process for class of projects
Rewards any activity that reduces emissions compared to the counterfactual situation	Rewards any activity that is low-emitting compared to the benchmark

Source: Lazurus et al. (2001).

Monitoring and verification protocols also need to be standardized to reduce the variability in data collection and reporting methodologies. Uncertainty over monitoring procedures at the international level has added to the monitoring transaction costs. There is a need for the development of guidelines on standardized reporting. This would enable more reliable information to be collected for international reviews as well as enhancing the value of the information for learning purposes (Wexler *et al.* 1994).

5.2.2.3 Centralisation of technical expertise

To date, project managers have designed carbon projects to meet the necessary AIJ/JI/CDM requirements. Evaluations of technical, economic, legal and political aspects of the project have been carried out 'in house' or through the hiring of consultants.

Costs could be reduced by centralizing technical, legal and economic expertise in one or more institutions in order to assist potential project developers in formulating JI/CDM projects. Several existing institutions could execute some or all of the project development functions. Examples include private companies, national research and development labs, universities and private brokerage houses and international organisations (Wexler *et al.* 1994).

The World Bank's PCF is receiving finance from both the public and private sectors to ensure projects meet the requirements of the UNFCCC for the purposes of the Kyoto Protocol. The portfolio includes about 11 JI and CDM-type projects from both Economies-in-Transition and developing countries. To date, most of the projects are renewable-energy and energy-efficiency projects.

The pre-implementation phase of the PCF consists of 20 steps and requires about 70 weeks to implement. (see Appendix 2) Independent experts are hired to provide baseline validation and verification/certification procedures for emissions reductions in accordance to the developing UNFCCC rules. The PCF reduces the transaction costs for the host organisations and investor by carrying out most of the required assessments 'in house' but it is unclear whether the PCF procedures would actually reduce the overall transaction costs, especially based on the World Bank rates estimated at US$10,000 per week. Pre-implementation costs for each project are estimated at between US$100,000-$200,000 (PCF 2000).

The PCF is also purchasing emission reductions directly from projects and through established intermediaries, such as local or regional energy investment funds, energy-service companies and commercial banks. It is attempting to aggregate smaller projects and build capacity for smaller economies to supply competitively-priced emission reductions.

5.2.3 Negotiation

In negotiating projects between Annex 1 and Annex 2 country partners, sound infrastructure in terms of transport, telecommunications, energy and institutions in Annex 2 countries will help to minimise transaction costs. It has often been noted that Africa's weak infrastructure significantly increases the transaction costs of project-negotiation and development and is partly the reason for the limited number of projects established on the continent (Humphreys *et al*. 1998). In the negotiation of individual contracts with landholders, local NGOs could help to minimise transaction costs for project managers not known locally. \

5.2.4 Validation

Advance approval of project designs by host, investor country governments and by international organisations can involve large delays, thereby increasing approval transaction costs. (http://www.northsea.nl/jiq/3-1996.doc). The establishment of a national institution to identify and administer the AIJ/CDM projects and ensure projects follow the guidelines and meet the required standards has been proposed and carried out in a number of host countries. One of the more successful institutions has been the Costa Rica AIJ office. It has been able to attract and support a large number of project-development activities as well as be an effective contact point for potential investors (http://www.ieagreen.org.uk/aij9.htm).

5.2.5 Implementation of contracts

Although local capacity building may increase transaction costs for project developers in the establishment phase, it is likely to significantly reduce enforcement and monitoring costs in the implementation phase thereby reducing the risk of forfeiting carbon payments because of project failure. Public participation and transparency in the project cycle have been recommended by ELI (1997) to increases the likelihood that all the objectives of the CDM (sustainable development, biodiversity, and carbon sequestration) are met.

Working with existing development projects and/or development workers is likely to lower production and transaction costs as well as the risk of leakage. The Scolel Té project, for example, was implemented by researchers and farmers who had a long history of partnership in jointly implementing development projects (Smith and Scherr 2002). To date, there are few examples of small-scale forest carbon projects managed by communities. In Mexico, the Scolel Té carbon sequestration project is now being organized by a community group. In India, Community Forestry

International is attempting to design a CDM project with the community so that the majority of the credits go to the community.

The use of NGOs who are already involved in community projects may also be a worthwhile partnership in order to meet carbon sequestration and sustainability benefits. Drawing on experience of NGOs in outgrower schemes in South Africa, it seems the NGOs can be more committed to community needs, beyond financial benefits. NGO staff are more likely to live in close proximity to the communities and therefore receive feedback from communities more regularly (Mack pers. com.).

5.2.6 Monitoring

For small-scale projects, community monitoring systems together with institutions to centralize monitoring information and/or place it on the internet, has been proposed as an option to provide timely information on project development, retain credibility of the system, and develop community and institutional expertise.

The *Plan Vivo* system, adopted by Scolel Té, is considered a cost effective system for managing the supply of carbon services from small-scale farmers and rural communities and promoting sustainable rural livelihoods. The technical and administrative framework for monitoring and registering carbon offsets is built around the principles of flexibility, simplicity, verifiability and transparency. To reduce the risk of carbon offsets losses, processes have been incorporated to ensure accurate recordings of carbon offsets and increase the likelihood of activities being maintained in the long term. According to an SGS report (2001)[17], 'the *Plan Vivo* System has great potential for use in developing CDM compliant projects'. The system has been implemented by the BCF in the Scolel Té project in Mexico and by the Women for Sustainable Development in India.

The internal verifier (or host organisation) in this system performs functions additional to monitoring of carbon offsets. The host also acts as an intermediary between the producer and the investor/purchaser of carbon. Their responsibilities include registering the carbon-offset activities, providing technical support to producers and administering the sale of the carbon offsets.

To prepare for independent verification of projects, host organisations are required to provide evidence to support their carbon offset calculations of registered producers. Technical specifications of carbon-offset activities should describe management requirements necessary to achieve a stated carbon offset. The activities must also be shown to be socially and economically viable in the long term to ensure a flow of carbon and livelihood benefits. In addition, documentation is required for monitoring and evaluation of carbon offset activities.
(http://www.eccm.uk.com/climafor/verification.html).

5.2.7 Enforcement

Ensuring trees remain on the land for the duration of projects is one of the greatest challenges facing managers of forest-carbon projects. The uncertainty this holds for

[17] The report is available at (http://www.eccm.uk.com/climafor/verification.html).

an investor is probably one of the major reasons for low investment in forest carbon projects. Existing projects have dealt with this problem in a number of ways. Scolel Té and the Klinki forestry program are working closely with project participants to instill a forestry culture and long term commitment whilst PROFAFOR has enforced legally-binding contracts with heavy fines for land conversion and early cutting. From these case studies it is evident that project enforcement costs maybe high in the future unless communities and smallholders understand the long-term benefits of remaining in the project and are provided with adequate incentives. Project developers could reduce enforcement costs in a number of ways:

1. invest in community participation and capacity building at the beginning of the project,
2. involve community groups in decisions on project design,
3. share the payments for carbon services, and
4. use funds derived from the project to finance activities that enable local people to increase their well being as well as support the sequestration of carbon.

5.2.8 Insurance

All partners in forest-carbon projects face the risk of re-emissions during the lifetime of the project due to natural hazards. Investors face the additional threat of producers converting their land to other uses.

Financial insurance policies, purchases on spot markets, and diversification of projects are possible insurance options http://www.northsea.nl/jiq/3-1996.doc. A more centralized insurance institution may reduce the risk and costs to individual projects, although overall, it would entail higher administrative costs. Individual projects would not need to set aside funds to cover their full risk, assuming a third-party insurer retains adequate reserves and provides a sound evaluation of risks (Wexler *et al.* 1994).

Despite the significant risks facing these projects, most existing AIJ projects have not insured all partners against project failure. In the case of PROFAFOR, contractual conditions partly protect the investor against land-use change and allow for contracts to be terminated in the case of natural disasters. However, for the producers, no compensation or insurance is provided. In the event of fire, the producer must submit a report to the project manager, to demonstrate that the fire was not their fault. The transaction costs for the producer is therefore potentially high. No insurance policy exists for the Klinki Forestry program or Scolel Té at this stage, partly due to the absence of a carbon market.

Under the UNFCCC, Annex 1 countries have specific commitments and are therefore "liable" to the COP if they fail to meet them. In the case of AIJ, the liability for achieving GHG abatement is placed on the investors. A number of options for the investor were outlined by JIQ (1996):

- Purchase of a private or public insurance policy against a fine or for the cost of procuring alternative GHG abatement services
- Include a risk-sharing clause in the contract terms.
- Arrange to procure in advance extra GHG abatement credits.
- Purchase credits on a spot market created by short-term abatement activities offered by hosts.

Diversify risk by investing in several abatement projects or partial shares of several projects along with funds pooled from other investors in a kind of AIJ mutual fund (JIQ 1996).

5.2.9 Verification and certification

To ensure credibility and confidence in the system, it has become widely accepted that verifiers and certifiers of projects should be third parties. Although the criteria for 'CDM compliant' project has not been finalized and the CDM is not yet operational, a number of verification agencies have begun to verify against likely eligibility requirements. Suggestions for OEs who could fill this role have also included national governments, universities, NGOs, consultants or multilateral institutions familiar with conditions in the host countries (Wexler *et al.* 1994).

At COP 6, methodologies for multi-project verification and certification were presented. Nordic delegates called for smaller projects to be streamlined to achieve greater efficiency and lower transaction costs through simultaneously verifying projects using similar technology or in similar locations (ENB 2000).

Since the CDM is not yet operational, there has been limited external project verification and certification. PROFAFOR has hired SGS to certify its carbon offsets and SIF plans to obtain project verification with SGS. Klinki and Scolel Té have only internally verified their offsets. In the case of Klinki, external verification and certification are unlikely to occur because the emitters are donors rather than investors and, therefore do not require verification and certification of the future carbon stores.

5.2.10 Sales of carbon credits

Early carbon sequestration projects were primarily bilateral agreements between Annex 1 financers and project developers and/or implementing agencies. In anticipation of the establishment of a carbon market, more players have entered the market, including financial intermediaries and brokers; shifting the sale of carbon credits from bilateral to multilateral arrangements. Investor pools and project portfolios have become more common in an attempt to reduce the risks and transaction costs for Annex 1 investors. Unilateral projects are also being developed, particularly in Latin America.

5.2.10.1 Project Bundling

Given the relatively high transaction costs associated with small-scale projects, there is wide support for the creation of institutions and financial intermediaries to bundle projects in a portfolio, such that investors would not be tied to a particular project (Ghosh, 1999; Michaelowa and Dutschke, 2000; and http://www.ecouncil.ac.cr/devalt/nl1099e.htm). An intermediary has several advantages over the current bilateral arrangements. Firstly, they are likely to increase the attractiveness of investing in small-scale carbon projects to a wider set of investors who are either risk averse or financially constrained by the high pre-implementation transaction costs and disproportionately large implementation costs of smaller projects (Wexler *et al.* 1994). Secondly, they are likely to provide potential project hosts with access to a broader capital base and thus access to more diverse projects than available under a bilateral system (Wexler *et al.* 1994). A number of institutions could act as the financial intermediary, including multilateral development banks, governments, NGOs, commodity exchanges, private sector entities and local community organisations.

The International Utility Efficiency Partnerships (IUEP) assists project developers with the quantification, creation, certification and the sale of CO_2 emission credits in international markets. IUEP has created a large emission reduction portfolio of more than 40 million metric tons of CO_2 emission-credit equivalents in projects in operation and more than 23 million metric tons of CO_2 emission-credit equivalents in projects under development. Two of the projects in their portfolio are carbon sequestration projects; Pozo del Tume Carbon Sequestration Project in Argentina and The Carlos Casado S.A. Carbon Sequestration Project in Paraguay (http://www.ji.org/project_01.htm).

Trexler and Associates are developing standardized portfolios of both energy and forestry carbon projects. They offer companies the opportunity to fund pre-screened mitigation activities (http://www.climateservices.com/index.htm?proj_preapproved.htm).

5.2.10.2 National or international credit banks

National or international credit banks could also be used in buying and selling credits. The Costa Rican JI Credit Fund is an example of a national credit bank. Centralising this function, however, again highlights the trade-off between reducing transaction costs and potentially reducing competitiveness in the carbon market. This could have a downward effect on the compensation offered to hosts for AIJ credits, and weaken the incentive to select projects for cost-effectiveness (through lack of competition for investment deposits) http://www.northsea.nl/jiq/3-1996.doc.

5.2.10.3 Unilateral arrangements

Costa Rica has set up its own environmental services program which now includes carbon offset projects (Norway-Costa Rica project). This unilateral arrangement is unlikely to meet the requirements of the CDM in terms of verification and certification. It is likely that operational entities, external to the government, will need to be set up..

Institutional arrangements of carbon projects in the carbon market are likely to consist of all three arrangements; multi-, bi- and unilateral. Projects are being developed by different types of stakeholders for different reasons, and this will in turn determine the choice of operational entities and partnerships.

6 Summary

This report provides some preliminary estimates of transaction costs, especially to project developers and investors and outlines the steps involved in establishing and implementing a number of forest-carbon projects. In order to provide more comprehensive policy recommendations on how to minimise transaction costs, more analysis is required on the distribution of transaction costs between the stakeholders. Currently, this type of study is constrained by the lack of an international carbon market, the early stages at which most projects are, and the limited number of forest-carbon projects in operation. As the carbon market develops, more operational entities are likely to enter, resulting in reduced transaction costs for individual projects. In terms of the size of transaction costs in the carbon market, this will depend on the institutional capacity and policy environment of both Annex 1 and host countries, and the establishment of new institutions to provide services currently implemented by individual projects and their partners.

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8 Appendix 1: Studies on the estimation of project transaction costs

Author	Project type	No. case studies	Location	Units	Est. TCs (US$ '000)
1. Sutter (2001)	Small scale energy	16	India	Absolute	225
2. Stronzik (2001)	AIJ energy	26	Central and Eastern Europe	Absolute and TC/t C	50-204
2. Stronzik (2001)	PCF JI and CDM	13	Global	Absolute, TC/tC	340 - 670
3. PCF (2000)	PCF JI and CDM small scale renewable energy	11	Global	Absolute and % of total project financing	200-400[18]
4. Carrington/PwC (2000)	small, medium and large generic energy project types	5	Simulated	Absolute and % of total capital	392-1057
5. Soffe/EcoSecurities (2000)	Small scale and large scale JI electricity generation	2	Simulated	Absolute and % of NPV of revenue of project	60-105
6. Lile, Powell and Toman (1998)	USIJI Energy end use and energy production	10	Central Europe Russia, Asia, Latin America	Absolute	30-600
7. Dudek and Wiener/OECD (1996)	JI projects-energy, reduced impact logging, conservation and forest	7	Global	Absolute	300-1100
8. Nordic Council of Ministers, NEFCO and COWI (1996)	Bilateral energy projects	5	Eastern Europe	Proportion of the total initial investment.	12-19 %
9. NEFCO (1997)	Industry projects	5	Eastern Europe	Proportion of the total initial investment.	15-30%

[18] Equivalent to total procedural cost: PCF Front end procedures (Baseline, Monitoring & Verification, Validation, legal fee, etc.): $100-200K + Procedures after project commissioning (lifetime (25 years) supervision, verification and certification): $100-200K. Does not include CDM fees or additional CDM registration and review requirements.

9 Appendix 2: Pre-implementation steps for PCF projects

PCF Description of Steps	Duration
1. Receipt of Project Idea Note (PIN) The PIN Template available on the PCF website, is completed by the project proponent and submitted to the PCF Fund Management Unit (FMU) via the website.	
2. Pre-Screening of PIN (a) Project idea is screened for basic eligibility criteria by the PCF Knowledge Manager, categorized and logged into the electronic project proposal database with an initial response to proponent. (b) Project idea is either dropped or if it meets the basic eligibility criteria, assigned to a PCF technical specialist for follow-up. The PCF technical specialists asks the project proponent for further information, if necessary.	Steps 2 & 3 occur simultaneously. Their completion can take up to 4 weeks.
3. Review of PIN by FMU FMU reviews and clears the PIN for further development and finalization.	
4. Early Notification of project proposal to Host Country Government To gain assurance from the host country government of its intention to eventually sign the "Letter of Endorsement," the Fund Manager or the responsible IFC staff asks project sponsor to inform the host country's focal point for UNFCCC, and other IFC/WB counterparts of the host country government. The relevant IFC Regional Dept is notified to gain comment on project's consistency with the CAS for that country. At the discretion of the Fund Manager, a "Letter of No-Objection" may be requested prior to further development of the project under CDM. A sample Letter of Endorsement is provided as part of the communication.	Steps 4 & 5 occur simultaneously. The entire process can take up to 6 weeks.
5. Review of PIN by GEF Secretariat (a) FMU requests GEF Coordination Unit at the World Bank to submit the *PIN* to the GEF Secretariat for clearance. (b) The GEF Secretariat has 10 days to issue its "no objection", or to indicate GEF interest in the project proposal. (c) If "no objection", the FMU asks the project proponent to prepare a Project Concept Note (PCN). (d) If GEF expresses interest, project is dropped from the PCF pipeline.	
6. Host Country Endorsement FMU asks Country Management Unit (CMU) to secure Letter of Endorsement (LOE) of the project from the host country. The received LOE is forwarded to the Legal Department. Host country endorsement of the project is sought in parallel with the preparation of the PCN. The endorsement could also come after the "no objection" by the GEF Secretariat.	4 weeks

Table continued

PCF Description of Steps	Duration
7. PCF Project Organizational Workshop FMU meets with the relevant IFC regional operations staff to confirm the project task team, including the Task Manager and the FMU staff member on the task team. The FMU also briefs the project team on the specific requirements of the PCF, including safeguard policies. Work program for defining the baseline concept is also discussed.	2-3 days
8. Preparation of Project Concept Note (PCN) **(a)** FMU authorizes funds for the preparation of the PCN, which would include preparation of the formal baseline study, expected emission reductions, application of safeguard policies, and an initial review of project risks. PCN is a PCF document that evolves into the PCF Project Document (PD) as project preparations advance. **(b)** Process of environmental and social assessment and review begins.	8-12 weeks
9. Independent Risk Assessment A risk assessment of the project is commissioned by the FMU and carried out by an independent entity, based on the PCN. At this time, special risks to PCF if any, may be addressed in this supplementary risk assessment.	4 weeks
10. Review of PCN by Fund Management Committee Two weeks before FMC Meeting, FMU submits PCN to the Fund Management Committee (FMC) for review to determine if project meets selection and portfolio criteria. FMC reviews on a "no objection" basis. Upon FMC clearance, the PCN is submitted to the Participants Committee (PC) for review, along with the LOE. The PCN is also posted on the Participants Discussion Area of the website.	2 weeks
11. Review of PCN by Participants Committee Participants Committee (PC) reviews PCN and approves project unless objections in writing by at least two members of the PC are conveyed to the PC Chairman within 30 calendar days of distribution of PCN. PC Chairman sends written notice to Fund Manager on the outcome of the PC review.	4 weeks
12. Preparation of PCF Project Document (PD): Baseline Determination & MVP If necessary, additional project preparation funds are made available for the preparation of the PCF PD, which is annexed to the IFC Investment Document. Preparation of the PCF PD involves the following: (a) Feasibility study is carried out for the PCF component; (b) the Monitoring and Verification Protocol (MVP) is developed. Process of environmental and social assessment and review continues. The Baseline Study and the MVP are submitted as attachments to the PCF PD.	16 weeks

Table continued

PCF Description of Steps	Duration
13. Validation Process Once the draft PCF PD (Annex to the IFC Investment Document) is cleared, the FMU: (a) carries out re-assessment of the project risk (which may be necessary for further work); (b) coordinates procurement of independent validator; and (c) makes a formal decision to submit the project documents (including baseline study and MVP) for independent validation.	3-4 weeks
14. Drafting of Informal Term Sheet for Purchase Agreement The FMU prepares an term sheet for informal review. This step represents the latest time to initiate the term sheet. Specific project circumstances may require this step to be initiated earlier. After the term sheet is drafted, LEGEN PCF initiates workplan for drafting legal documents.	3 weeks
15. Pre-Negotiations Workshop/Consultation A consultation (which normally takes the form of a workshop) is held before to prepare for negotiation of the Emissions Reduction Purchase Agreement, and to informally review specific terms for Agreement.	3 days
16. Post-Validation Review of PCF PD by FMU The FMU reviews the PCF PD, in light of the Validation Report. At this stage, the draft legal documents are also in place, if possible.	3 weeks
17. Appraisal Mission During the appraisal mission, all PCF project documents, including the baseline study, MVP, Emissions Reduction Purchase Agreement, and the financing agreement are discussed with the host country.	2-3 weeks
18. FMC Review of Term Sheet and completion of Due Diligence on PD Fund Management Committee reviews draft Term Sheet before project/ERPA negotiation.	1 week
19. Negotiation of Final PCF Contract The PCF Financial Specialist conducts negotiations with the project sponsor on the PCF ERPA and HCA. All legal documents are finalized at this stage.	4 weeks
20. Post-Negotiation Workshop (Optional) Subject to the agreement by the project sponsor, a post-negotiations workshop is held to share the experience and lessons learned in the PCF component .	3 days