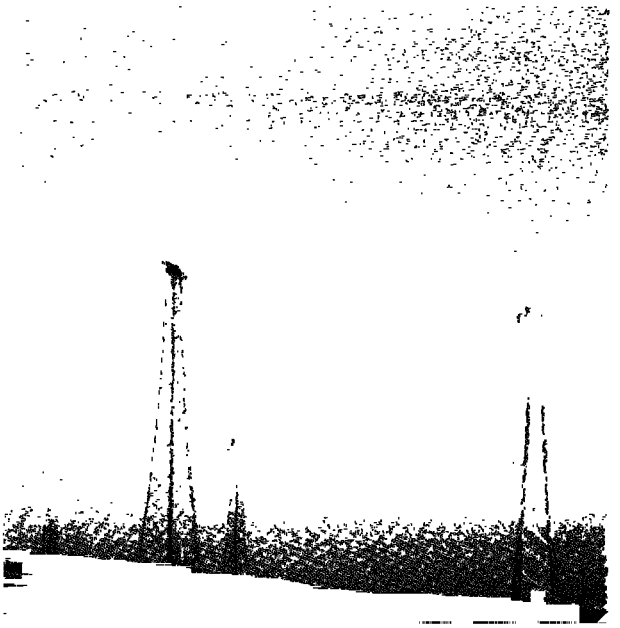
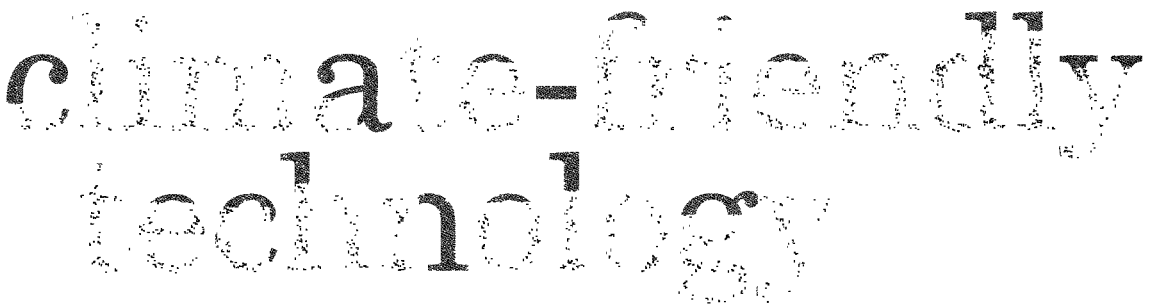
ANNUAL REPORT 2001





This is the first annual report of the World Bank's Prototype Carbon Fund, which covers the period from the fund's inception in 2000 to the time of publication in September 2001.

The audited PCF financial statements for fiscal year 2001 (July 1, 2000 to June 30, 2001) are being published under separate cover.

An online version of this report and the PCF financial statements are available at the PCF website (www.prototypecarbonfund.org).

NOTES

All $ = U.S. dollars.

FOR FURTHER PLEASE CONTACT

Prototype Carbon Fund

1818 H Street, NW Washington, D.C. 20433, USA

p 202.473.6010 f 202.522.7432

www.prototypecarbonfund.org

Climate change is one of the most serious environmental issues facing the world today, and developing countries will suffer the most damage. Poor people will be at an even greater disadvantage. The World Bank believes that climate change concerns are central to development itself.

Alleviating the crippling effects of climate change on poorer countries will require private as well as public investment. Efficient market-based mechanisms are crucial to lowering the costs of climate change mitigation and to channeling private capital to cleaner technologies and more socially and environmentally sustainable development in our client countries.

The Prototype Carbon Fund (PCF) demonstrates the Bank's commitment to catalyze the development of these market mechanisms in order to help developing countries benefit from carbon finance.

I am grateful to the companies and governments that are participating in the Fund, to the countries who host the PCF's emission reduction purchase transactions, and to the many stakeholders that have provided support and guidance. All have enabled the countries engaged in the United Nations Framework Convention on Climate Change's (UNFCCC) Kyoto Protocol negotiations to take advantage of the PCF's learning by doing. All have helped open the eyes of the private sector working in developing countries to the opportunity of carbon finance to enhance the profitability of cleaner climate-friendly technology.

More broadly, the Kyoto Protocol is leading the way in addressing environmental problems of global scale and significance. Its pioneering of market-based mechanisms demonstrates how markets can begin to internalize global environmental externalities and work for sustainable development.

In the next twelve months the PCF will commit the great majority of its capital and expand the learning experience to about a dozen new projects which will generate emissions reductions. I will be following these developments with great interest and wish those participating in this business every success.

Sincerely,

Ian Johnson

Ian Johnson
Vice President and Head of Network
Environmentally and Socially Sustainable Development
World Bank

The world has faced the fact that emitting carbon dioxide and other greenhouse gases is no longer free, and stabilizing their concentrations in the atmosphere and minimizing future emissions is critical. Using the tools and instruments provided by the UNFCCC, the PCF promotes the preparation of projects to achieve these objectives, and to enhance the capacity of all parties involved through a learning by doing process.

Today's society is conceived as an interlinked world where governments, business, and communities work together to find viable solutions to current challenges. PCF has demonstrated that this sense of interaction among the different parties involved in Clean Development Mechanism (CDM) and Joint Implementation (JI) projects is not a mere expression of desire, but a reality.

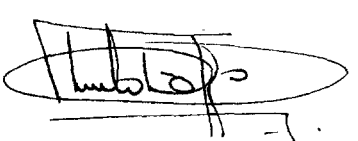
The ongoing uncertainty of the climate change negotiation process was heightened during the last year. The PCF proved able to meet the challenge by becoming a reference for public and private institutions interested in the emission reductions market. The PCF is a unique platform to discuss matters related to CDM and JI. It brings together host and participant country representatives, as well as private sector investors and technical experts from the PCF team, provides the opportunity to exchange views and advances the knowledge base for both mechanisms.

The PCFplus program was created to respond to the capacity building needs of the host countries through three different tools: the PCFplus fellowship program; PCFplus outreach and training activities; and PCFplus research, which analyzes the technical challenges of project development, carbon markets, and the relationship between CDM and sustainable development.

The evolution of the carbon market presents a new challenge for the PCF. Taking into consideration the nature and limitations of the fund, we can count on the PCF team's creativity to find answers to the new questions formulated by an increasing number of active and knowledgeable participants and hosts and the public-at-large.

It is important to recognize the efforts and commitment of the PCF team, which shows an extraordinary level of professionalism. We would also like to express our gratitude for the help and support provided by our colleagues in the Participants' Committee and Host Country Committee, with whom we remain committed to quality work and increased cooperation in the further development of the Prototype Carbon Fund.

Maurits Blanson Henkemans
Chairman
Participants' Committee



Eduardo Dopazo
Chairman
Host Country Committee

Dear Friends,

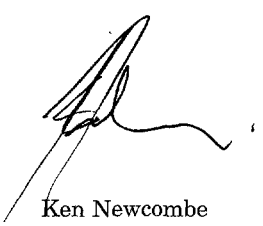
It is my pleasure to share some observations almost 18 months into the PCF's emission reductions purchase phase. It has been a period full of interesting surprises. I will mention here a couple that were particularly striking and explain how PCF is addressing them. On pages 8–9 we present some of the highlights of our progress in this period.

First, I am struck by the diversity we confront in every part of our business—it is showing no signs of becoming routine. To meet this challenge, PCF is constantly innovating, whether by pioneering ways to define credible baselines, or by structuring innovative transactions to accommodate a country's legal framework. On a daily basis, we build our knowledge of business processes and legal contracts related to the CDM/JI project cycles, creating a rich set of resources that others can adapt to their own projects. This makes our path-breaking efforts all the more important for the private sector entering this new market.

Second, our work with our developing country and transition economy clients has revealed an unforeseen opportunity. In developing our first commercial transaction, we recognized the remarkable educational power of learning by doing. Only when confronted with requests to make long term legal commitments to create and sell this new "sovereign commodity" can governments and local private sectors realize the opportunity to benefit from the CDM and JI.

The lesson for the PCF team is that we must provide more than our unique transactional knowledge and funding for a single carbon purchase transaction. We must build strategic coalitions with bilaterals, business associations and development agencies to help host countries efficiently gain the legal, administrative and market capacity they need to compete for a share in the CDM/JI market.

Over the next 12 months we hope to bring this vision closer to reality by developing a technologically and geographically diverse portfolio of highly replicable projects. We expect to complete several pioneering emission reduction purchase transactions in renewable energy and energy efficiency, and create innovative, low-cost transaction structures to efficiently bundle small projects for delivery of carbon finance.



Ken Newcombe
Fund Manager

COMPLETED OUR FIRST EMISSION REDUCTION PURCHASE TRANSACTION

- Negotiated an emission reduction purchase agreement for the Latvia Liepaja Solid Waste Management Project in accordance with then-current CDM rules (July 2000)

DEVELOPED A STRONG, DIVERSIFIED PROJECT PIPELINE

- Reviewed and registered over 130 Project Idea Notes
- Obtained clearance from PCF participants to prepare 15 emission reduction transactions, covering 6 technologies, 8 countries, and 4 regions, for a total of up to US $50 million, and developed a pipeline of over 30 projects under active review
- Prepared 10 projects for validation, including several projects in Costa Rica, and projects in Brazil, Chile and Uganda

DISTILLED AND SHARED KEY LESSONS LEARNED ON THE CDM AND JI

- Analyzed the cost burden of CDM transactions, in particular on small projects
- Demonstrated the sufficiency of environmental additionality and conservative and reasonable approaches to establishing baselines for CDM and JI operations
- Demonstrated that carbon finance, even at relatively low prices, can have an important impact on project viability

PIONEERED PROJECT DOCUMENTATION AND STRUCTURING OF PROJECTS

- Developed a Preliminary Validation Manual to facilitate streamlined, systematic, comprehensive approaches to validation
- Completed baseline studies and Monitoring and Verification Plans for several projects
- Pioneered legal structures for JI and CDM projects
- Finalized intermediary agreements to bundle carbon purchase transactions for small renewable and energy efficiency projects in Brazil and Eastern Europe
- Developed a coherent initial approach to carbon pricing, risk assessment and transaction structuring

PROVIDED CAPACITY BUILDING OPPORTUNITIES, AND DISSEMINATED PCF EXPERIENCES AND RESEARCH RESULTS WIDELY

- Launched training in partnership with the World Bank Institute covering basics of carbon finance and project design, and delivered training to 22 country teams
- Increased the number of PCF participating countries to over 30 and created a PCF fellowship program enabling 9 representatives to work in the PCF Fund Management Unit for up to three months at a time
- Launched a research and development program, which completed reviews of carbon market developments, carbon finance for solar photovoltaic operations, and streamlined baselines for small-scale energy conservation projects
- Built an interactive website *(www.prototypecarbonfund.org)* to disseminate knowledge of PCF's work

One of the difficult challenges facing the global community is how to cost-effectively reduce greenhouse gas emissions to avert the worst impacts of climate change. Under the Kyoto Protocol, which was adopted under the UNFCCC, industrialized countries must reduce their carbon emissions by an average of 5.2 percent below their 1990 levels by the end of 2012.

To meet these commitments in the most cost-effective manner, the Protocol contains provisions allowing industrialized countries some flexibility to meet their obligations through projects generating emission reductions (ERs) in developing countries and transition economies. Two provisions are particularly important:

- Article 6 of the Kyoto Protocol allows for the "Joint Implementation" (JI) of projects by industrialized countries, including those with economies in transition. Under this provision, an entity in one such country finances or purchases ERs from a project in another.
- Article 12 of the Kyoto Protocol provides for a similar project-based mechanism, the so-called "Clean Development Mechanism" (CDM), under which an entity in an industrialized country finances or purchases ERs from a project in a developing country. The purpose is to assist developing countries with sustainable development through the transfer of cleaner technology and financial resources for specific projects, while at the same time contributing to the objectives of the Convention by lowering carbon emissions.

Established in 2000 *(see Milestones, page 12)*, the World Bank's Prototype Carbon Fund is a response to these opportunities, the challenge of the potential adverse impacts of climate change for developing countries, and the need to understand and test the processes and procedures for creating a market in project-based emission reductions under JI and the CDM.

There appear to be many opportunities to reduce emissions of greenhouse gases in developing countries at a cost of between $1 and $4 per ton of CO_2 equivalent. This compares with a marginal abatement cost that rises quickly to $15 per ton of CO_2e in industrialized

economies, and already exceeds this level in the most energy-efficient economies. It is the difference in cost to industrialized and developing countries that provides the opportunity for mutually beneficial trading relationships.

In terms of adverse impacts, the Intergovernmental Panel on Climate Change (IPCC) estimated in 1995 that—should the global level of CO_2 concentrations double—the cost of climate change could be as high as 5 to 9 percent of GDP in developing countries. This is several times higher than the share of the GDP that would be borne by industrialized countries. Among the Bank's member countries, the IPCC also concluded that the poorest would be at the greatest disadvantage.

The Bank's Board of Executive Directors has expressed the view that the PCF can contribute practical learning experience as negotiations continue on the final rules and procedures of the market for project-based emissions reductions.

STRATEGIC OBJECTIVES

From the outset, the PCF had three primary strategic objectives:

1. Show how project-based greenhouse gas emission reduction (ER) transactions can promote and contribute to sustainable development and lower the cost of compliance with the Kyoto Protocol.

2. Provide the Parties to the UNFCCC, the private sector, and other interested parties with an opportunity to learn by doing in the development of policies, rules, and business processes for the achievement of ERs under JI and the CDM.

3. Demonstrate how the World Bank can work in partnership with the public and private sector to mobilize new resources for its borrowing member countries while addressing global environmental problems through market-based mechanisms.

PCF'S STRUCTURE

PCF contributors comprise both companies and governments. The PCF aims to demonstrate how insights and experience from both sectors can be pooled to mobilize additional resources for sustainable development and address global environmental concerns through the marketplace.

The contributions from both companies and governments will be used to purchase ERs fully consistent with the Kyoto Protocol and the emerging framework for JI and the CDM. Contributors, or "participants" in the PCF, will receive a pro rata share of the emissions reductions, verified and certified in accordance with carbon purchase agreements reached with the respective project sponsors *(see list of the PCF participants, page 13).*

The fact that not only governments, but also 17 private companies are subscribers to the

PCF demonstrates to host countries and other stakeholders that there is a significant private sector interest in the emerging market for ERs under JI and CDM. After all, to effectively address climate change, implementation of the Kyoto mechanisms must be dominated by the private sector.

Governments are involved to learn from the PCF's experience in supporting sustainable development within the regulatory framework being developed by the Parties to the UNFCCC. At the same time, governments are interested in the emission reductions generated by JI and CDM projects in order to comply with their reduction commitments under Article 3 of the Kyoto Protocol.

Countries hosting PCF projects participate actively in PCF as a formal element of its governance, providing advice and receiving technical assistance in preparing to participate in CDM and JI. Membership in the Host Country Committee has grown steadily to over 30 by mid-2001 *(see map, page 14)*.

PCF expects to place all its funds by 2004, and is scheduled to terminate in 2012.

July 1997

World Bank President James D. Wolfensohn received positive feedback from a number of industrialized and developing countries to his suggestion to establish a carbon investment fund.

July 20, 1999

Executive Directors of the International Bank for Reconstruction and Development (IBRD) approved the establishment of the Prototype Carbon Fund.

January 18, 2000

PCF was launched and sought private and public subscriptions.

April 10, 2000

At its first closing, six countries and 15 private sector entities agreed to pay $10 million and $5 million respectively to participate in the PCF.

May 15, 2000

World Bank's Board increased the Fund's maximum size to $180 million and approved advancing the date of a second closing.

October 31, 2000

At its second closing, two more private sector entities joined, bringing the capital of the fund to $145 million.

Companies

British Petroleum-Amoco, United Kingdom

Chubu Electric Power Co., Japan

Chugoku Electric Power Co., Japan

Deutsche Bank, Germany

Electrabel, Belgium

Fortum, Finland

Gaz de France, France

Kyushu Electric Power Co., Japan

Mitsubishi Corp., Japan

Mitsui & Co. Ltd., Japan

Norsk Hydro, Norway

RaboBank, The Netherlands

RWE, Germany

Shikoku Power Co., Japan

Statoil, Norway

Tohoku Electric Power Co., Japan

Tokyo Electric Power Co., Japan

Governments

Government of Canada

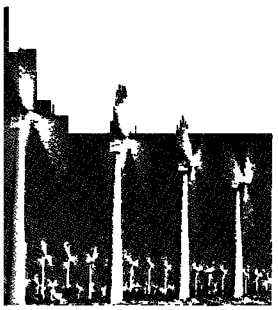
Government of Finland

Japan Bank for International Cooperation

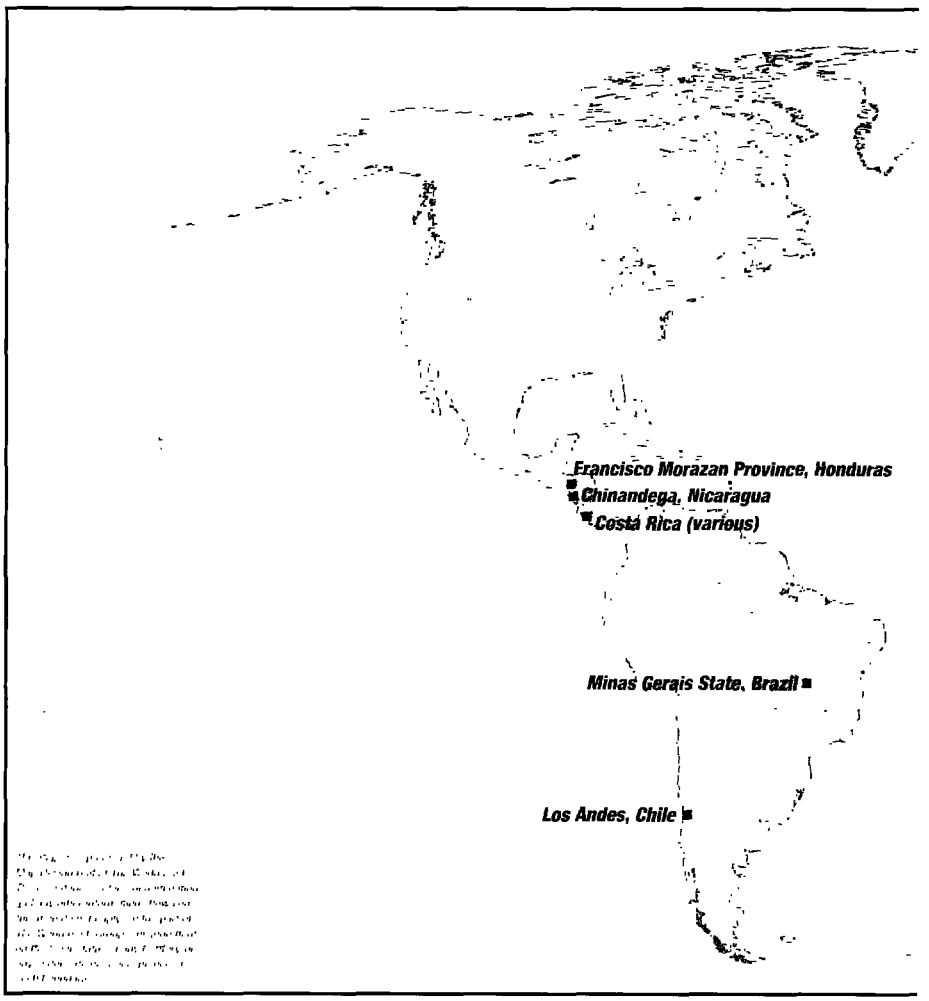
Government of The Netherlands

Government of Norway

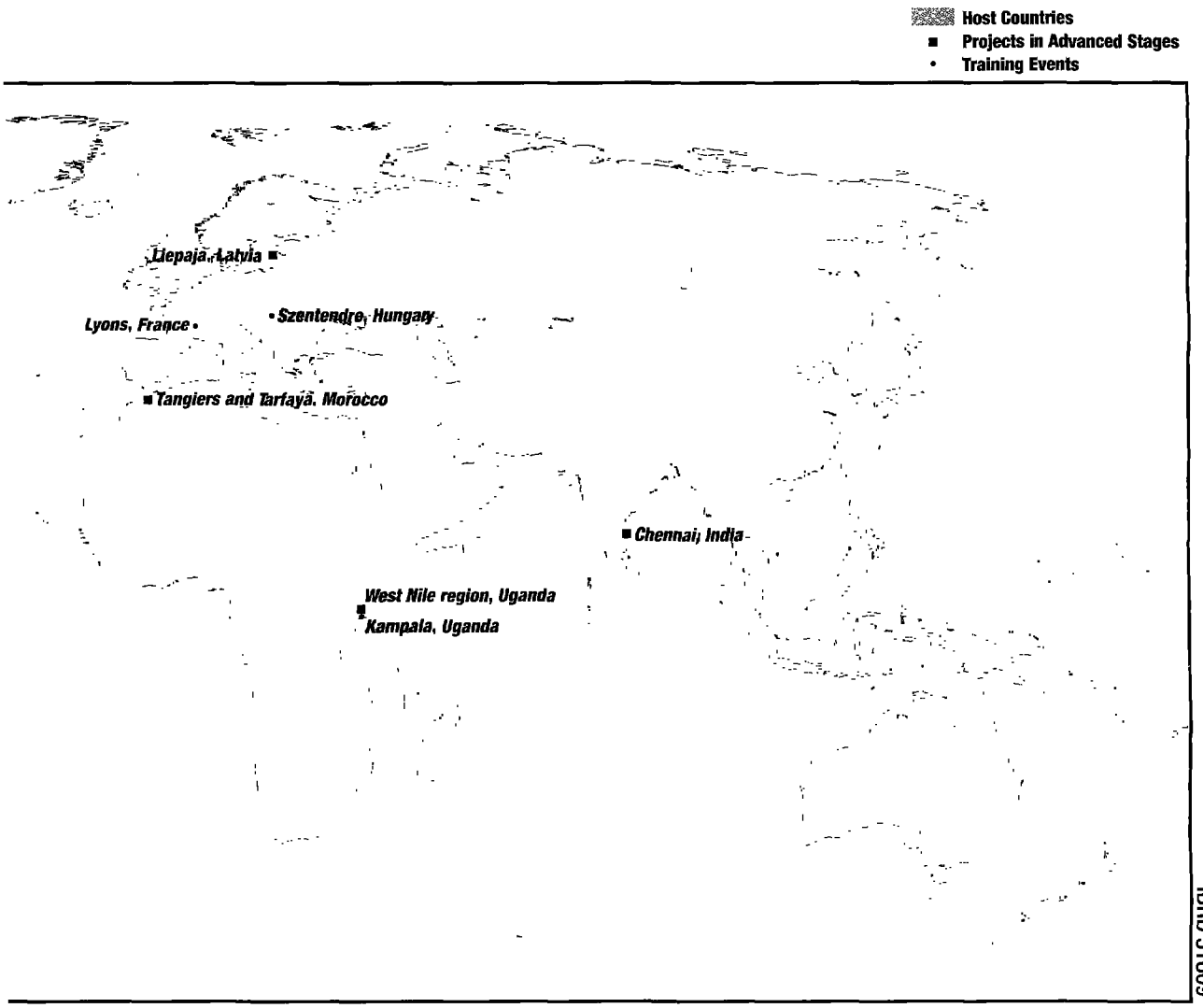
Government of Sweden



[illegible] countries, projec[illegible] pipeline [illegible] training



OCTOBER 2001


Host Countries
Projects in Advanced Stages
Training Events
Liepaja, Latvia
Lyons, France
Szentendre, Hungary
Tangiers and Tarfaya, Morocco
Chennai, India
West Nile region, Uganda
Kampala, Uganda
IBRD 31609

The PCF intends to purchase emission reductions from 25–30 projects, and identify, prepare and approve these transactions in the first three years of its operation. Various stakeholders including PCF participants, host country governments and non-governmental organizations (NGOs), were consulted on the design of the PCF's project selection *(see Web version of this report)* and portfolio development criteria *(see Web version)*, which are described in the *Instrument Establishing the Prototype Carbon Fund*. Further guidance has been provided through discussion with PCF participants and others to help focus the efforts of the PCF Fund Management Unit's (FMU's) screening of projects.

The PCF will develop a project portfolio with the intention of achieving a balance in the number of projects undertaken in economies in transition and in developing countries, and in doing so will aim for regional balance. While the PCF intends to emphasize the development of projects in the area of renewable energy technology, energy efficiency projects will also be supported. Where permitted under the Protocol, a small number of forestry, land use and land-use-change (LULUCF) will also be identified[1].

THE PCF PROJECT CYCLE

The PCF project cycle *(see Figure 2.1)* was designed to adapt to the emerging guidelines of the legal framework of the UNFCCC and/or the Kyoto Protocol *(see Web version)*. Chapter 4 discusses these steps and their costs in more detail, and the Web version summarizes the costs for each stage in the project preparation.

PCF PORTFOLIO DEVELOPMENT

Experience shows that most of the projects for which the PCF will eventually provide funds must be identified within the first 12 months of Fund implementation in order to reach negotiations before the end of June 2003.

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[1] This will have to consider the agreement of the UNFCCC Parties at CoP 6 bis to allow afforestation and deforestation projects under the CDM.

As of the end of September 2001, the PCF had received 130 Project Idea Notes (PINs). Project Concept Notes (PCNs) were prepared for 25 of these projects *(see Figure 2.2)*. The PCF Fund Management Committee (FMC) and the Participants Committee has reviewed and cleared 15 of these PCNs. It should be noted that these numbers include the 7 PCNs for subprojects under the Costa Rica umbrella project. The Project Design Document (which includes the detailed baseline study and the monitoring and verification plan) and the Emission Reduction Purchase Agreement (ERPA) has been negotiated (or is expected to be so shortly) for projects in Latvia, Uganda, Chile, and Brazil. As the list of projects approved by the FMC and the Participants Committee indicates *(see Table 2.1 and map)*, it is expected that a number of other cleared projects will go through the preparation stages quite rapidly.

REGIONAL DISTRIBUTION OF PCF PROJECTS

The enthusiasm of the Central American countries and those of the economies in transition has resulted in the initial focus of project development activities in these regions *(Figure 2.3)*. Greater effort is being made to identify projects in Africa and Asia, where an endorsement was received for the first project in India.

TECHNOLOGY MIX IN THE PCF PORTFOLIO

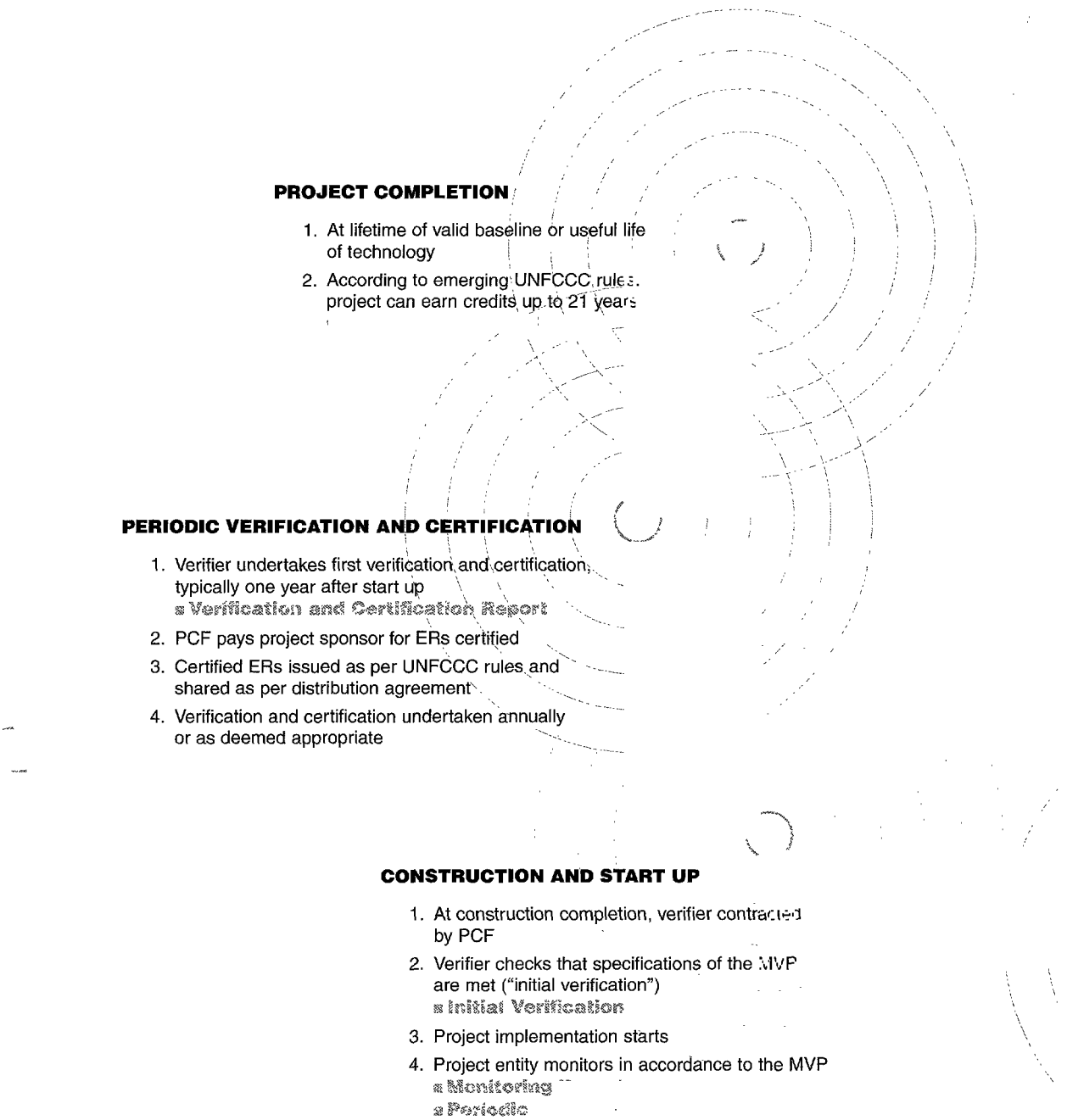
The PCF places a major emphasis on the development of renewable energy projects. These will include wind, small hydro, solar direct, solar photovoltaic (PV), landfill gas, refuse-derived fuel, geothermal power and heat, and biomass fuels, including crop-residue fuels such as bagasse, rice husks, coffee husks, and wood fuels. While the PCF intends to achieve a 3:2 ratio between renewable energy and energy efficiency projects in its portfolio, renewable energy projects dominated those going forward in fiscal year 2002 *(see Figure 2.4)*. Greater effort is being devoted to locating suitable energy efficiency projects, including demand-side management, such as manufacturing processes, building and appliance efficiency measures, and supply-side efficiency such as transmission, distribution efficiency measures, and gas flaring reduction.

EXPANDING THE SCOPE OF EMISSION REDUCTION PROJECTS

It is expected that the project-based carbon market will be dominated by single-project transactions generating millions of tons of ERs per year, such as coal-to-gas conversions and clean coal technology in power supply, and gas supply efficiency improvements. In such projects, CDM transaction costs are small in proportion to overall investment. But very few countries can sustain these large scale projects.

In contrast, all countries have small-scale renewable energy and energy efficiency opportunities that can enhance their rural economies and provide clean technology in manufacturing and infrastructure. Therefore, the PCF will seek means to bring smaller projects into its

Figure 2.1. PCF Project Cycle
(Required PCF-specific documentation in blue; other World Bank documentation in green)



PREPARATION AND REVIEW OF THE PROJECT

1. Project ideas reviewed by PCF
   - Project Idea Note
2. Host country endorsement sought
   - Letter of Endorsement
3. Advanced project design documentation prepared by project sponsor
   Note (PCN) Document
4. Further work authorized by Fund Management Committee and Participants Committee
5. PCF formally signals intention to purchase ERs (optional)
   - Letter of Intent

BASELINE STUDY AND MONITORING AND VERIFICATION PLAN (MVP)

1. Baseline study and MVP prepared by consultants or project sponsor
2. PCF quality control of results
3. Documents for Validation prepared by PCF and project sponsor
   Design Document (PDD), Study and MVP

VALIDATION PROCESS

1. PCF contracts the validator and submits documents
2. Validator studies project design, baseline and MVP and consults with PCF and project participants
3. Validator issues a report and opinion
   Report and Appraisal Document
4. Registration of project as per UNFCCC rules

NEGOTIATION OF PROJECT AGREEMENTS

1. PCF prepares term sheets and draft legal documents
2. Pre-negotiations workshop for project participants on market, contracts and the Kyoto Protocol (optional)
3. Negotiations
4. Project financial closure
5. Effectiveness of project agreements
   - Emission Reduction Purchase
   - Host

portfolio. Smaller projects, however, are difficult to process cost-effectively, even with provisions for streamlining CDM procedures for small projects. Delivering carbon finance efficiently to tiny projects of hundreds of watts to a few kilowatts of installed power, or to mass distribution of single energy efficient appliances, such as air conditioners or solar water heaters, is even more challenging. Encouraging such projects will enable the benefits of the CDM to reach smaller countries, rural areas and the poor.

Figure 2.2. Development of Project Ideas Submitted to PCF
(as of September 30, 2001)

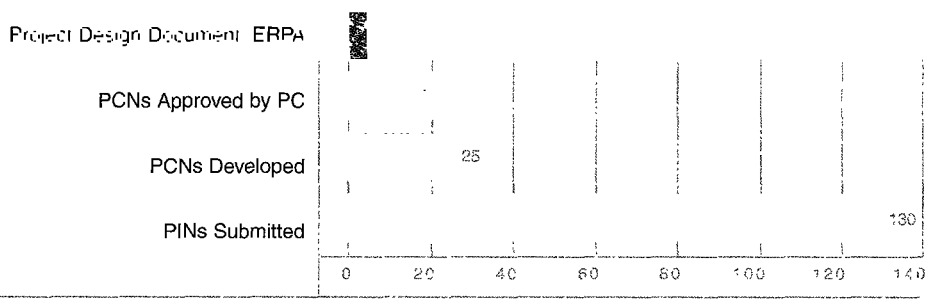


Table 2.1. Projects Cleared by the Participants Committee
(see Web version for full description and project status)

Country/project	PCF ER purchase	Total project cost
	(in million US$)	
Latvia: capture of landfill gas and power generation	2.477	16.97
Uganda: small hydro power displacing diesel oil in the rural West Nile Region	3.9	21
Chile: 26 MW run-of-river hydro power facility set up in cascade with other hydro projects in Chacabuquito	3.5	37
Brazil: replacement of coke in pig iron production by charcoal	5	TBD
Morocco: construction of wind farm displacing gas-fired power generation	7–10	TBD
Costa Rica: umbrella project for renewable energy	7.5–10	TBD
India: energy from municipal solid waste	8	48
Central America (other than Costa Rica): renewable energy	10	TBD

PCF anticipates purchasing over $50M of ERs from projects already approved by the Participants Committee

Early in its development, PCF committed $10–15 million to demonstrate land use change and forestry activities to generate ERs that were eligible under JI. With agreement in CoP6 to include afforestation and reforestation under CDM, PCF resources can be applied to exploring good practice here as well.

LOOKING AHEAD

In addition to aggressively developing projects and concluding emissions purchase agreements, the following developments are expected in fiscal 2002.

Going East. With healthy project pipelines in Latin America, Eastern Europe, Central Asia and Africa, the PCF will undertake more extensive outreach and consultation with countries in East Asia. Discussions have been initiated with China, the Philippines, Thailand, and Vietnam and the PCF expects to fully utilize the $15 million set aside by the PCF Participants for this region.

Bundling small projects and intermediation. PCF is exploring cost-reduction measures to allow ERs from small deals to compete with high-volume, low-cost projects in cooperation with A2R/EIC in Brazil, OCIC in Costa Rica, and Fondelec-Dexia in Eastern Europe. These measures include (a) using one generic "umbrella" agreement with a host country covering all transactions for an extended period and simple letters of approval for each small sub-project; (b) establishing multi-project or sectoral baselines, which allow a simple test of additionality for each small project; and (c) applying bulk validation, verification, and certification procedures, which use statistical sampling techniques.

Contractual arrangements for these are in preparation. Over the next year, these partnerships should demonstrate the effectiveness of these measures and offer insights for further streamlining.

Pico projects. PCF has earmarked a small but relatively important part of its resources to purchase carbon from tiny projects to learn how carbon finance can help. The first of these projects is being implemented in Guatemala in partnership with Fundacion Solar, which is seeking to establish micro hydropower to isolated villages that are not connected to the grid. As part of the project, Fundacion Solar will promote local management to guarantee the economic sustainability and long term viability of the project. The PCFplus program intends to meet most of the transaction costs as the PCF explores all options to channel carbon finance to these micro hydropower transactions.

Land-use change and forestry projects. Already, PCF is working with the Romanian government on a project to restore degraded forest ecosystems for conservation and plant degraded agricultural lands with commercial forests. PCF's Brazilian Sustainable Fuel

Wood and Charcoal Project has also been modified to include restoration forestry for the "Cerrado" ecosystem and to explore integrated conservation and production forestry on a landscape scale supported by carbon finance.

These projects will enable PCF to explore approaches to addressing "permanence" in forest-based ERs, the synergy between biodiversity conservation and LULUCF activities, and good practice in social assessment.

Figure 2.3. Geographic Distribution of Projects by End of FY02

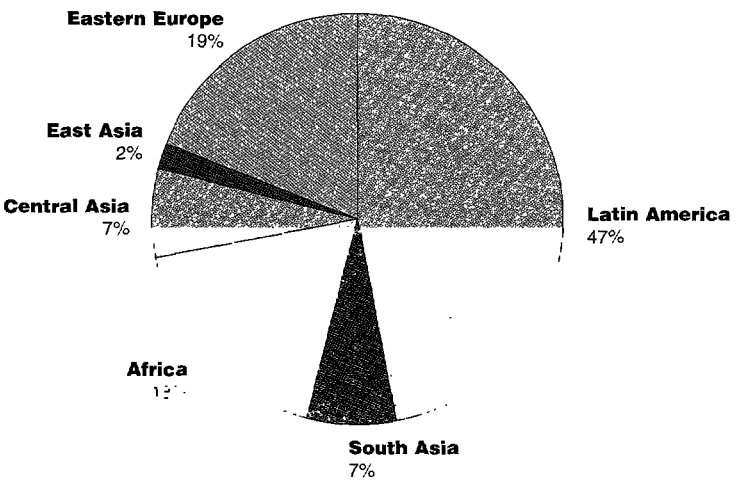
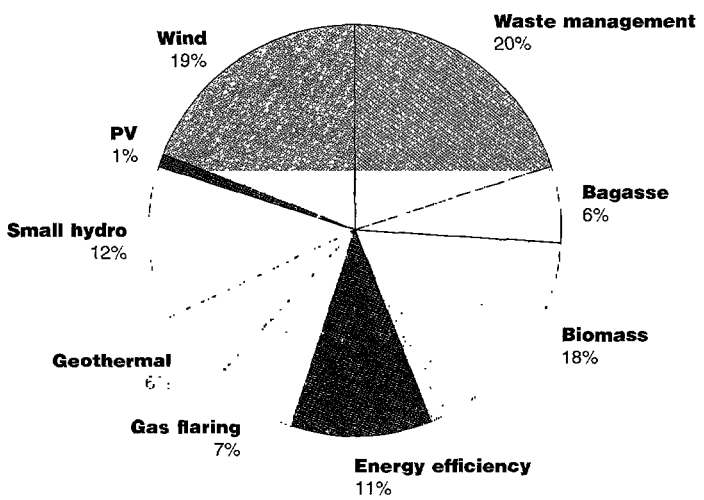
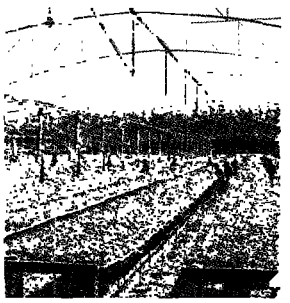


Figure 2.4. Technology Distribution for FY02 Pipeline





PCF'S PRICING POLICY

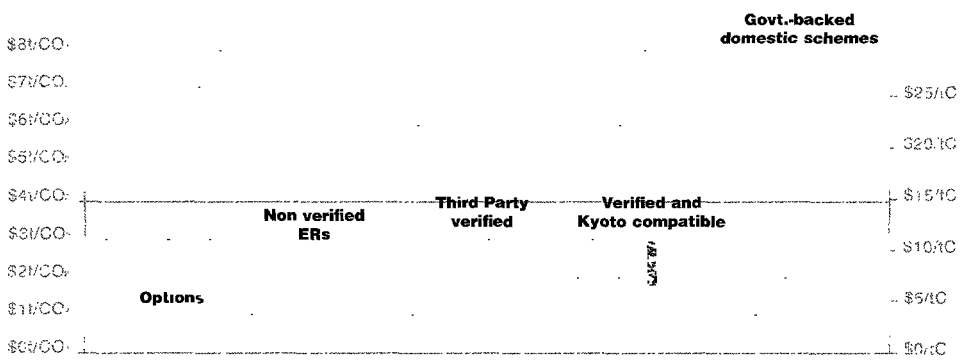
In the absence of a public, liquid market for emission reductions, and given the heterogeneity of the few transactions that have been executed, determining the price to pay for ERs is a challenge. The future evolution of ER prices is even more speculative. The PCF therefore considers several factors in determining its offer price for ERs, including:

- Consistency with evolving market prices,
- Equitable benefit sharing,
- Participants' willingness to pay, and
- Coherence across the PCF portfolio.

Consistency with evolving market prices

The PCF monitors the emerging carbon market to ensure that the price it pays for ERs is broadly in line with prices paid by other buyers under comparable transactions. Thus far, ERs have been valued across a wide price range—from about $1 per ton of carbon dioxide equivalent (tCO_2e) for non-verified ERs, to over $8/$tCO_2e$ for permits that are recognized by governments under existing domestic schemes. ERs generated for the

Figure 3.1. Historic Prices for CO_2-Equivalent Emission Reductions

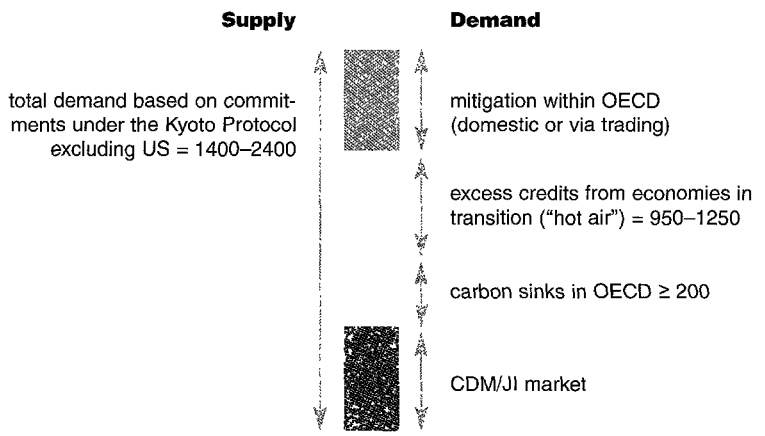


Credibility commands a substantial premium.

emerging CDM/JI market (that is, which are compatible with the emerging rules of the Kyoto Protocol) trade within a narrower band of about \$2-\$3/ tCO_2e *(see Figure 3.1)*. PCF-supported projects fall into this latter category.

Prospective market prices will depend largely on the evolution of demand and supply. Demand will depend upon factors such as economic growth in industrialized countries, voluntary corporate commitments, and potential US commitments. Supply will be influenced, among other things, by barriers to project development, abatement costs within OECD countries and emissions trading under Article 17 of the Kyoto Protocol, in particular by the attractiveness of "hot air." Figure 3.2 breaks down the elements of demand and supply, indicating that, depending on these factors, the future market for ERs from CDM/JI projects may be relatively small. This would imply possible prices ranging from zero to about \$7–\$8/tCO_2e in a medium-growth scenario excluding the US. If the US were to take commitments under the Protocol, prices would likely be substantially higher. *(Web version surveys the global carbon market and evaluates prospective demand and supply, based on recent market assessments commissioned by PCFplus.)*

Figure 3.2. Estimates of Potential Demand and Supply of Emission Reduction Credits
(m tCO_2e/annum)



The size of the CDM/JI market will depend on evolution of supply and demand for ERs.

Equitable Benefit Sharing

In addition to mitigating climate change, the CDM is intended to help developing countries achieve sustainable development and enable them to share in the benefits of CDM projects. The PCF supports these objectives, not only because they correspond to the World Bank's mission, but also because a fair deal is likely to be durable—an important factor given that PCF may make ER purchase contracts for 10 years or longer. The PCF therefore seeks projects that will deliver sustainable *local* benefits beyond climate change, and seeks to negotiate prices and payment terms that will enable project entities to share equitably in the benefits of the ERs arising from these projects.

Willingness to Pay

The PCF's FMU has obtained guidance from the PCF participants on the parameters of their willingness to pay, notably in terms of the average outcome price they are seeking over the portfolio as a whole. The participants' willingness to pay may evolve as the market develops and as price signals become clearer. The FMU negotiates contracts at prices intended to enable the PCF to attain the target portfolio outcome price, after allowing for risk, overheads, and transaction costs.

Coherence across the PCF Portfolio

The prices paid by the PCF will vary over time and from contract to contract. They will depend on factors such as those noted above and, critically, on the level of risk inherent in the transaction and the underlying project. The PCF is willing to pay more for high-quality, low-risk ERs. However, because the fund's objectives go beyond maximizing return, the PCF expects that transactions that are first-of-a-kind, located in small or poor countries, or involve intermediaries that execute and aggregate small projects will cost more primarily because of higher transaction costs.

IMPACT OF CARBON FINANCE ON PROJECT INVESTMENTS

Based on the above factors, the PCF anticipates to pay around \$3/ tCO_2e on average (on delivery of ERs) under contracts it signs in the coming year.

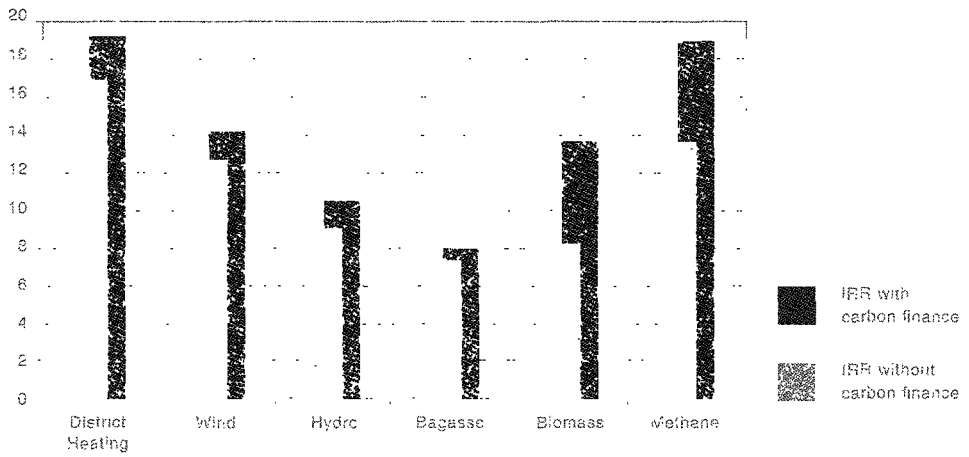
Even at this price, carbon finance can have an important impact on project viability by providing a high-quality stream of cash flows: it can boost financial internal rates of return (IRRs) substantially, and improve access to both public and private financing.

Impact on Project Financial Viability

The positive impact of carbon finance on the financial viability of projects is particularly important in projects that mitigate emissions of potent greenhouse gases such as methane. For example, for a proposed municipal solid waste project in India involving methane conversion and electricity generation, the sale of carbon offsets could provide revenues equivalent to over 2 cents/kWh. This increases the estimated project IRR by over 5 percent—from 14 percent without carbon finance to 19 percent with the sale of a share of ERs—making the project viable without subsidies. At the same time, the project would improve the sanitary conditions of waste management, reduce the space required for landfill, and create jobs.

The implications are important: carbon finance can help turn marginal projects, which might otherwise require either subsidies or public sector management, into freestanding projects capable of being privately financed and operated.

Figure 3.3. Impact of Carbon Finance on Sample Renewable Energy and Energy Efficiency Projects



Carbon finance can make marginal profits bankable.
(Web version provides IRR data for a range of projects, with and without carbon finance.)

Even for traditional renewables and energy efficiency projects, which achieve ERs by displacing carbon-intensive generation of power and/or heat, carbon finance can be catalytic. With the potential to boost project financial IRRs by 0.5 to 2.5 percent, it can make these projects competitive with thermal alternatives, thus providing the financial incentive to invest in environmentally friendly projects with local as well as global benefits. Figure 3.3 shows the impact of selling carbon at \$3/ tCO_2e on project IRRs for a range of technologies.

Among renewables, off-grid power generation projects provide the greatest climate benefit (and hence the greatest potential ERs per kilowatt-hour), because they generally displace more carbon-intensive generation than grid-based projects. For example, an off-grid hydro project in western Uganda could generate carbon credits worth about 0.5 cents/kWh (assuming an ER price of \$3/tCO_2e) by displacing small, inefficient diesel generation *(see Web Version for additional examples)*. Grid-based hydro projects generate only one-third to one-half of the ERs as compared to off-grid projects because they displace industrial-scale gas or coal generation, which is substantially less carbon-intensive.

Improved Access to Financing

The impact of carbon finance goes beyond boosting cash flows. An emission reduction purchase contract with the PCF represents a high-quality, contractual flow of foreign exchange with none of the cross-border risks (such as transfer and convertibility risk) that an investor faces on local-currency cash flows. In this sense, *carbon finance reduces the riskiness of the cash flows generated by the project and can therefore enhance its ability to attract private financing.*

Carbon finance can also facilitate the flow of development assistance as well as private financing. To illustrate, the Latvia Liepaja Solid Waste Management Project used PCF financing as matching funds, enabling it to receive over $5 million in grant funding from the European Union for which it would not otherwise have qualified.

More generally, the rigorous environmental and social assessments and monitoring required by the PCF (in accordance with the World Bank Group's safeguard policies) provide an implicit "seal of approval" that is attractive to aid donors and to the growing community of socially responsible investors. As noted above, this evidence of environmental, social and economic sustainability also enhances the value of the ERs.

MANAGING RISK AND UNCERTAINTY

Types of risk in carbon transactions

Carbon finance is inherently risky. It involves contracting to purchase an asset created by documenting the absence of invisible gases, generated by projects located in emerging markets, over a period of many years, where the host country must consent to transfer the asset to the buyer. Even if all goes well and the ERs are delivered, their value is highly speculative and their liquidity is not assured. Beyond the normative risks faced by any investor in an emerging-market project, carbon purchasers face additional risks, which can be grouped into four main categories:

- *Baseline risk* relates to the creditability of the ERs *(see Chapter 4)*. Is the project's baseline robust and will its assumptions remain valid, enabling it to generate the expected level of certifiable ERs on schedule? For CDM projects, will the Executive Board clear the baseline? Will the crediting period be renewed after 7 and 14 years?
- *Regulatory risk*, closely related to baseline risk, relates to the Kyoto Protocol and host countries' compliance with their obligations under the Protocol. Will the Kyoto Protocol enter into force? If so, will the ERs generated by the project be eligible for crediting? Will the host country (a) ratify the Kyoto Protocol, and (b) maintain compliance with the Protocol?
- *Market or price risk*. What is the expected price of ERs on delivery? This risk is high because little is known about the future evolution of the market.
- *Project risks* relate to the underlying project. Will it perform as expected, and hence will it deliver the expected quantity of creditable ERs? These risks include performance risk, contract risk, counterparty risk, and country risk. They are generic to the project and are faced to some extent by all of the financiers, including PCF.

(Web version provides more on the elements of risk.)

Risk assessment and management

The PCF manages these risks by systematically assessing each category of risk, ensuring that each specific type of risk is assigned to the party best able to manage it, and mitigating the risks it assumes itself through financial engineering and contractual clauses. *(Web version discusses PCF's risk assessment tools.)*

Structuring Projects to Mitigate Risk

The PCF manages its exposure to *baseline risk* by commissioning a rigorous *baseline study* and *monitoring and verification plan*, and having these, as well as the project concept, *validated* by a qualified, independent third party.

It mitigates *regulatory* risk by seeking commitment from host countries that they will ratify the Kyoto Protocol, maintain compliance, and transfer the ERs purchased by PCF.

The PCF is willing to assume the *market or price risk* for the ERs that it contracts to purchase from a project entity. It agrees in advance to pay a specific price on delivery of ERs, regardless of the actual price available in the market at that time. The PCF commissions periodic assessments of carbon purchase transactions (including those referred to above) to better understand the market risk it is assuming, to identify trends in market prices, and to update its participants on market risk and price trends.

The PCF manages and mitigates its exposure to *project risks* by measures such as:

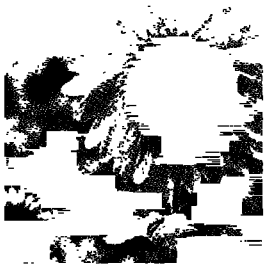
- Commissioning independent risk assessments to evaluate risks identified in its own reviews,
- Overcollateralization, *(Web version defines and illustrates this.)*
- Purchasing ERs primarily in the early years of a project,
- Establishing the PCF's senior interest in ERs generated by each project,
- Purchasing ERs on delivery, and
- Requiring credit enhancement through security, insurance, guarantees, and/or other risk management tools.

LOOKING AHEAD

In the coming year, PCF will gain additional experience in structuring emission reduction purchase transactions. We expect this to yield:

- A range of transactions structured to mitigate risk, and priced to reflect the risks assumed by PCF,
- Good estimates of the cost of the CDM project cycle steps, and
- An increasingly systematic approach to project evaluation, risk assessment, pricing, and transaction structuring to improve the transparency of carbon purchases.

The PCF experience so far shows that carbon finance can improve the viability of projects, especially those involving the mitigation of methane emissions. Uncontrolled waste deposition *(as above)* can become a practice of the past.



carbon

The main quality concern in the PCF project cycle is environmental additionality and the credibility of a project's future emission reductions. Ensuring the quality of the carbon asset requires at least:

- an excellent understanding of the concepts of additionality and baseline;
- the use of practical methodologies to determine baselines for concrete projects;
- the creation of workable tools to monitor relevant data and calculate ERs; and
- accepted procedures for project validation and verification of ERs.

The PCF's methodological work and experience to date has resulted in a much better understanding of environmental additionality. The often-heard statement that "baselines are complex" is no longer an abstract notion, as numerous issues have had to be addressed in virtually every PCF project. Actually designing and validating projects has helped to clarify these issues. We now understand that:

- There is not one single baseline methodology that works for all projects and all possible situations during a project's lifetime.
- Many projects require the use of several methodological elements to establish a credible baseline, which is reflected in the MVP.
- The baseline study and MVP must be closely linked to ensure project validation and verifiability of ERs.
- The MVP must not only contain the requirements for a monitoring system, but is also a model of the project's performance and can be used to simulate and forecast ERs.

BASELINES AND ADDITIONALITY

In keeping with the Kyoto Protocol, the PCF defines additionality as the positive difference between the emissions that would have occurred without the JI or CDM project activity (baseline emissions) and the actual emissions of the project over its lifetime. A project

that credibly promises to generate ERs is therefore additional and, provided it meets all other requirements, can be registered as a CDM or JI project.

Baselines are the lynchpin of JI and the CDM. They are required to demonstrate project eligibility and calculate certifiable ERs.

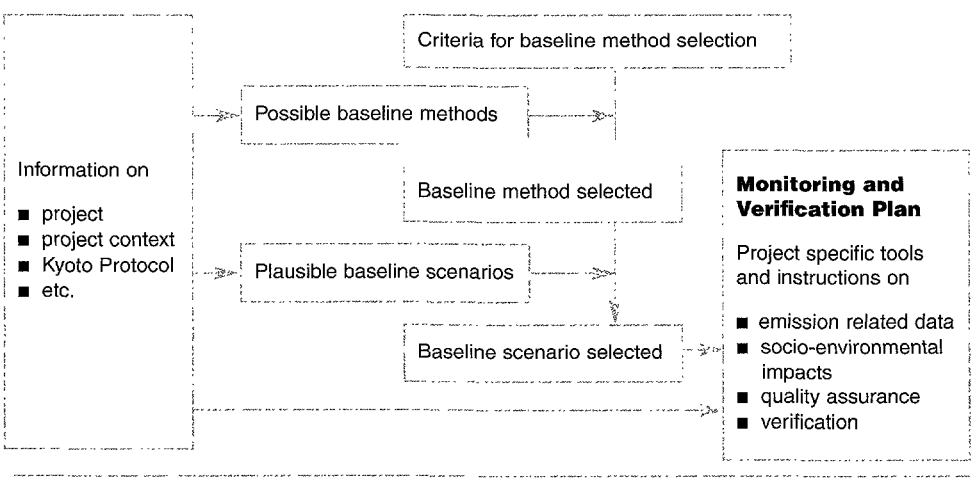
While project emissions can normally be measured, baseline emissions are a theoretical construct. Baseline emissions are associated with a hypothetical scenario that is superseded by the JI or CDM project. Consequently, much of the PCF's work deals with the proper identification of the baseline scenario as it would evolve over time. Using its project pipeline, the PCF develops and tests approaches that help establish practical methodologies for baselines. Such methodological approaches are indispensable because they are the only means for an independent third party to validate the project baseline.

The PCF's estimate of the baseline for a particular project is developed after extensive discussions among PCF staff, project proponents, and outside experts. The PCF then commissions a formal baseline study, which is defined as "a systematic and methodological analysis to determine the most likely development scenario and its evolution in time in the absence of the Kyoto Protocol and its mechanisms."

The PCF has learned to quickly identify realistic baseline claims and to put them to the test of a formal baseline study. Even more importantly, the PCF has learned how the baseline study and the project's monitoring and verification plan must work hand in hand, because details that the baseline study may not be able to resolve may resurface and can often be resolved in the MVP.

Figure 4.1 depicts the process the PCF typically applies in baseline studies. The process involves the selection of an appropriate baseline methodology and its application to a number of plausible development scenarios, one of which is identified by the methodology as

Figure 4.1. PCF Baseline Study



the most appropriate and most likely baseline for this project. The graph also shows that the MVP builds on the baseline study by providing a tool to monitor relevant data and calculate baseline emissions.

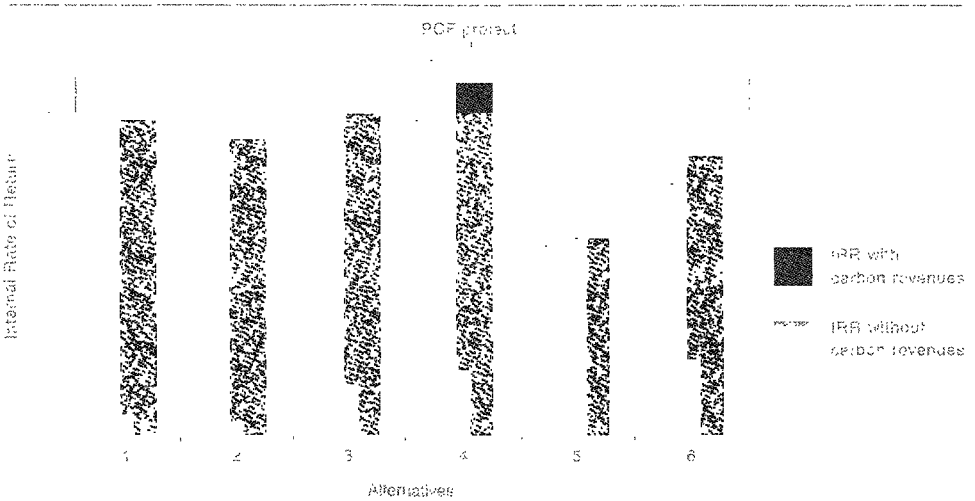
BASELINE METHODOLOGIES FOR PCF PROJECTS

The PCF experiments with a number of baseline methodologies. The methodology applied to a particular project depends on a number of factors, including the type and size of project, data availability, uniqueness, replicability, and costs. To date, the focus has been on project-by-project methodologies such as investment analysis. Project-by-project approaches look at the particular project circumstances as opposed to baseline standards such as benchmarks. Baseline standards are costly to establish, require a high degree of experience with baselines, and require a political agreement among UNFCCC Parties.

The PCF considers a financial or economic investment analysis to be adequate for projects where sufficient information on all plausible project alternatives is available. In fact, such an analysis is often undertaken by World Bank task teams, which must advise Bank client countries on the most beneficial project alternative. This, for instance, was the case for the Latvia Liepaja Solid Waste Management Project, where data was available on the IRRs of a number of plausible waste management solutions and their variants.

Figure 4.2 shows a comparison of IRRs for a number of plausible project alternatives. The applicable baseline is the alternative with the highest IRR without consideration of carbon finance. This alternative does not produce ERs, so IRRs with and without carbon are identical. Hence, the conclusion is that this project alternative is not additional, whereas all other alternatives would be.

Figure 4.2. Liepaja: Economic Analysis of Plausible Baseline Scenarios



The baseline is the alternative with the highest IRR without carbon revenue.

The PCF has used a similar, but more formalized analysis for a wind farm project in Morocco, where the least cost power generation plan (as determined by a power system expansion and dispatch model) was used to determine the baseline scenario. During implementation, actual dispatch data is used to determine what the emissions would have been in the baseline case as well as the ERs in the project case. PCF experience suggests that such models will often play a role in baseline determination for large-scale power projects.

In a third case, the West Nile Hydropower Project in Uganda, extreme risks for long-term investments prevented the use of a straightforward investment analysis. Instead, a risk-based scenario analysis was chosen that looked at various risks, costs, and market conditions for plausible alternatives and, given those factors, selected the least risky alternative as the baseline.

Finally, in Costa Rica, the PCF baseline methodology used the marginal cost of producing power for the national grid as a benchmark to determine additionality. The CO_2 intensity of marginal power in the national grid is used sector-wide as baseline emissions to determine the ERs generated by many small renewable power stations. Once established, the methodology is easy to use and replicable even by non-PCF projects.

SOME LESSONS ON BASELINES AND ADDITIONALITY

A broad variety of issues came up in the relatively small number of projects the PCF has prepared thus far. These issues include for instance:

Baseline shifts. Baseline scenarios and their evolution over time can be significantly affected by unrelated economic developments and political decisions, such as Latvia's preparations to become a member of the European Union. The baseline study must anticipate such developments, and the monitoring plan must make provisions for the necessary adjustments when the anticipated event occurs. The treatment of events that may occur in some distant future and their impact on the baseline is likely to remain a much-debated issue that the PCF intends to study further.

Integrated grid power systems. Integrated grid power systems are a particularly complex case for a number of reasons:

- First, decisions on power system expansion as a whole are very different from decisions on the replacement of specific carbon intensive generation sources. This has been studied in the projects in Morocco and Costa Rica, where Costa Rica presents the additional challenge that the envisaged independent power projects are too small to be part of the system expansion plan.
- Second, international power pools complicate the matter, because at least some of the ERs may physically occur in another country, such as is likely to happen in the planned Central American Grid. This situation can result in monitoring and data problems and may require political agreement between participating countries with respect to the ERs generated.

High transaction costs. Projects in developing countries, particularly small-scale projects, may not yield sufficient ERs to justify the relatively high costs of project preparation. Complicated institutional and political circumstances in the host country and insufficient data may contribute to this problem. For developing countries to benefit from the CDM, simplified procedures are of utmost importance (as has now been agreed among UNFCCC Parties). In the coming 12 months, the PCF will work to simplify procedures for small projects and on standardization of baselines.

Development assistance. The Parties to the UNFCCC have been considering whether projects that are partly financed with official development assistance (ODA) should be eligible for the CDM. This question also raises significant methodological problems. In essence, it is virtually impossible to provide conclusive proof that ODA financing would make the project happen, as this depends on intangible political decisions. If such proof were required to determine the baseline, it would exclude many useful projects from the CDM. The PCF has faced this situation in Uganda and has argued that baseline determination should be based on commercial viability, and should not consider ODA, which should be treated as financing of last resort to fill gaps after the project has used ERs to generate income. This approach is consistent with the notion of the CDM as a private-sector-driven and market-based instrument.

Policy framework. Other issues the PCF will invariably have to deal with in the next 12 months are related to the impact of policy decisions—for example, regarding energy subsidies—and perverse incentives on the acceptability of a proposed baseline. These issues are subtle, potentially highly controversial, and very difficult to deal with in a methodological way. Examples of such issues are described in Table 4.1, next page. In each case, a reason could be presented why the policy plan is not decisive for the baseline. The ongoing World Bank dialogue with the host country will be particularly helpful in providing clues on how to best address these issues.

MONITORING AND CALCULATION OF ERS

The PCF prepares an MVP for each project, which serves as a project-specific performance standard that is validated and used to guide the monitoring and verification process *(See Figure 2.1)*. The MVP is also a performance monitoring and measurement tool. It contains the monitorable indicators for the project and provides instructions to the project entity on how to monitor and measure these indicators. The MVP also contains the technical parameters and equations as well as a spreadsheet model that the project entity must use to record data and calculate ERs.

MVPs often address problems that cannot be resolved in the baseline study, such as defining observable indicators for a shift in the baseline scenario. Such a shift is expected for Latvia, which will have to observe EU solid waste management standards after the country joins the EU and after expiry of any possible transition period. In fact, the MVP often employs elements of control groups to provide real-time details to further specify the baseline scenario and calculate baseline emissions.

Table 4.1. PCF Projects, Baseline Methodologies and Issues

Project	Baseline methodology	Important issue	Solution
Latvia Landfill gas (LFG) collection and renewable power generation	*Investment analysis* baseline is project alternative with the highest IERR	When will EU waste management standards become applicable in Latvia?	MVP indicator identifies deadline for EU compliance and shift in baseline
Uganda Hydropower displaces diesel-based power generation	*Risk-based scenario analysis:* baseline is least risky supply alternative considering costs and market structure	Could project happen with ODA alone, and is this relevant?	Not consistent with development objective: baseline based on commercial scenarios. ODA fills remaining financing gap.
Morocco Wind energy displaces thermal capacity extension	*Investment analysis* baseline is least-economic-cost marginal generation based on expansion and dispatch model	Would Morocco go ahead with project anyway to increase supply security?	Baseline work confirms that Morocco would only proceed with concessional financing
Costa Rica Small-scale renewable generation displaces thermal and hydro generation	*Economic analysis of power sector:* sectoral "standard" defined as baseline for small-scale projects	How can a large number of small-scale projects be brought into the CDM?	Umbrella project with multi-project baseline and procedures: sectoral cost benchmark determines additionality. Sectoral carbon intensity determines baseline emissions. Simple MVP.

Furthermore, the MVP contains a section on the project's social and environmental performance. The host country can use the information to assess whether the project meets the CDM objective of assisting the host country in achieving sustainable development. In addition, a PCF project's social and environmental performance is an important aspect of the quality of the project's ERs as a green commodity.

The MVP requires the establishment of a monitoring management and operational system to ensure that the project entity will be able to monitor and provide the necessary data to the verifier. The management system includes, for instance, provisions for training and proper management oversight. The MVP also contains the instructions and procedures that should be followed during the verification process.

The PCF considers the MVP as a key project document. The MVP allocates clear responsibilities of all those parties involved in the monitoring process. It provides a clear framework, and thus some degree of certainty, for the project entity and PCF regarding the ERs to expect. It is used to project the stream of ERs and later calculate them. Finally, whether the amount of ERs purchased can actually be delivered is also a matter of the quality and reliability of the baseline and the MVP. Therefore, the project sponsor is required under the ERPA to abide by the MVP.

In addition to helping combat climate change, many CDM and JI projects will have significant local and regional environmental benefits. PCF monitoring plans can include indicators for environmental and social benefits.

The MVP the PCF developed for the Latvia Liepaja Solid Waste Management Project has by now become a model for many CDM and JI projects. Indeed, preliminary experience indicates that a project MVP can be a fairly standard document that is easy to replicate and adjust to new projects.

VALIDATION, VERIFICATION, AND CERTIFICATION

The PCF requires the validation of the project design by an independent third party, or "validator." The validator is expected to acquire the status of a UNFCCC-accredited entity as soon as this becomes possible. Validation, if successful, results in the confirmation that the project meets all relevant CDM or JI criteria and requirements and is thus eligible for registration as a CDM or JI project. The validation process is based on the project design document, baseline study, MVP, and ER projections. The validator conducts a rigorous check of all claims made in those documents, while taking comments from stakeholders into consideration, before he issues a public validation report and opinion.

The PCF has completed the validation process for projects in Latvia and Uganda. In both cases, validators have demonstrated their ability to quickly identify the issues on which the credibility of the project hinges, and have required improvements both to the project's design and documentation. They have thus contributed considerably to the quality of the project and to the quality assurance process, giving comfort to the PCF, its participants, the host country and UNFCCC Parties that the project is likely to generate real and verifiable ERs. Based on this validation experience, the PCF has developed a Preliminary Validation Manual (PVM), which is updated and which validators are invited to use.

Independent third-party verification occurs throughout the lifetime of PCF projects and ensures the quality of the ERs achieved by the project. A reputable and experienced environmental auditing firm (verifier), which must be an UNFCCC-accredited entity (when this becomes possible), performs verification in accordance with the validated MVP and best practice industry standards. Before the PCF accepts ERs from a project, an independent third party must verify that the project is, indeed, ready to monitor performance and achieve ERs in accordance with its MVP ("initial verification"). Thereafter, verification is repeated periodically to audit monitoring records and to confirm the calculation of ERs and the project's continued compliance with the MVP and other relevant requirements. The verification process results in a public verification report and, if successful, in a certificate that confirms the number of ERs that have been generated and verified.

TIME SCHEDULE AND COSTS

The time required and the costs incurred to operate the PCF project preparation and quality assurance system are closely monitored by the PCF. PCF is trying to bring these costs down as the experience grows and projects can become more routine.

The time required for work on baseline and MVP has varied greatly, reflecting the variety of project types, sizes, circumstances, and countries, and the complexities of establishing a baseline. New and unexpected issues emerge in virtually every transaction that the PCF develops. Although the format and contents of the baseline study and MVP are now better understood, there is still insufficient experience to identify a full spectrum of issues and to provide uniform and comprehensive guidelines to address them. As a result, preparation times for a formal baseline study and MVP continue to exceed the ideal 2 month target *(See Figure 2.1)*. However, one is expected to approach this target as experience expands and standardized approaches evolve.

The PCF experience so far indicates that the cost for a baseline study and MVP combined is in the order of $55,000. These costs include not only the formal baseline study and drafting of the MVP, but also preparatory work and staff time spent on baseline and related issues prior to drafting the Project Concept Note.

The validation process is already more standardized and can normally be completed within one month unless major issues are discovered in the process. Validation services typically cost in the order of $25,000.

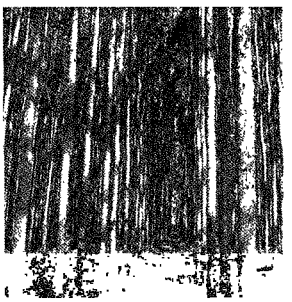
No experience exists yet with the project performance monitoring and verification process. The PCF expects that it may need to assist project entities with the monitoring system and with preparations for initial verification. Monitoring costs are generally absorbed by the project entity. The PCF tries to keep those costs as low as possible by aligning the MVP with the performance monitoring and quality assurance system, which can be operated routinely by a well-managed project. The PCF also expects that verification activities will have to be more intense and more frequent in the early years of a project's life. PCF estimates that verification and supervision would require a minimum of $10,000 per year.

LOOKING AHEAD

With the anticipated work program for fiscal year 2002, the PCF will gain significantly more experience with baselines for various types of projects, in particular with small-scale demand side and energy conservation projects. Coupled with ongoing research, this experience will contribute to a better understanding of control groups as a baseline methodology, the eventual development of standardized baselines, and simplified procedures for small projects.

With the increase in PCF projects, significant progress in the development of a standard MVP template for PCF projects is also anticipated.

PCF experience can significantly help resolve difficult issues concerning baselines as the JI and CDM modalities and methodologies continue to evolve. PCF is well positioned to contribute to this process.



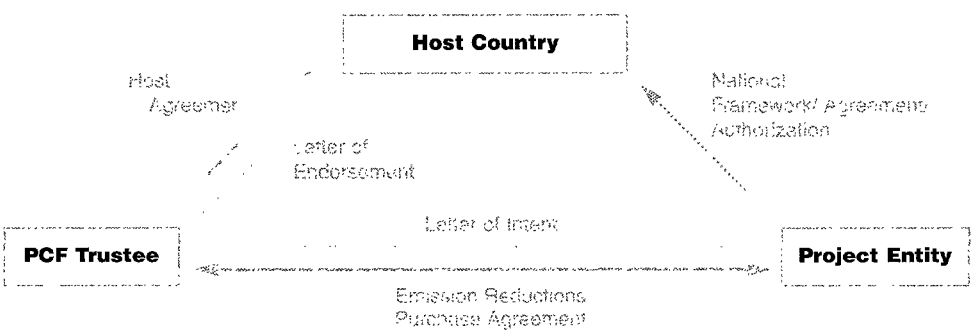
The PCF is negotiating emission reduction purchase transactions before the procedures of the Kyoto mechanisms are finalized. While this provides an opportunity for negotiators and market players to understand how these transactions can work, it also places the PCF in an uncertain legal environment. To accommodate this uncertainty, PCF has developed a set of legal documents for ER purchase transactions. These documents are intended to be sufficiently flexible to adapt to the Kyoto Protocol's future requirements.

EARLY PROJECT PREPARATION

In the early stages of project preparation, parties to the transaction proceed through a series of formal steps *(see Figure 5.1)*, including the following:

Letter of Endorsement. In the early stages of PCF's project review, PCF requests a Letter of Endorsement from the host country. With this letter the host country confirms that it endorses further development of the project for the purposes of the Kyoto Protocol and it is willing to provide all necessary assistance in this regard.

Figure 5.1. Legal Documents for PCF Projects



Legend
documents used in early project preparation
documents that formally structure the transaction
documents required by PCF but to which it is not a party

Letter of Intent. After a project is approved by the PCF's Participants Committee, PCF may sign a Letter of Intent with the project sponsor. In this document, the PCF declares its intention to purchase ERs (under terms to be agreed), while the project entity grants PCF an exclusive mandate and agrees to repay project preparation costs if it unilaterally decides not to proceed with the transaction.

STRUCTURING THE TRANSACTION

Several legal documents engage the parties to the transaction *(see Figure 5.1)*.

Emission Reductions Purchase Agreement. An ERPA will be signed either by the project entity or the host country, depending on national policies and regulations relating to the ownership and the transfer of ERs, and the (IBRD as trustee of the) PCF. The ERPA ensures that the project entity or the host country sells to the PCF all rights, title and interest in all or a part of the ERs generated by the project.

The PCF commits to pay the purchase price in exchange for the exclusive right to have an independent third party certify all or a certain amount of ERs generated by the project. In this respect, the ERPA resembles a forward contract. The ERPA also includes structural provisions that assign risks to the parties most capable of absorbing them *(see Chapter 3)*. Furthermore, the ERPA contains provisions on satisfactory project implementation and requests the maintenance of insurance by the project entity.

The PCF recognizes that the regulatory framework of the UNFCCC and/or the Kyoto Protocol relating to the ownership, holding and transfer of ERs is still under development. The PCF therefore seeks to ensure that the ERPA will be structured flexibly enough so as to enable the parties to the agreement to conform with the guidelines, modalities and procedures of the forthcoming regulatory framework.

Host Country Agreement. In addition to the formal project approval, the PCF will seek a commitment from the host country to transfer rights, title and interest in the ERs generated by PCF projects to the PCF participants[1], either directly or through a private sector project entity. Such agreement may also contain provisions to make sure that the project entity is able to carry out the project with due diligence and efficiency. To this end, the host country is required to take all necessary action, including the provision of permits and licenses. The host country also undertakes that it will remain in compliance with its relevant obligations under the UNFCCC and the Kyoto Protocol.

In the case of the Latvia Liepaja Solid Waste Management Project, the project entity was a public entity and the ERPA which was signed by the host country included these provisions *(see Web version for details)*.

[1] Literally "to or to the order of, the IBRD as trustee of the PCF".

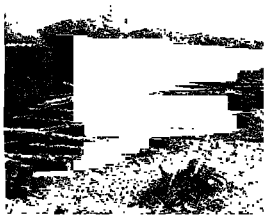
Due to significant interest, the PCF is approaching its limit for transactions involving wind technology. In accordance with the PCF Instrument, no more than approximately 25 percent of the Fund's assets should be put into projects using the same technology.

RISKS MITIGATED THROUGH LEGAL DOCUMENTS

In addition to normal project risks, PCF legal documents try to address specific risks posed by the purchase of ERs under the legislative framework of UNFCCC and/or Kyoto Protocol. PCF experience has shown that the lack of expertise in carbon transactions may be a limiting factor in a carbon market. Carbon transactions are a new business and the knowledge and capacity to deal with these transactions may be limited. Carbon transactions cause new interactions between different sectors such as energy, finance, development, and environment. For many legal and administrative experts, PCF emission reductions purchases are their first exposure to this kind of transaction. Further, most countries have yet to put legislative and administrative frameworks in place to regulate the ownership, holding, and transfer of ERs. As long as such legislation is not in place, the PCF has to address the issues of regulatory risk and uncertainty in its agreements.

LOOKING AHEAD

PCF is developing new types of legal documents to accommodate new types of transactions, including umbrella host-country agreements covering multiple projects, and agreements with intermediaries who bundle smaller transactions.



Knowledge is the PCF's highest value product. Distilled and disseminated efficiently, it can catalyze market development for emissions reductions and help UNFCCC Parties meet the wider objectives of the Kyoto Protocol. Knowledge is the logical outcome of a fund whose primary objective is learning by doing.

For participants, both private and public, the know-how PCF captures through its first-of-a-kind transactions are a source of competitive advantage, either in meeting their obligations to reduce their greenhouse gas emissions or seeking to engage as players in the trade and service industry emerging in response to JI and CDM.

For host-country beneficiaries, both governments and the local private sector, knowledge gained in completing the first sale of ERs sheds light on the export revenue opportunities and the gaps in local laws, rules, and administrative capacity to implement the Protocol and facilitate CDM or JI transactions.

For the Parties to the UNFCCC, PCF's commercial transactions to purchase carbon based on the emerging rules of the game have provided insights on transaction costs, efficacy, and benefit distribution.

From specific PCF transactions, PCF gains knowledge about the impact of emerging rules for JI and CDM. Such knowledge has demonstrated, for example, an unexpected transaction cost burden on small projects, and hence small countries and rural development projects. This is useful both to regulators and to market actors. Knowledge of the impact of carbon finance on projects and average carbon prices helps inform and stimulate market activity.

Other kinds of information—for example, proprietary knowledge of technology, or market positioning of corporate participants—are not essential to enhance the learning value of these insights to UNFCCC negotiators. But such privileged information does provide an advantage to PCF participants and direct beneficiaries in developing countries and economies in transition.

After final project approval, PCF CDM and JI project-cycle documentation and the contracts that frame and enable ER purchases become public knowledge, and thus a global public good. This transparency helps stimulate market activity by lowering learning costs for other players. In addition, it provides a benchmark for constant improvement.

DISSEMINATING PCF'S KNOWLEDGE

PCF has forged an internal partnership with the World Bank Institute (WBI) to develop training programs for its clients and the PCF staff. This partnership is described in Chapter 7. Outside of its capacity building program, PCF's knowledge thus far has been shared with stakeholders through public events at UNFCCC conferences; participation in major global forums around CDM and JI transactions; fellowship programs for Participants and host countries; and through its website.

PROTOTYPECARBONFUND.ORG

The PCF website *(see Figure 6.1)* posts all PCF documents to its stakeholders in a registered private domain. In the public domain, information on projects appears at three stages:

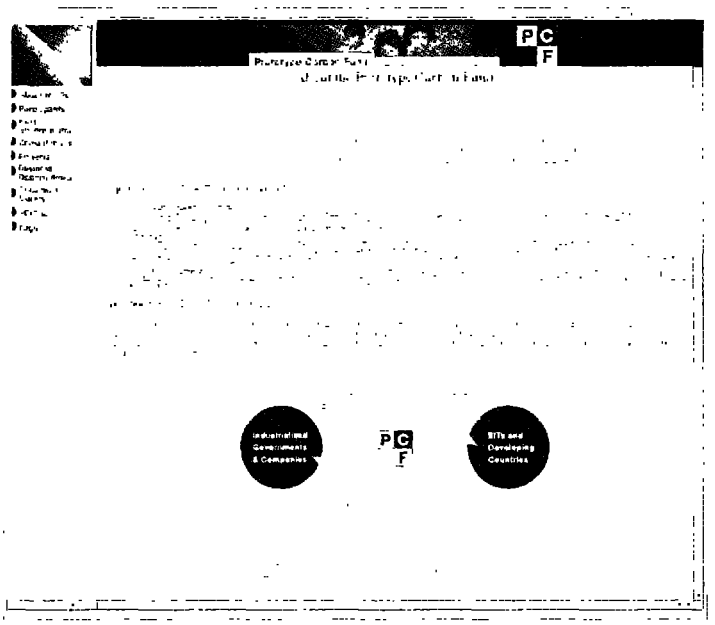
- Project Idea Notes (PINs) are posted after they are endorsed by governments.
- Baseline studies, monitoring and verification plans, and project-design documents are posted after they reach the validation stage.
- The contracts and final project documentation are posted after they are formally approved by all parties.

Since it was established in October 1999, the website has averaged 82 visits per day, and has been visited by 16,000 users, of which some 5,000 have become repeat users. The website has become PCF's primary vehicle for knowledge delivery and information transfer to the global public.

KNOWLEDGE FELLOWSHIP

PCF opens its doors to shareholders, host-country beneficiaries, and developing country NGOs on its Technical Advisory Group through live-in fellowships that allow members of these groups to spend weeks to months participating in the work of the PCF FMU at the World Bank. PCF host-country fellows contribute research and discussion papers on aspects of CDM and JI implementation, as well as support to PCF transactions. These fellowship programs began in January 2000 and have already included three host-country, one NGO, and four participant representatives. In the coming year, these numbers will increase substantially. PCF participants also second staff to the PCF FMU where there is a fit with business needs. These arrangements ensure PCF's work benefits from constant exchange with parties to the UNFCCC, private sector, and NGO actors in carbon market development and Kyoto Protocol implementation and contribute to a dynamic work environment in the FMU.

Figure 6.1. www.prototypecarbonfund.org

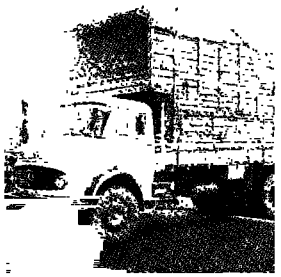


All important PCF communications are recorded in the various discussion areas, which provide for on-line discussions regarding PCF projects and the emerging carbon market.

LOOKING AHEAD

In the following year, PCF will expand knowledge-sharing further by:

- Widely sharing work in progress on baselines, MVPs, and validation opinions of at least 15 unique CDM and JI projects, along with about 10 completed carbon purchase agreements and host country agreements;
- Overcoming broadband internet access problems for its host-country stakeholders by cutting and distributing CDs of its website when content significantly expands;
- Reorganizing the website to allow easier navigation and links to PCF's project sponsors' websites;
- Expanding the PCFplus website link to give public access to PCF's growing volume of methodological and market research as well as training modules, including presentation materials and video clips of training sessions.



PCF experience so far demonstrates that the development of an effective emission reduction market depends on two critical components. First, host governments need to build their capacity to understand and meet the Kyoto Protocol's requirements and to facilitate CDM/JI transactions. Second, the private sector, especially in the host countries, needs greater capacity to identify carbon financing opportunities, assist with project preparation and supervision, and undertake validation, verification, and certification of projects.

The PCF has a significant contribution to make in building the capacity of developing countries, economies in transition, and the private sector to address both components. This is achieved primarily through a learning by doing approach and research, in partnership with WBI's efforts to deliver outreach and training activities in support of the PCF.

LEARNING BY DOING

The PCF's main contribution to capacity building is its learning by doing approach, that is, working hand-in-hand with the host country to implement its first CDM or JI project, or the first-of-kind project in a particular sector, from conception to the delivery of ERs. This differs from traditional capacity building since host countries take the initiative to develop and implement projects that lead to ERs, but have access to the expertise of the PCF team in developing the project.

Such an approach allows for the public sector in the host country to develop the administrative capacity to facilitate CDM and JI transactions, identify and correct any gaps in local laws necessary to register and transfer ERs, and develop an overall strategy to attract further investments.

The approach also provides the local private sector first hand experience in the implementation of the project cycle; allows for the development of local expertise for baselines, monitoring, and verification; and provides invaluable experience in negotiating an ERPA that is fair and equitable to both the buyer and the seller.

As for the PCF, it learns from each and every project, and thus increases its knowledge asset, which in turn is disseminated widely. Thus, learning by doing is a win-win approach.

PCFplus PROGRAM AND WBI PARTNERSHIP

With donor assistance from the Governments of Canada, Sweden, and Finland, a capacity building program called PCFplus was established with specific components in outreach, training and research. The objectives of the program are to enhance the operations and activities of the PCF and its partners, to assist all market participants by providing know-how, and to reduce risks and transaction costs in the emerging carbon market.

At the end of fiscal 2001, the PCF announced a partnership with WBI to deliver the training component and support the outreach component of the PCFplus program. The training program is designed to provide assistance to project proponents on the PCF project cycle and to disseminate information on lessons learned.

Much of the training is geared toward building the capacity of representatives from the public and private sectors of developing countries and economies in transition to develop and negotiate a PCF project. It goes through the various steps necessary to confirm and quantify the emission reductions that are likely to occur in a given project.

One of the main features of the outreach component is the fellowship program. Other outreach activities include workshops around PCF project negotiations and financial support for host country and NGO participation in PCF meetings. Issues under study in the research component are described in detail later in this chapter.

PCF CONSULTATIONS AND WORKSHOPS

In order to ensure a fair negotiation process, the PCF has implemented pre-negotiation consultations, which are essentially a capacity building initiative. This is an additional step in the project cycle not contemplated by the Kyoto Protocol *(See Figure 2.1)*. These consultations, held with representatives of the project entity and the host country, ensure that all parties are aware of the relationship between pricing and risk, and serve to promote the equitable sharing of benefits arising from CDM and JI activities.

If a PCF project is considered unique or the project preparation process has been a 'best practice' experience, the PCF may share the lessons learned from a specific project with a wider audience of PCF constituents. These post-negotiation workshops are designed to disseminate lessons learned for an audience consisting of host country representatives, experts from other countries with similar technology barriers, and the PCF team. Such a workshop was organized on the Latvia Liepaja Solid Waste Management Project.

Under the PCF instrument, sinks projects can account up to 10 percent of the Fund. To date, PCF has considered projects with sinks components in Romania and Brazil.

THE LATVIAN EXPERIENCE

The challenge of implementing a first-of-a-kind real-life project is an effective learning and capacity building process, in part because it:

- facilitates improvements to the existing legal, institutional, and financial systems to promote the participation of the host country in the CDM/JI market;
- promotes the development of national strategy and institutional linkages necessary for effective decision making;
- allows for practical experience in emission reduction transactions, including issues of price, financing conditions, payment schedule, risk, and transaction cost sharing.

In order to benefit from the CDM/JI market, the host country should have:

- a party with efficient institutional linkages responsible for endorsing and negotiating projects and for signing ERPAs;
- transparent criteria for project selection;
- a well-developed pipeline of high-priority projects;
- the ability to develop local capacity and expertise for the negotiation and implementation of high-quality ER projects and to reduce transaction costs.

In and around negotiations or pre-negotiations, the PCF in partnership with WBI takes advantage of the presence of the PCF team in the field to host CDM/JI training workshops for representatives of the host country and neighboring countries. This allows for unique training using specific case studies and an exchange of views with recognized experts. So far, two training workshops have been organized, one for Sub-Saharan African countries in Kampala, Uganda, and one for Central and Eastern Europe in Szentendre, Hungary.

RESEARCH

Lessons from PCF Projects

In its pioneering role to implement new types of emission reduction transactions in an emerging market, the PCF often faces methodological obstacles requiring solutions that are unavailable through existing sources. Consequently, the PCF team conducts in-depth analysis and research that draws on the insight of in-house staff, guidance from UNFCCC Parties and PCF participants, as well as external expertise in related fields. As a matter of policy, the PCF publishes all research, unless confidential in nature, for the wider benefit of the CDM/JI community.

PCFplus research aims at providing scientifically sound answers to the most demanding methodological questions which confront the PCF. PCFplus research also intends to distill PCF's unique experience into general methodological lessons.

PCFplus research is managed by the World Bank's Research Group, which provides extensive in-house expertise, and also builds on a wide range of climate-related World Bank programs. The management team maintains a continuous dialogue with other organizations piloting research on project-based mechanisms.

PCFplus Research Activities

The activities of PCFplus Research are focused in three areas.

- *Area 1. "Nuts-and-bolts" project issues.* At the heart of the ERs market are a host of practical issues related to project design, project implementation, and the measurement of emissions reductions. Area 1 includes, for example, the construction of unbiased, cost-effective, and transparent baselines; the design of efficient protocols for monitoring, verification, and validation; and financial or legal issues related to the definition and exchange of emission reductions.
- *Area 2. Potential market for ERs under JI and CDM.* Understanding the future price path of ERs is crucial for all participants in the carbon market. Despite huge uncertainties, some price assumptions must be made by both sellers and buyers in order to appraise projects, schedule investments and sales, and select project portfolios. Area 2 seeks to keep abreast of current market trends, insights on future carbon prices, and the assessment of potential CDM and JI supply curves.
- *Area 3. The CDM and sustainable development.* The implementation of the sustainable development objective of CDM remains controversial. Area 3 intends to bring some insights into this debate by addressing issues regarding the impact of CDM on development, and by analyzing the conditions under which this instrument might be most efficient in enhancing sustainable development.

FISCAL 2001 ACHIEVEMENTS

During its first year of existence, PCFplus research has financed eight studies. Four were concluded in fiscal 2001, while final reports for the other half are to be delivered in Fall 2001. The results of these studies have been disseminated through the PCF website (under the PCFplus section).

Below are descriptions of three PCFplus research projects launched or concluded in fiscal 2001.

- *Can Carbon Finance Accelerate the Diffusion of Solar Home Systems in Developing Countries?* This study shows that carbon finance could catalyze market penetration of solar home systems for households in developing countries,

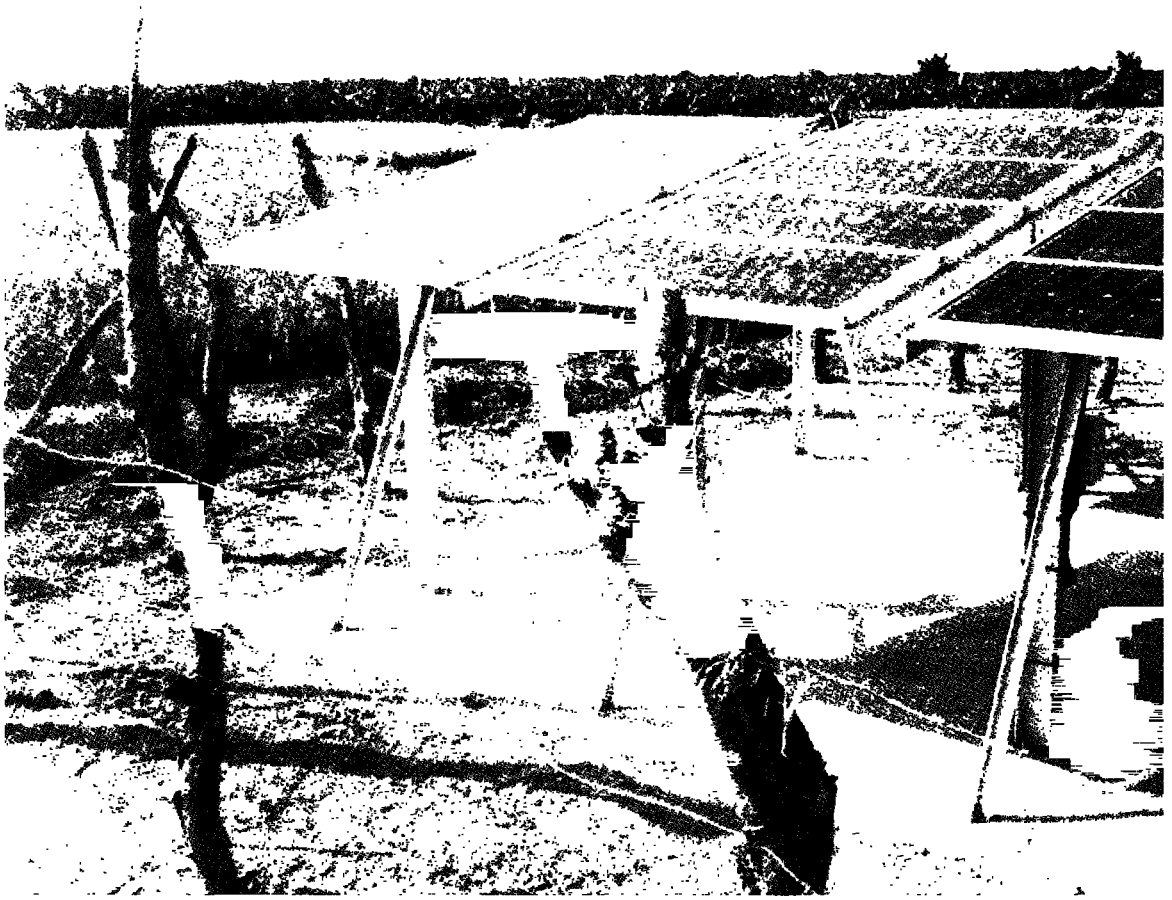
although carbon finance constitutes a limited part of the total project investment (typically 5 percent). Findings indicate that the structuring of solar home systems projects remains complex.

- *Market Intelligence.* At this early stage of development of the carbon market, there is still no clear price index, nor any central source of information on effective projects and transactions. In addition, the commercial value of ERs depends to a large extent on international, national, and regional regulations, which evolve rapidly and are not easy to follow. In order to provide up-to-date information about the state, trends, and environment of the carbon market, PCFplus has commissioned two market intelligence studies. One focuses on the status of the carbon market, and the other on its regulatory drivers. Key conclusions from these studies informed Chapter 3 of this report.
- *Baseline for Energy Efficiency Projects addressed through intermediaries.* Small-to-medium size energy efficiency projects represent a major abatement potential in most countries, but they are usually too small to be attractive to carbon investors. It is therefore necessary to find ways of bundling projects together through an intermediary such as an energy service company. Within this configuration however, the baseline problem—that is, how to determine what would have occurred in the absence of the project—becomes more complex. It is necessary to build baselines for each individual (or for each class of) energy efficiency project. But in addition, it is important to understand what the intermediary itself would have done in the absence of carbon finance. An ongoing study is assessing these two baseline levels, with a primary focus on economies in transition.

LOOKING AHEAD

In the coming fiscal year, capacity building initiatives will include the following:

- *Training modules.* PCF is developing training modules covering all aspects of the PCF business, such as pricing and market formation, legal contracts, baselines, the impact of carbon finance, risk considerations, the PCF project cycle, the history and objectives of the PCF, PCF portfolio, and project pipeline. These training modules will be available on-line, including ready-made presentations and video-clips for use by other training specialists. WBI will actively seek to establish formal partnerships for the delivery of training modules concerning the Kyoto Mechanisms.
- A comprehensive training program will be implemented and delivered in conjunction with PCF negotiations and pre-negotiations. Although specifics are not available at this time, it is contemplated that CDM/JI workshops will be held to cover the following countries/ regions: China, Central America, South America, India, South Asia, and Southeast Asia.



PCFplus research considered whether carbon finance can accelerate the diffusion of solar home systems, which at current prices, remains a challenge.

- *PCFplus fellowship program.* The PCFplus Fellowship Program will be expanded substantially to cover about 10 PCF host countries.

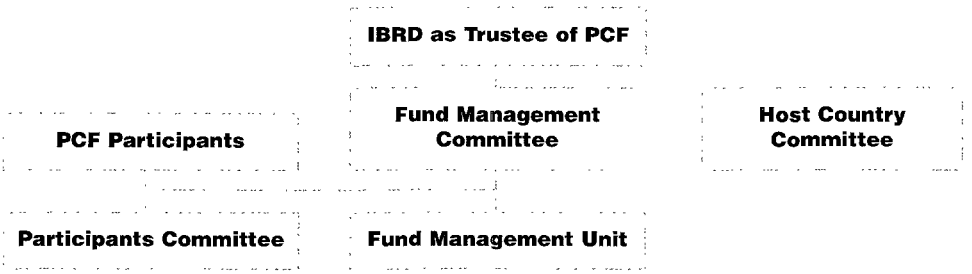
In Fall 2001, three important studies are expected to be concluded: the energy efficiency study noted above; a study on the impact of EU accession on the supply of JI projects; and an assessment of the PCF portfolio of projects with regard to sustainable development. Updates on the regulatory drivers of the carbon market will be posted on the PCF website throughout the coming year.

In addition, several new studies will be launched, including:

- *Baselines and MVPs for new types of projects.* As PCF is fully engaged in its investment phase, PCFplus research will try to build up methodologies for baseline construction, monitoring, and validation for relatively-unexplored types of projects such as bundles of numerous pico-renewables installations and afforestation activities.

- *Standardized baselines.* PCFplus research will seek to consolidate the experience of PCF projects by building up standardized baselines and monitoring plans, in particular on landfill gas capture projects, which have the potential for large returns on investment even at low carbon prices.

As results from studies become available, dissemination should also play a stronger role in PCFplus research activities. In the same spirit, PCFplus research will explore possible collaboration with other research institutions working on similar programs, especially in developing countries and economies in transition.



Fund Management Committee

Ken Newcombe, *PCF Fund Manager, ESSD (Chair)*

Denis J. Clarke, *Manager, Chief Investment Officer, Power Department, International Finance Corporation*

Susan G. Goldmark, *Sector Manager, Private Sector Development & Energy Cluster, Latin America Region*

Arun Sanghvi, *Lead Energy Specialist, Africa Energy Unit*

Robert T. Watson, *Chief Scientist and Director, ESSD*

The Vice President of Environmentally and Socially Sustainable Development Network (ESSD) oversees the PCF for the World Bank as Trustee. From left to right: Ken Newcombe, *PCF Fund Manager*, Ian Johnson, *VP and Head of Network (ESSD)*, and Kristalina Georgieva, *Director, Environment Department*.

Participants Committee

(as of June 2001)

Olle Björk, Sweden

Maurits Blanson Henkemans, Netherlands

Christine Fedigan, Gaz de France

Sushma Gera, Canada

Yasuo Hosoya, Tokyo Electric Power Co.

Liv Rathe, Norsk Hydro

Jean Claude Steffens, Electrabel

Fund Management Unit
(from left to right)

First Row

Charlotte Streck, *Counsel*

Teresita Macanlalay, *Program Assistant*

Maritza Bojorge, *Program Assistant*

Rosemary Thompson-Elhosseine, *Legal Team Assistant*

Nancy Rodriguez, *Consultant*

Benoit Bosquet, *Natural Resources Management Specialist*

Hanneke Van Tilburg, *Sr. Counsel*

Second Row

Veronique Bishop, *Principal Financial Specialist*

Chandra Sekhar Sinha, *Senior Environmental Specialist*

Jari Väyrynen, *Operations Analyst*

Ken Newcombe, *Fund Manager*

Johannes Heister, *Senior Environmental Economist*

Franck Lecocq, *Economist, PCFplus Research*

Ikuo Nishimura, *Senior Environmental Specialist*

Charles Cormier, *Senior Training Specialist, World Bank Institute.*

Absentees

Cremilda Amaral, *Staff Assistant*

Eduardo Dopazo, *Consultant*

David Freestone, *Chief Counsel*

Christina Reinhard, *Information Analyst*

Odil Tunali-Payton, *Environmental Specialist*

Cynthia B. Wilson, *Consultant*

assigned amount The total amount, pursuant to the Kyoto Protocol, of an industrialized country's anthropogenic greenhouse gas emissions, over a certain commitment period, the first of which is 2008–2012.

baseline The emissions of greenhouse gases that would occur without the contemplated policy intervention or project activity (i.e. a business-as-usual scenario). Baseline estimates are needed to determine the effectiveness of emission reductions programs and projects.

carbon finance Resources provided to projects generating (or expected to generate) emission reductions, in the form of the purchase of such emission reductions.

carbon sinks: Ecosystems, notably forests and oceans, which remove carbon dioxide from the atmosphere by absorbing and storing it, thereby offsetting CO_2 emissions.

Clean Development Mechanism (CDM) The mechanism provided by Article 12 of the Kyoto Protocol to assist developing countries in achieving sustainable development and to contribute to stabilizing the concentration of greenhouse gases in the atmosphere at a safe level, as well as to enable industrialized countries to finance emissions-avoiding projects in developing countries and receive credit for doing so.

emission reductions (ERs) The measurable reduction of releases of greenhouse gases into the atmosphere from a specified activity, or over a specified area, and period of time.

environmental additionality According to the Kyoto Protocol articles on Joint Implementation and the Clean Development Mechanism, emission reductions must be additional to those that otherwise would occur. Environmental additionality is established when there is a positive difference between the emissions that occur in the baseline scenario, and the emissions that occur in the proposed project.

Fund Management Committee (FMC) Committee comprised of five members, consisting of the Fund Manager and four other members of the IBRD's management selected by the President of the IBRD. The FMC is is responsible for overseeing the operations of the Fund.

Fund Management Unit (FMU) Unit headed by the PCF Fund Manager and responsible for the day-to-day operations of the Fund.

greenhouse gases The six gases listed in Annex A of the Kyoto Protocol which are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_20), as well as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6).

hot air Term commonly given to the part of an industrialized country's assigned amount that is most likely to be surplus to its needs even without that Party making additional efforts, beyond existing policies in 1990, to reduce its emissions. Under Article 17 of the Kyoto Protocol, this surplus can be traded, thus reducing the incentive for other countries to cut their domestic emissions or invest in projects in third countries that reduce emissions.

high quality emission reductions Means emission reductions of a sufficient quality so that, in the opinion of the Trustee, at the time a project is selected and designed, there will be a strong likelihood, to the extent it can be assessed, that PCF participants may be able to apply their share of emissions reductions for the purpose of satisfying the requirements of the UNFCCC, relevant international agreements, or applicable national legislation.

internal rate of return (IRR) The annual return that would make the present value future cash flows from an investment (including its residual market value) equal the current market price of the investment. In other words, the discount rate at which an investment has zero net present value.

Joint Implementation (JI) Mechanism provided by Article 6 of the Kyoto Protocol, whereby a developed country may acquire emission reduction units when it helps to finance projects that reduce net emissions in another developed country (including countries with economies in transition).

project-based emission reductions Emission reductions that occur from projects pursuant to JI or CDM (as opposed to "emissions trading" or transfer of assigned amount units under Article 17 of the Kyoto Protocol).

United Nations Framework Convention on Climate Change (UNFCCC) The international treaty adopted in June 1992 that commits Parties to stabilize anthropogenic (ie. human-induced) greenhouse gas emissions to levels that would prevent dangerous anthropogenic interference with the climate system. In December 1997, the Parties to the UNFCCC adopted the Kyoto Protocol.

Prototype Carbon Fund
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Washington, D.C. 20433
☎ 202.473.6010 ⌗ 202.522.7432
www.prototypecarbonfund.org

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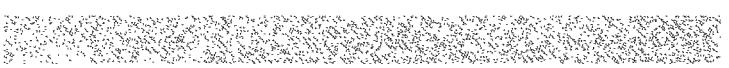

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