

# PCF*plus* Research Strategy

October 2000

## MOTIVATION AND OBJECTIVES

Climate change poses an economic and environmental threat to the World Bank's client countries. Emerging mechanisms under the Kyoto Protocol potentially provide a means of mitigating this threat while helping to finance and promote sustainable development. For these reasons, the World Bank board launched in 1999 a Prototype Carbon Fund (PCF) to show how project based emission reductions (ERs) in economies in transition and developing countries can promote and contribute to sustainable development, to demonstrate the possibilities of public-private partnerships in this domain, and to offer a "learning-by-doing" opportunity to its stakeholders and to the global climate change community.

PCF*plus* is a research, training, and outreach program designed to complement the PCF. While an important goal of the PCF is to disseminate its experience, PCF objectives and resources restrict its research and outreach activities to those directly associated with project implementation. **PCF*plus* is intended to assist PCF stakeholders (staff, participants and host countries), and the international community at large in understanding the complex issues related to the implementation of markets for project-based greenhouse gas emission reductions under the Clean Development Mechanism (CDM) and Joint Implementation (JI), with a view to reducing transaction costs and risks of doing business in the emerging GHG market.**

The research component of PCF*plus* (hereafter PCF*plus* Research) brings a unique set of strengths to the climate change research arena. Most importantly, it will be able to draw on and elucidate the lessons of PCF's pioneering activities. Its location in the World Bank enables it also to link with a wide range of climate-related programs, including the National Strategy Studies on JI/CDM, Bank-administered GEF projects in the climate area, and the broad range of Bank projects and studies involving energy and land use. PCF*plus* Research is administered by the Bank's Research Group, providing extensive in-house expertise in environmental economics, public finance, and development economics, and ensuring analytical rigor. **PCF*plus* Research will actively seek to collaborate with other research organizations and climate change initiatives that possess complementary expertise or resources.**

PCF*plus* Research will emphasize dissemination activities, in collaboration with PCF*plus* Training and Outreach. All PCF*plus* sponsored research will be public. Results will be published in peer-reviewed journals, in working papers, and on the Internet. Seminars and workshops will be web-cast worldwide.

## RESEARCH AGENDA

### Criteria

PCFplus Research designs its research agenda based on the following considerations:

- *relevance to PCF stakeholders*: does the proposed work help PCF stakeholders better to meet their needs?
- *relevance to the global climate community*: does it help inform interested parties about carbon market design and implementation issues and options, and about the broader impacts of these markets on the economy and the environment?
- *comparative advantage*: is PCFplus Research better suited than other institutions to perform this work?

Tentatively, PCFplus Research has identified three broad areas of importance:

1. *‘nuts and bolts’ project issues, including baselines, contracts, monitoring and verification,*
2. *assessing the market for emissions reductions*
3. *carbon markets and sustainable development.*

The research areas are detailed below.

### **Area 1: “nuts and bolts” project issues, including baselines, contracts, monitoring and verification**

At the heart of the emissions reductions market are a host of practical issues related to project design, project implementation, and the measurement of emissions reductions. The success of the PCF, and of the markets it intends to catalyze, depends on finding practical solutions to problems such as:

- defining unbiased, cost-effective, transparent baselines
- setting up reliable but affordable protocols for monitoring, verification, and validation (MVV)
- creating contractual mechanisms for ER purchase that provide equitable and efficient allocation of risks and returns, along with appropriate performance incentives

These problems are closely linked, and must be addressed in a holistic fashion. For instance, choice of baseline methodology has implications for MVV as well as contractual forms and performance incentives.

Below is a tentative list of specific topics to be addressed in this area, along with some examples of potential research tasks. While the topics are listed individually for analytic convenience, the research program will ensure that linkages between topics are kept in mind.

## *Baselines*

Finding unbiased, accurate, cost-effective baseline methodologies is arguably the single most important challenge facing the emission reductions market. Inaccurate or biased baselines threaten the environmental integrity of the markets; expensive, elaborate baseline procedures threaten the financial viability of the projects.

PCF*plus* Research proposes to undertake empirical surveys and quasi-experimental studies to determine ‘true’ baselines – that is, actual, business-as-usual technology choice and emissions levels – for prominent classes of emissions reductions project. The working hypothesis is that, for many interesting classes of projects, firms’ choices of technologies (and associated emissions levels) are predictable on the basis of a relatively small number of parameters, such as electricity tariffs, prevailing interest rates, size of firm. These parameters – and firms’ baseline behavior – differ between countries, between different sizes of firms, and over time. Hence an international survey can yield a ‘test-bed’ database for evaluating baseline procedures. Using these databases, often together with detailed sector-specific information derived from PCF projects, PCF*plus* Research will compare the predictive performance of alternative baseline methodologies, ranging from simple benchmarking approaches to investment-choice simulation to econometric models of behavior. Because of its environmental implications, this research will attract broad interest beyond its application to baseline issues.

For this set of investigations, PCF*plus* Research will focus on project classes with the following characteristics:

- significant worldwide potential for generating emissions reductions
- a relatively small set of technological options
- apparent cross-national or intertemporal differences in baseline technologies and emissions
- examples available in current or candidate PCF projects.

Candidate project classes include:

- methane recovery from landfills (under what circumstances do landfills utilize methane for electricity?)
- oil well flaring
- certain types of energy conservation
- ESCO (energy service company) behavior – how do ESCO’s set baselines for their clients?

Other baseline issues are not restricted to particular project types, but are sectoral or generic. For instance, any project that affects supply to or demand from the electric grid needs to model the business-as-usual expansion path of generation capacity, and dispatch patterns, of the grid. A key baseline question is then the extent to which a nation should or would diversify away from least-cost generation technologies in order to decrease the

risk of supply disruption. PCF*plus* Research may review and synthesize methodologies that address this issue.

### *Contractual and legal issues*

Pioneers in the emissions reductions market face a variety of contractual and legal issues. Pricing and risk management for buyers and sellers are prominent issues now, because of the considerable uncertainty about future prices of emissions reductions. Drawing on emerging results of PCF ER purchase negotiations, on lessons from other markets for long-term commodity supply, and from theoretical and financial-market studies, PCF*plus* Research may assess and propose contractual forms that encourage equitable and efficient sharing of risk and returns, and provide proper incentives for performance.

Assignment of rights to ER's is another potentially important issue for negotiation. Research on this topic might, for instance, examine the relationships between domestic emission allowances and projects in the case of JI, or examine the legal issues raised by emission reduction projects targeted at transnational electricity grids.

### *Monitoring, verification, and validation*

The PCF is pioneering the development and application of protocols for methodologies, for monitoring and verifying emissions reductions, and for validating baselines and monitoring/verification protocols. There is scope to assess the performance of these institutions, with particular attention to assessing any trade-offs between cost and reliability. Minimizing monitoring and verification costs is particularly important for the viability of small projects. PCF*plus* Research will compare alternative approaches to monitoring, verification, and validation, in part through workshops that will encourage sharing of experiences in different sectors and project classes.

### *Forest and land-use projects*

Forestry and land use projects present a distinctive set of issues at all levels: baseline determination, leakage assessment, implementation, monitoring and verification. These issues will be an unavoidable aspect of forestry projects already allowed under JI; the feasibility of addressing these issues will bear on the potential acceptability of land use and land use change projects under the CDM, under article 3.4 or under non-Kyoto-related markets (such as those driven by domestic regulatory regimes). Projects of this type are of particular interest to many World Bank client countries because of their potential to support sustainable rural development goals. The PCF has stated its potential willingness to consider a forestry project under JI.

Drawing on extensive World Bank research and operations in the forestry and land use sector, PCF*plus* Research may address some of the following topics:

- ex-post evaluation of forest-carbon-like projects: the World Bank has undertaken projects that, while not intended as carbon sequestration projects, nonetheless

resulted in forest regeneration or deforestation prevention. Re-examination of these projects through a carbon ‘lens’ may yield important lessons regarding leakage, co-benefits such as poverty alleviation or hydrological improvements, and permanence of sequestration.

- contracting for land management: assessment of mechanisms and institutions to induce landowners to manage lands for carbon benefits and to monitor compliance. Many proposed projects involve the provision of financial inducements to landholders for specified carbon-saving actions. A generic problem facing these projects is how to minimize the transactions costs involved in contracting with, paying, and monitoring compliance of, these landholders. Environmental services programs in developed and developing countries may provide lessons for the design of carbon projects associated with land use. A review of emerging remote sensing technologies may also be useful.
- methodologies for assessing baselines and leakage. Recent advances in understanding the spatial dynamics of land use and of agricultural markets make it increasingly feasible to model deforestation baselines and understand leakage.

## **Area 2: Potential market for emissions reductions under JI and CDM**

Understanding the future price path of ER’s is crucial for all participants in the carbon market. Despite the huge uncertainty about market prospects, some price assumptions must be made by both sellers and buyers in order to appraise projects, schedule investments and sales, and select project portfolios. An understanding of the potential volume of market transactions is particularly important for World Bank client countries.

Much uncertainty will remain while Kyoto procedures are undefined and the Protocol not yet in force. However, PCF*plus* Research can help PCF stakeholders and others to better evaluate future market prospects and scenarios. Potential PCF*plus* Research activities include the following:

- market intelligence service: working with carbon-market experts, PCF*plus* Research could gather and synthesize information on carbon market projects, secondary market transactions, and developments affecting future supply and demand.
- future price assessment: PCF*plus* Research could experiment with alternative mechanisms for predicting future ER prices, including surveys of experts or the analysis of futures prices in related markets (e.g energy or air pollution permits).
- market dynamics: an analysis of the evolution of existing environmental permit markets may provide insight into issues such as the relation of market volatility to market maturity, and the effect on prices of permit banking across commitment periods.
- assessment of CDM/JI supply curves: PCF and other World Bank projects may help to critically assess JI and CDM supply curves currently used in carbon market models, and commission modeling studies using revised curves.

### **Area 3: the CDM and sustainable development**

Although Article 12 of the Kyoto Protocol states that one of the three purposes of CDM “*shall be to assist Parties not included in Annex I in achieving sustainable development*”, the compliance with this objective remains controversial. Area 3 intends to bring some insights into this debate by addressing the most important issues that have been raised regarding the impact of CDM on development, and by analyzing the conditions under which this instrument might be the most efficient in enhancing sustainable development.

Potential research topics include:

- the so-called “low-hanging fruit” problem: under what assumptions would a country be better off refraining from undertaking CDM projects that produce low-cost emissions reductions, in order to benefit in the future?
- assessing which classes of ER projects offer the greatest potential for catalyzing additional investment: under which conditions could the CDM, as a potential additional source of revenue from projects, trigger more investment in developing countries?
- measuring environmental and social co-benefits from PCF projects in different sectors
- assessing the development and distributional impact of financial flows under the CDM: and in particular the figures on the financial flows associated with JI and CDM for the first commitment period modeling studies have produced.

### **PROJECT SELECTION GUIDELINES**

The following guidelines are suggested:

- At least 90% of PCF*plus* Research resources should be devoted to the three areas described above.
- Some smaller projects will be procured through sole sourcing procedures. In addition, PCF*plus* Research will solicit bids for undertaking specific research tasks, and may also issue broad requests for proposals within priority research areas.
- PCF*plus* Research will seek collaborative or co-sponsored research projects with other private or public entities.