Katoomba Working Group III

NEW MARKETS FOR A GREEN ECONOMY:
CARBON CREDITS AND ENVIRONMENTAL SERVICES OF FORESTS

The Global Carbon Market and
the Prototype Carbon Fund

March 23rd, 2001
BNDES Training Center
Rio de Janeiro, Brazil

Formal Market Drivers

- Kyoto Protocol :
  - OECD/EITs to reduce GHG emissions 5% below 1990 levels in 2008 - 2012.
  - Quantity to be met through trade: about 500 million t- C/year (each of 5 yrs, 2008/12) requiring thousands of transactions
  - Value of global trade estimate: ~$5-10 billion/year
- Flexibility Mechanisms:
  - Project-based: Joint Implementation (JI) between OECD countries and EITs; Clean Development Mechanism (CDM) between industrialized and developing country Parties after 2000
  - Emissions trading including 'Hot Air' trading
- Key decisions at COP6 II bis July, 2001, and beyond.

Informal Market Drivers on Corporate Behavior

- Companies see the climate change political process is real
  - *Industrial countries are slowly -- but inexorably -- moving towards substantial policies to reduce overall greenhouse gas emissions* ***(Nordics, UK, EU)***
  - *Ultimately the Kyoto Protocol implies a massive reallocation of assets*
  - *Shift will impact internal investment decision making and external valuation* ***(BP-Amoco, Southern Pacific)***
- Developing and projecting an efficient greenhouse response has become an issue of corporate strategic competitiveness

Factors influencing CDM Carbon Market Development

- OECD will miss targets by 20-30% if no action is taken
- Published Marginal Abatement Cost estimates inside OECD: $67-$584/ton C. But this likely under-estimates "low hanging fruit" in US and less energy-efficient OECD economies
- Clearing price with full trade: $20-50/ton C. $20/t/C is more realistic
- Dutch Study: CDM/developing country "technical" supply potential is 1.6 billion tons at up to $22/t/Carbon
- Developing Country Capacity Constraints will limit volume of of supply
- CDM project cycle transaction costs and possible additionality requirements are key factors in cost of supply

Competing CDM Models and Carbon Market Development

- Does CDM create a new "sovereign commodity" market regulated by the Protocol or a project-based facility like GEF with ex-ante review and clearance of each transaction
- For CDM to meet Technology Transfer and Sustainable Development goals requires
  - **high volume private investment**
  - **risk management and profit opportunity through active secondary market**
  - ***'ex post'* market-based regulation rather than *'ex ante'* project by project review, ie Low transaction costs**
  - **fungibility and transferability of emission reductions**

Critical Capacity Constraints

- Host country government and private sector capacity is an important factor limiting the volume of investment and technology transfer.
  - **Effective private sector capacity is key to lowering transaction costs of developing, negotiating and implementing CDM/JI projects**
  - **Efficient arrangements across government agencies are key to oversee CDM/JI, build investor confidence and protect Governments' interests**
  - **The most effective capacity building is through the first projects and real emission reduction purchase transactions**

Engaging the Private Sector

- Private Sector Capacity exists in both Annex I and some non-Annex I countries for Validation, Verification, and Certification
  - With clear guidance, the auditing profession can efficiently fulfill these needs
- Private sector investment will flow more readily if the CDM project cycle….
  - **is short and predictable**
  - **avoids ex ante, open-ended approval processes**
  - **ensures transparency and certainty (validation protocol, accreditation criteria)**

Transaction Costs As Barriers to CDM Market Development

- Small projects involving technologies such as PV, small wind, biomass, micro-hydro often
  - have higher unit costs due to small size
  - displace lower carbon intensity end-uses
  - operate in riskier environments (e.g. remote rural areas)
- AND they represent majority of CDM opportunities for most developing countries
- To be competitive in CDM such projects need
  - aggregation to reduce transaction costs
  - streamlined/ simplified CDM procedures

Need for Intermediation for Small projects/small countries

- Smaller-scale project sponsors in small countries and riskier investment environments lack ready access to carbon finance;
- need “bundling” of small projects by financial intermediaries to tap global carbon market and deliver benefits to small project sponsors and communities;
  - **use of “Multi-project” or standardized baselines using performance standards for medium scale projects and**
  - **agree on standard emission factors for particular end-uses and technologies in micro-projects**

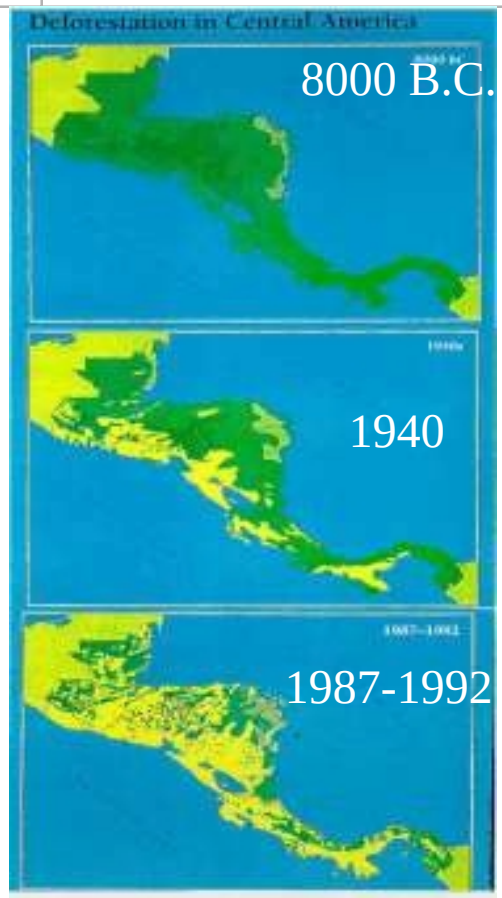
Cost of CDM Project Cycle procedures

- Total procedural cost: $200-400K
  - PCF Front end procedures (Baseline, Monitoring & Verification, Validation, legal fee, etc.): $100-200K
  - Procedures after project commissioning (lifetime supervision, verification and certification): $100-200K
  - NOT including CDM fees
  - NOT including additional CDM registration and review requirements
- Compare with medium sized project with ER purchase from project: $2 million and total financing of ~$10 million (power projects ~5-10MW)

Carbon Market Observations
Value of CDM Carbon Financing

- Carbon Prices are NOT >$5/t/CO2 and unlikely to exceed this level before 2005
- **At $3-5/t/CO2 Carbon Finance contributes:**
  - **typically an additional 0.5-3.0% to Project FIRR and;**
  - **5-15% of project finance in PV terms**
  - **Exceptions with higher financing impacts include any methane abatement measures (e.g. MSW to energy, gas flare & loss reduction), some energy efficiency measures, biomass and crop waste to energy options**
- Conclusion:
  - **carbon finance is no “magic bullet”**
  - **delicate balance between Protocol transaction costs and carbon finance volume**

Will the CDM Contribute to Reduction of Emissions of CO_2 through reducing vulnerability to land degradation and rural poverty?



Reduce Deforestation

Recover Degraded Areas

Combat Forest Fires

Results of Poor Land Management in Ethiopia

Loss of:

- **carbon sinks (soil/vegetation C), hence**
- **soil fertility (nutrients, humus) and**
- **soil biodiversity, native fauna, flora, and key food crop landraces**

Will Maximize the Central American CERs Potential* which is Substantial at a Market Price of $28/ton*

Potencial de Reducción de Carbono en Centroamérica

(En Toneladas Métricas de Carbono)

País	Actividad				
	Combustibles	**Deforestación**	**Plantaciones**	**Aforestación**	**Total por País**
Costa Rica	1,223,000	3,360,000	648,000	1,400,000	**6,631,000**
El Salvador	1,991,000	1,584,000	324,000	84,000	**3,983,000**
Guatemala	1,608,000	10,125,000	644,000	2,150,000	**14,527,000**
Honduras	964,000	16,218,000	227,000	2,826,000	**20,235,000**
Nicaragua	747,000	13,200,000	648,000	2,626,000	**17,221,000**
Panama**	NA	NA	NA	NA	**1,260,736**
Belize**	NA	NA	NA	NA	**318,000**
Total	**6,533,000**	**44,487,000**	**2,491,000**	**9,086,000**	**64,175,736**

***** Carbon estimates comes from the Harvard-INCAE-CABEI project, for the range between 6.5 and 62 million tons per year cost estimates are less than $20 per ton (Castro Salazar, 1999; Boscolo et al., 2000)

** Estimates for Panama and Belize come from a CCAD study conducted in 1998.

Slides on Central America in this presentation come from Rene Castro and others who madea presentation to the World Bank on possible collaboration in Carbon Finance in mid-2ooo. See PCF web-site.

Carbon price scenarios and its potential for expansion of the Mesoamerican Biological Corridor

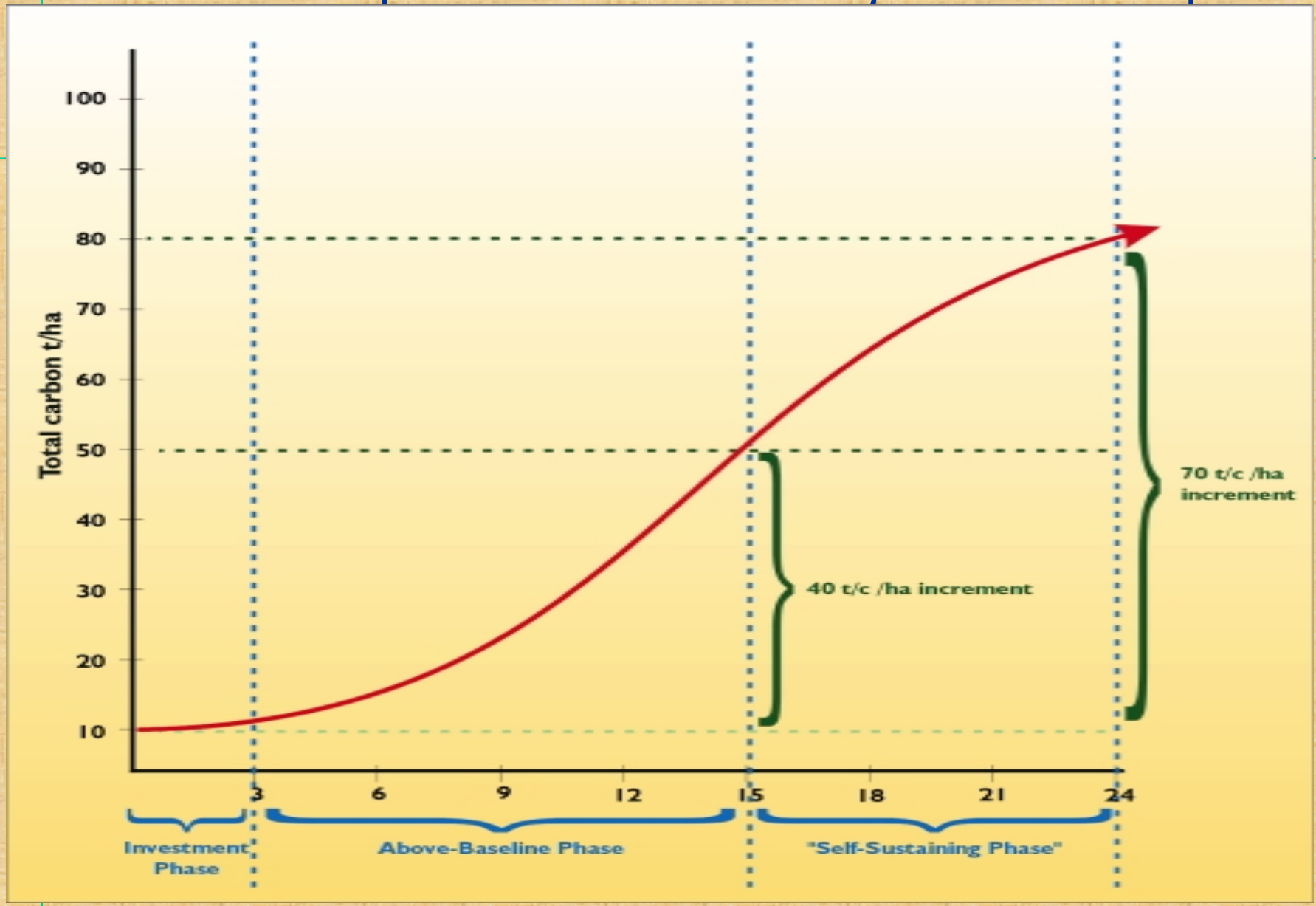
Proposed Protected Area Expansion	Price Scenarios $10	$20	$30	$50	$100	$200	Maximum land (000) ha
	Percentage of the Total Area						
La Amistad	18	88	100	100	100	100	186,201
Rincon de la Vieja	0	10	26	76	94	95	12,421
Palo Verde	0	33	70	98	98	100	9,302
Piedras Blancas	4	4	8	25	65	89	11,537
Barra Honda	0	45	45	66	88	100	2,019
Guanacaste	1	18	61	91	100	100	32,895
Carara	0	11	90	94	95	100	5,349
Barbilla	0	18	61	100	100	100	2,604
All Areas	10	56	82	93	98	99	262,000

Note: Each protected area has a different opportunity cost and carbon productivity level.

All land costs are based on historical acquisitions. All protected area figures are rounded to the unit, the proposed expansion of the protected areas.

Ref: Castro Salazar, 1999.

Agro-Ecosystem/ Farming System Carbon Sequestration Project Concept

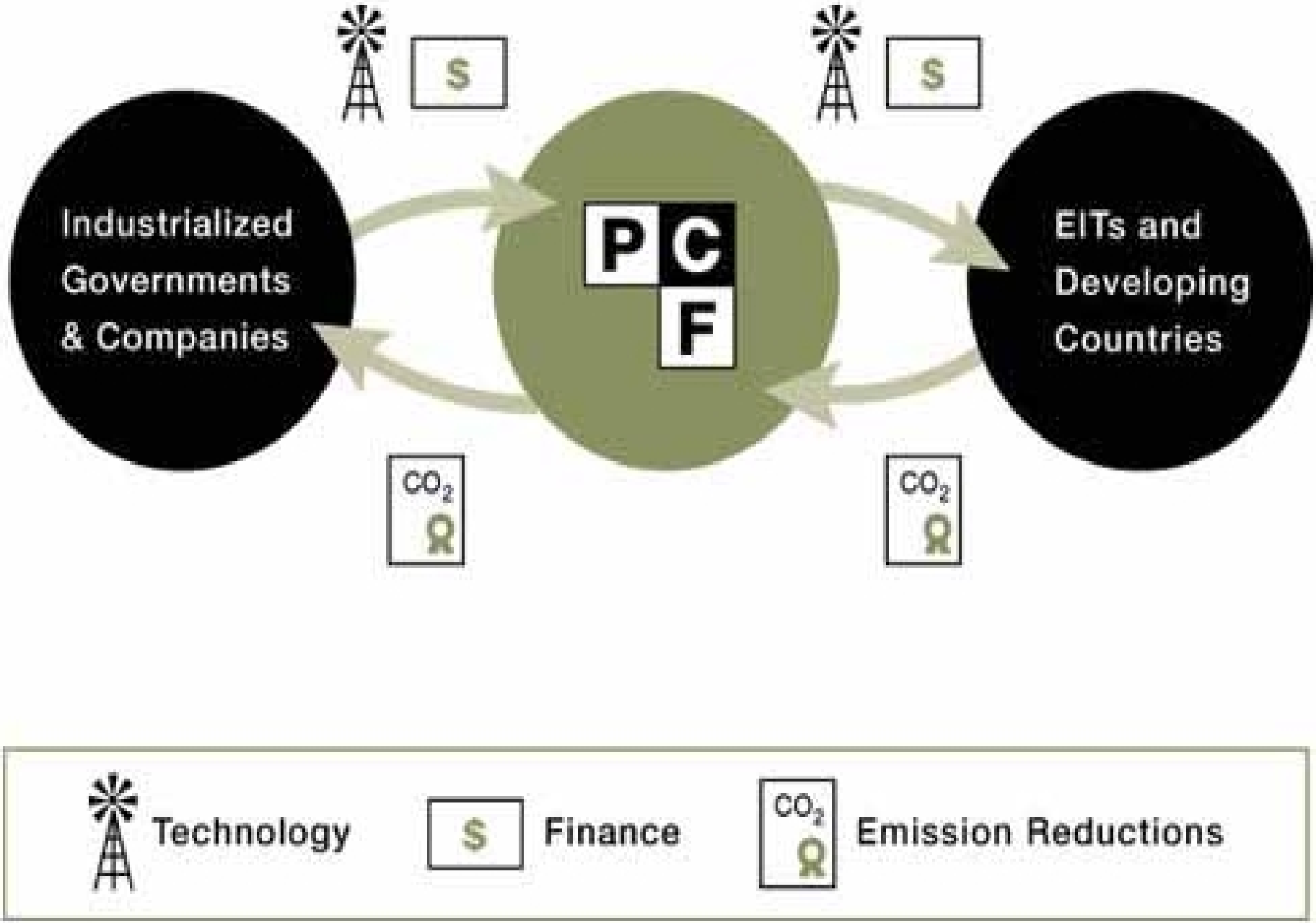


Clean Development Mechanism Opportunity for Rural Poverty Alleviation:

- To mobilize private capital to:
  - **capitalize transition to sustainable intensive agriculture/agro-forestry & sustainable forestry**
  - **Direct private capital to address rural poverty, land degradation and forest loss**
  - **increase incentives for policy and market reform**
- Per hectare opportunity: 1.25-2.5 t/ha/year above and belowground, or ~$20-40/ha/year or
- ~$250-500/ha, or over 15 years, front-end loaded.

Approaches to SIA/LM and Carbon Sequestration

	Techniques	Outcomes
Above Ground Carbon	Water shed, shelter-belt planting Living fences Agro-forestry Home-plot copses Restoration planting	Reduced erosion, better water management; increased biomass/C, increased fuel/fodder/food
Below Ground Carbon	No/low tillage Legume rotation Mulching Improved fertilizn.	Increased soil fertility; humus and soil carbon; soil biota
Farming Communities	Demonstration, training, incentive policies, marketing organizations, credit mechanisms	Increased farm yields, “commons” yields, increased farm incomes, community welfare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Industrialized Governments & Companies
PCF
EITs and Developing Countries
CO2
CO2
Technology
$
Finance
CO2
Emission Reductions

Features of the PCF

- Portfolio or fund structure
  - Minimize Project Risks
  - Reduce Transactional Costs
  - Enhance the Learning Experience
- Governments: $10 m; Companies: $5 m
- Total: US$145 million to be used in 20-25 projects
- PCF Products:
  - Competitively priced, high quality emissions reductions
    - target price outcome: $4-5/t-CO2 (= $20/t-C)
    - target *cost* of generating ERs: $3/t-CO2 (= $10/t-C)
  - High value knowledge asset to help create competitive advantage for corporate investors and efficient market regulation for Parties

Key Demonstration Effects

… that investments under CDM/JI can:

- Earn export revenue for Developing Countries/Transition Economies engaging in the new ER commodity trade
- Increase the profitability of cleaner more efficient technology in energy, industry, and transport sectors
- Contribute to sustainable development

… and how to implement the CDM(JI?) project cycle

Participants

($145 million in subscribed capital)

Governments: (6)

Netherlands, Finland, Sweden, Norway, Canada, Japan (through Japan Bank for International Cooperation)

Private Sector: (17)

RWE - Germany, Gaz de France, Tokyo Electric Power, Deutsche Bank, Chubu Electric, Chugoku Electric, Kyushu Electric, Shikoku Electric, Tohoku Electric, Mitsui, Mitsubishi, Electrabel, NorskHydro- Norway, Statoil -Norway, BP-Amoco, Fortum, RaboBank, NL

PCF Status and Focus

Deal flow far exceeds funding - several carbon contracts now under negotiation

>50 deals with $300m+ carbon purchases under review

Targeting signed Emissions Reductions Purchase Agreements (ERPAs)

by end-Summer, 2001 of $30-35mm in Chile, Cost Rica, Nicaragua, El Salvador, Belarus, Brazil, Honduras, India

by end December 2001 of $25-30mm in Hungary, Bulgaria, Morocco, Jamaica, Guyana, Guatemala, Argentina, Uganda.

Constraints: Government Awareness and Resolve, Quality of Asset after baseline review

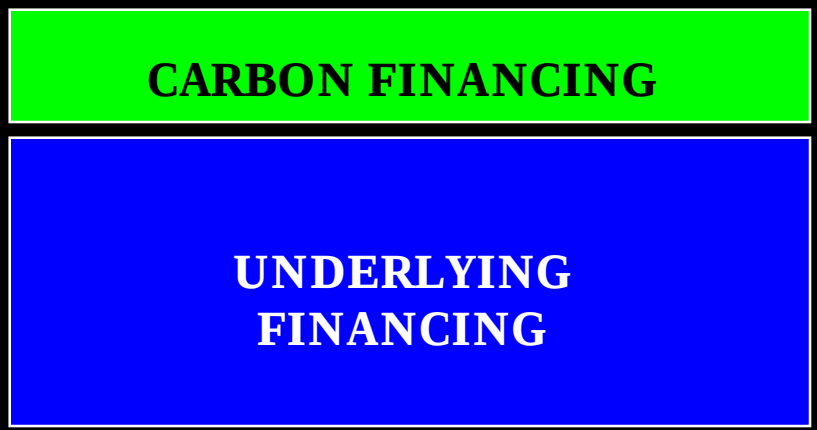
Current PCF Portfolio and Focus

- predominance of wind, municipal solid waste management, small-hydro, and bagasse/biomass co-generation
- strategic focus on building market infrastructure for aggregation and intermediation of small projects
- leaving space for Solar PV, transport energy efficiency, fuel-switching – coal to gas, Land Use and Forestry (JI only) and expanded Energy Efficiency

Carbon Financing v.s. Underlying Financing

TOTAL PROJECT COST =

UNDERLYING FINANCING (LEAST COST OPTION TO ATTAIN EQUAL BENEFIT OTHER THAN ENVIRONMENTAL BENEFIT IN THE SETTING) + CARBON FINANCING



- Carbon financing is defined as the financing to attain emission reductions which would not otherwise realized in the absence of the project (compared with the least cost option in the setting)
- PCF funds*[1] a part of carbon financing

*** PCF prefers to pay on delivery for emissions reductions**

PCF In Brazil

- Letter of intent to PLANTAR to buy emissions reductions
  - from sustainable charcoal to displace imported coke and
  - to upgrade charcoal-making technology to reduce GHG emissions and local pollution
- In negotiations to purchase emissions reductions from small-scale power generation from wood and crop waste operations
- Require independently certified sustainable forestry for wood waste/charcoal operations

Traditional Brazilian Brick Beehive Kiln

Used in about 90% of Brazilian Charcoal operations

Efficiency: About 4m3 wood for 1m3 Charcoal

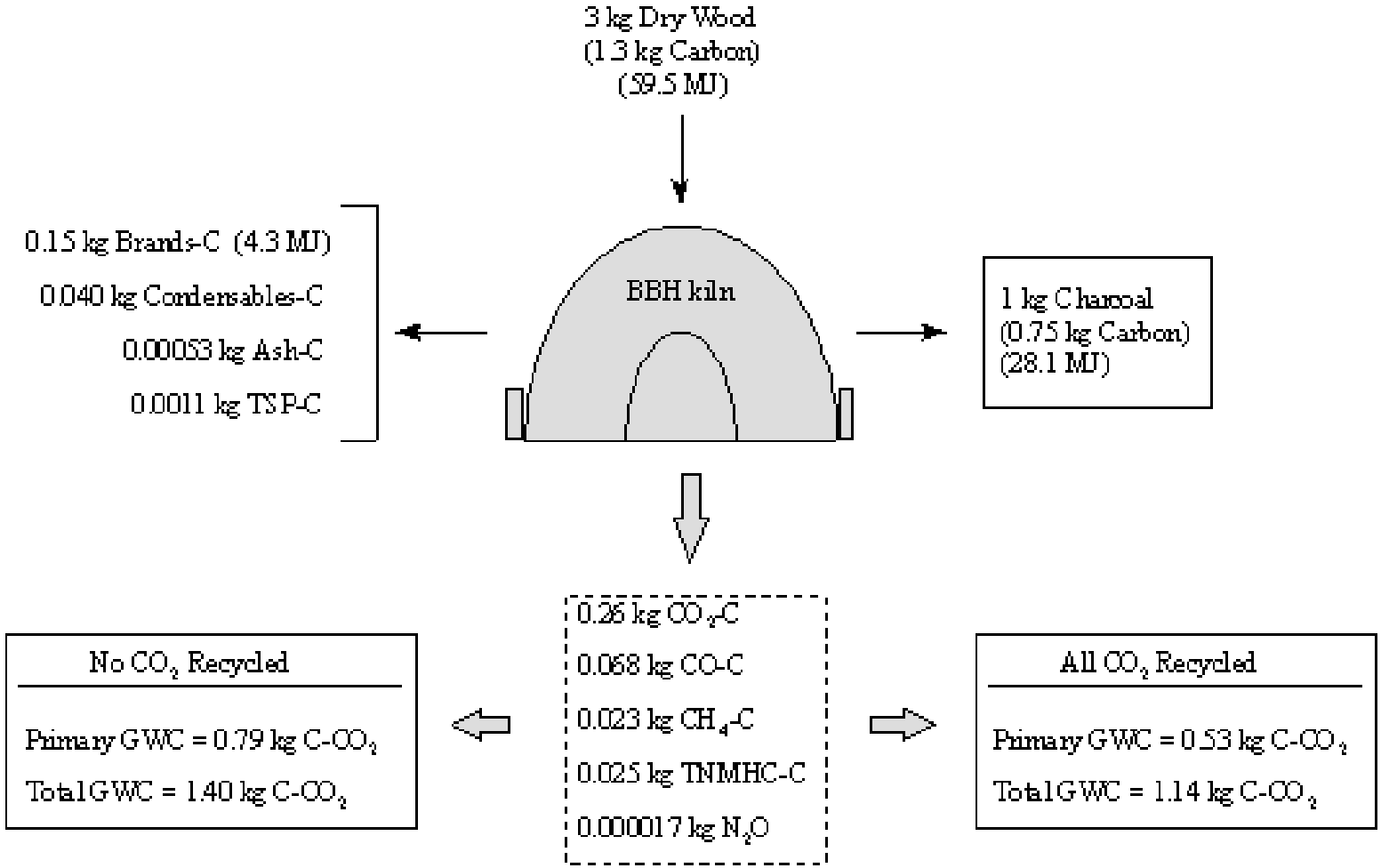


Figure 1. Carbon cycle for charcoal making in the BBH kiln and the GWC resulting from renewable and non-renewable harvesting of the wood. GWC = Global Warming Commitment in kg C as CO_2 equivalent.

Improved Brazilian Brick Kiln: < 2m3 wood to 1m3 Charcoal

Advanced Brazilian Beehive Kiln

Collects Tars and Pyrolytic Oils in smoke – minimizes local air pollution. Efficiency: Better than 2m3 Wood per m3 charcoal

Annexes

PCF Project Selection and Portfolio Criteria

Generic: Adhering to UNFCCC, Bank standards, with emphasis on renewable energy projects

- **Broad balance between CDM and JI**
- **Not less than 2% or more than 10% of Fund's assets**
- **Not more than 20% in the same host country**
- **Not more than 10% in forest-based sinks (only in EITs)**
- **Emphasis on renewable energy technology and efficiency (3:2 ratio)**
- **No more than 25% in any one technology**

Impact of lack of transferability

- Draft text required designating Annex I destination of ERs irrevocably at time of registration of projects by Host Country
- Impact would be to eliminate:
  - **secondary market outside of domestic regimes;**
  - **arbitrage between domestic regimes when Ers are certified and transferred to investors**
  - **‘pooling’ investment and‘bundling’ projects (for spreading risk and/or reducing transaction cost)**
  - **much small-country, small project ER trade**

Development Finance & CDM Eligibility

- Blending concessional and ODA funds and carbon finance should not render the project ineligible as a CDM project
  - **And separate this from the quite different issue of whether emission reductions can be acquired with ODA**
- Carbon finance will gradually displace and free up ODA for other socially beneficial development applications such as health & education

Host Country Committee Members

Joined/Signed MOUs

- Latvia
- CzechRepublic
- Argentina
- CostaRica
- Guatemala
- Brazil
- Mexico
- El Salvador
- Guyana
- Uruguay
- Colombia
- Togo
- Zimbabwe
- Uganda
- Morocco
- Nicaragua
- Honduras
- Peru
- Senegal
- Burkina Faso
- India

Joining soon through endorsing Projects

- Belarus
- Bulgaria
- Chile
- Jamaica

"Ensuring Environmental Credibility"

Project identification and preparation

Baseline Study as part of Feasibility Study

3-4 weeks effort
Cost: $20,000

Preparation of Monitoring and Verification Protocol

4-5 weeks effort
Cost: $40,000

Validation process and opinion

4 weeks
Cost: $30,000

Negotiation of Carbon Purchase Agreement

Project approval

Total Front-End of PCF Project Cycle Costs of ~ $150-200k being sum of "Baseline and Validation Process" plus unique CDM analysis and dialogue+negotiations

Convention Objectives and Development Context

- Desertification Convention
- Biodiversity Convention
- Climate Change Convention

→ **Mitigate desertification, Sustainable development, integrated NRM**

→ **conservation, sustainable use, benefit sharing**
  - eradicate poverty (Art.20.4)
  - focus on environmentally vulnerable incl. Aris-semi-arid

→ **"common but differentiated responsibilities" to mitigate climate change**
  - poverty eradication comes first (art. 7)
  - sustainable management of sinks..incl. Biomass, forests, terrestial ecosystems
  - meet special needs of arid/semi-arid and the prone to drought and desertification

Example of possible Soil Carbon increment under improved management

(over 7-10 years)

Pasture	Savanna	*A. gayanus/ S.capitata*	
Depth cm	C t ha^{-1}	C t ha^{-1}	C t ha^{-1}
0-20	64	71	7 (+or-)2.0 **
20-100	123	166	44 (+or-)9.7 ***
Total	187	237	51 (+or-)11.4 ***
%>20 cm			86.0

Yield, net gain of C and percentage of the net gain below the plow layer (20 cm) in an introduced pasture compared with native savanna at Matazul Farm on the eastern plains of Colombia