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**Issues to be Addressed by the Program for
Measuring Incremental Costs for the Environment**

Ken King

Working Paper
Number 8



THE WORLD BANK

GEF Documentation

The Global Environment Facility (GEF) assists developing countries to protect the global environment in four areas: global warming, pollution of international waters, destruction of biodiversity, and depletion of the ozone layer. The GEF is jointly implemented by the United Nations Development Programme, the United Nations Environment Programme, and the World Bank.

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Issues to be Addressed by the Program for Measuring Incremental Costs for the Environment

This paper is the fifth among a series of GEF Working Papers to deal with the Program for Measuring Incremental Costs for the Environment (PRINCE). The GEF is a financial mechanism that provides grants to developing countries for projects aimed at protecting the global environment.

PRINCE was initiated in February 1993 at a workshop held at the Tata Energy Research Institute in New Delhi. It covers methodological studies, field tests, and dissemination related to the technical issues of measuring incremental cost. This is a concept central to the GEF; the two conventions to which it is linked—the Framework Convention on Climate Change and the Convention on Biological Diversity; and the Montreal Protocol dealing with ozone depletion.

Participating governments provided US \$2.6 million from the Core Fund for a three-year program. It builds on existing work concerning the phase-out of ozone-depleting substances and concentrates on the incremental costs of reducing the emissions of greenhouse gases. Parallel work will extend the concept of incremental costs to the protection of international waters and the conservation of biodiversity.

This paper outlines PRINCE's work program and its proposed approach for five primary categories of tasks—incremental cost concepts, operational interpretations, national climate change studies, ozone layer protection country studies, and transaction costs.

The other Working Papers currently in the PRINCE series are numbers 4, 5, 6 and 7.

Ken King is Senior Environmental Specialist at the GEF Administrator's Office in Washington, D.C.

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Abbreviations

CCE	Cost of conserved energy
CICERO	Center for International Climate and Energy Research, Oslo (Norway)
ESMAP	Energy Sector and Management Assistance Program (of the World Bank and the United Nations Development Programme)
FCCC	Framework Convention on Climate Change
GHG	Greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
NGO	Non-governmental organization
ODS	Ozone-depleting substances
OECD	Organization for Economic Cooperation and Development
PRINCE	Program for Measuring Incremental Costs for the Environment
STAP	Scientific and Technical Advisory Panel (of the Global Environment Facility)
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
WEC	World Energy Conference

Introduction

This paper provides an account of the incremental cost issues which are being studied under the Program for Measuring Incremental Costs for the Environment (PRINCE), and is a supplement to PRINCE's work program. Extended information is provided on the role of PRINCE, its work program, and its proposed approach for five primary categories of tasks. Chapters are divided according to these tasks:

- Incremental cost concepts
- Operational interpretations
- National climate change studies
- Ozone layer protection country studies
- Transaction costs.

The report covers the issues expected to emerge within these tasks in the course of studies and workshops. Some aspects of the work program will need to be reshaped as issues evolve and as opportunities for collaboration arise. This paper aims to foster an understanding of the work of PRINCE and to encourage parallel activities in member countries of the Global Environment Facility (GEF).

The importance of incremental cost

Incremental cost is a concept that is central to the GEF, to the Framework Convention on Climate Change (FCCC), and to the Convention on Biological Diversity to which the Facility is linked. Likewise, incremental cost is crucial to GEF-supported activities that are linked to the Montreal Protocol on Substances that Deplete the Ozone Layer. Incremental cost can be used to calculate the grants made for actions that

further the objectives of the conventions or otherwise protect the global environment; to select and sequence such actions; and to evaluate alternative measures that can be taken to implement convention obligations.

Incremental cost and related concepts are being studied by many governments, international agencies, universities, research institutes, and other interested groups. These efforts provide useful inputs for the deliberations of the Conferences of the Parties to the Conventions and to the Intergovernmental Panel on Climate Change (IPCC), as well as to the GEF.

Incremental cost and the GEF

There is need for a broad interpretation of incremental cost that is consistent across the GEF's focal areas—climate change mitigation, ozone layer protection, biodiversity protection, and prevention of the pollution of international waters. It should be possible for each of the GEF implementing agencies to apply this interpretation uniformly in all participating countries. Although the Conferences of the Parties are expected to provide broad guidance on incremental cost in relation to climate change and biodiversity, there remains a need for GEF operational guidelines on these areas in the interim.

Many developing country governments and developed-country bilateral aid agencies are called upon to finance the baseline cost of projects, and have therefore as keen an interest as the GEF in ensuring the clear distinction between incremental and non-incremental costs. Supplemental work on

this subject by PRINCE will build on the experience of the three implementing agencies of the GEF—the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP), and the World Bank—which have researched these concepts and dealt with them in operational settings.

The nature of PRINCE

PRINCE can provide the technical underpinnings for debate on the GEF's financing policy and on the conventions that influence investment decisions. PRINCE is not a forum for resolving legal and political issues; these must be tackled in appropriate inter-governmental forums and other settings. PRINCE can, however, describe the conceptual, analytical, and program issues inherent in the incremental cost approach. And the program can distinguish the various types of incremental costs that the Conferences of the Parties to the Conventions and the Participants may wish to see funded.

The United States Agency for International Development (USAID) provided PRINCE with seed funding for its program launch in New Delhi in February 1993, and for its initial studies. PRINCE is managed by the Office of the GEF Administrator in Washington, D.C.

Three types of activities are currently underway:

- Methodology studies designed to refine the concepts and procedures for key operational concepts in incremental cost
- Field tests that apply the methodologies to real settings to ensure that they meet GEF criteria
- Dissemination of information about the methodologies through best-practice workshops, training programs, and codes of practice.

One way in which PRINCE applies its research activities is through cross-cutting analysis from one focal area, such as ozone depletion, to another, such as climate change. Since the implementing agencies of the Montreal Protocol already have operational definitions for incremental cost in the phasing out of ozone-depleting substances (ODS), PRINCE will undertake only limited work in this area, and draw on the lessons learned in that simpler environmental context. PRINCE's main work will be on climate change—the abatement of greenhouse gases (GHGs),

and the mitigation of possible global warming impacts. This is probably the most transparent context (after ozone depletion), because of the simplicity of the analytical tools used to study various sectors and gases. Studies will be undertaken to outline the main issues in the other focal areas (biodiversity and international waters), and possibly in emerging areas such as desertification. PRINCE would initiate detailed work in these fields only after a work program had been developed and agreed with the Scientific and Technical Advisory Panel (STAP) of the GEF.

Another PRINCE activity involves the development of its methodology studies, field tests, and dissemination efforts within a distinct functional area such as climate change. The three activities are interdependent and follow a line of progression. For example, a methodology study on country incremental cost would be field tested in a suitable country. The field activity would aim to test the methodology to suggest program and policy options to the national government, and to develop a consistent program of projects to qualify for GEF support. The results of the study—modified, if necessary, in the light of practical experience gained from the field test—would be disseminated at a workshop so that a consensus on best practices could be codified. Results would also be incorporated into a syllabus for training those who needed to calculate incremental cost or understand its implications. The feedback from completed activities would help to redefine a new sequence of activities so that each area would be progressively refined.

Where possible, PRINCE will complement in-depth national and international work, ensuring that such efforts meet the requirements of the GEF. PRINCE would do this by providing strategic inputs and incremental resources for existing studies and operations.

The PRINCE proposal

On December 31, 1992, the GEF Administrator's Office submitted the PRINCE proposal to STAP for consideration for funding under the GEF's Fifth Tranche. The proposal provided the rationale for GEF funding, set out goals, and briefly described the project and its proposed activities. Subsequently, a more detailed work program (as requested by STAP) and

this companion document were prepared. The focus in these documents was mostly on climate change. Detailed work programs on biodiversity and other areas still need to be prepared for submission to STAP. Initially, the plan was for PRINCE to submit a major program of comprehensive national studies on GHGs. However, because of the need to limit the size of the Fifth Tranche, the Chairman of GEF requested that the majority of these studies be resubmitted for the Sixth Tranche. Consequently, only a few national studies will now be carried out within PRINCE; they will be selected with a view to testing the methodologies for calculating incremental cost at the country level.

It is anticipated that a major program of national studies will be financed in the Sixth Tranche of the GEF. These national studies would satisfy government requests for assistance with, among other things, the information they wish to document under the FCCC. Because they would be financed in the Sixth Tranche, these studies would not begin until six months after PRINCE; they could thus make use of methodologies that had been developed and tested within PRINCE. This GEF-financed program of national studies would be managed by UNEP, which is both a GEF implementing agency and the organization responsible for country studies under the World Climate Programme. Although this program of national studies would make use of the agreed methodologies, it need not be managed as an integral part of PRINCE.

1 Incremental Cost Concepts

PRINCE was created to examine the types of GEF policies and procedures that are likely to correspond with the requirements of the Conventions on Climate Change and Biological Diversity, and to interpret their operational implications for the implementing agencies, particularly as they relate to incremental cost calculations.¹

Background

In addition to supporting the two conventions mentioned above, the GEF also provides limited assistance to developing countries² to meet their obligations under the Montreal Protocol, consistent with the policies and criteria of the Executive Committee of the Multilateral Fund under the Montreal Protocol. Technical and scientific guidance on the Bank's activities in ozone-layer protection is provided by a team of leading engineers covering each sector where ODS are used. STAP members are invited to attend team meetings as observers.

The GEF provides some assistance for actions by developing countries to reduce the pollution of international waters, for which there is no financing mechanism prescribed under a convention. Policy work in this area (and possibly new functional areas) will be limited to steps to ensure consistency of approach within the convention-linked focal areas, and to defining possible program scope and operational issues.

The work program has two main elements related to both convention-linked and non-convention linked activities. The first is an exploration of incremental cost. This requires an identification of different types of incremental costs and incremental benefits; methods for analyzing and measuring each of these types of incremental costs and benefits; practical limitations and considerations; and alternative methods by which agreement can be reached on the financing of individual projects. (Decisions about which of the various incremental costs are to be financed by GEF or used to determine eligibility or priority, constitute financing policy, which has legal and political dimensions and cannot be solved by technical analysis alone.) The second element of the work program is a limited exploration of the issues concerning any expansion of the program scope to cover support for other international conventions.

The PRINCE work program and approach

Incremental cost is used to select appropriate projects and activities; to determine the appropriate GEF grant for a project or activity; to suggest the optimal sequence of projects, activities, and policies at country level; and to estimate resource mobilization requirements for the conventions.

Sound practical ways of calculating and applying incremental cost in GEF financial policies and in

¹ See *Article 4*, paragraph 3, of the Convention on Biological Diversity; and *Article 20*, paragraph 2, of the Framework Convention on Climate Change.

² Developing countries which are not covered by *Article 5*, paragraph 1, of the Montreal Protocol (because their ozone depletion emissions are more than 0.3 kilograms per capita per annum) and countries in transition to a market economy.

project preparation are essential if the GEF is to service the conventions, because the conventions designate "agreed full incremental costs" as the basis for financial assistance.³

The participants at the PRINCE workshop in New Delhi, February 8-9, 1993, included representatives from research institutes, non-governmental organizations (NGOs), STAP, the GEF Participants, and development assistance agencies. Methodological issues of incremental costs and incremental benefits were discussed. Operational interpretations (particularly the possible treatments of domestic environmental benefits), adaptation, and transaction costs were highlighted. Papers and deliberations from the workshop were later used to shape PRINCE's detailed three-year workplan. The papers are being finalized by the authors in light of the discussions, and will be made available to Participants. Selected papers will be published in the GEF Working Paper series, marking the completion of the introductory component of PRINCE.

Issues

The technical issues concerning incremental cost have been grouped into five tasks that are set out in the following sections. These are operational interpretations (chapter 2), national climate change studies (chapter 3), ozone layer protection country studies (chapter 4), transaction costs (chapter 5), and the program scope, portfolio development, and modalities task (chapter 6).

³ *Article 4*, paragraph 3, of the Framework Convention on Climate Change provides for the funding of the "agreed full costs" of the obligations under *Article 12*, paragraph 1. Note, however, that the incremental costs of the activities mentioned in *Article 12*, paragraph 1, are in fact the total costs, since no activities of the kind mentioned here would have been undertaken in the absence of climate change obligations.

2 Operational Interpretations

Background

The operational interpretations detailed in this chapter offer a means of calculating the grant that should be made in line with the incremental cost of a GEF project, and a method for determining the cost-effectiveness of such an undertaking for project selection purposes.

The GEF Pilot Phase has been largely experimental, with grants determined on the basis of several criteria. In GEF II, which begins in mid-1994, both rigorous calculation of incremental cost and cost-effectiveness are likely to be much more heavily emphasized, because the GEF will have entered a more fully operational phase. Rigor will be particularly important for large projects, because of the potentially high financial cost to the GEF of estimation errors.

The cost-effectiveness of global warming projects in the Pilot Phase is being assessed in a study commissioned by the World Bank.⁴ The study will take into account the incremental costs of the projects, assess their incremental global benefits (reduction of GHG emissions), and determine project cost-effectiveness in terms of the unit cost of GHG reductions (in carbon dioxide equivalent). Different types of interventions could thus be ranked by cost-effectiveness. Generic costs of energy technologies and methodologies for calculating cost-effectiveness in the energy sector have

also been published by the Environment Department of the Bank.⁵

Operational interpretations of the incremental cost principle have been made for phasing out ODS. On the basis of earlier theoretical work, the World Bank, with assistance from the GEF Administrator's Office, has prepared a document on behalf of the three implementing agencies of the Multilateral Fund of the Montreal Protocol that are concerned with investment projects—UNDP, the United Nations Industrial Development Organization, and the World Bank. This document has been circulated to members of the Multilateral Fund Executive Committee.

The role of PRINCE

The first PRINCE workshop drew attention to three key issues concerning the interpretation of incremental cost:

- The extent to which domestic benefits should be subtracted from the gross incremental cost to determine the grant
- The financing of measures to adapt to climate change
- The linkage between incremental costs and the new and additional resources that are being used to finance them.

⁴ Irving M. Mintzer and David Von Hippel, "Greenhouse Gas Assessment Methodology," Report by the Center for Global Change and Stockholm Environment Institute for the World Bank (Washington, D.C.: World Bank, 1993).

⁵ M. Bernstein, *Costs and Greenhouse Gas Emissions of Energy Supply and Use*, World Bank Divisional Working Paper, no. 1993-40 (Washington, D.C.: World Bank, 1993).

Financing policy cannot be determined solely on the basis of technical distinctions analyzed in PRINCE. PRINCE can assist by offering alternative interpretations and by analyzing their implications, but ultimately the determination of policy must go beyond these technical considerations to take account of wider legal and political issues outside the realm of a research-oriented effort.

The advantage of PRINCE will be its ability to draw on experience gained by the GEF implementing agencies, and its capacity to relate this part of the work with the other ongoing studies, particularly those related to climate change country studies (chapter 3); transaction costs (chapter 5); and program scope, portfolio, development, and modalities (chapter 6).

Work program and approach

Studies will be conducted on the adaptation of existing operational interpretations of incremental cost developed in the context of phasing out ODS to meet the requirements of GEF's other focal areas. A broad operational interpretation of incremental cost applicable to all four areas will be synthesized following GEF principles. Subsequently, interpretations applying only to specific focal areas or to particular sectoral operations will be developed, consistent with the broad interpretation. Alternative interpretations not currently consistent with GEF policy will also be developed for discussion purposes.

One of the risks associated with this task is that the results might be perceived to be definitive. In fact, because there is always a baseline situation that is counterfactual, the portion of the costs that is incremental will always be partly subjective. In this sense at least, incremental costs will have to be agreed. What this PRINCE task can achieve, though, is to eliminate particular speculative categories and to limit the areas of possible disagreement by making analytical distinctions and requiring a consistent approach.

Issues

There are unique conceptual, analytical, and program development issues in each of the various sectors where interventions can be made. Initially, paradigm

cases were developed for energy sector interventions⁶ because the energy sector is a major contributor of GHGs, and because the planning methodologies in energy are better developed than in other sectors. However, it is essential to examine the special issues that are presented by other sectors such as transport, agriculture, forestry, and industry, and general issues related to land management.

The incremental cost issues are:

- *Specification of a realistic and credible baseline.* This is important because, conceptually, incremental cost is the difference between two costs: the cost of the project and the cost of the baseline situation. (Incremental cost is not the difference between the cost of a project and its own revenue or benefit.)
- *Discount rate.* A decision needs to be made between a uniform international rate, a country official rate, and a calculated rate.
- *Disbursement profile.* If the grant is made as a lump sum, then the risks of obtaining future savings and benefits are borne by the enterprise. If the grant discounts these savings and benefits for risk, then it would not be appropriate to reopen the financial agreement after the fact if it turns out to be less (or more) favorable to the enterprise than had been anticipated. If, on the other hand, disbursements are made against actual incremental costs as they occur (for example, on an annual basis), this would add considerably to the GEF's administrative costs. In determining a time horizon for the consideration of incremental costs, a cut-off date could be used for operating costs, the costs of replacing capital equipment in the future, or both.

Domestic benefits

To what extent should the GEF grant be net of the domestic benefit (gross incremental cost less portion of the incremental domestic benefit)? Economically, benefits and negative costs are interchangeable. However, the purpose of an incremental cost definition—cost allocation—is financial rather than strictly economic. In this case, the distinction between benefits and negative costs has consequences for financing.

⁶ Dennis Anderson and Robert H. Williams, *The Cost-Effectiveness of GEF Projects*, GEF Working Paper, no. 6 (Washington, D.C.: Global Environment Facility, forthcoming); and Ken King, *The Incremental Costs of Global Environmental Benefits*, GEF Working Paper, no. 5 (Washington, D.C.: Global Environment Facility, 1993).

On the one hand, host countries that receive only incremental cost reimbursement for projects have no financial incentive to agree to them. (They may have other incentives though, such as a national desire to participate in the global effort.) On the other hand, donor countries have specifically mobilized new and additional funds to meet global environmental objectives. Thus GEF funding aims to provide something other than net transfers to developing countries (which may be the purpose of their regular development assistance programs).

It would be useful to distinguish five types of incremental domestic benefits, because policies concerning the reimbursement of their associated costs may differ:⁷

- (i) *Risk-free financial benefits accruing to the host enterprise or government.* Examples include the cost of fuel saved that results from energy conservation, and ecotourism receipts that result from a conservation reserve project.
- (ii) *Uncertain financial benefits accruing to the host enterprise or to the government.* This could apply to savings from fuel costs that are expected only in the more distant future or that are calculated on the basis of uncertain commercial prospects of the host enterprise.
- (iii) *Environmental benefits.* Examples include the improved health and welfare of the population that results from reduced sulfur dioxide emissions which accompany a project aimed at reducing carbon dioxide emissions, and the soil stabilization that occurs following a project to protect biodiversity.
- (iv) *Additional benefits.* Sometimes a project will provide additional domestic benefits that the project host was not seeking. To the extent that the benefits were not being sought, they are worth less to the host than they would otherwise be. One example is the modernization of plant and equipment that results when older machinery that manufactures ODS is replaced by newer machinery—the enterprise may have

been perfectly satisfied with the older machinery even though the newer machinery will be an additional benefit. Another example is the acquisition of facilities for testing low-carbon technologies that are also useful for other purposes—the enterprise may not have been able to justify acquiring such facilities on economic grounds, but having acquired them, would reap additional benefits.

- (v) *Adaptation benefits.* In this case the incremental domestic benefits are the avoided costs of climate change. Any costs of climate change that are borne or avoided are costs imposed by the previous actions of the global community.

One possible financing principle is that category (i) of domestic benefit should be fully subtracted; category (ii) should be discounted for risk and then subtracted; while category (iii) and (iv) should not be subtracted, but left as an incentive for host country participation and continued operational support for the project. Category (v) requires explicit consideration because it involves a different financing principle; namely, compensation for the incremental costs imposed by climate change, rather than reimbursement for voluntary actions to abate the global problem.

The technical work of PRINCE can help inform decisions about the financing principle, but the explicit policy choice remains in the hands of other decision-makers.

Further operational interpretations need to be made concerning the discount rate used for the savings and benefits; the time horizon for considering the recurrent savings and benefits; and when to treat an avoided cost as a benefit and when to include it in the baseline used for calculating incremental cost. This final distinction may be important if benefits are not fully subtracted from incremental cost, or if the time horizons for the consideration of costs and benefits differ.

⁷ In order to understand the treatment of domestic benefits, one can imagine a scenario where the global community, by grant-financing the gross incremental cost, acquired the domestic and global incremental benefits. Since only the global benefits represent the objective of the financing, the global community would want to transfer the new domestic benefits to the country being targeted. One way is to sell them (at a price equal to the value, appropriately discounted for time and risk) back to the host country. This, effectively, is the same as subtracting incremental domestic benefit from incremental cost for reimbursement purposes. The other way is to sell the new domestic benefits back as they are realized. This adds to administrative costs, but removes the element of risk.

Economic costs

There are a number of issues in this broad category:

- The role of financial incremental costs as incentives at the enterprise level.
- The calculation of incremental taxes and duties, excess earnings (the amount by which earnings exceed the economic cost of capital), and the incremental financial costs of lost subsidies caused by the shift from a subsidized input (such as a fossil fuel) to an unsubsidized one.
- Choosing the best way of treating each of these categories. Options could include requiring the government to waive or reimburse the incremental taxes, relying on government regulation to provide the incentive framework for reducing GHG emissions rather than financial prices, and so on.

Enterprise level costs

There are a number of disadvantages in considering costs only at this level:

- *Distributional effects.* One needs to treat existing and potential start-up firms on an equal footing. Also, it is necessary to take account of the way costs are passed on from one enterprise to another and to avoid the “double counting” of incremental costs borne at different points along the supply chain.
- *Enterprise viability.* It may be too costly and intrusive to collect the data that would enable an implementing agency to judge the commercial viability of each enterprise that claimed the “incremental costs” of its new operations. Some firms will go out of business after receiving GEF grants; to this extent there will be some waste. This effect will be stronger in countries undertaking economic reforms, because many government enterprises may find themselves unable to operate at the same level of production in a deregulated environment.
- *Conversion of excess capacity.* Where the GEF supports wholesale conversion of a utility or of an industrial firm that is operating at excess capacity, overfunding will result. This will be inevitable unless there is a way of determining the appropriate capacity (such as through sector studies) and of deciding which firms should receive grant assistance.

Decision issues

Some issues simply require a clear choice to be made among various financing policy options and do not call for detailed analysis. It would be useful to elaborate the items for which such decisions would be necessary, highlight some possible consequences, and describe the experience elsewhere (such as with the Montreal Protocol). Examples of such issues include retroactive financing, the costs of institutional support, the treatment of multinational corporations, and the treatment of consumer welfare costs and unemployment.

National Climate Change Studies

Background

What is the appropriate methodology to be adopted for country studies on the incremental cost of GHG reduction and adaptation to climate change? Such studies can provide governments with a useful general framework in which they can assess, among other things, the incremental cost of actions to reduce the emissions of GHGs, and actions to protect or enhance GHG sinks. The cost-effectiveness of such interventions, whether GEF-financed or not, depends on the sequence of projects and the consistency of program responses that are described in country studies. Country studies can also provide a description of the baseline situation against which the incremental costs of interventions can be measured.

Existing and ongoing country studies

Various country studies, many of which are national efforts, have been completed or are underway. The Centre international de recherche sur l'environnement et le développement (CIRED, France) is working with several developing countries on such studies, and cooperates with the UNEP network. The Asian Development Bank (ADB) is helping to implement a series of country studies in the Asia region and will help carry out a series of GEF-financed country studies on behalf of the UNDP. UNEP, which will help eleven developing countries prepare GHG inventories, is also coordinating a series of GHG-costing studies through its collaborating center, Risø

Laboratories in Denmark. Various bilateral donor agencies from the United States, the United Kingdom, and other countries have sponsored studies in developing countries. A few countries have undertaken and financed their own studies. All these efforts were surveyed for PRINCE by the Center for International Climate and Energy Research, Oslo (CICERO, Norway).⁸ The CICERO survey revealed that in some countries several studies were in progress, sometimes with little coordination. Often the terms of reference of these studies differed in scope and assumptions, making intercountry comparisons difficult.

Future national studies

Under *Article 12* of the FCCC, each Party will inform the Conference of the Parties about the sources and sinks of GHGs, and the steps taken or envisaged to implement the Convention. Such information will usually be obtained through prior national studies. Developing countries need not communicate this information until three years after they become Parties to the Convention. Since the Convention is expected to enter into force in 1994, demand from developing countries for national studies may be expected to rise after that date in anticipation of the communication obligations to begin in 1997. Although this deadline is four years away, working toward an international understanding of the requirements of the national studies and of an international consensus on best-practice methodology is important. Such advance

⁸ Jan Fuglestedt et al., *A Review of Country Case Studies on Climate Change*, GEF Working Paper, no. 7 (Washington, D.C.: Global Environment Facility, 1993).

work can reduce wasteful duplication, and can lay the groundwork for intercountry comparability in studies that are to be commissioned.

The nature of information to be communicated to the FCCC will determine the minimum requirements for national studies. Individual governments may well decide to set additional requirements to ensure that the national studies provide them with as much useful knowledge as possible, including information that would be required in proposing projects for international financing.

Whichever requirements governments set, national study teams and consultants should adapt methodologies suited to local conditions. It is also important that they be familiar with the commonly adopted technical terms and assumptions likely to be used in other studies in the same country. In due course, and within the policy framework that will be provided by the Conference of the Parties, there will be a need to develop an international consensus on technical terms, assumptions, and methodologies in the appropriate intergovernmental forums, such as the IPCC.

The role of PRINCE

The results of various studies, including PRINCE's work on incremental cost, will play an important role in building an international consensus on GEF study methodologies and other global concerns. There are several advantages to studying the incremental cost implications of alternative assumptions and methodologies within the PRINCE framework:

- Under the restructured GEF, there will be an opportunity to examine the applicability of methodologies in the widest possible range of country situations
- PRINCE provides the opportunity to build on substantial analytical work done by the GEF Administrator's Office and the GEF implementing agencies on country incremental cost studies, on the related problem of phasing out ODS, and on the cost-effectiveness of GHG-reduction activities in the energy sector
- The country studies are related to other PRINCE tasks, particularly the plans to study transaction costs (which will look at the costs of making overall shifts to greenhouse-friendly investment programs).

Issues

The specific purpose of PRINCE studies is to calculate incremental costs at the country level. However, an awareness is required of other objectives that governments might have for country studies, namely:

- To gather information that the government may need to convey to the Conference of the Parties in accordance with *Article 12* of the Convention. This could include general information on the steps taken or envisaged to implement the FCCC and on projects proposed for financing.
- To suggest the optimal policy and investment sequence for meeting targets or commitments on GHG reduction.
- To build the capacity of participating countries to further refine strategies and to participate in international forums such as the Conferences of the Parties to the Conventions.
- To provide, where possible, data required by the IPCC Working Group 2 (impacts) and Working Group 3 (costs).
- To develop a program of investment options for possible GEF financing or other support.

Generic terms of reference

Following is a list of the elements that should be included in the terms of reference for country studies. For some aspects of the underlying studies, there are existing methodologies in common use. These are indicated in parentheses. The mandatory elements are as follows:

- Inventory of sources and sinks of GHGs. (*Estimation of Greenhouse Gas Emissions and Sinks: Final Report from the OECD Experts Meeting, February 18-21, 1991, OECD Paris, revised August 1991.*)
- Vulnerabilities and impacts. (*Preliminary Guidelines for Assessing Impacts of Climate Change, IPCC Working Group 2; Global Climate Change and the Rising Challenge of the Sea, IPCC Working Group 2, Coastal Zone Management Subgroup, May 1992.*)
- Technical options to reduce vulnerability to climate change.
- Alternative programs and measures to promote mitigation and/or adaptation.

- Feasibility, costs, and benefits of alternative options.

Other elements recommended by national study teams could also be included.

Balance of effort

The level of effort on inventories would be partly determined by the nature of feasible interventions. In general, this work will be strategically focused. The sophistication of sectoral and economic modeling might depend on the modeling traditions of the country, the interactions of the different elements of the GHG problem, and the expected sensitivity of the main outputs to model sophistication. Maintaining conceptual clarity and robustness, which will be especially important, may entail using modeling techniques that are less sophisticated than those used for other purposes, such as expansion planning for least-cost power systems. The extent of the effort put into sensitivity testing will be a function of data quality. The degree of testing will affect the level of model sophistication. The comprehensiveness of sectoral response strategies will be decided on a case-by-case basis. The gases treated and the sectoral interventions considered may depend on country circumstances. Likewise, the balance between abatement, mitigation, and adaptation too will depend on country circumstances.

Common assumptions, definitions, and units

Several definitions, units, and assumptions⁹ in common use cover aspects that include:

- Global exogenous factors, including fuel prices, and global economic performance.
- Various scenarios including targets, timetables, and specific objectives of the studies.
- Definitions of key terms such as abatement, mitigation, adaptation, incremental cost, emissions reduction, and sinks and sources.
- Units as they apply to energy (such as those defined according to International Energy Agency formats and definitions), forestry, agriculture, and economic and monetary units.
- Definitions of sectors, for example, according to the International Standard Industrial Classification, or modified to take account of special features (as in the case of energy planning).
- Cost data, including data on the international costs of energy options published by the Environment Department of the World Bank. This, or another agreed source, could be used to standardize assumptions.

Operational interpretations

Several other factors related to incremental cost calculations could be useful to standardize for comparative purposes:

- *Baseline.* Since the baseline will be counterfactual, there may be several types of these, depending on the objective being studied. One issue will be whether the baseline is descriptive (outlining what would actually be expected in the country) or prescriptive (outlining the economic optimum in the absence of abatement, but assuming economic pricing and the absence of structural impediments). The key issue is whether or not to include negative incremental cost options. Alternatives could include the development of a baseline with official forecasts, a business-as-usual formulation, and an economic reform calculation (perhaps more realistic for long-term baselines).
- *Scenarios.* Scenarios describe the exogenous occurrences common for the baseline and the abatement cases considered. There are some existing scenarios developed by international consensus, such as the World Energy Conference (WEC) scenarios. However, some of these (including the WEC scenarios) do not explicitly include price effects, and consideration may have to be given to others. For comparability, the global part of the scenario needs to be standardized. It may feature the amount of global abatement expected and the extent of expected climate change, which would have an effect on world energy prices. Treatment of uncertainties needs to be standardized, possibly through a range of scenarios.
- *Abatement targets.* A range of alternative (but hypothetical) targets could be used to illustrate the

⁹ A set of assumptions has been developed by UNEP for its studies. These cover GHG abatement in the energy sector. "Methodological Framework for National Greenhouse Gas Abatement Costing Studies: GHG Phase Two Guidelines," UNEP Collaborating Centre on Energy and the Environment (Copenhagen, 1993).

costs that would be incurred if such targets were to be committed. Possible targets include emission rate targets relative to either a base year or a baseline emissions rate; targets on total emissions (possibly discounted); physical targets applied separately to the various gases and sectors; and emissions aggregated according to a global warming potential. The issues to be addressed will include the choice of base year, corrections for unusual base-year events, and the determination of trends against which reductions are measured.

- *Abatement cases.* These could be constructed as the sequences of projects coupled with appropriate policies that meet the targets at least cost, or they could be constructed in some other way that reflects the most likely response strategy of countries. Least-cost system planning may be easier to develop in sectors where such planning techniques are regularly used (such as energy). Yet in other sectors it may be necessary to build up cost curves of independent projects. It may be important to decide whether abatement is to be assisted by policy interventions or achieved solely through the international financing of incremental costs.
- *Climate impact scenarios.*
- *Treatment of costs.* Existing methods for measuring economic costs would be used. While no new methods need be invented, a better understanding needs to be fostered among the groups engaged in country studies. Some features of special interest include:
 - (i) Taxes and subsidies;
 - (ii) Price distortions and monopoly profits;
 - (iii) External costs (particulates, acid rain, and so on) and resource rents on depletable non-tradeable resources;
 - (iv) Apportionment of expenditure on public goods;
 - (v) Capital operating and other costs; and
 - (vi) Discount rates (standardized on given values, official rates, or values calculated according to some agreed methodology for each country).
- *Comprehensiveness.* Gases, sectors, levels of intervention and public sector response.
- *Time horizons.* “Short term” usually implies fixed investment (one to five years); “medium term” implies fixed knowledge (five to ten years); where-

as “long term” permits technical change (ten years and longer). However, there is no universally agreed definition of a time horizon.

- *System boundary.* Attribution of emissions to countries for the purposes of the studies, such as bunker fuels, trade in carbon-intensive goods, migration of carbon-intensive industry, and induced trade effects of GHG-reduction strategies.
- *Uncertainties.* Treatment through sensitivity analysis on specified variables or through other means. One option is to postpone treatment of uncertainties as much as possible until the end of the analysis—for example, by adjusting for the global warming potential of the separate gases only at the end. This preserves as much of the analysis as possible in the event of a change of assumptions.

Work program and approach

As mentioned before, an initial survey of country studies has been completed for PRINCE by CICERO. The methodology of the UNEP studies and certain other studies has been reviewed and an issues paper is being prepared.

Pending further guidance from the Conference of the Parties to the FCCC and further assessment of methodology by the IPCC, interim choices would need to be made about the most appropriate methodologies for use in national studies slated to be financed by the GEF, including those PRINCE studies that are designed to demonstrate how incremental cost can be calculated. To make these choices, the views of the other main sponsors and providers of country studies, and of the developing countries affected, would be sought.

Some of the methodologies needed for comprehensive national studies have already been developed and tested, such as the Organization for Economic Cooperation and Development (OECD)/IPCC methodology on inventories. PRINCE will concentrate on other methodologies that are less well developed and that focus on incremental cost calculation. Because methodologies are evolving continuously, several PRINCE workshops will be needed to update national study teams on the latest developments.

The calculation of country incremental cost must be based on a comprehensive study of various countries.

Some elements based on a common approach would be:

- *Existing conventions and guidelines.* The general approach would be to adopt, wherever possible, the conventions and guidelines already in common use. (Some existing guidelines may need to be supplemented by operational details.)
- *Interim adoption.* The adoption of existing guidelines would be an interim arrangement; analyses, comments and study results over the coming year will dictate what is feasible, and occasional revisions to the guidelines may be needed.
- *Commonality and transparency.* While guidelines are intended to be common, they are not meant to be constraining. Commonality is especially important in areas that are essentially arbitrary, such as units, definitions, and targets. Where divergences occur in other areas, they should be noted and explained with reference to the common guidelines. Transparency is even more important than commonality.
- *Use of guidelines.* It is hoped that national study teams and the organizations that finance the studies will adopt the guidelines that are commonly used, and agree on some other specific approaches that are unique to the incremental cost issue.

To inform countries about the methodologies being used by consultants and by other national teams, PRINCE would sponsor an annual review of country studies. Such a review would not be an assessment of the national strategies that are proposed, but simply a technical comparison of the incremental cost methodologies used. The Intergovernmental Negotiating Committee for the FCCC information exchange system would be one means of disseminating information on methodologies.

To demonstrate the calculation of incremental costs on the basis of best-practice methodology in diverse country situations, a few GHG national studies will be commissioned under PRINCE by subcontracting one or other of the implementing agencies. (However, as mentioned, the bulk of the national studies will be budgeted for separately since it is not the purpose of PRINCE to replace the regular operations of GEF, but only to develop or demonstrate methodologies related to incremental cost.)

4 Ozone Layer Protection Country Studies

Background

The appropriate methodology to use for country studies of ozone layer protection, and the lessons that can be drawn from such work for climate change country studies are of critical importance.

The Multilateral Fund of the Montreal Protocol finances the incremental costs of projects that phase out ODS in developing countries. For the purposes of the Fund, eligible countries must also have per capita consumptions of ODS of less than 0.3 kilograms per annum. Countries that are otherwise eligible but exceed this consumption limit (mainly the countries of Eastern Europe) may be financed under the GEF. The GEF applies criteria and requirements that are no less stringent than those which apply under the Multilateral Fund, including the requirement for a Country Program.

Country Programs, therefore, are produced for countries that receive funding from either the GEF or the Multilateral Fund for their efforts to phase out ODS. Such programs typically estimate the country compliance costs of meeting the Protocol targets. In theory, the least-incremental cost investment sequences for a variety of alternative assumptions serve several functions:

- They prepare the program of investment projects whose incremental costs are eligible for funding by the Multilateral Fund

- They suggest the most appropriate set of measures for phasing out ODS, for example, the set of measures that would reduce the overall costs of compliance as much as possible
- They provide estimates of the total compensation that might be expected from the Fund for all the actions taken.

The results of this assessment of methodology are required for the refinement of GEF work in ozone layer protection. PRINCE involvement in this work provides a natural channel whereby lessons learned in one focal area (ozone layer protection) can benefit those working in another are (global warming). This task will therefore be linked to the climate change country studies task (chapter 3).

Work program and approach

The Pollution and Environmental Economics Division of the Environment Department of the World Bank commissioned four papers¹⁰ from consulting firms that have, in the course of preparing Country Programs, operationalized the Bank's methodology on calculating the incremental cost of country phase-out actions. These papers, three of which are now complete, cover the application of the methodology in the Czech and Slovak Republics, Egypt, India, Jordan, Thailand, Tunisia, Turkey, and Zimbabwe.

There will be a workshop to present and review all four papers as well as a paper on the Bank's methodology

¹⁰ These papers were financed by the World Bank, not by PRINCE. The case studies are Egypt (C. Catanach); India, Turkey, Jordan, and Zimbabwe (Touche Ross); Tunisia and the Czech and Slovak Republics (COWiconsult); and Thailand (ICF Incorporated).

prepared by the GEF Administrator's Office. This workshop will be co-hosted by the GEF and the Bank. Following the workshop and revision of the draft papers, the commissioned studies and a paper on the lessons learned will be submitted for publication as a GEF Working Paper.

Issues

The three main issues which consultants had been asked to address were:

- Calculation of country incremental cost
- Strategies and measures
- Lessons learned.

Calculation of country incremental cost

This involves several steps, each one of which has different aspects:

- Projecting unconstrained demand for ODS according to various growth and/or price scenarios
- Specifying the constraints imposed by technologies, institutions, and the Montreal Protocol schedules
- Defining the technical options and substitution possibilities for each producer, user, and consumer sector; and for each group of ODS
- Outlining the alternative strategies (allowable, accelerated, and least cost)
- Recognizing incremental costs where they occur, discounting them, and avoiding double counting
- Estimating, in particular, the consumer costs of premature obsolescence of household appliances.

The technical and economic assumptions (such as the price and availability of ODS, ODS substitutes, and alternative technologies) should be standardized as far as possible to promote inter-country comparability. There may be special difficulties in any of these steps due to the lack of quality data.

There are some important methodological questions, for example: the way in which recovery, recycling, and destruction are represented; how supply and demand are balanced; how price effects are included (if at all); how consumer appliance ownership and servicing should be modeled; and how investments are sequenced to minimize cost.

Strategies and measures

These center on their effect on incremental costs, and on the formulation of particular proposals.

Lessons learned

The potential lessons to be applied to new work on ODS phase-out concern sensitivities, uncertainties, data problems, institutional constraints, and whether these aspects should be dealt with differently in the future to make the studies more useful. It may be necessary to change the scenario descriptions, the mix of scenarios, and the sophistication of the model, or to include new elements. Other potential lessons concern promising areas for research or data collection.

The lessons learned would also be useful for country case study work on climate change. There are similarities in specifying scenarios, strategies, price effects, and technical options. There are also some significant differences between ODS phase-out and GHG reduction which would need to be taken into account before transferring the lessons to the latter area. ODS phase-out differs from GHG reduction in the following ways:

- It is to be a complete phase-out
- It is subject to physical targets set by a Protocol
- It concerns only a few readily identified sectors
- It involves relatively few uncertainties
- It would be fully financed in the next few years
- It requires action only over the medium term (about ten years) for most activities to be complete.

Transaction Costs

Background

How can the adoption of apparent win-win solutions be stimulated? Such solutions are sometimes referred to as negative incremental cost projects because they are economically viable in their own right. The dilemma arises because these projects are often not being funded. On the one hand, if the GEF restricts itself to those projects that have positive incremental cost while the bulk of negative incremental cost options remains unfunded, it risks becoming irrelevant to the main solution to the global environmental problem. On the other hand, providing grant finance for economically viable projects effectively makes a net transfer to the country, which is not the purpose of the new and additional funding; worse, it provides a perverse incentive to potential recipient countries to delay economic reform.

This issue was discussed at the New Delhi PRINCE workshop and has been the subject of further studies. There seem to be many cases where economic projects impose positive economic costs on countries. By identifying and analyzing these costs, a compelling case can be made for GEF financing in such cases.

These costs may include the price of developing efficient markets, and the costs of market entry. They may also include the resources needed to obtain economies of scale, information costs, implementation costs (where there are various constraints), and other transaction costs. There are also other benefits,

such as those obtained by a shift of program priorities stimulated by a demonstration project.¹¹

Because of the risks of creating perverse incentives and financing domestic energy subsidies with international grants, considerable rigor will be required if this analysis is used to justify GEF grants.

Much related work has been done elsewhere and for other purposes: on energy conservation (at the Lawrence Berkeley Laboratories in California), on implementation costs where there are constraints on financing and trained manpower (at the Institute of Environmental Studies in Amsterdam), on institutional capacity (at the Indira Gandhi Institute of Development Research in Bombay), on energy and other issues through the World Bank/UNDP Energy Sector and Management Assistance Program (ESMAP), and on other issues by institutes around the world. This work will need to be reviewed to determine its relevance for the issue of financing these costs.

Role of PRINCE

There is a need to explore the possibility of replicability through projects that can help shift entire programs to new technologies that are greenhouse-friendly. Solving this dilemma will prevent a situation where the GEF has a portfolio of expensive projects while the low-cost, high-impact shifts of investment programs go unfunded.

¹¹ The term "transaction costs" may thus be too limited to fully describe the work envisaged in this task and a new term may be coined later.

There are advantages to studying transaction costs under PRINCE. First, this issue is already being studied as operational interpretations of the incremental cost concept under PRINCE (see chapter 1). Second, the shifts of investment programs that give rise to transaction costs may require a country study for background information. Such a study would include the strategies and measures a country proposes for implementing its commitments under the FCCC. The methodologies for such country studies are proposed as a task under PRINCE (see chapter 3). Third, PRINCE would be able to draw lessons from the operational experience of the implementing agencies in previous demonstration projects, such as those of the UNDP and the World Bank through ESMAP.

Work program and approach

Studies would be undertaken by the GEF Administrator's Office to develop the methodological tools for the rigorous assessment of transaction costs. Consultants would be hired to review any relevant experience with transaction costs and to field test the concepts. A workshop would be held to review progress. It is hoped that pilot projects would be developed by the implementing agencies in conformity with the PRINCE results for the consideration of GEF Participants.

One risk is that the methodology could be misinterpreted as a way of justifying whatever financial subsidy is required to make a given project proposal attractive. This is not the intention; close scrutiny will be needed in the analysis to provide independent estimates of the transaction costs that could form the basis of a GEF grant. Another risk is that previous failures in demonstration projects will be repeated; to avoid this, the reasons for any failures of similar projects in the past will have to be analyzed and understood.

Issues

The issues concerning PRINCE are often presented in terms of the GEF's original distinction between Type I and Type II projects. When the GEF was established, a distinction was made between projects on the basis of the size of the domestic benefits compared with the costs. In Type I projects, domestic economic benefits exceed costs; that is, the incremental costs are negative and the project is not eligible for GEF grant financing.

Type II projects are eligible because the incremental costs are positive. This typology was thus an early attempt to operationalize the concept of incremental cost, but it requires additional refinement.¹²

There are projects that appear to be Type I, but are actually Type II due to costs that have not been fully valued or because the boundary of the project was drawn too narrowly to capture all the relevant costs and benefits. Thus, there are "hard" Type I projects (where only a continuing subsidy can overcome domestic distortions), and "hard" Type II projects (which are domestically uneconomic but would have significant global environmental benefits). It is the incremental costs and benefits of the other win-win Type II projects that need to be identified and assessed. A possible typology is given below.

Ineligible projects

Type I. Economic project but non-economic pricing. Despite the profitability of the project, continuous subsidies are needed to maintain the project because of non-economic pricing.

Possible case study—Efficient electrical water pumps for the agricultural sector would reduce GHG emissions. Even when this technology is economically attractive, highly subsidized power (in some countries the marginal cost of electricity for this purpose is zero) would prevent its adoption.

Eligible projects and possible case studies

The Conferences of the Parties to the Conventions may find that the resolution of technical conclusions drawn using the following typology could provide a useful input to their selection of eligibility criteria:

Type IIa. Non-economic project but no economic distortions. Such a project would clearly be eligible if there were commensurate global benefits.

Possible case study in Latin America—Ecological restoration using halophyte biomass. The project would have domestic benefits, but if these were lower than the costs, the country could not justify the investment based on domestic considerations alone. Grant

¹² See World Bank, "Funding for the Global Environment," World Bank Discussion Paper. (Washington, D.C.: World Bank, 1990).

financing from the GEF would be justified if the resulting GHG reductions were large enough.

Type IIb. Economic project with constraints. There may be financial, manpower, or institutional factors that could give rise to cost constraints.

Possible case study in West Africa—Use of scarce agricultural extension services to provide information to farmers to switch to economic biomass projects (which fix carbon dioxide). The loss of the agricultural extension services to other sectors could cause economic losses.

Type IIc. Intervention with wide system boundary. It might be possible to design a sectoral intervention to break down market barriers or other structural impediments to efficient markets for low-carbon technologies. That is, it might be necessary to draw a wide system boundary to include a broad range of costs (market development) and a broad range of benefits (demonstration effect that shifts the overall program of investments to a more sustainable approach). Because the usual focus of analysis is at the project level, these wider costs and wider benefits would not be considered in the calculation of incremental cost and incremental benefit, and the results could be misleading.

Possible case study in South-East Asia—Financing the energy conservation activities of industries with small energy consumption levels (less than 2 percent of total costs). The management costs of such a project are very high for the company; a firm or even the utility can make these interventions for the companies and achieve economies of scale. Although finance may be needed to set up such an enterprise, once started it could be self-sustaining.

Type II d. Intervention with long time horizon. It may be possible to design an intervention to reduce incremental costs in the long term by developing markets (to achieve economies of scale), and by stimulating organizational learning and technical adaptation in the country concerned.

Possible case study in Southern Africa—Development of an indigenous renewable energy equipment industry.

Type IIe. Intervention with indirect benefits. Some interventions, such as capacity building, promote GHG reduction indirectly. In such cases, additional costs may be justifiable in relation to these indirect benefits. Projects with benefits other than direct GHG abatement are those that:

- Build capacity
- Provide insurance against damage due to climate change
- Reduce scientific, economic, or institutional uncertainties
- Assess country vulnerability and abatement options
- Develop operational modalities and principles.

Possible case study—Regional study of options and impacts in Eastern Europe.

6 Program Scope, Portfolio Development, and Modalities

This task addresses three broad issues for the operation of the GEF:

- How can incremental cost principles be generalized to cover the existing and potential focal areas of the GEF?
- How can the GEF portfolio be systematically developed around the incremental cost principle?
- Which modalities besides grant financing are appropriate?

Background

Incremental cost principles have been most fully explored in the ozone layer protection area of the GEF, with most of the work being aimed at setting in motion the requirements of the Multilateral Fund. PRINCE is initially concentrating on applying this work to the area of climate change, where most progress can be made in the short term. Many of the insights, however, should also be readily transferable to the prevention of pollution of international waters. Biodiversity protection involves virtually all the issues that arise in climate change (baselines, uncertainty, incentives, and so on) as well as certain additional complex issues such as the valuation and separation of benefits.

Prevention of desertification is not a GEF focal area—desertification projects can only be funded to the extent that there are incremental costs for global environmental benefits in the focal areas, such as climate change mitigation (arresting devegetation

prevents the release of GHGs), or biodiversity protection (preserving habitats).

Portfolios have been built up in the Pilot Phase by the implementing agencies to demonstrate a range of interventions with global environmental benefits. Unit abatement costs have been estimated in some cases. In GEF II, more attention will need to be given to the systematic development of portfolios based on the incremental cost principle. Rather than rely on bottom-up suggestions which are then matched against the criteria, there needs to be some top-down guidance to ensure that promising areas are systematically identified and matched to implementing agencies and collaborating institutions. This would help to build up the long-term capacity to solve global environmental problems and to respond to them more cost-effectively.

The advantage of considering a range of portfolio options and of modalities (such as regional cooperation and private sector participation) within PRINCE derives from the links to other PRINCE work, in particular, the operational interpretations task (see chapter 2), the national climate change studies task (see chapter 3) and the transaction costs task (see chapter 5).

Program scope

In considering program scope, the parameters of the four GEF focal areas and of the conventions must be considered. The status of work on biodiversity, international waters, regional environmental issues, and scientific research can be summarized as follows:

- *Biodiversity*. Initial work was commissioned on economic issues in biodiversity.¹³ Some of the work will be conducted in parallel with PRINCE activities to see how incremental costs can be applied to biodiversity protection. Such parallel research will also provide early inputs to the country study work of UNEP. However, no major work will be undertaken until a work program has been drawn up for consideration by STAP.
- *International waters*. The Law of the Sea (not yet entered into force), the Regional Seas Agreements, and other conventions will be reviewed to identify global environmental projects and to consider how their incremental costs might be calculated. Although GEF Participants may wish to alter the financing policy of the GEF at any time to accommodate specifically regional issues, the underlying assumption in this task will be that projects will need to produce incremental global environmental benefits commensurate with the incremental costs. Possible projects could include port waste facilities and the prevention of aquaculture runoff which pollutes oceans, depending on how global the benefits are.
- *Regional environmental issues*. Concepts developed elsewhere for these initiatives will be studied to determine whether they have any significance for the GEF. Although GEF has no mandate to finance incremental costs for regional environmental issues, the treatment of regional side-benefits needs to be addressed (such as the benefits that accrue from reduced sulfur dioxide emissions accompanying a project to reduce GHGs).
- *Scientific research*. Research has progressed furthest in the focal area of climate change, but remains in the early stages for the other focal areas.

The World Climate Programme, coordinated by the World Meteorological Organization, provides an appropriate framework for scientific research related to climate change. There may be incremental costs associated with the climate research conducted in countries eligible for GEF financing. The methodological issues are:

- To separate research related to anthropogenic climate change from that related to other climate

change, climate variability, the role of climate in economic performance generally, and the prediction of weather

- To determine the baseline against which the incremental costs and benefits are to be measured.

For scientific research on biodiversity and the other focal areas, the primary considerations would be the valuation of biodiversity and the separation of domestic and global benefits.

Portfolio development

Where a focal area is covered by a convention, operational programming would use the program priorities established by the relevant Conference of the Parties as the basis for developing sets of specific projects. There are several possible approaches to operational programming, and PRINCE could help draw out the implications of each. The following are three commonly suggested approaches:

- *Least-cost programming*. Field tests of methodologies developed under the climate change country studies task (chapter 3) will be conducted to test their usefulness in developing an entire country or sectoral least-cost program of climate change mitigation. These studies will only be carried out in small countries where it can be anticipated that funding from GEF during its next phase would support the entire least-cost program, since there is little sense in financing only part of a least-cost program that involves systemic effects.
- *Cost-effectiveness rankings*. Global studies will be undertaken to identify projects and project types that meet portfolio criteria for diversity, replicability in the long term, capacity-building potential, and so on. The projects and project types would, in addition, be subject to project criteria for cost-effectiveness on the basis of incremental cost for incremental benefit. In most instances, current uncertainties preclude the development of least-cost country least-cost programs. Likewise, current financial and capacity constraints mean that full funding of such least-cost programs worldwide will require more than an initial three years of GEF II support.

¹³ David Pearce et al., *Economics and the Conservation of Global Biological Diversity*, GEF Working Paper, no. 2 (Washington, D.C.: Global Environment Facility, forthcoming).

- *Precautionary programming.* Studies will be undertaken to identify projects and project types that meet portfolio criteria for catalytic effect, innovation, risk-spreading (including diversification), and capacity building (including replicability). The studies would also look at broad project criteria, discussed in detail below, for cost-effectiveness on the basis of incremental cost for incremental benefit. Such portfolio criteria have implications only for operational programming and for the post-project evaluation of GEF projects:

- (i) *Catalytic.* New and additional GEF funding could help governments that seek to integrate global environmental considerations into their general development programs. By meeting the cost of any initial incremental financial risk, the GEF could stimulate the adoption of win-win projects—the ones that benefit both the country and the global environment. (During post-project evaluation, it would be useful to show how a GEF project or program had helped to do this, and how it had improved the regular operations of the implementing agency in the country concerned.)
- (ii) *Innovative.* The GEF could help to resolve uncertainties about the institutional feasibility of alternative solutions to global environmental problems. One of the goals could be to experiment with innovative approaches to test hypotheses about their usefulness. The portfolio might also include several studies. (In post-project evaluation, a number of experimental projects will be unable to directly alleviate the global environmental problem. This would not constitute failure; failure results from poor experimental design, not from an imperfect answer.)
- (iii) *Risk-spreading.* The GEF portfolio could hedge against uncertain scientific, technological, and economic issues, and would adjust its investment in the light of newly discovered information. Within each focal area, the portfolio should be diversified by the economic policy of recipient countries, by geography, sector, technology, and institutional form. (Some projects will be found during post-project evaluation to have been based on a wrong assumption or on an inappropriate pri-

ority. This would not indicate failure—the program should be judged on the rationale of the portfolio, given prevailing uncertainties and opportunities.)

- (iv) *Capacity building.* The GEF could help build the capacity needed to implement a major, fully-funded program once most of the uncertainties are satisfactorily resolved. Capacity building would be needed in the GEF implementing agencies, in collaborating institutions, and in participating country institutions. Many GEF projects will not only directly alleviate a global environmental problem, but will also establish new markets, demonstrate innovative techniques, provide technical assistance, train specialists, and disseminate information. Such projects should be selected according to various criteria, not just according to the incremental unit cost of direct environmental protection. These criteria should be recalled for post-project evaluation. Particular care needs to be taken to separate the various types of incremental cost. Examples include the incremental costs of certain types of projects in the long run; those incurred only by the first project of a certain type (costs often associated with capacity building); and costs that arise solely as a result of inefficient implementation. The long-run unit protection (or abatement) cost is a more useful indicator for future programming than the actual unit cost, because the long-run unit cost does not include these on-time costs. Even so, the long-run unit cost is but one of several factors on which the project should be selected and evaluated.

Scoping studies

Studies will be commissioned to determine the scope for certain types of technologies or interventions. Initially these would be on climate change mitigation, and would normally include the following three elements:

- *Financial viability.* The scope for applying particular technologies that are not financially viable but would be if identifiable barriers were overcome, or if certain technical developments occurred. Barriers to financial viability include the lack of adequate consumer information; the

absence of supportive institutions and infrastructure; unsound pricing policies; and markets that are too small or fragmented to permit economies of scale. Technical developments that are likely to be induced by the existence of a mass market or government support will also affect financial viability.

- *Economic viability.* Economic viability constitutes the scope for applying particular technologies that, even if not financially viable in the sense above, would be economically viable if all local external costs and benefits (mainly environmental costs and benefits other than the specifically global ones being considered) were internalized. For example, if the external costs of particulate emissions were fully internalized, coal-fired power generation would be less attractive than otherwise.
- *Global viability.* The scope for applying particular technologies that, even if not economically viable in the sense described above, would be economically attractive if a value were imputed for the benefits of protecting the global environment.

Past scoping studies have not all used the incremental cost principle in identifying projects. It is important to guard against several common misconceptions that are sometimes perpetuated in both technical scoping studies and in country studies:

- *Total rather than incremental costs.* Sometimes, only one side of the calculation is considered. For example, only the costs of the renewable energy alternatives are considered, without taking into account the costs of the conventional energy it will replace. It is the incremental costs that are relevant.
- *Costs of conserved energy.* Energy conservation costs in particular are often misunderstood because they are in a sense doubly incremental. First, one must calculate the cost of conserved energy (CCE), which is the demand-side incremental expenditure per unit of energy saved. For example, the annualized difference in the cost of fluorescent light tubes and the cost otherwise borne for incandescent bulbs providing the same lighting service, divided by the annual energy savings, is the CCE for this particular action. Second, one must calculate the difference between the CCE and the cost of supply.

Often the CCE is less than the cost of the energy supplied, which makes the investment economic. In this case the CCE is positive but the incremental cost of any carbon dioxide not emitted would be negative.

The distinction is important. Because incremental costs are the only costs eligible for reimbursement, the costs of conservation activities that are economic would be ineligible, whereas conservation that goes beyond what is economic would incur some reimbursable expenditures. As in the general case above, it is only by considering the complete supply system in the absence of global warming considerations that one can determine incremental costs; one cannot do it by examining only the alternative action, in this case conservation.

- *Operating costs.* Often operating costs are ignored and only capital costs are considered. In fact all costs—operational as well as capital costs—need to be included in the calculations.
- *Baselines.* Sometimes no explicit baseline is used. For some global warming projects a baseline is considered in the form of the shadow project not implemented. Incremental costs are considered in reference to this shadow project. However, the call for a one-for-one project replacement is rare. It is important to consider the projects in a full systems context to arrive at the complete baseline. A geothermal power plant, for example, would not usually replace a coal-fired plant of exactly the same capacity, timing, and operating characteristics. The savings of carbon dioxide and the incremental cost have to be calculated between two system expansion-cum-operations plans, one that includes the geothermal plant, and one that excludes it.

Modalities

The main modalities used by the Facility so far have been grant financing and the facilitation of cofinancing. A possible GEF role in promoting regional cooperation is to be considered, and some exploratory work has already been done on collaboration with the private sector.

Facilitation of regional cooperation

Examples of how the GEF could facilitate regional cooperation include support for regional power grids to transmit renewable energy to areas otherwise served

by fossil fuels; for regional gas grids to reduce coal use in other countries of the region; for conservation corridors between nature reserves in neighboring countries; for joint action to phase out ODS in existing customs unions and in regions with a history of cooperative production and use of these substances; and for joint action to clean up international waterways.

Facilitation of the role of the private sector

The mobilization of private sector funds for projects that have global environmental benefits may be possible.¹⁴ Many firms, however, will be wary of the incremental risks associated with such investments and may require guarantees or grants to compensate for the incremental costs of such risks. Private sector participation would also require careful attention to the special issues of baseline, financial constraints, additionality, and incentives.

¹⁴ For more on links between the private sector and the Global Environment Facility see Frances Cairncross, Michael Rubino and Lloyd Timberlake, *The Private Sector and the Global Environment Facility*, GEF Working Paper, no. 3 (Washington, D.C.: Global Environment Facility, 1993).

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