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**The Wirth Chair in Environmental and Community Development Policy**



**UNIVERSITY OF COLORADO AT DENVER & HEALTH SCIENCES CENTER**

**The Graduate School of Public Affairs**

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## **Matching Carbon Emission Reduction Projects To Financing: Building Prototypes**

January 2000

A Brazil/U.S Aspen Global Forum Report

**The Wirth Chair in Environmental and Community Development Policy  
The Graduate School of Public Affairs  
University of Colorado at Denver & Health Sciences Center  
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# **MATCHING CARBON EMISSION REDUCTION PROJECTS TO FINANCING: BUILDING PROTOTYPES**

A Report Based on the Proceedings of the  
BRAZIL/U.S. ASPEN GLOBAL FORUM  
Aspen, Colorado • January 20-23, 2000

**Institute for Policy Research and Implementation  
Wirth Chair for Environmental & Community Development Policy**



**University of Colorado at Denver**

**American Chamber of Commerce — São Paulo, Brazil**

**Matching Carbon Emission  
Reduction Project to Financing:  
Building Prototypes**

A Report Based on the Proceedings of  
The Brazil/U.S. Aspen Global Forum  
January 20-23, 2000  
Aspen, Colorado

Convened by:

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in conjunction with the

Wirth Chair in Environmental and Community Development Policy,  
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and

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March 3, 2000

Dear Colleague:

I am pleased to provide you with this report titled "Matching Carbon Emission Reduction Projects to Financing: Building Prototypes." It results from the discussions at the Brazil/U.S. Aspen Global Forum. The Forum was convened by the American Chamber of Commerce—São Paulo; the Institute for Policy Implementation, University of Colorado; and the Wirth Chair, University of Colorado. The Forum occurred January 20-23, 2000.

The Brazil/U.S. Aspen Global Forum is a unique institution. It provides an opportunity for public, non-profit, academic and private sector leaders from both the U.S. and Brazil to talk frankly to one another about key public policy issues. More than talk, however, the Forum allows leaders from each nation to work together to develop policies, programs and initiatives to improve Brazil's economy, its environment and the quality of life for its citizens.

The January sessions of the Forum focused on evaluating the financial feasibility of several early start carbon emission reduction projects. The dialogue encompassed issues related to financial as well as environmental additionality. It directed attention to diverse problems and opportunities associated with funding anticipated early start projects.

Most of the projects discussed at the Brazil/U.S. Aspen Global Forum were subjected to a pre-feasibility analysis by the Lawrence Berkeley National Laboratory (LBNL) and the University of São Paulo (USP). Their efforts were supported by USAID and the EPA. Other early start carbon emission reduction projects were presented directly by their sponsors and/or investors at the Forum.

I was privileged to facilitate the Forum's discussions. I want to thank my co-convenor John Mein, President of the American Chamber of Commerce in São Paulo, for his leadership in helping make the Forums possible. Dr. Toddi Steelman of the Graduate School of Public Affairs at the University of Colorado deserves special commendation for her work in recording the Forum and in developing the initial report draft. A special thanks to Tom McCoy of the Wirth Chair and Steve Meyers of LBNL for providing me their editorial comments on the final drafts. Finally, I want to express appreciation to Heidi VanGenderen, associate of the Wirth Chair, Catherine Rafferty, my assistant, and Karla Brandão, John Mein's assistant, for making the logistics of the Forum work smoothly.

I welcome your comments on the report. As its final author, I am responsible for errors of omission and inadvertent commission. I believe the report reflects the proceedings of a very important meeting, one that will help both the U.S. and Brazil move forward in defining workable carbon emission reduction strategies.

Sincerely,

Marshall Kaplan  
Executive Director



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# Matching Carbon Emission Reduction Projects to Financing: Building Prototypes

*A Report of the Brazil/U.S. Aspen Global Forum,  
Aspen, Colorado, January 20-23, 2000*

## Introduction

The Brazil/U.S. Aspen Global Forum<sup>1</sup> convened its fifth Forum on climate change policies and programs January 20-23, 2000. Over sixty participants from Brazil and the United States met in Aspen, Colorado to discuss the issues involved in matching early start carbon emissions reduction projects to potential funding sources. Representatives from the public, private, non-profit, and academic sectors reviewed several potential "priority" early start carbon emission projects defined by the Lawrence Berkeley National Laboratory (LBNL) and the University of São Paulo (USP) for the Forum. Participants heard presentations from several additional project sponsors and possible investors. Apart from the definition of funding alternatives, discussions granted attention to remaining Clean Development Mechanism (CDM) policy and program issues that could impede financing of early start carbon emission projects.<sup>2</sup>

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<sup>1</sup> The Brazil/U.S. Aspen Global Forum has facilitated important policy discussions between key Brazil and U.S. public and private sector leaders since 1996. Issues tackled by the Forum include: energy, telecommunications and primary and secondary mortgage markets. The Forums are convened by both the American Chamber of Commerce in São Paulo and the Institute for Policy at the University of Colorado at Denver. The Wirth Chair at the University has partnered with the Chamber and the Institute on the Forums related to climate change and the Kyoto Protocol.

<sup>2</sup> The January 2000 Brazil/U.S. Aspen Global Forum resulted from the success of the May 1999 Forum meeting in São Roque, Brazil. Participants at this Forum discussed fifteen potential CDM projects in Brazil presented to the Forum by the LBNL and the USP. They reviewed options concerning the determination of baselines, the measurement of additionality, the allocation of credits, the development of financing principles and the structuring and organization of the Executive Board, the Conference of Parties (COP) and Operating Entities.

This report is divided into several sections. They track the discussion that occurred during the Forum. They are: Section I: Brazil's Economic Status; Section II: The Status of the CDM; Section III: The Financial Assessment of Potential CDM Projects in Brazil; Section IV: Additional Projects for Consideration; Section V: Funding for Projects; Section VI: Deforestation, Aforestation, Reforestation; Section VII: Next Steps.

### **Section I: Brazil's Economic Status—Sustaining Stability and Growth**

Brazil's economy has stabilized and overall projections for the Year 2000 are good. Reforms to the foreign exchange sector have increased direct foreign investment; despite considerable volatility in the foreign exchange markets. The increase in foreign investment combined with lower repayment obligations on foreign debt have led to improvements in Brazil's balance of payments position.

"Brazil has been able to keep its inflation rate and unemployment under control. While inflation rates crept up during 1999, they have begun to decline and should remain in the target band set by the Ministry of Finance. Unemployment decreased slightly between 1998 and 1999. It was 8.4 percent in 1998 and 8.2 percent in 1999. It is expected to decline further in the Year 2000.

The government predicts a three to four percent growth rate this year, somewhat higher than the predictions of most analysts. The current account deficit is expected to fall in 2000 with an accompanying rise in exported products. The government has tightened its belt and is now running a primary surplus. Public debt as a percentage of domestic product is expected to fall. Deficits are still occurring in the social security area. Brazil's short-term challenges center on sustaining the current reforms. Our future policies must continue to emphasize lower inflation rates, lower interest rates, reduced account and trade deficits and movement toward a balanced budget. (Mein)"

### **Section II: The Status of CDM—COP 5**

The Forum's review of Brazil's economic condition lent optimism to the participants concerning general investment opportunities. "While Brazil's economy is still fragile, it appears that the country has surmounted the worst of their recent problems and has turned the corner. If Brazil's economy continues to grow, if inflation is reigned in, if the budget reflects sound fiscal policy and if economic policies are stable and predictable, the country, over time, should be able to attract increased foreign investment. These are big ifs, but Brazil appears on the right track. (Mein)"

The optimism generated by the economy was not matched by the participants' view of the proceedings of COP 5 in Bonn. Most participants felt that while



COP 5 discussions were useful, very little progress was made on resolving or securing agreement on key CDM issues concerning baseline and additionality. Similarly, very little progress was made in determining the basic structure and operation of the CDM. Clearly, the COP 5 participants "did not reach consensus concerning the institutional character of the CDM and/or the technical aspects of certification and verification. We were able to start negotiation of the final agreements. We hope to be finished in time for the COP 6 meeting in the fall of 2000. (Miguez)"

There were still critical gaps between the position of the U.S. and developing countries positions concerning: the basic organization of the CDM; the role of national governments in identifying and determining CDM projects; the ability of private sector firms to deal with their counterparts directly in host nations. "While we understood that we were behind schedule and while we acknowledged that the longer we failed to resolve key questions, the tougher it would be to meet targets agreed upon in Kyoto, no one wanted to highlight divisions. (White)"

Clearly, the fact that the U.S. had not ratified the Protocol and likely would not until after its national elections in the fall reduced the ability of COP 5 to secure consensus on key policies. COP 5, however, did serve a useful function. It permitted participants to continue discussions on methodological problems associated with defining baselines and additionality. It reaffirmed Kyoto principles concerning the priority importance of environmental additionality. It set in motion an initiative to analyze and hopefully reach agreement on baseline, benchmarking and additionality criteria and measurements. Perhaps, as important, it agreed that at least provisional institutional arrangements governing the CDM would be defined by COP 6. "We need to use the time before COP 6 to develop technology and models to move the CDM forward. We need to define institutions and procedures that will achieve fair third party auditing, benchmarking and verification. Lean, efficient and transparent institutional arrangements must be put in place. They will help assure lower transaction costs. The private sector must be included in deliberations before COP 6, if we want groundrules that result in required investment flows. (White)"

Many participants in Aspen commended Brazil for its leadership role concerning development of a permanent CDM. The Brazilian government has set up an inter-ministerial council to work on the implementation of the CDM. It has designated the Brazilian Minister of Science and Technology as the Secretariat to the group. Brazil has advocated moving faster with respect to creation of CDM institutions. It wants "COP 6 to develop an institutional framework and lend legitimacy to groups like the inter-ministerial council. The establishment and approval of these national institutions would guarantee the quality and environmental benefits of CDM projects. At a minimum, we need to create an institutional framework at COP 6 and provisional institutions. (Miguez)"

Lack of positive action at COP 5 concerning early start projects raised questions in Aspen concerning the applicability of carbon credits for early start projects. Early start projects will be risky. They will be perceived as even more risky if the door is absolutely closed with respect to possible receipt of credits for reductions. There is a significant public policy benefit that could be achieved if a number of carbon emission reduction projects could get underway even before COP 6. "We should develop prototypes...we should learn by doing...we should use projects to help resolve baseline and additionality issues. (Schwengels)"

Brazil "will not provide credits or assurance of credit eligibility upon verification until COP 6 agrees on at least the rules for the CDM as well as the establishment of the Executive Board and Operating Entities. We need to have in place at least provisional CDM institutions before we review early start projects. We need to make sure that projects meet the purposes of the Kyoto Protocol. We are reluctant to sanction projects or even encourage them prior to agreements on the basics by COP 6. We believe it would not be easy to initiate retroactive reviews of early start projects after the CDM is ratified by the necessary number of nations. (Miguez)"

Several participants from both Brazil and the U.S. hoped that Brazil would play a proactive role with respect to early start projects. "Brazil is adopting the wrong strategy. Brazil and other developing nations (G77) hold the keys to ratification of the Kyoto Protocol. Brazil should encourage as many good projects as possible to show that Kyoto can work and that developing countries will be active participants in terms of lowering green house gas emissions. (Catania)" Brazil should indicate whether projects appeared to be on the right track. "We will need some recognition—perhaps in the form of a letter—by the government that proposed early start projects appear to be consistent with the Kyoto Protocol, likely CDM stipulations and present Brazilian policies, if we are to access funding opportunities. (Moreira)" Brazil "could use the experience of working with early start carbon emission projects—even informally—to help define CDM mechanisms and approaches. (Hecht)" "The government could provide technical assistance. It would be helpful if it maintained a registry of potential projects and interested investors. It should provide relevant information about other CDM projects in Brazil and elsewhere. It should involve the NGO community. (Cesario)"

While Brazil will not offer credit guarantees, it "will not exclude the possibilities of credit for early start projects. Brazil will entertain an open door. It probably will agree to provide informal comments on early start projects. It is uncertain just how far beyond informal comments Brazil will agree to go at the present time with respect to early start projects. (Miguez)" Several Forum participants asked the Forum's conveners to urge the government to consider alternate ways to help early start projects.



### Section III: Financial Assessment of Potential CDM Projects in Brazil<sup>3</sup>

Participants in the Brazil/U.S. Aspen Global Forum in São Roque in May 1999 reviewed fifteen potential early start projects in Brazil. These projects were identified for the Forum by the LBNL and the USP under a contract with USAID/EPA. The discussion focused on preliminary assessments of project viability and social/economic as well as carbon reduction benefits. Issues related to financing and additionality were highlighted and options concerning development of baselines and benchmarking put on the table.

The Brazil/U.S. Aspen Global Forum agreed to meet in January to discuss a relatively small number of projects. The projects would be selected from the fifteen potential early start projects reviewed at the Forum in May 1999 based on further financial and environmental assessments by LBNL and USP. Hopefully, the selected projects would suggest possible relevance as early start projects. They at least would warrant extended study and review by the Forum. "The January session would test the use of alternate methodologies to judge financial feasibility. (Meyer)" It would use project analysis and discussion to further progress toward implementation of specific projects in Brazil. At the same time, it would provide analytical and project prototypes for early start projects in other nations.

Four projects from the energy sector and four projects from the forestry sector were examined by the Forum in January. The Forum's review was premised on the following assumptions concerning policies and methodology.

#### Value of Carbon Credit

Two scenarios were used to estimate carbon credit value in addition to a base case without carbon credits.

- **Kyoto in 2005:** This scenario assumes that the Kyoto Protocol takes effect in 2005, resulting in a significant increase in carbon credits. Large amounts of carbon credits are available from Russia and the Ukraine, dampening the market price of carbon credits from CDM and Joint Implementation (JI). The values are assumed to be \$5/tC in 2001.<sup>4</sup> They would increase

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<sup>3</sup> Information in this section of the report draws extensively from "Financial Assessment of Potential CDM Projects in Brazil" by S. Meyers, J. Sthaye, B. Lehmann and J.R. Moreira. Paper prepared for Brazil/U.S. Aspen Global Forum, Aspen, Colorado, January 21-23, 2000.

<sup>4</sup> "\$" denotes U.S. dollars except where Real is noted directly in the text.

to \$20/tC in 2005. They would rise 10 percent per year until 2020 when they would be \$75/tC.<sup>5</sup>

- **Footprint Detected:** This scenario assumes consensus concerning the negative impact of climate change develops relatively quickly. Strong international agreements evolve to limit green house gas emissions. These agreements lead to higher values for carbon credits. Under this scenario, the assumed value of carbon credits in 2001 is \$5/tC. The value would rise gradually to \$50/tC in 2005. It would increase thereafter at 10 percent a year and reach \$305/tC in 2020.

### Energy

- The reduction in carbon (C) emissions reflects expected avoided electricity generation. The reduction is estimated by technical calculations related to project performance.
- A projection of the configuration of the future electricity system is necessary to estimate the carbon impacts of a project aimed at reducing grid electricity generation. A load curve method was used to approximate total power output for future years. Different generating resources were ranked. Avoided electricity generation was projected to be roughly 50 percent from natural gas combined cycle power plants and 50 percent from hydropower.
- Revenue from energy supply projects results from the sale of electricity to utilities or industry. The projects receive a somewhat higher price than utilities currently pay to independent power producers using natural gas. For the energy efficiency project, the revenue to the sponsor comes from the estimated savings in electricity charges to the client.

### Forestry

- Carbon sequestration is estimated for biomass and products related to biomass as well as the displacement of carbon fuels.<sup>6</sup>

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<sup>5</sup> The financial analysis of each project uses data based on projected capital and operating costs and revenues over the expected lifetime of each project. Costs and revenues are expressed in U.S. dollars. The conversion rate was R\$1.9 (Brazilian Real) to the U.S. dollar. The projects are anticipated to commence operation in January 2001.

<sup>6</sup> There are five potential sources of carbon credits for forestry projects. Projects may store carbon in biomass above and below ground; soils, decomposing matter; products; displacement. Data was available only for biomass and products as well as displacement of carbon fuels.

- Two different approaches are used to account for changes in carbon stocks. The first approach assumes perpetual rotations. The project is maintained in perpetuity. The sequestered biomass carbon is never released into the atmosphere. The second approach—limited period carbon sink—assumes that the rotations have a finite life. Carbon is released in the atmosphere at the end of the project. Carbon in the projects is released sometime between the 18th to the 25th year.
- Revenue from forestry projects comes from the sale of specific products.<sup>7</sup>

### Equity and Taxes

- Projects, for purposes of analysis, are fully financed with sponsor equity.
- Taxes are estimated to be approximately 20 percent of net profit with respect to each project. Revenue from carbon credits is not subject to taxation.

### Project Description and Financial Analysis

#### Energy<sup>8</sup>

- **Small Hydro in State of Goiás:** This project will offer 10 MW of installed power from a small hydroelectric plant to the existing utility-owned grid. The plant, assuming a utilization factor of 70 percent, will generate 61,300 MWH/year. The expected investment is \$12 million.

Direct revenues without carbon credits are \$13.08 million. Carbon credit revenues are \$.51 million under the Kyoto in 2005 scenario and \$1.37 million under the Footprint Detected scenario. The internal rate of return (IRR) is 12.2 percent without carbon credits; 13.0 percent with carbon credits premised on Kyoto in 2005 Scenario and 14.3 percent based on the Footprint Detected Scenario.

- **Wind Farms in Northeast Brazil:** The project consists of two wind farms of 30 MW and 10 MW to be built near industrial centers in Macao and Araripina in the Northeast

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<sup>7</sup> Sales prices were estimated by the project sponsors.

<sup>8</sup> Net present value calculations based on 15 percent discount rate. The analysis, however, is focused primarily on IRR. Discount rate for energy is not particularly relevant.

Brazilian states of Rio Grande do Norte and Pernambuco. Electricity from the wind farms would be sold to the state electric utility. The total investment for the project is estimated at \$50 million.

Direct revenues without carbon credits are \$36.24 million. Carbon credit revenues are \$1.18 million under the Kyoto in 2005 scenario and \$3.13 million under the Footprint Detected Scenario. The internal rate of return is 6.7 percent without carbon credits; 7.5 percent with carbon credits based on Kyoto in 2005 scenario; 8.5 percent based on the Footprint Detected scenario.

- **Electricity Cogeneration from Sugarcane Bagasse:** The project will utilize bagasse from sugarcane harvesting to generate surplus electricity. If fully utilized, the annual surplus generation will be 180,000 MWH. It will be sold to either the local utility or other users. The total investment for the project will be \$50 million.

Direct revenues without carbon credits are \$36.19 million. Carbon credits revenues are \$1.25 million based on Kyoto in 2005 scenario and \$3.36 million based on Footprint Detected scenario. The internal rate of return is 32.1 percent without carbon credits; 33.0 percent with carbon credits based on Kyoto in 2005; 34.5 percent with carbon credits based on Footprint Detected scenario.

- **Lighting Efficiency Improvement:** The project plans to reduce electricity use for lighting in a number of supermarkets. The investment required is around \$250,000. The sponsor will collect revenue from their clients based on the clients' electricity saving. They will initiate a "shared savings" agreement.

Direct revenues without carbon credits are \$.27 million. Carbon credit revenues are \$.01 million based on Kyoto in 2005 and \$.02 million based on Footprint Detected scenario. The internal rate of return is 19.5 percent without carbon credits; 20.3 percent with carbon credits based on the Kyoto in 2005 scenario; and 21.5 percent based on Footprint Detected scenario.



Forestry<sup>9</sup>

- **Charcoal from Forest Plantation:** The present high investment associated with establishing a forest plantation in Brazil, particularly when compared to the relatively low cost of coal, has increased pressure on the native forests. It also induced charcoal based industries to adapt their blast furnaces to coal. This project intends to produce charcoal for use in the pig iron industry from a eucalyptus plantation of 9600 hectares (ha). Assumedly, revenue from carbon credits will make it possible to sell charcoal at a competitive price. The total cost is \$77 million over the life of the project. It includes investment for the plantation as well as wood to charcoal facilities. It also includes operating costs for wood harvesting and processing as well as delivery of charcoal.

This project using perpetual rotation calculations reflects a net present value deficit of \$997 million without carbon credits and a similar amount using limited period C sink calculations without carbon credits. The net present value deficit is reduced based on a Kyoto in 2005 scenario. The perpetual rotation calculation illustrates a \$172 million deficit; the Footprint Detected scenario a \$634 million deficit. The net present value deficit turns positive using the perpetual rotation calculation and the Kyoto in 2005 scenario (\$2024 million) as well as the Limited period C Sink calculation and the Footprint detected scenario (\$844 million).<sup>10</sup>

- **Rubber Plantation:** This project will establish a "hevea" plantation on degraded land. The plantation can store over 200 tons of carbon per hectare, similar to the recovery of land by natural forests. The average plantation cost is approximately \$3,000/ha.

The plantation will begin to produce latex at a commercial scale four years after planting. Full production will occur two years later. Latex is continuously collected from the trees

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<sup>9</sup> The internal rate of return is not used because the uneven cash flow stream for forestry projects renders it problematic. The net cash flow is negative for the first few years and then becomes positive, as the revenue from carbon credits becomes significant prior to harvest. Once the harvest begins, the first year of the harvest has a net loss of C and hence revenue. The net cash flow is negative. For the perpetual rotation case, the cash flow is negative in the early years, positive for one or two years, is negative for the harvest year and turns positive for all subsequent years. For the limited period C sink, the net cash flow has a negative value since all the accumulated C is lost in the last year. This fact more than offsets the revenue derived from the timber harvest. The NPV provides a more reliable indicator for comparison across scenarios. The Net Present value was estimated based on a discount rate of 18 percent.

<sup>10</sup> The Net Present Value was estimated based on a discount rate of 18 percent.

during the productive life of the plantation at a rate of 2 tons/ha/year. The product has a market value of \$1,300/ton in Brazil. The average production life is 30 years.

The project, without carbon credits, using perpetual rotation calculations, shows a net present value of \$1170 million. It illustrates a net present value of \$1124 million using Limited period C sink calculations. With carbon credits valued according to the Kyoto in 2005 scenario, the project using perpetual rotation calculations illustrates a net present value of \$1719 million and with Limited period C sink calculations a net present value of \$1360 million. With carbon credits valued according to the Footprint Detected scenario calculations, the project, using perpetual rotation calculations, reflects a net present value of \$2673 million and with Limited period C sink calculations, a net present value of \$1844 million.

- **Palm Oil Plantation:** The sponsor of this project seeks to expand its oil palm plantation in the State of Para. An oil palm plantation requires five years of growth before it can be fully exploited commercially. It can be used as a source of palm oil for another 25 years. The investment in both agricultural and industrial facilities required by this project will be \$3,000/ha. The planned area of 5,000 ha will require an investment of \$15 million.

This project has a negative net present value without credits based on both perpetual and Limited period C sink calculations. It also has a negative present value with credits in both scenarios.

- **Eucalyptus Plantation:** This project's objective is to reform a eucalyptus plantation. It will be used as a source of fuel for industrial processing of ceramics. Oil will be required without the availability of firewood.

The plantation will use 240 ha of land. Eucalyptus will be cut at 6 and 12 years. It will be harvested after 18 years. The expected annual yield is 30 m<sup>3</sup>/ha. The investment required to initiate the project is \$500/ha.

The net present value based on perpetual rotation calculations without carbon credits is \$91,600. It is \$59,600 based on Limited period C sink calculations. The net present value based on perpetual rotation calculations assuming the Kyoto in 2005 scenario is \$107,000. It is \$166,000 based on the Footprint Detected Scenario. The net present value using Limited period C sink calculations is \$58,500 based on the Kyoto 2005



scenario; it is \$91,900 based on the Footprint Detected scenario.

### **Adding it all up: The Economic and Financial Return of the Projects**

Clearly, the value of carbon credits may be less than initially assumed by CDM advocates—at least with respect to the reviewed projects. “The value of CDM status is a function of the value of the carbon emission reductions (CERs) generated by the project, minus the costs associated with gaining CDM certification. (Meyer)” CERS may not be able to help convert a financially doubtful project into a financially feasible project.

According to the LBNL and USP presentation, the difference in most project’s IRR or NPV with or without carbon credits is generally less than the uncertainty and risks associated with initial judgments concerning financial feasibility. “The analysis suggests that the ratcheting up of the price of carbon may not have a substantial impact on financial viability. (Moorcroft)”

“The trajectory of increasing carbon prices implies that in discounted terms the value of carbon is pretty flat. Recent analyses by others suggest that if ratification is delayed then what is likely to occur is that carbon prices would sharply rise at first and then fall. This would happen because late ratification would make reaching targets difficult. We would have to reduce a large amount of carbon in a short time. As a result, instead of gradually increasing carbon prices, they would go up quickly and then decline again. This possibility should be factored into future Forum analysis. (Repetto)”

“Energy projects in Brazil, according to the LBNL and USP study, present a special case. Carbon credits are not as important to the electricity sector in Brazil. We are dependent on hydropower. The value of carbon credits is small compared to the revenue from the sale of electricity or electricity savings. The carbon reduction anticipated in the independent electricity sector from generation or efficiency savings will likely be marginal. (Moreira)”

Only the bagasse cogeneration project reflects an attractive investment without carbon credits. The Lighting Efficiency project may be (marginally) attractive without carbon credits. In both projects, the value of carbon credits, whether calculated according to the Kyoto in 2005 scenario or the Footprint Detected scenario, provide relatively small additions to the internal rate of return. (See Table 1.) “However, while they may not make a real difference given the very positive rate of return reflected in the Bagasse project, they may increase investor interest in the Lighting project. (Langer)”

The financial impact of carbon credits on project viability varies considerably but, on average, it appears much higher in forestry projects. (See Table 2 & 3.) The effect on NPV is substantial for the charcoal for pig iron and rubber plantation projects even under the low carbon price scenario. The NPV

increases by a substantial amount as the price of carbon moves from the lower to the higher estimate of carbon prices for all forestry projects.

**Table 1. Internal Rate of Return for Energy Projects in Brazil (%)**

	Without Carbon Credits	With Carbon Credits Kyoto in 2005	With Carbon Credits Footprint Detected
Small Hydro	12.2	13.0	14.3
Wind Farms	6.7	7.5	8.5
Bagasse Cogeneration	32.1	33.0	34.5
Lighting Efficiency	19.5	20.3	21.5

**Table 2. Revenues from Energy Projects in Brazil, NPV\* (\$US Million)**

	Without Carbon Credits	With Carbon Credits Kyoto in 2005	With Carbon Credits Footprint Detected
Small Hydro			
Direct Revenues	13.08	13.08	13.08
Carbon Credit Revenues	0	0.51	1.37
Wind Farms			
Direct Revenues	36.24	36.24	36.24
Carbon Credit Revenues	0	1.18	3.13
Bagasse Cogeneration			
Direct Revenues	36.19	36.19	36.19
Carbon Credit Revenues	0	1.25	3.36
Lighting Efficiency			
Direct Revenues	.27	0.27	0.27
Carbon Credit Revenues	0	0.01	0.02

\*Note: NPV calculation assumes 15 percent discount rate. Revenue is before taxes.

Table 3 suggests the effect of methodology and by implication public policy on the value of carbon credits. The perpetual rotations method for counting sequestration results in a much larger NPV. Conversely, the limited period C sink approach generates much less carbon. The sponsor must pay for carbon release at the end of the project. The price associated with carbon in the future is likely to be higher and reflect a considerable cost.

**Table 3. Net Present Value of Forestry Projects in Brazil for Two Carbon Accounting Methods ('000 US \$)**

	Without Carbon Credits	With Carbon Credits Kyoto in 2005	With Carbon Credits Footprint Detected
Charcoal For Pig Iron			
Perpetual Rotations	(997)	(162)	2024
Limited Period C Sink	(997)	(634)	844
Rubber Plantation			
Perpetual Rotations	1170	1719	2673
Limited Period C Sink	1124	1360	1644
Palm Oil Plantation			
Perpetual Rotations	(3012)	(2741)	(2011)
Limited Period C Sink*	--	--	--
Eucalyptus Plantation			
Perpetual Rotations	91.6	107	66
Limited Period C Sink	59.6	58.5	91.9

\*Note: Not calculated, since the NPV was negative in the more favorable case.

### Project Financial Additionality

If a project shows a sizeable IRR or NPV without carbon credits, would it be additional? Maybe. "We don't know. A large IRR or NPV without carbon credits, could indicate the project would happen without the CDM. It wouldn't meet the "but for"<sup>11</sup> test with respect to financial additionality. (Russell)"

However, "its not so simple." Financial feasibility tests are paper tests. Between project projections of NPV and/or IRR and actual project cash flow are many imponderables that could negatively influence financial results. For early start carbon emission reduction projects, they include: still undefined CDM policies; national policies and regulations; carbon credit values; capital needs and capital costs; political risk; unforeseen project risk including failure to predict accurately operating costs; etc.

Participants in Aspen questioned the value of carbon credits to sponsors as opposed to investors—foreign and domestic. "Sponsors probably will be looking for investment—equity or debt. To them CERs may not count for much. Investors on the other hand may be looking to speculate on equity enhancement. CERs could be a sweetener—a residual with unforeseen benefits down the line. If they can pick up CER's relatively cheap or at a discounted rate, they might find investment in projects more attractive. (Langer)"

"There are lots of reasons why foreign companies or investors might be interested in certified emission reductions (CERs) from Brazil. They might want to speculate on their value after Kyoto is ratified...on their value if Kyoto is not ratified but Brazil initiates national policies or regulations to grant credit to emissions reductions...on their need to use CERs from Brazil to reduce their own targets or requirements based on national regulations in their countries. If the price is right, foreign companies may want to acquire CERs. (Prolman)"

Many participants called attention to the need to keep transactional costs relatively low, particularly when carbon credits suggest only a marginal impact on financial results. Intense bureaucracy, time consuming delays, significant paper work "could result in a situation where sponsors may say the hell with it, if the perceived benefits of credits are not clear or if they are only hypothetical. (Bartsch)" However, "low transaction costs may conflict with the CDM objectives to obtain real, measurable and permanent emissions reductions at lower costs and the transfer of resources and technology to developing countries. The host country, the sponsor, and the investor may have incentives to exaggerate carbon reductions. Can we design a surveillance and enforcement system by third parties that responds to the need for simple

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<sup>11</sup> The project would not have occurred "but for" carbon credits.



and standardized operating rules that encourage a large volume of transactions and low transaction costs? It will not be easy. (Repetto)”

### **Environmental Additionality**

Most participants in Aspen felt that priority attention with respect to early start projects should be granted environmental additionality. There are too many difficulties associated with financial additionality. The concept reflects more than a methodological problem. Additionality is a concept that heavily relies on assumptions concerning market behavior, firm characteristics, capital costs, political variables, etc. It is difficult to predict the often vastly different perceptions of investors and firms concerning acceptable risks. What one investor or firm will accept as a sufficient rate of return is often different than other investors and or firms even in the same sector. Changes in opportunity cost assumptions concerning similar projects can markedly affect estimates of rates of return. Financial additionality—perhaps intuitive—should provide context for judgments concerning the relevance of early start projects but environmental additionality should be a prerequisite to decisions concerning CDM status.

Granting priority attention to environmental additionality did not lead to an easy or ready definition of techniques to measure it. Participants in Aspen, however, generally were comfortable with two related approaches. “Benchmarking offers a doable way to get at environmental additionality. Nations would define default emission rates in or for different sectors or geographical areas of their country. Benchmarks could be set in terms of C (carbon) per unit of output. Benchmarks could be set to represent better than average standards. Judgments concerning additionality would be based on the relationship of project emissions to sector or geographic benchmarks. As an alternative, default technologies could be set within a region for a specified time period. Project baselines could equal the emissions rate for a specific identified technology. If the project reflected technologies with emissions lower than the emissions for the identified technology, they would be judged additional. (Kelly)”

“We should not have to look individually at every project. We should not have to spend significant time creating individual baselines for every project. If we do, the transaction costs will be significant and the bureaucracy worse. Sector or geographic benchmarks would allow us to make expeditious decisions concerning project baselines. They would reflect historical data about emissions and business as usual scenarios. They would incorporate descriptions of current technology. They would facilitate analysis of GHG emissions with and without proposed CDM projects. (Schwengels)” Whatever we do, if we are serious about moving forward on early start carbon emission projects, we must be flexible. If we impose difficult criteria and complicated methodology, we will have few early start projects and few CDM projects. Reasonable tests of additionality by reasonable people should be put in place.

This is another argument for choosing good projects at the outset or for shifting risks to investors. Certification doesn't mean verification. (Bartsch)"

Benchmarks should be defined in a transparent manner. Consistency is important with respect to the award of carbon credits across sectors or regions. Different technologies that result in similar carbon emission reductions should secure similar credit. "This discussion and the project review have been very valuable in highlighting problems with measuring baselines and additionality. We should be thinking now about concrete benchmarks. (Moorcroft)"

#### **Section IV: Additional Projects for Consideration**

Several sponsors of and possible investors in projects were present in Aspen. Time and budget constraints did not permit their projects to be included in the LBNL and USP analysis. They were invited to describe their proposed projects in Aspen.

##### **Whirlpool: Replacement of Old Refrigerators**

Whirlpool has been a leader in efforts to encourage early retirement of appliances. Early retirement of refrigerators could result in 3+million tons CO<sub>2</sub> reduction annually in Brazil. Additional carbon savings would come from chlorofluorocarbon (CFC) reduction.<sup>12</sup> While 95 percent of baseline power is hydro, consumption during peak hours is based on fossil fuels.<sup>13</sup>

Whirlpool would welcome receipt of CER credits under CDM to help defray the costs of a replacement program. "Our target is to replace 28.7 million refrigerators. These refrigerators consume more than 50 percent more energy than the 2002 product. They are refrigerated by CFCs and insulated with fiberglass. They are attractive to recycle because of their higher steel content. Each new refrigerator will save 12kWh/month. Replacing 40 percent of existing old refrigerators would lead to the avoidance of 300,000 k tons of carbon emissions. CDM credits at \$15 a ton would not drive the effort but it could help make it financially feasible. It would lead to possible CDM funding of \$46 million. (Catania)"<sup>14</sup>

Whirlpool would like to start with a pilot program as a learning initiative. Certified results would be made available to investors at the end of the pilot.

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<sup>12</sup> Refrigerators older than four years are CFC refrigerated and glass wool insulated. The current product is 30 percent more efficient than four-year-old products.

<sup>13</sup> Use of thermal power in Brazil is expected to rise from 9 percent in 1998 to 19 percent of total installed capacity in 2009. Thermal power generation is expected to rise almost four fold during the same period, while total generation is anticipated to increase by 70 percent. These numbers increase dramatically the importance of efficiency related projects for emission offsets.

<sup>14</sup> ... 17 kg C/kWh, useful life of 11 years, U.S \$15/tC

Baseline and additionality would be relatively simple to estimate for the project. Both would be related in part to technological measures. Both would involve the difference between estimates of lifetime emission levels of older units and newer units. "Refrigerators in Brazil have been energy labeled since the eighties. Additionality calculations could be performed through standardized energy consumption data and industry sales information, etc. Brazil could set overall targets in order to calculate actual credit reductions. (Catania)"

Financing of the pilot replacement program would be shared by sponsors—Whirlpool, government, utilities, perhaps NGOs—and resources obtained through the sale of CERs. Whirlpool would initiate a sustained and strategic marketing campaign. There would be incentives to the consumer. Capital costs would accrue because of product modification, distribution and recycling operations. There would be independent auditing.

"Issues related to consumer acceptance and consumer ability to finance purchases of new refrigerators need to be addressed before the initiation of the program. We need to focus particular attention on the poor. (Marcu)" "What is the best way to help lower income households acquire new refrigerators? (Catania)" "Should we consider direct subsidies or low interest rate loans? If older refrigerators are eliminated or recycled and if sizeable numbers of poor people are not involved in the program, we will restrict a secondary market for refrigerators—often the only market poor people can participate in to secure refrigerators. (Juca)" "We need to define a partnership effort involving government, the utility companies and ourselves. We are open to suggestions. (Catania)"

"Low cost financing might work better instead of a rebate. What matters most to consumers is monthly payments. If Whirlpool could subsidize the interest rate, the monthly carrying cost would go down. (Moreira)" To gain consumer acceptance of the proposed program will definitely require a sustained education program.

"Everyone would benefit from the success of the program. Brazil would secure lower emissions. Utilities (ElectroBras/Procel) could be allocated credits if they come forward with consumer incentives to help consumers recycle their old refrigerators. Whirlpool would get credits for producing and selling products that generate reduced emissions. Consumers would win because they would secure reduced utility bills. Depending on final agreed upon strategies, they could also secure rebates and or favorable terms with respect to financing of refrigerators. (Catania)"

"Would Whirlpool be willing to use the project to create a strategic research and evaluation program? The pilot program would involve two geographical areas or two subsets of population with equivalent characteristics. One area or population subset would be involved in the recycling effort and one would not. The program would measure emissions impact, costs, consumer behavior,



etc. (Chomitz) "Yes, we would be willing to consider a demonstration of this type. Whatever we do, we would understand could be done by other companies eventually. We would welcome competition. We, however, would need a commitment that Whirlpool would have proprietary time with respect to the recycling program to make the market and recover costs, etc. (Catania)"

Aspen participants were generally positive about the Whirlpool proposal. "While there would be problems in estimating additionality and credits, I find it encouraging that a company like Whirlpool would come forward with this kind of initiative. Apart from possible carbon reduction benefits, an additional benefit would be heightened public awareness of the need to make green house gas reductions. (Moreira)" "This project could help the government move forward with respect to CDM, particularly if it were an early start proposal. Discussions, for example, concerning certification and verification would facilitate the deliberations in Brazil concerning appropriate CDM structures and procedures. Indeed, it would assist COP 6 deliberations if a case study could be done of the decisions associated with the Whirlpool project. (Hecht)" It could permit countries like Brazil that are dependent on hydro to secure carbon emission offsets through focusing on energy efficiency. "The project could be used to measure the variation in additionality, given likely differences in regional benchmarks and baselines. It could also be used to evaluate demand side management and how demand side management relates to additionality. (Schwengels)" "It could help resolve questions concerning the relevance of technologically oriented benchmarks.<sup>15</sup> (Kelly)" It could demonstrate strategies to share credits. It could result in social as well as economic benefits to Brazil in terms of increased jobs and income.<sup>16</sup>

### **Carbon Sequestration in Babacu Forests**

Babacu is a prolific growing palm tree. Pro Natura in Partnership with Maranhao State Government, the Pig Iron Industry and Babacu gatherers proposed to produce high quality charcoal obtained from babacu fruit. High quality charcoal will substitute directly for imported coking coal and charcoal derived from deforestation of tropical hardwood forests in the Amazon basin.

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<sup>15</sup> The technology exists to produce refrigerators with low carbon emissions. Whirlpool has initiated recycling programs in Italy and the U.S. If benchmarks are to be technologically based, should they be based on the technology used or available in international companies or technology in use in Brazil? If Whirlpool has introduced non-CDM related recycling programs in other countries than Brazil, would or could they introduce it in Brazil without CDM credits? What is the test of additionality? How important is time; that is, if Whirlpool would initiate a major program in Brazil earlier because of the CDM than it would without the CDM, would it qualify as additional?

<sup>16</sup> The presentation by Whirlpool at the Aspen Forum enumerated a range of potential benefits. They included: reduced local pollution; creation of a conservation culture; increased VAT taxes; avoidance of hard currency investment to cover peak power needs; development of an energy efficient low cost model refrigerator for low-income households; creation of a local recycling industry.

According to its sponsors, the project will directly benefit small farmers and landowners of degraded properties in the native palm forest in Maranhao. "It will reduce the amount of carbon emitted into the atmosphere thereby contributing to global efforts to combat global warming. It will improve local income while making sustainable use of biodiversity. From a regional and national standpoint, the project will enhance the competitive position of the Brazilian pig iron industry. (Muschette)"

Babacu stands totaling 100,000 ha would be selected based on their stand coverage density and threat of deforestation. Landowners and state agencies (where lands are public domain) would enter into a 20 year management agreement. The agreement would permit access by fruit gatherers. It would also include an investment provision for stand management and enrichment. Finally, it would provide for monitoring of biomass growth and net carbon sequestration after harvesting. The terms of the management agreement would provide that the landowners grant access rights to the palms in return for investments in stand productivity and an option to participate in eventual carbon credits.

Babacu fruit charcoal from this project would substitute for at least 115,000 tons of charcoal per year, currently derived from unsustainable logging and deforestation in regional pig iron smelters in the Carajas metallurgical corridor. It would also substitute for imported coke, increasingly required to satisfy the unmet demand as timber supplies become scarce. The use of babacu fruit for charcoal has the advantage of making it unnecessary to cut the palm, where most carbon is stored. Growth is ongoing allowing for continuous sequestration. The proportional substitution by source will be estimated and the carbon emissions offsets calculated based on annual fuel utilization by pig iron enterprises in the Carajas corridor.

Establishment costs are minimal in the case of babacu. The species grow wild. Investments are limited to management improvements and enrichment. Wild babacu stands are capable of sequestering an average of 12.5t/ha/yr of forest carbon (at 50 percent C by dry weight) primarily through leaf biomass. Even if all the fruit is harvested, up to 10.7 tC/ha/yr of net carbon is sequestered. "It is conservatively estimated that steps to protect and manage existing babacu stands will generate net measurable carbon sequestration benefits of 1 tC/ha/year or 100,00 tC/yr in the project area. The carbon emissions offsets from substitution of unsustainable charcoal production from deforestation and imported coke are also significant. (Muschette)"

Financing for the six initial operational units has been obtained from the Banco do Nordeste. The majority of fixed capital investments would be made by the State of Maranhao and the Banoc do Nordeste. An investment partner would be sought for investments associated with babacu stand, fruit breaking equipment, etc. Operating costs would be financed from revenues from sale of charcoal to regional pig iron manufacturers. The proposed full-scale pilot

project (two years, 100,000 ha of babacu stands, 4,500 fruit gatherers) would require an investment of \$7,253,200. The project total needs would equal \$9,363,200. Counterpart financing of \$2,110,000 is available. Initial, very preliminary analysis suggests an IRR before carbon credits of 2.5 percent; access to carbon credits, according to the sponsor, would increase the IRR to close to 20 percent (assuming carbon credits are valued at \$10 U.S. per ton.)

“The project would have significant social, environmental and economic benefits. (Cesario)” Jobs for very low-income people will be created, for example, both for fruit gatherers and in the manufacture of charcoal. Charcoal sales will be significant. The project will demonstrate sustainable options for charcoal production. “It will provide a model for as many as 50 production areas in Maranhão. (Cesario)”

The initial impression of Forum participants concerning this project was very positive. They liked this project because “it combined economic, social and environmental sustainability. (Cesario)” If the project could “demonstrate that it was backing out the coking of coal then there will be a good offset. But work remains to be done concerning the measurement of carbon reduction and the methane and nitrogen oxides (CH<sub>4</sub>/N<sub>2</sub>O) emissions from charcoal production. (Schwengles)” The projects apparent low rate of return or IRR concerned several Forum participants. “In a post-Kyoto world, I don’t think that people would quibble with \$10/ton carbon. However an IRR of 2.5 percent, without a guarantee of carbon credits, would not be very appealing for investment purposes. (Langer)” “If you could demonstrate coke displacement, this is the type of project that the World Bank might well be interested in looking at. We might be able to help structure the finances of the project so that the degree of risk is lessened for investors, including possibly the Bank. (Chomitz)”

### **Bannanal Island**

This on-going project undertaken by Ecologica Environmental Development and Planning on Bannanal Island started July 1997. The goal of the project has been to establish an international interdisciplinary research program. The project is associated with Bannanal Island Carbon Sequestration Project (BICSP) and is based at the Cangucu Research Center on Bannanal Island. Its objectives are to contribute scientific and technical information to advance: carbon sequestration projects; sustainable development; quality of life for local area communities. It is supported by the AES Barry Foundation, Ecologica, IBAMA, Naturatins and GAIA.

“The project is focusing on the development of methodologies to calculate carbon cycles and carbon stocks in regional ecosystems and the development of norms and standards for the certification and commercialization of carbon credits. Researchers, using Bannanal Island as a laboratory, have identified baseline biomass estimates of all trees and bushes in different ecosystems in



the study area. They have also calculated the existing carbon stocks in this biomass. (Rezende)”

BICSP wishes to pursue a strategy of ecotourism for the island in an effort to discourage deforestation. The baseline estimates of the existing carbon stocks will help identify the amount of carbon emissions that will be sequestered and/or not released into the atmosphere, if deforestation is slowed or halted on the island.

Results from the project to date indicate that approximately 15.15 % of the total area on the island has been deforested, while 4,316,800 ha remain undegraded. Biomass has been calculated for the ecosystems. A total of 223.30 tons of biomass per hectare is in dry land forest; 197.17 tons of biomass per hectare is in seasonally flooded forest; 62.93 tons of biomass per hectare is in savannah; and, 12.68 tons of biomass per hectare is in seasonally water logged areas. Given these figures, researchers estimate that 50,120,000 tons of carbon is sequestered on the island. If the BICSP project were not to take place, there would be an annual loss of 670,000 tons of carbon from deforestation and degradation. Provided that the project takes place, 33,485,000 tons of carbon is anticipated to be sequestered over the next 25 years. This would occur through preservation of forested lands (21,000,000 t/C), regeneration of forested areas (3,900,000 t/C) and agro forestry (210,000 t/C), regeneration of forested areas (3,900,000 t/C) and agroforestry (210,000 t/C). In addition, if deforestation on the island is reduced from 1 percent to .5 percent per year, an additional 8,375,000 tons of carbon will be prevented from entering the atmosphere.

At this time, the sponsors of the project are not looking for investors. Rather they are using the BICSP as a pilot project to gain experience with respect to methodologies and strategies associated with carbon sequestration. In this context, they were encouraged by the Forum’s discussion. “The project could offer us needed data and analysis to evaluate sequestration benefits and ways to measure carbon absorption in different ecosystems. It provides a useful laboratory. (Keegan)”

### **Forestry Activities in the Amazon**

Axial Bank asked Winrock to undertake an evaluation of the direct economic and carbon sequestration benefits of the project in Itacoatiara that would use biomass residue from four local sawmills to power a 60-80 MW generator. A new plant would supply power to sawmills in the region. It would sell surplus to the Municipality of Itacoatiara. “Banco Axial has been working in the region for some time. It has directed capital investments to and structured long term debt for sawmills to become certified sustainable. The Winrock study and the resulting project could provide a model for the region. (Moles-Rivero)”

“At present, some of the sawmills produce their own energy, albeit inefficiently. One of the sawmills has a 60 year-old cogeneration plant with a capacity for 1.9 MW, another has a diesel generator of .5 MW. The rest of the power in the region comes from diesel-fired plants. They produce 13 MW. This project, if it comes to pass, would substitute biomass residue for diesel fuel generated power. (Pereira)”

Large amount of biomass residue results from sawmill operations. Nearly two-thirds of the harvested trees become residue and could be used to generate power. Two years ago, use of biomass residue did not seem feasible because the government subsidized diesel fuel. In August 1999, the diesel subsidy was extended to other energy sources, notably renewable energy and small hydro energy. Axial sees this project as “a potential benchmark.” It could provide off grid energy production in the Amazon. Other timber or sawmill centers could provide future sites. “For us to be involved, however, the project will have to make economic sense without CDM credits. CDM credits would not supply the main cash flow. They could increase profitability and judgments concerning project feasibility. (Moles-Rivero)”

### **General Motors**

The recycling proposal put before the Forum by Whirlpool led to a discussion about the possibility of a similar program by General Motors. Would General Motors be willing to consider an automobile replacement program? “The Auto Manufacturer’s Association in Brazil is discussing a replacement program at the present time with the government. The program is driven by the economic doldrums faced by the auto industry. Slow sales and excess capacity have hurt the automobile producers in Brazil, including Volkswagen, Fiat, and GM—the top three producers. We would like the federal and state governments to reduce their taxes to help promote the sale of cars. If people bring in old cars, then they would get a bonus of R\$1,800. If the person wants to purchase a new alcohol driven car, then they would get double that bonus. The old cars would be sent to recycling centers. We could replace about 10 million ten-year or older vehicles. There would be environmental, safety and economic benefits. (Sciante)” “We have not taken into consideration any CDM issues in our plan. The relative efficiency improvement likely would not be as good as in the Whirlpool case, given the status of automobile technology and related costs. We haven’t been able to conclude an agreement with the government. We are optimistic that an agreement will be reached by the end of this year. (Kialka)”

Several participants urged GM and its colleagues in the Auto Manufacturer’s Association to consider the replacement project or variations on a theme as a possible CDM initiative. “Avoiding emissions of gasoline will probably get us farther than avoided emissions on the electricity grid, even if the efficiency gain is smaller. (Meyer)” “This would be a good example of a CDM project if

help change attitudes toward ethanol which evolved after the 1989 ethanol shortage. (Moreira) “Market strategies, for example, the use of derivatives, could be put in place to manage future price fluctuations concerning gasoline and ethanol. (Langer)”

GM indicated a willingness to ask the Auto Manufacturer’s Association to look at a possible CDM effort with respect to the replacement proposal. The Secretary of Brazil’s Environmental Ministry agreed to meet with GM and others to look at the carbon emission reduction benefits associated with the replacement program.

Other potential transportation project ideas were raised by Forum participants. For example, while the economics may not work yet for hybrid electric vehicles, their use should not be discounted in the future. “We need additional research. We are sharing technology with Toyota. We may need government incentives to convert the hybrid vehicle to a real large-scale program. (Sciance)”

“Brazil has a very big potential for biomass generation and we need to take advantage of that. I would urge the Forum to explore the entire transportation sector and the potential for the use of biomass. (Juca)”

Alcohol fuel promotion options should be discussed independently of the replacement program. Alcohol fuel should be considered as a substitute for diesel fuel. Continuous efforts to improve the fuel efficiency, operation and maintenance of vehicles could have carbon reduction benefits.

## **Section V: Funding for Projects**

While the level of detail varied, the range of projects presented in Aspen suggested the possibilities inherent in the CDM mechanism. In and of themselves, they reflected visible opportunities to reduce carbon emissions. As important, they provided a range of project types that might be reviewed and replicated with variations on a theme in Brazil and by other nations. The projects proved helpful in moving the international dialogue concerning baselines, benchmarks and additionality forward. They also helped clarify issues related to financial feasibility and they helped ground discussions with respect to the potential value of CDM credits for early start projects in reality.



### Matching Projects to Financing

Forum participants turned their attention to matching projects and project types to financing alternatives. They acknowledged the difficulties. Early start carbon emission reduction projects have no real status. The Kyoto Protocol has not been ratified by most countries and put into effect. National regulation is absent concerning credits and credit possibilities. The risks and uncertainties inherent in early start projects are real. Even a projected positive cash flow and a return on investment of near 20 percent may not stimulate investors. Capital markets, at least at the outset, will not grant primacy to early start projects. They will be seen as speculative endeavors. Brazil's economy, while improving, is still fragile. Investors will have alternative investment options. "We will need to find ways to attract traditional sources of capital. As relevant, we will need to secure new or non-traditional sources of money. (Langer)"

Foreign investors will likely not be interested in equity investments unless the project looks like its rate of return will be very significant (over 20 percent) and its bonafides look very, very good. It may be possible, however, to interest some investors in "CER equity." While CER equity investors will want to be sure that a project does not go belly up, they are not specifically concerned with precise rates of return. Instead, they will be concerned with the returns associated with CERs. But even here, for an investor to convert estimates of CERs and value of CERs to relatively large equity investments may be difficult. Presently, the price of carbon credits is low (\$0.50-\$2.00) "because the Kyoto Protocol's status is in doubt and national regulations creating value for credits are by no means certain. An investor has to bet on their being a market for credits. He or she also has to bet on low transaction costs. And both a market and low transaction costs are by no means certain. (Langer)"

"Companies that would have high adverse financial exposures if the Kyoto Protocol comes into force—oil, gas, coal, petrochemical, and fossil fuel based energy generation (power) companies—might be good candidates to invest in CER options. They have a stake in mitigating risk. Generally, however, at this juncture, CERs are not a viable financial instrument for trading purposes. Trades done to date are not market valued and are not good indexes for forecasting the potential return on trading CERs. (Prolman)"

"Is there a possibility of putting together a mutual fund of projects where investors would get carbon credits but also equity in the project? We could float a certain number of shares plus the carbon credits if/when they are approved. (Meyers)" "It might be possible to bundle CER projects into a mutual fund or to create a mutual fund for bundled projects. We would be creating a fund to share the risks associated with investing in carbon reduction

return on investment. Understandably, “given perceptions of risk, the first projects probably will be “gold plated projects.” (Moles-Rivero)” Private sector investors in these funds will look hard at their content and their context. They, likely, will significantly discount the value of carbon credits. “Debt may be easier to finance than equity because investor return will depend more on cash flow than project profitability. (Langer)”

At present, different financial institutions use different approaches in thinking about early start projects. “While they know the risks, most investment institutions will likely think of early start projects in terms of equity investments, as opposed to speculative ventures on CERs. Axial Bank activities in Brazil have not focused on CDM. We focused on equity. We have created a significant timber fund. As such, we would be interested in some of the forestry projects presented here in Aspen. Carbon sequestration is icing on the cake for us. The fund basically is a venture capital fund. We look for returns of at least 20 percent. We also look for certification. We are market driven. We may look at early start projects but we would have to be certain that they would work without CER credits. (Moles-Rivero)”

“Clearly, the Brazilian government’s willingness to provide “comfort letters” to early start projects will be important to the fundability of projects. Projects to secure investor interest will need some sort of signal from the government indicating that they appear to conform to evolving CDM criteria and fit Brazilian policy. (Moreira)”

### **The Prototype Carbon Fund—Helping to Make a Market**

The World Bank launched the Prototype Carbon Fund (PCF) simultaneously with the initiation of the Aspen Forum in January. PCF is a market based mechanism to address climate change and promote the transfer of finance and climate-friendly technology to developing countries “The goal of the PCF is to produce emissions reductions through supporting specific projects. The

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<sup>17</sup> For example, the Global Environment Emerging Markets Fund was set up in 1994. It is a 70 million dollar private equity fund. It makes investments in companies that own and operate infrastructure systems that provide clean energy, potable water, wastewater treatment and resource recovery. The Fund is partially capitalized with promissory notes guaranteed by the Overseas Private Investment Corporation. Banco Axial has set up a fund in Brazil to focus on biodiversity investments. It is a venture capital fund that invests in small and medium sized companies. Banco Axial is very active in the sustainable forestry business. They are considering a fund to invest in sustainability projects with respect to forestry operations. They would join with a forestry fund in the United States.

Fund hopes to extend knowledge about the principles and methodology associated with developing baselines and measuring additionality. The Fund, acknowledging the uncertainty and risks now associated with early start projects and CERs, will help "make the market." It will forge relationships among relevant CDM participants—governments, NGOs, investors, sponsors. It will create a diverse portfolio or pool of projects that sequester GHG emissions. Funds allocated to projects would be equity investments. Project activities will generate CERs that will be transferred to the Fund. PCF will distribute CERs to investors on a pro rata basis related to investment in funds. (Chomitz)"

The PCF has secured money from public and private sector investors. The Fund is capped at \$150,000,000. Each public sector contribution is and will be \$10,000,000 and each private sector contribution is and will be \$5 million. Finland, Norway, the Netherlands and Sweden have confirmed their participation. Nine companies with operations in the energy or financial sector have signed participation agreements. They include the energy utilities Chubu, Chugoku, Kyushu, Shikoku, Tohoku and Tokyo Electric Power of Japan, and Electrabel of Belgium. They also include the Japanese trading houses Mitsubishi and Mitsui.<sup>18</sup> There is \$85 million in the fund at present.

Through supporting early start projects, the PCF will demonstrate financial options that the World Bank believes will apply ultimately to CDM projects. The Bank is placing emphasis on "learning-by-doing." If "we are successful, other public, quasi public, non profit and private organization will have a replicable set of experiences. The PCF will test alternative financing approaches—some involving partnerships with national financial institutions like BNDES in Brazil, some with privately sponsored investment funds, some with financial institutions and NGOs, some directly with sponsors. The Fund will transfer part of the risk associated with projects to PCF investors. However, at the same time, by pooling projects, we will be able to reduce individual investor risk. The Fund's experience should increase the comfort level of wary participants in both domestic and international capital markets. Over time, we will become a catalyst stimulating the entry of new kinds of investors or the development of new financial approaches with respect to carbon emission reduction initiatives. (Chomitz)"

The PCF will invest in projects where positive climate change reduction benefits can be achieved and independently validated at a reasonable cost. The PCF will not guarantee that the emission reductions will be recognized by the CDM or by national governments outside the CDM framework.

To ameliorate risk, the PCF will be governed by very conservative principles. "We want projects with clear additionality. The PCF hopes to support

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<sup>18</sup> Information taken from <http://www.prototypecarbonfund.org>.



that there will be clear-cut carbon emission reduction benefits. We want what we do to be readily supportable in terms of carbon reduction to outside observers. (Chomitz)”

Two basic means exist with respect to financing potential PCF projects. They are: 1) straight project financing; and, 2) a fund established with domestic and PCF sources to facilitate investment in additional in-country projects.

The PCF project pipeline currently has two active projects—one in Latvia and one in Costa Rica. The Latvian project is a self-sustaining modern waste management system for the city and region of Liepaja.<sup>19</sup> The project will receive straight project financing support. The sponsor will be able to install state-of-the-art energy cell technology for collection of generated methane. Without PCF support, the project would not be financially feasible. If successful, the project will lead to lower greenhouse gas emissions by capturing the methane emitted by decaying waste, and, by substituting this methane for fossil fuels to generate electricity and heat. The second project is the Renewable Energy Fund in Costa Rica. It will support the development of small renewable energy projects to meet increased demand for energy within Costa Rica as well as neighboring countries.

“The PCF is very interested in working with Brazil. Several of the early start carbon emission reduction projects discussed in Aspen have promise. We’d be willing to commit up to \$10 million to approved Brazilian projects. While there have been no commitments to date to Brazilian projects, we would be interested in testing both project specific and fund investments in Brazil. The PCF would need a positive response from the Brazilian government to its investments. (Chomitz)”

The Bank’s initiative was met with a positive response by participants in Aspen. Questions were raised by some, however, concerning the extent of the Fund and whether or not it could support sufficient numbers of projects to “lead” the market and provide models or prototypes concerning the CDM. Similarly, issues were raised concerning whether the Bank’s criteria would be so rigorous as to exclude promising but risky projects. Put another way, if the Bank funded only projects that clearly reflected clear economic sense and proven technology would the Bank miss an opportunity to maximize environmental additionality? Finally, participants called attention to the Bank’s need to secure an affirmative response from Brazil to early start

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<sup>19</sup> For additional information about both the Latvian and Costa Rican projects, please refer to <http://www.prototypecarbonfund.org>.



projects. "This suggests the need for a more aggressive role for Brazil with respect to review of early start initiatives. (Moreira)"

#### **Other Sources of Public Funds**

"The Multilateral Investment Fund (MIF) administered by the Inter-American Development Bank (IDB) has a total of \$1.3 billion. The MIF provides technical assistance grants to support market reforms, build the capacity of the workforce, and broaden the economic viability of small and medium size enterprises. The MIF, through special equity funds, also acts as a catalyst to attract capital to small business and finance sectors. (Shepard)"

"The MIF is interested in demonstrating the use of equity as a development tool. It has invested in 23 or more investment funds in the Latin American and Caribbean region. These funds in turn invest in small and medium size companies. Through this process, transaction costs are kept low and there is an increase in intermediary capacity. The MIF fund can be used for environmental projects; indeed, we are looking for innovative projects—new directions. We have not yet looked at CDM projects specifically. But support for CDM projects is consistent with MIF purposes. (Shepard)"

"The IDB is considering a new Clean Technology Fund. It would be an equity fund. We are looking for support from other investment agencies or multilateral institutions. The Fund as originally conceived was aimed at responding to the threat of climate change. As the idea evolved, the focus has broadened to include the application of clean technology. The Fund should be ready to go soon. It may well provide another source of funds for CDM related projects in Brazil. Our focus will be on the southern cone. We, likely, would be willing to consider projects like the lighting and oil palm initiatives. (Shepard)"

Participants urged the IDB to look at how CDM projects and early start projects could be supported through its initiatives. Several also urged the IDB and the World Bank to work together to maximize limited funding options with respect to CDM. Both IDB and the World Bank should look at ways to leverage their money with private sector investment funds, perhaps through offering guarantees and other financial product options necessary to make a market.

#### **The Need for Pre-Feasibility Funds**

While several funds exist or are likely to emerge to provide support for early start projects, their respective funding criteria or guidelines may be a deterrent to projects looking for financing. "The gap between available funds and the actual investment in CDM projects is and will be very big. There is a huge gap here in terms of the requirements. The people who run the funds don't see the gap. The fact that there is a fund doesn't mean much unless funding criteria and project characteristics are reasonably similar. (Juca)"

to the multilaterals that initial projects satisfy investor perceptions of feasibility. Both public and private sector funding organizations will want “good first projects” to show that the CDM will work and to attract additional investors. Venture capital funds, even green funds, generally will insist on projects with high profit potential, a predictable cash flow, and a very positive net present value. They will have investment alternatives. All this translates into rigorous criteria.

Most of the funds—public and private—will want to be sure of environmental additionality. Their guidelines will emphasize the need for sponsors to measure GHG reductions or sequestration. It won't always be easy for sponsors to do this, given methodological uncertainties. Finally, most funds will likely require some evidence of political or governmental support, given risks related to CDM.

“We need a project pipeline. We need pre-feasibility funds. We need to help project sponsors respond to criteria. We need to work with sponsors to structure projects to meet feasibility and additionality questions. We need to increase the supply of potentially feasible projects. (Juca)” “I am hopeful that we can find a way to get some planning and technical assistance money to these projects. A small amount of money spent up front will facilitate project review and eliminate pipeline bottlenecks. It will be essential to reduce transaction costs. (White)”

### **Granting Credence to Sustainability and Co-Benefits**

As we evaluate the viability of early start projects, “we cannot lose sight of the importance of sustainability objectives and the relevance of co-benefits associated with carbon reduction. (Novaes)” Although sponsor data was not always available, several of the projects reviewed in Aspen seemed to reflect job and income creation; some suggested real environmental benefits (e.g., pollution reduction) apart from carbon reduction; some seemed to illustrate resource conservation. “All the projects seemed consistent with Brazil's stated goals concerning economic, environmental and social development. We should find a way to articulate, and, where possible, measure environmental, economic and social benefits and, if present, costs. They should be part of our project evaluation approach. Clearly, projects should be consistent with the host government's policy objectives, including sustainability objectives. (White)” At minimum, ranking projects even intuitively according to economic, environmental and social impacts would provide “all other things being equal” criteria.

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It will be important to the private sector investment funds that initial projects reflect a sound economic base; it will be important to the multilaterals that initial projects satisfy investor perceptions of feasibility. Both public and private sector funding organizations will want “good first projects” to show that the CDM will work and to attract additional investors. Venture capital funds, even green funds, generally will insist on projects with high profit potential, a predictable cash flow, and a very positive net present value. They will have investment alternatives. All this translates into rigorous criteria.

Most of the funds—public and private—will want to be sure of environmental additionality. Their guidelines will emphasize the need for sponsors to measure GHG reductions or sequestration. It won’t always be easy for sponsors to do this, given methodological uncertainties. Finally, most funds will likely require some evidence of political or governmental support, given risks related to CDM.

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## Section VI: Deforestation, Aforestation, Reforestation

Brazil, at least at the national level, is still opposed to granting credits for deforestation efforts. "Brazil's position has not changed since the last Forum. Brazil believes that it should not gain credits for what it should be doing as part and parcel of national policy. (Novaes)" Gylvan Meira indicated at the May Forum that "Kyoto did not inadvertently fail to dwell on deforestation. Sinks are not included in Article 12 of the Protocol, yet they are mentioned in Article 6. This was purposeful. We didn't want to create an incentive to cut trees in the CDM. The IPPC (Intergovernmental Panel on Climate Change) will evaluate and sort out the science underlying carbon sequestration and forest ecosystems. We will have better data and methodology soon. But for now, the plenary group was clear: forest sequestration is not included in the CDM."

Several participants urged Brazil to rethink its position on sequestration and deforestation. "Deforestation destroys sinks. Logging results in significant emissions (e.g., decaying tree stumps, exposed soils, etc). Preservation is a less expensive strategy than others to avoid carbon emissions. (Rezende)" Many state governments in Brazil "want to provide credits for deforestation. The subject is still open for debate. Some state governments are asking the federal government to reevaluate its position against preservation counting as CDM projects (Cesario)" "But for now we are a federal system and federal policy governs Brazil's position. (Novaes)"

The forest industry is particularly interested in how the debate or dialogue in Brazil turns out with respect to the relationship of the CDM to varied national policies concerning sequestration. "The forest product industry, particularly those companies that are vertically integrated and that have forest holdings, have limited exposure, at least as compared to say the petrochemical industry. Forest products firms not only sequester carbon in forests, but also use biomass for much of the energy they require. Thus, if the rules governing CER transactions and post transactions are too complex and costly, many industry firms will see little or no incentive to participate. This will be particularly true if the final definition of what constitutes a Kyoto forest is too narrow. CDM policies should not be limited to new carbon sinks. They should not exclude existing efforts and existing carbon sinks. Further, there is a net gain in sequestered CO<sub>2</sub> that accrues from sustainability managed industrial aforestation projects, natural forests or industrial forests that are converted to actively managed and high yield forestry practices, where the rate of growth and carbon sequestration is greater than that which occurs in a natural forest. If the final definition fails to include these forests, there will be little incentive for forest product companies to jump into this investment arena. (Prolman)"

Brazil's current position found some support among Forum participants. "We hope the IPPC report helps respond to methodological problems. But I am not sure it will be as clear cut as some have said concerning deforestation impacts

After much discussion, participants asked Brazil to keep an open mind on the subject. They agreed to evaluate the IPPC study and to revisit the subject at a future Forum.

### Section VII: Proposed Next Steps

Forum participants from both the U.S. and Brazil were unanimous in their positive perceptions of the dialogue. "We came far. The project review was strategic. It helped us better understand issues related to financial feasibility, environmental additionality. (Mein)"

Participants asked the Forum to establish two working task forces: one on energy projects and one on forestry projects. Both Task Forces will contain from 5-10 members from the public and private sector including potential project sponsors and investors. Each Task Force would focus on from three to five projects judged potentially meritorious as CDM early start projects. They would secure strategic analyses and make judgments concerning financial feasibility and environmental additionality. They will weigh the co-benefits of each project.

The Task Forces will attempt to develop a range of specific financial options for each project both in terms of the projects themselves and in terms of prototypes for other similar Brazilian projects. Their discussions will be framed to respond to issues related to CDM structure, groundrules and procedures in Brazil. Their efforts with respect to key projects will be developed into mini-case studies for presentation at an Aspen Forum in early August.

The agenda for the Brazil/U.S. Aspen Global Forum in early August will be critical. It will review, amend and summarize recommendations from all previous Forums on key issues facing COP 6 in the fall. These issues include: development of baselines, use of benchmarking, measurement of additionality, options concerning CDM structure and procedures, the Executive Board of the Conference of Parties, reporting, certification and verification. It will analyze the work of the Task Forces. Based on their work, it would develop specific recommendations concerning relevant CDM policies and financing options for early start projects and CDM projects for COP 6. "The combined product of the Task Forces and the August Forum will provide COP 6 with a valuable framework for and a base upon which to further its deliberations. (Hecht)"