Measuring Results from Climate Change Programs:

Performance Indicators for GEF

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Preface

The GEF Monitoring and Evaluation (M&E) team is tasked with analyzing and documenting GEF results. Until now, conclusions of these efforts have been in the form of evaluation and study reports, annual Project Performance Reports, and GEF Lessons Notes. With the introduction of the M&E series of Working Papers, we are publishing reports that are not full-fledged evaluations, but nevertheless deserve attention. Many of the issues and early results that these reports identify will be pursued later in broader evaluations to arrive at more definite conclusions. We expect the M&E working papers to be a valuable catalyst for promoting dialogue on issues and results of importance within GEF's operational areas and efforts. We therefore look forward to your feedback and suggestions. Please contact us through the coordinates listed below and visit the GEF Web site to find out more about the Monitoring and Evaluation program.

Measuring Results from Climate Change Programs: Performance Indicators for the GEF is the result of an exercise conducted during 1999-2000 to develop a framework for determining the impacts of GEF's climate change activities. The exercise was conducted by an external study team, under the guidance of a Steering Committee, and in close consultation with GEF management and staff.

We intend to apply performance indicators identified in this report to evaluate the accomplishment of climate change activities supported by the GEF. We also hope that this report will provide guidance to staff in the GEF and its partner organizations for developing appropriate frameworks for project design, implementation, and performance monitoring.

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This exercise was made possible by the excellent cooperation extended by the management and staff at the GEF secretariat and the three implementing agencies, who were willing to spend time with the study team sharing their perspectives and insights regarding the GEF and is operations. Particular thanks are due to Mohamed T. El-Ashry, Kenneth King, Patricia Bliss-Guest, Alan Miller, Dilip Ahuja, Chona Cruz, Michael Sanio, Jarle Harstad, Scott Smith, Lars Vidaeus, Charles Feinstein, Karl Jechoutek, Louis Boorstin, Dana Younger, Rafael Asenjo, Emma Torres, Richard Hosier, Nandita Mongia, Rana Maalouf, Katya Birr, Martin Krause, and Ahmed Djoghlaf.

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Measuring the Performance of GEF Climate Change Programs

Through its programs in the climate change area, GEF assists developing countries and countries in transition to meet both national development and global climate change objectives by promoting energy efficiency and renewable energy. This promotion takes the form of fostering sound investments and policies, improving national capabilities, and nurturing businesses. Since 1991, GEF and its implementing agencies—the United Nations Environment Programme, the United Nations Development Programme, and the World Bank Group, including the Group's private sector affiliate, the International Finance Corporation—have contributed to the development and financing of a series of projects that reflect GEF's climate change mitigation strategies (see Annex A).

GEF climate change programs are innovative and unique because they reflect integrated strategies to remove barriers and reduce costs for a broad range of applications and markets for energy efficiency and renewable energy technologies. After eight years of operation, GEF has amassed a project portfolio of 72 such projects in 45 countries, for which it has provided more than US$700 million. So far, performance indicators have been specified, and a few evaluations have occurred only for individual projects. Most projects do a reasonable job of specifying project-specific performance indicators during the project design and approval process. But these indicators tend to measure discrete project activities or their direct outputs rather than outcomes and the attainment of broader objectives. In addition, the performance indicators selected are sometimes not readily measurable or, if measurable, are lacking documentation as to when, how, or indeed whether the indicators have been measured.

GEF clearly needs additional performance indicators and methods to measure the results of its climate change programs. GEF must go beyond the results from individual projects and look at overall program performance. Good program performance indicators would enable GEF to better manage and attain results from its programs and projects. But what would such indicators entail and how could they be applied operationally?

In 1999, the GEF Monitoring and Evaluation Unit commissioned a study team to develop program performance indicators of the results being achieved in the climate change area. Performance indicators are measures, qualitative or quantitative, used to reflect progress toward achievement of objectives. Unlike those sustainability indicators that measure broad physical, economic, energy, and environmental factors at a macro level, program performance indicators focus on the degree to which a program has achieved its intended results. Program indicators can measure "ends" (achievement of objectives) or "means"(methods to achieve objectives) or a combination at any point along the continuum from ends to means.

What are the ends and means in GEF climate change projects and programs? The study began with a complete review of the GEF project portfolio and strategy documents. More revealing, however, were interviews that the team conducted with the GEF chief

executive officer (CEO), other senior GEF managers (including the assistant CEO and executive coordinators in the three implementing agencies), GEF Climate Change Task Force members, the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, and members of the GEF Scientific and Technical Advisory Panel. The interviews aimed to elicit internal stakeholder perspectives on the kinds of results from GEF's climate change programs that are appropriate and that are needed for management purposes and for reporting to external stakeholders.

The interviews underscored GEF's broad aim of empowering developing countries to incorporate climate change actions into their development paths more rapidly and effectively. GEF's programs should enable governments, the private sector, non-governmental organizations (NGOs), and local communities to better address climate change. GEF employs multifaceted strategies and evolving tactics to pursue this comprehensive goal. GEF's direct activities and projects, however beneficial in themselves, have the basic objective of catalyzing continuing processes that help country actors to integrate climate-friendly dynamics into the more immediate and fundamental strategies of economic development and poverty alleviation.

Interview responses emphasized five major types of results from GEF climate change strategies:

- Remove market barriers so that the level of market penetration of sustainable technologies and practices in given country markets is increased during and after GEF-supported market interventions. In short, GEF promotes market transformation and technology transfer and diffusion through barrier removal

- Build policymakers' capacity to address challenges ranging from meaningful participation in the UNFCCC, to incorporating climate change objectives in economic policy, to reformulating specific regulatory, tax, or other economic policies

- Build business infrastructures by triggering additional development aid, public financing, or private investment, and by demonstrating the business viability of sustainable energy products and services

- Add to social reservoirs of both expert and community awareness and knowledge about climate change issues in general and sustainable energy technologies in particular, and translate such awareness into active involvement of non-governmental and private sector groups in activities related to climate change

- Demonstrate creative project approaches that promote climate-friendly economic growth, including impacts on improved quality of life, by bringing together mixes of government, business, community, and other stakeholders in ways that bridge gaps and cause change. (Demonstration effects may occur at scales from local to global, short term to longer term, and individual to national.)

The interviews suggested that evidence of the removal of barriers would, measured over time, constitute highly appropriate indicators of GEF's actual results. It is seen as critical that GEF projects lead to additional activities beyond those directly resulting from the projects themselves. For example, if increases in the market share of renewable energy and energy efficiency technologies were found to exceed baseline projections of their market penetration, this would mean a more rapid rate of diffusion of sustainable energy technologies and would be solid evidence of GEF influence.

Interviews also revealed a diversity of views on the utility of greenhouse gas (GHG) emissions as an indicator. Sustainable energy technologies reduce GHG emissions, and GEF requires that GHG emissions reductions flowing directly from each individual project be estimated in the project proposal. Managers interviewed generally held that estimating carbon emissions reductions is necessary and useful, yet is not the sole or major measure of GEF results. It is difficult to link post-project replication and spillover effects to rigorous estimates of incremental carbon impacts attributable to GEF. The study team concluded that estimation of carbon impacts may thus be more important at the level of individual projects than at the level of measuring climate change program performance.

During the study, it became clear that there is a strong need for performance indicators that reflect the market development objectives of climate change programs *and* measure changes in markets. There is scant published literature on this subject, and, indeed,

there is no single generally accepted academic model of how markets work. It was clear, therefore, that GEF would have to be innovative in developing indicators to measure market changes.

A logical framework can help in visualizing market development (see Table 1; see also Table 8). Projects conduct market interventions (project outputs), which can lead ultimately, through replication, to sustainable markets in which the full economic potential for energy efficiency or renewable energy technologies is realized. Although performance indicators for market interventions are useful for measuring project inputs, activities, and direct outputs within the boundaries of projects, such indicators do not address replication effects. Conversely, indicators could also measure the level of untapped economic potential for climate-friendly technologies or the aggregate level of GHG emissions, but it would be difficult to detect the effects of GEF's climate change program on such a long-run and macro-level scale. Thus program performance indicators most usefully measure the "development objective" level shown in the logical framework. These indicators go beyond direct project outputs but still can be plausibly linked to GEF activities.

The study team also investigated and examined performance indicators used by other organizations that promote sustainable energy development (see Annex B). Other organizations' program performance indicators vary greatly; moreover, there is a growing number of performance indicators used by different organizations at different levels. Like GEF project-level indicators, however, most of these performance indicators measure activities or direct outputs rather than outcomes, and some organizations have not even identified any outcome indicators. In particular, it was clear from the survey that institutionalization of market change indicators, and especially *market development* indicators, is in its infancy. It was also surprising that the development of qualitative capacity development and institutional strengthening indicators was not as advanced as might be expected.

Drawing from the GEF project portfolio, the interviews, and indicators from other organizations, the study team developed seven core program performance indicators. These are discussed in the next section, along with the monitoring and evaluation activities needed to assess climate change program impacts. Three types of monitoring and evaluation activities are then outlined in the paper's third section: (1) cross-cutting program evaluation studies, (2) market studies, and (3) aggregates of project-level indicators. The final section of the paper provides operational guidance to GEF on how to apply and measure the proposed performance indicators.

Table 1. Climate Change Program Objectives in a Logical Framework

Framework Level	Objective	Indicators and Monitoring	Assumptions and Risks
Global objective (Avoided GHG emissions)	Reduce CO2 emissions from energy consumption and production	Avoided GHG emissions that result from market development and other changes in practices and infrastructure	
Development objective (Outcomes as a result of project national market other development impacts)	Build markets for energy efficiency and renewable energy technologies	Market development indicators measure indirect project impacts	Changes in products, and sales, and investments will avoid or reduce energy production from GHG-emitting sources
Project outputs (Direct or intended results of projects)	Technologies installed, enhanced capabilities, new financing services, new codes and standards, etc.	Market intervention indicators measure project outputs and direct impacts	Project outputs are necessary and sufficient to build markets
Project inputs (Specific project activities)	Complete specific project activities (e.g., training, financing, research, demonstration, technical assistance, information dissemination)	Project performance monitoring	Project activities taken together are sufficient and necessary to produce project outputs

Source: Adapted from Martinot (1998).

Seven Program-Level Indicators

This section describes seven program-level indicators, developed through research and consultation with GEF stakeholders in 1999. The indicators reflect key GEF climate change strategies and objectives, particularly the sustainable adoption and market development of renewable energy, energy efficiency, and other GEF-supported clean technologies in all three climate change operational programs.

These seven core indicators are:

1. Energy production or savings and installed capacities
2. Technology cost trajectories
3. Business and supporting services development
4. Financing availability and mechanisms
5. Policy development
6. Awareness and understanding of technologies
7. Energy consumption, fuel-use patterns, and impacts on end users.

These indicators are static. GEF program evaluators will need to monitor them periodically in order to assess changes over time. The indicators reflect both broader trends as well as specific results of GEF projects; this means that plausible linkages between GEF activities and changes in the indicators need to be established through supporting evaluation activities (this subject is covered in more detail in the next section, "Monitoring and Evaluation Strategies").

The seven core indicators can be measured at three levels:

- At the *project level*, indicators measure a project's direct activities and outputs—the project-level results for which implementing agencies are directly responsible. These are the types of indicators generally put forth in project evaluation and supervision reports by implementing agencies.[1]

- At the *country level*, indicators become "national profiles" showing national technology, market, and policy trends for energy efficiency and/or renewable energy in a specific country. Linkages can be inferred between direct GEF project results and national trends to show areas of relevance and influence. Usually GEF projects are designed to influence national trends directly; in these cases, country-level indicators are an inherent part of the monitoring and evaluation activities for individual projects performed by implementing agencies.

- At the *international level*, the indicators show international trends and linkages. Linkages can be inferred between direct GEF interventions and international trends to show areas of relevance and influence (for example, international costs of solar thermal power plants or the number of countries with regulatory frameworks that support utility power purchases of wind, biomass, or mini-hydro generation), or to show how successful GEF-supported experiences in one country have contributed to market or policy development in other countries.

All three levels are necessary to establish GEF programmatic results (see also Table 8). Linkages between levels are what make GEF a programmatic entity and not just a funder of a collection of projects. *Plausible linkages* means analyzing whether the results being achieved in GEF projects are relevant to broader trends, whether GEF project results are influencing or contributing to broader trends, and whether experience from GEF projects is being used outside immediate project contexts.

For example, evaluators could look at the total installed capacity of wind turbines directly resulting from GEF projects, the total capacity installed in countries where GEF has wind projects, and the total in all GEF client countries and ask: How did the directly financed GEF capacity (Indicator #1 at the project level) influence national capacity installations (Indicator #1 at the country level) and capacity installations in all GEF client countries (Indicator #1 at the international level)? Or how did financing models developed under the project (Indicator #4 at the project level) influence the availability of financing for wind turbines within a given country (Indicator #4 at the country level)? See Box 1 for an illustration of these questions for the case of India.

Capacity strengthening is employed in virtually all GEF climate change activities. But rather than being a separate indicator, capacity strengthening is an integral and inherent feature of most of the seven core indicators. For example, policy development will reflect increased regulatory capabilities and understanding of technologies on the part of policymakers. Business and supporting services development will reflect increased capabilities among businesses. We view capacity (or capability) strengthening as the means to other objectives in GEF projects and think it is better to use indicators that measure the accomplishments resulting from strengthened capacities. Nevertheless, at the project and national levels it may still be fruitful to employ additional indicators relating to capacity strengthening, depending on the nature of the project.

GEF climate change projects have impacts on end users. Projects may contribute to changes in livelihood and lifestyle as a result of a shift in energy use patterns, or as power is introduced, for example, into remote and rural villages. Such impacts may be reflected in changes in social conditions, gender-differentiated activities, and (in some cases) in income and living standards. For example, for some 300 to 400 million households worldwide without electricity that are unlikely to receive grid power in the near future, indicators can measure poverty reduction and other social benefits of off-grid decentralized energy from solar photovoltaic (PV), small hydropower, and wind systems.

End user impacts are captured in Indicator #7 in particular, although they may also be reflected in the other indicators. At the *project level*, indicators measure the direct effects on relevant end users and intended project beneficiaries. At the *country level*, indicators measure broader socioeconomic impacts (for example, increased percentage of households electrified). At the *international level*, international trends in poverty reduction strategies and programs using renewable energy that target the poorest of the poor can be tracked.

There is also a potential role for estimated reductions in GHG emissions as a type of program performance indicator. The reduction of carbon emissions is of course a GEF goal and a fundamental objective of its climate change programs. One reflection of its importance is the fact that, in order for a project to be

Box 1. GEF Project-Level and Country-Level Influences on Wind Power Development in India

In India, GEF support for wind power occurred in parallel with the explosive market growth of the mid-1990s fueled by favorable investment tax policies. By 1998, almost 1,000 MW of wind capacity had been installed in India, and dozens of wind turbine manufacturers had emerged. During the 1990s, the World Bank-GEF project directly financed 41 MW of wind turbine installations in India. The project strengthened the capabilities of the India Renewable Energy Development Agency (IREDA) to promote and finance private sector investments, and more than 270 MW of wind projects were financed through IREDA. The project also promoted the acceptability of wind power among investors and banking institutions. As a result, along with favorable market conditions, many domestic sources of finance became available for wind power that helped fuel market growth.

Source: Martinot (2000).

accepted by GEF, its proponents must make the case that it will lead to incremental carbon reductions, and indeed must estimate the magnitude of the reductions. A rigorous approach to estimating and verifying carbon reductions is feasible at the level of project outputs, but the climate change programs aim for post-project replication and spillover effects. Carbon reductions from such indirect effects (at national and international levels) are much harder to measure and rigorously link to GEF activities. For this reason, we have not included estimation of incremental carbon impacts as a core program performance indicator.

It is difficult to imagine measuring these seven indicators in the same way across the entire diversity of projects in the GEF climate change project portfolio. Rather, these seven generic program indicators are most usefully discussed in the context of specific clusters of projects. For program performance evaluation purposes, we find it useful to group GEF projects into nine clusters of similar projects (see Table 2).[2] Some projects will contain components from different clusters and so must be evaluated using different sets of indicators.

Tables 3 through 6 show the seven indicators applied to four different project clusters. Box 2 illustrates the seven indicators at the country level for a solar PV project in Zimbabwe supported by the United Nations Development Programme (UNDP) and GEF.

Table 2. Clustering of GEF Climate Change Projects

Cluster	Types of Projects
Solar home systems and rural energy services	Projects to promote the adoption of off-grid rural energy services using solar home systems or other village power configurations
Grid-connected renewable energy	Projects to promote the adoption of grid-connected electricity generation from wind, small-scale hydropower, biomass, bagasse, or geothermal resources
Solar hot water supply	Projects to promote the adoption of solar thermal hot water supply in domestic, public, and commercial applications
Pre-commercial renewable energy technologies	Projects to reduce long-term costs of selected electric[ity?] generation technologies distributed and central station PV power, hybrid solar-thermal or gas power plants, and biomass integrated gasification/gas turbine technology (OP7 projects)
Energy-efficient product manufacturing and markets	Projects to build markets for efficient lighting, refrigeration, motors, industrial boilers, and other manufactured products by simultaneously helping manufacturers adopt, produce, and sell more efficient models and increasing consumer awareness and demand for more efficient models
Energy efficiency investments in industry	Projects to reduce energy consumption in industrial processes, either directly by supporting industrial enterprises to implement a variety of measures such as efficient motors, efficient boilers, and energy auditing and management; or indirectly through support and promotion of energy service companies
Energy-efficient building codes and construction	Projects to promote energy efficiency in buildings through new construction codes and practices, retrofits of existing buildings, energy management techniques, and labeling or installation of efficient equipment
District heating energy efficiency improvements	Projects to develop the institutional, technical, financial, and skill resources for ongoing improvement of centralized and decentralized space and water heating systems in countries in transition
Fuel switching and production/recovery	Short-term response measures promoting switching from high-carbon to lower-carbon fuels (such as from coal to gas), or producing methane from coal beds or municipal waste

Table 3. Indicators for Solar Home Systems and Rural Energy Services Project Cluster

Indicator	Examples
1. Energy production or savings and installed capacities	• Number of individual solar home systems installed • Capacity of off-grid village power supplies from mini-hydro, biomass, wind, and solar PV(MW)
2. Technology cost trajectories	• Installed costs or life cycle system costs of solar home systems • Unit electricity costs of renewable-energy-produced power relative to conventional power costs (e.g.,from diesel generators)
3. Business and supporting services development	• Number of solar home system manufacturers, system assemblers, dealers, installers, and service firms (including firms for which solar home systems are not the primary business line) • Existence and appropriateness (to local needs) of equipment quality standards and certification procedures/institutions for equipment and installation
4. Financing availability and mechanisms	• Availability of consumer credit for purchase of solar home systems, including dealer-supplied credit, microfinance, and credit from development banks • Number of financial institutions and volume of lending for off-grid village power
5. Policy development	• Existence of policies and/or plans that explicitly recognize and account for the role of renewable energy technologies in rural electrification • Existence of working regulatory/social models for village power schemes, including tariffs, responsibilities for ownership and maintenance, and equity
6. Awareness and understanding of technologies	• Awareness among rural households of benefits and costs of solar home systems • Abilities of village leaders or project developers to implement and manage village power schemes
7. Energy consumption, fuel-use patterns, and impacts on end users	• Percentage of off-grid households receiving energy services from renewable energy sources relative to conventional sources (by income group or other social parameters) • Consumer satisfaction (by income group or other social parameters)

Table 4. Indicators for Grid-Connected Renewable Energy Project Cluster

Indicator	Examples
1. Energy production or savings and installed capacities	• Installed capacity (MW) of wind, biomass, geothermal, small-hydro • Annual or cumulative production (MWh)
2. Technology cost trajectories	• Installed costs per kW in selected GEF client countries for each technology • Levelized production costs (per kWh) in selected GEF client countries for each technology
3. Business and supporting services development	• Number of domestic commercial businesses that can manufacture/assemble, sell/install, and service/maintain technologies • Existence of quality standards and certification procedures for equipment and installation
4. Financing availability and mechanisms	• Amounts of government, commercial, and bilateral/multilateral financing for grid-connected renewable energy generation facilities • Characteristics of financing programs dedicated to renewable energy technologies
5. Policy development	• Existence and characteristics of electric power regulation and policies for independent power producers, power purchase agreements, transmission wheeling of generated power, and power dispatch requirements • Fairness/equivalence of wholesale tariff structures for generation from renewable energy sources relative to those for conventional fuels
6. Awareness and understanding of technologies	• Awareness among financiers, project developers, and utilities • Knowledge base for technology application (e.g.,wind resource maps, wind turbine siting experience, wind farm operations, and maintenance experience)
7. Energy consumption, fuel-use patterns, and impacts on end users	• Share of renewable energy generation relative to total generation (% kWh) • Number of equivalent beneficiaries (households) supplied by renewable energy generation (same as kWh share but translated into household equivalents)

Table 5. Indicators for Energy-Efficient Product Manufacturing and Markets Project Cluster

Indicator	Examples
1. Energy production or savings and installed capacities	• Cumulative or annual energy savings (MWh) from stream of energy-efficient manufactured products • Electric power demand reductions (MW) from stream of energy-efficient manufactured products
2. Technology cost trajectories	• Market price of manufactured product • Life cycle cost of manufactured product relative to that of conventional product (e.g., compact fluorescent lamps relative to conventional lighting)
3. Business and supporting services development	• Number of in-country commercial businesses that can manufacture/assemble, sell/install, and service manufactured product • Existence of equipment quality standards and certification procedures for service personnel
4. Financing availability and mechanisms	• Availability of financing to manufacturers that serve target market to upgrade product designs and production processes for energy-efficient products • Amount of relevant investment, if obtainable, by these manufacturers
5. Policy development	• Existence of policies or regulations that have a significant influence (+/-) on demand/supply of manufactured product (efficiency standards, equipment labels, environmental emissions limits, import quotas, etc.)
6. Awareness and understanding of technologies	• Consumer or industry awareness of characteristics, costs, and benefits of manufactured product • Mentions of targeted technologies in media
7. Energy consumption, fuel-use patterns, and impacts on end users	• Market share of manufactured product (e.g., sales of efficient vs. normal boilers) • Penetration of manufactured product (e.g., share of households or industrial enterprises with efficient product)

Table 6. Indicators for Energy Efficiency Investments in Industry Project Cluster

Indicator	Examples
1. Energy production or savings and installed capacities	• Annual or cumulative energy savings (MWh) from energy efficiency investments in industry, either by industrial firms or by energy service companies • Electric power capacity (MW) reduced through energy efficiency investments
2. Technology cost trajectories	• Rates of return achieved from energy efficiency investments in industry • Costs of conserved energy (e.g., cents/kWh)
3. Business and supporting services development	• Number of operating energy service companies or other companies offering efficiency improvement equipment or services in target market • Existence of energy service company trade association that establishes standards of professional practice and measurement
4. Financing availability and mechanisms	• Availability of business financing for energy service companies • Availability of lease financing and performance contract financing for energy-related in-plant projects • Volume of financing in energy efficiency investments from energy service companies or by industry
5. Policy development	• Existence of regulatory/contracting frameworks that support energy service companies (i.e., policies supporting performance contracting) • Existence of policies creating incentives for industry to improve energy efficiency
6. Awareness and understanding of technologies	• Awareness within industry of the benefits of energy efficiency investments and of potential contracting approaches with energy service companies (i.e., performance contracting) • Awareness and capability of energy service companies to make profitable investments in industry and sustain a profitable business
7. Energy consumption, fuel-use patterns, and impacts on end users	• Energy intensities of particular industrial subsectors, compared with past years and baseline projections

Box 2. Project-Level and National-Level Indicators for a Solar PV Project in Zimbabwe

A UNDP/GEF project in Zimbabwe from 1995 to 1998 was designed to enhance and upgrade indigenous solar manufacturing and delivery infrastructure, develop an expanded commercial market in rural areas for affordable domestic solar electric lighting by providing low-interest financing through existing institutions, and establish new credit mechanisms at the grassroots level to benefit lower income groups in rural areas. The project has had a number of impacts on the market for PV systems in Zimbabwe:

1. *Energy production or savings and installed capacities.* Roughly 10,000 solar home systems were installed by project completion, 300 of which were provided by NGOs and the rest of which were provided by private sector dealers. An estimated 3,000 PV systems had been installed prior to the project, mostly in rural and semi-urban centers such as health clinics, schools, community centers, and commercial farms, so the project has greatly increased the installed base. A market baseline, estimated before the project started, projected sales of 320 home systems per year, which would have equaled roughly 1,600 systems over the five-year project.

2. *Technology cost trajectories.* Import duties of 40 percent on imported components were waived during the project, which resulted in substantial cost reductions for installed PV systems. Installed costs also declined during the project based upon increased dealer experience, competition, and economies of scale.

3. *Business and supporting services development.* Prior to the project there was one PV module and systems manufacturer, and three smaller firms performing installation and system integration. At the completion of the project, 60 firms were registered with the Solar Energy Industries Association(although only 30 had renewed by 1999, and only 6 accounted for 80 percent of the market share for the project. A code of conduct for the Solar Energy Industries Association was added to the organization's constitution. Technicians from five installer companies were trained during the project. No new module assembly companies have emerged as a result of the project; this is attributable to lack of funds for plants and machinery. Some project observers have worried about industry shake-outs after the project if demand slackens.

4. *Financing availability and mechanisms.* The Zimbabwe Agricultural Finance Corporation (AFC) successfully provided low-interest credit to 4,200 PV consumers through a revolving fund mechanism. No data are available on the repayment rates and turnover for the revolving fund, and thus what additional resources will be required to sustain it. The AFC has been unable to replenish the fund, which will deplete without replenishment.

5. *Policy development.* The project did not target policy development explicitly, although original plans for the national electric utility to participate in the project could have potentially influenced rural electrification policy. Standards are another potential area of policy impact. The Standards Association of Zimbabwe and the Solar Energy Industries Association created PV module standards that were used to certify and warranty installed systems. Standards were being drafted for batteries, lamps, and charge controllers.

6. *Awareness and understanding of technologies.* Two colleges and one polytechnic institute will begin to provide courses on PV technology initially in the form of adult education courses. The University of Zimbabwe began to offer a M.Sc degree in renewable energy systems in 1996. The project management unit and the Solar Energy Industries Association have produced a solar magazine. According to one evaluation report, "There is now much greater awareness by government, NGOs, and the public about home PV systems than before the project."

7. *Energy consumption, fuel-use patterns, and impacts on end users.* Changes in household energy use patterns have not yet been measured. The social impacts of the project, in terms of livelihood support and social equity, are not well understood. While the project supported the country's rural poverty alleviation program by providing the basic energy requirements for investments in social infrastructure (e.g., health centers and schools), further survey work is needed to investigate these impacts.

Source: Martinot and McDoom (2000).

Monitoring and Evaluation Strategies

Monitoring and evaluation strategies are needed to establish the values of the indicators, aggregate them in appropriate ways, and measure trends over time. Considered in isolation, indicators alone do not measure performance. Monitoring and evaluation efforts must also be initiated to collect evidence linking the state of the indicators to GEF activities. In general, this evidence can be strongest and most direct at the level of specific projects. As the focus of assessment moves from immediate activities and project outputs toward achievement of project- and program-level objectives in national and international markets, performance indicators become more aggregate in nature.

At a program level it also becomes more difficult to draw causal linkages of national- and international-level changes back to GEF activities. Because of the complex and evolving nature of national and international markets, the number of actors involved, and the multiplicity of influences that shape technology and market changes over time, it can be analytically difficult, time-consuming, and expensive to isolate GEF's influence on market development at these levels with a high degree of technical rigor. We have sought cheaper and more practical solutions. At the least, evaluation research can create documented historical narratives that allow readers to make plausible judgments about the meaning of performance indicators as measures of GEF's role and influence in market development, energy policy, and improvements in the lives of affected populations.

Strategies for measuring the capacity-strengthening elements of program indicators are perhaps the most problematic. Capacity strengthening is inherently specific to certain groups or institutions at the project level, and the linkages between groups and the transmission of knowledge and capabilities across groups are difficult to assess. Indeed, capacity strengthening and social impact objectives are part of many energy projects conducted by development and environmental agencies around the world, yet our review found that few employ output indicators to measure the results of these activities (as opposed, for example, to simply documenting how many people or organizations underwent training). In general, efforts to measure capacity strengthening will tend to be relatively costly in terms of specialized resources and time.

Strategies for measuring social impacts among affected populations and direct beneficiaries may require social surveys, ethnographic methods, information-gathering techniques such as focus groups and expert interviews, consensus building, and targeted stakeholder evaluations such as gender analysis. If project objectives are focused largely on market transformations, as is often the case with GEF-supported climate change projects, social impacts are indirect and thus harder to measure than market impacts. At the same time, it is recognized that in the case of off-grid renewable energy projects, the beneficiaries are largely poor rural communities where the social impacts are important. Social surveys may also measure the degree to which stakeholders were consulted or expressed satisfaction with the project.

Availability of Data and Costs of Measurement

The availability of data and the cost of gathering data are key issues in measuring performance. By emphasizing the use of available information and by formally incorporating indicators and measurement into the design of individual projects as described in the next section ("Monitoring and Evaluation Responsibilities and Activities"), the costs of measurement can be kept low(at least relative to the costs of collecting data through original research such as field surveys. Nevertheless, the costs of measurement will vary. Sources of information for measurement are indicated in general terms and estimates of how measurement costs will vary—low, moderate, or high cost, on a relative basis across indicators—are discussed below.

1. *Energy production or savings and installed capacities.* These data are usually available from GEF project reports, published government data, or published industry or market reports (low cost). For some project clusters, data may need to be obtained from local unpublished sources or industry observers (medium cost). Energy savings figures will be readily available for direct project outputs (low cost) but may not be available at all on a national or industrywide basis (high cost), or may require limited sampling of installations in the field (medium cost). Energy savings from utility demand-side management (DSM) projects using national electric power utilities should be readily available (low cost). Energy savings figures will generally be unavailable at the international level.

2. *Costs per technology unit or measure installed.* For renewable energy projects and programs, these data are usually available from GEF project reports, published government data, utility data, or published industry or market reports (low cost).[3] For energy efficiency projects and programs, rates of return and costs of conserved energy are generally available at the project level only. Energy efficiency project and program data at national and international levels are either unavailable or would require sampled industry surveys—which would not be expected to exist in all cases (medium to high cost).

3. *Business and supporting services development.* The number of businesses or services in a given national or regional market is usually available from GEF project reports, local government data, or private sector market surveys (low cost); or through limited field surveys (medium cost). International compilations of these indicators are more difficult but probably less useful anyway. The condition, capabilities, and profitability of those businesses are much more difficult to ascertain without individual business surveys (high cost). The exception is where a GEF project targets specific firms (for example, a small number of model energy service businesses), in which case the project must collect data that demonstrate the viability of these specific firms (low to medium cost). The existence of quality standards and certification procedures and institutions is generally easy to learn (low cost), but the effectiveness and appropriateness of these standards and procedures requires in-depth industry and market analysis (high cost).

4. *Financing availability and mechanisms.* The number of financing programs and mechanisms dedicated to target measures should be available from government and donor agencies (low cost). Surveys of commercial banks as to their lending patterns, interest rates, and views of specific technologies, as well as industry views on the availability of financing would require much greater resources (medium to high cost).

5. *Policy development.* The existence of policies that have a significant effect on the market penetration of targeted technologies or measures must be a subjective judgment, based on information in project reports and reports of local governments and development agencies (low cost). The effectiveness of these policies (whether they support or retard market penetration, for example) is much more difficult to judge, requiring expert policy analysis and understanding of policy context (high cost). In some cases, very visible policies (such as India's policy experience with investment tax credits for wind power) have been the subject of many published analyses (low cost); the challenge in this case is to portray often conflicting conclusions in a fair manner.

6. *Awareness and understanding of technologies.* Awareness of sustainable energy technologies among households and firms that might potentially acquire or install them can be measured directly through field surveys (high cost). Cheaper, proxy

approaches can be used to infer awareness, such as increases in mentions of the target technologies in the media, industry meetings and publications, and other forms of communication (medium cost). For some clusters of projects, the sets of potential users are small, so the costs of measuring awareness through targeted interviews should be lower (low to medium cost). Projects with good monitoring and evaluation plans will conduct pre-project market surveys that would provide a baseline of awareness, followed by later market surveys that would measure awareness.

7. *Energy consumption, fuel-use patterns, and end user impacts.* For some project clusters, such as product manufacturing (e.g., efficient boilers or compact fluorescent lamps [CFLs]), market penetration is relatively easy to determine through existing market or project data (low cost). Utility data, usually compiled statistically, make it similarly easy to analyze grid-connected renewable energy generation relative to conventional alternatives (low cost). But for most project clusters and technologies, these indicators will be relatively expensive to determine because extensive analytical work would be needed with large amounts of data to collect (medium to high cost). Examples are changes in energy intensities of particular industries, which need to be measured with respect to those industry sectors that the cluster of projects in this area have endeavored to affect; or changes in building (or centralized heating system) energy efficiency with the penetration of practices for designing and constructing more efficient buildings (or centralized heating systems); or, for fuel switching and production/recovery, the percentage of potential fuel switching or methane recovery that has been tapped. Impacts on end users generally require new information, e.g., from social surveys.

Cross-Cutting Program Studies

Special cross-cutting program-level evaluations can assist in measuring program performance indicators in the near term. In-depth studies can encompass clusters of activities or emerging results whose performance can be assessed together. Each evaluation may need to include substantial data collection components, because of the lack of readily available data and the relatively slow growth in the available evaluations of individual GEF projects to date. Cross-cutting studies must include multiple methodologies designed to capture spillover or learning effects(i.e., market effects that reflect learning about sustainable energy technologies in regions outside projects' immediate geographic boundaries(or market transformation effects that persist after projects are completed. To allow time for learning effects to diffuse, evaluations may need follow-up phases aimed at capturing them.

Cross-cutting multicountry impact evaluations can be costly in nature if field research and surveys are required. A process of prioritization is needed to decide what cross-cutting evaluation studies would be most useful. GEF could then scope out any studies elected for a first round of cross-cutting evaluations. Useful results from them could be expected in a two- to three-year time frame.

The nine clusters set forth above (Table 2) can provide a basis for evaluation studies. For example, the solar home systems and rural energy services cluster represents 20 individual projects (past, existing, and new). GEF appears to be having a discernable impact on diffusion of this technology in developing countries. Box 3 offers a brief outline for an evaluation of GEF's role in PV technology diffusion.

Box 3. Cross-Cutting Study: Diffusion of Solar PV Technology

A cross-cutting study of the market diffusion of off-grid PV systems would focus on the countries in which GEF projects have occurred or are occurring. It would also include components to investigate broader replication from GEF projects. Information on the seven core program-level indicators would need to be collected, for example:

- Capacity installed to date and annual electricity supplied
- Level and trends in installed total costs of PVs
- Number and size of PV vendors
- Level of PV activity (value of sales)
- Trends in local manufacturing and assembly capacity
- Capacity of businesses and individuals to service PVs over time
- Availability and terms of financing for PVs
- Trends in key policies affecting PV market penetration
- Consumer acceptance and understanding of PVs
- Impacts on affected populations
- Portions of end use demands for electricity and other fuels being met through PVs
- Technology mainstreamed in other multilateral programs. In addition, the study would investigate what market barriers are influencing the further development of the PV industry.

The study could recommend additional projects, if warranted, that would seek to reduce these barriers. The study could be structured along two different, but complementary, paths: (1) What are the opportunities for additional PV industry development?, and (2) How could projects focus on innovators for promoting PV industry development? Data collection would begin with a review of existing documents but would primarily involve interviews with key stakeholders in countries where PV industries are being developed pursuant to GEF projects.

There is no single method of clustering to identify subsets of climate change projects upon which it is may be useful to focus cross-cutting in-depth studies, and so consideration of potential cross-cutting evaluation studies need not be restricted to the nine clusters set out in Table 2. Alternative clusterings could be based on the type of technology, the primary modality (type of activity/intervention strategy), countries in which projects occur, the implementing agency involved, the level of GEF financial commitment, the importance accorded a set of projects, or other criteria. Some topics of potential study interest based on alternative clusterings follow.

- *Enabling activities related to the UNFCCC.* GEF's enabling activities support UNFCCC-related communications and studies in many countries through numerous relatively small grants and are best evaluated as a whole.

- *Efficient lighting technology diffusion.* A variety of projects in different locations have promoted these technologies, and a new global initiative—the International Finance Corporation (IFC)-GEF Efficient Lighting Initiative[4] —has been launched.

- *Impacts of GEF-supported projects on China's adoption of sustainable energy techniques.* In China, some of the four GEF-supported projects are reputed to have had a substantial policy development and technology transfer impact.

- *Creation of financing mechanisms.* This refers to the establishment of funds or mechanisms to finance energy efficiency and/or renewable energy projects. Some GEF projects have this objective as their major thrust—e.g., the Renewable Energy and Energy Efficiency Fund and the earlier Solar Development Corporation—while in others, it is an important project component.

- *The ESCO industry.* Development of an "ESCO" industry—energy service companies that offer leasing, performance contracting, or other business arrangements for "win-win" efficiency investments at host facilities—is an objective of at least 10 GEF projects.

Box 4 provides an illustrative outline of an evaluation in the last of the additional areas identified, that of ESCO development.

Box 4. Cross-Cutting Study: Development of an ESCO Industry

In a cross-cutting study of the ESCO industry, information on key project-level indicators would need to be collected. Types of information such as the following are appropriate:

- Annual energy saved through ESCO contracts
- Co-benefits in ESCO projects (waste reduction, pollution prevention, water conservation)
- Estimated cost of saved energy in ESCO projects
- Number of ESCOs formed
- Level of ESCO activity (number and value of contracts with customers)
- Business advisory services for facilitating the development of an ESCO industry
- Training of ESCOs and NGOs on providing energy efficiency services
- Number of business plans developed for ESCOs
- Pilot energy performance contracting program (loan guarantees to support performance contracts)
- Policies implemented to facilitate performance contracting
- Host facility managers awareness of performance contractings structure and benefits.

In addition, the study would focus on what market barriers are confronting the development of an ESCO industry and how these barriers are being overcome (if they are) by GEF-funded projects. The study could recommend additional projects that would seek to reduce these barriers. The study could be structured along two different, but complementary, paths: (1) What are the opportunities for ESCO development?, and (2) How could projects focus on innovators for promoting ESCO development? Data collection would begin with a review of existing documents, but would primarily involve interviews with key stakeholders in countries where ESCOs are being developed pursuant to GEF projects.

Four Key Elements of Project-Level Monitoring and Evaluation

The selection of measurable performance indicators and associated performance targets as part of the project design process promotes a focus on achievable impacts and post-project sustainability. Project indicator measurement provides a source of feedback on project effectiveness. The development of good project-level indicators and measurement is also integrally connected to the task of operationalizing the core program-level performance indicators (see next section, "Monitoring and Evaluation Responsibilities and Activities"). Project-level indicator measurement can provide basic data that can be added to information from other projects to develop program-level performance information. This subsection discusses how GEF can incorporate more systematic use of performance indicators, targets, and impact evaluation studies in all of its new projects. Improved monitoring and evaluation at the project level can strengthen measurement of performance indicators at all levels.

Below we consider four elements of good project-level indicators: (1) generate production reports of project activities and results, (2) select appropriate project performance indicators, (3) develop baselines and targets, and (4) conduct project impact evaluations.

Generate Production Reports on Direct Project Results

An assembly of data on key project activities and direct results—what we call a *production report*—can increase understanding of what GEF is doing and allow observers to make informed subjective assessments of the value of, and likely outcomes from, the activities reported.[5] When a project is under way, its managers should track all basic project activities and results in a straightforward way and do so in quantitative terms to the extent possible. Continuous activity tracking provides a tool for monitoring implementation as well as for reporting to project sponsors. A common tracking and reporting format should be used across all GEF projects. Data should be tracked on an annual basis. A production report can be organized by the seven indicators discussed in the previous section:

1. Energy production or savings and installed capacities (i.e., the electric capacity or capacity savings of the measures installed; the energy production

or energy savings of measures installed; and/or the number of technologies/measures sold, financed, or directly installed through the project)

2. Technology cost trajectories (the costs of measures directly installed through the project)

3. Business and supporting services development (number of businesses supported and number of personnel receiving training)

4. Financing availability and mechanisms (subproject financing committed or dispersed)

5. Policy development (agencies created or policies developed as a direct result of project activity)

6. Awareness and understanding of technologies (number of participants with increased awareness and understanding, by type of participant, such as energy end users, energy-related businesses, and NGOs)

7. Energy consumption and fuel-use patterns and shares (for directly supported project beneficiaries).

Other direct project activities can be tracked that do not necessarily correspond to the seven performance indicators. For example, the flow of dollars into the project by source, or the use of dollars by the project by application, may be useful to track. The number of participants in different project activities may be another useful indicator to track that does not necessarily correspond to one of the seven indicators.

Such activity tracking can be useful for assessing GEF climate change performance at the program level. First, it institutionalizes the collection of data that can be used in the project impact evaluation process, which in turn feeds into program performance indicator measurement. Second, it provides the basis for a simple aggregation of all the activity that GEF catalyzes through its climate change programs. Despite the emphasis in this report on performance indicators related to outcomes, simply summarizing all climate change activities can itself be a useful supplementary form of performance reporting. Moreover, it could be accomplished in a relatively short time.

Select Appropriate Project Performance Indicators

Each new GEF project should include a set of performance indicators that can be measured over time to reflect the project's outputs and its progress in attaining objectives. At the current time, in providing information for the annual Project Implementation Review (PIR), projects report their degree of success in implementation and in achieving impacts without systematically linking these assessments of success to performance indicators. Each project should select measurable indicators that reflect the seven core indicators at the project level. Insofar as possible, the units of measurement employed should be those set forth above. Additional or supplementary units of measurement may be appropriate for a particular project.

In order to have a coherent basis for improved program performance measurement over time, each project should consider the applicability of the seven core indicators and use them at the project level to the extent possible. These project-level performance indicators must reflect each project's own objectives. The stakeholders in a project must agree at the outset as to what measurable performance indicators are logically related to the objectives they have agreed to pursue through project activity.

Indicators might include a mix of output and outcome measures. Output measures can also provide *leading* indicators of project outcomes (i.e., results relating to the broader objectives of the project); such measures can describe early effects that are measurable before the project begins to achieve its outcomes.

Indicators must be specified with reference to a particular market. The *reference market* definition has two components: (1) geographic scope, defined as the country (or other region) within which the project is expected to promote market development; and (2) market segment, defined as the energy end use or supply sector within which market development is expected to occur. The project clusters described in the previous section group climate change projects into nine market segments.

For each individual indicator, the following are required:

- An operational definition of the indicator, i.e., how it is measured
- Target values of the indicator for each year, from the first (or next) full year of project implementation through the end of the time period for measurement
- Identification of the entity and staff person responsible for measuring and recording actual values of the indicator for each year throughout the measurement period
- Identification of the means to be used to measure the indicator.

Key assumptions made in defining the indicators, developing target values, assigning measurement responsibility, and identifying means of measurement should be set forth explicitly. Assumptions are key conditions under which indicators can be used as planned. Should these conditions change significantly after project indicators and indicator measurements are implemented, one or more aspects of indicator use and measurement may need to be changed.[6]

Indicator selection is driven by the objectives of the project. Each project has a unique mix of *immediate objectives*, reflected in the market interventions and planned outputs included in the project design. These need to be reflected in measurable, project-specific indicators that can help project stakeholders recognize the degree to which these objectives are being achieved. Each project also has what might be termed *intermediate objectives*, i.e., planned outcomes involving replication and market development. Objectives at this level will have elements of uniqueness as well as elements in common with many other climate change projects. One of the purposes of the core indicators developed in this paper is to encourage project developers to reflect market development objectives that are shared with other non-GEF projects and programs through common indicators.

Annex C presents a range of possible project indicators.

Establish Baselines and Targets

Performance indicators can and probably should function as *targets*. Each new GEF project should set, *ex ante*, the schedule of expected values for its selected output and outcome indicators. Target values for output indicators should be set out by year for the expected duration of the project. Consistent with GEF's strategic thrust toward long-run priorities, target values for outcome indicators could extend beyond the project time period, covering a mid-term time frame (for example, the period through the year 2030. Performance targets might also be established by existing projects that still have several years of activity ahead of them.

For projects whose objectives include market transformation (barrier removal), two kinds of baseline assessments are needed to select indicators and targets. These are:

- Baseline market characterization
- Baseline market development forecast.

The baseline market characterization applies to the reference market to be addressed by anticipated project outputs and outcomes. The reference market in turn refers to the energy end use or supply sector within the country (or other region) in which the project is expected to have a market transformative influence. Baselines establish the existing pattern of energy technology choices and the political, economic, and social factors that appear to be linked to this pattern. Market barriers that the project would attempt to overcome would be identified. This baseline information is an important input to the design of a sustainable energy project.

Also needed is a projection of how the reference market is expected to evolve absent programmatic intervention. In particular, the expected market penetration of the sustainable energy technologies of interest should be forecast under the assumption that there will be no project. Several methods could be applied in making such a baseline forecast. For example, expert judgments could be collected about likely trends from market observers, historical data could be examined and a simple time trend developed, or an energy forecasting (supply/demand) model could be applied to develop expected trends.

Baseline forecasts can inform the setting of *target* values for performance indicators—most importantly, outcome indicators. Thus, the forecast period should substantially exceed the project time frame. Performance targets would then be set to *exceed* current expectations as reflected in baseline forecasts. Baseline forecasts can also simplify later evaluation studies, providing a supplement to, or even an alternative to, data-intensive *ex post* methods of inferring incremental impacts from GEF's activities.[7]

Conduct Project Impact Evaluations

A key function of monitoring and evaluation is to determine whether and to what extent anticipated project results and effects do in fact flow. Systematic use of performance indicators, targets, and project impact evaluation studies in full GEF projects can support objectively based assessment and aggregation of the results from projects. By *evaluation studies*, we mean formal research designed to collect and analyze data bearing on the project's results at the output level and, especially, at the *outcome* level(i.e., results related to the achievement of the project's objectives. Such studies are needed to estimate the actual values of those performance indicators that cannot simply be tracked by project sponsors and partners. Formal evaluation should be scheduled to occur at least (1) by the completion of a project and (2) several years post-project.

Evaluation activities may or may not endeavor to establish strict *ex post facto* causality. Some evaluation activities attempt to establish causality, for example through quantitative analysis of data to verify hypotheses about caused effects within acceptable statistical parameters. Other monitoring and evaluation activities use information in a less rigorous framework, assessing qualitative information to determine subjectively the degree to which it is consistent with the causal hypotheses inherent in the logical framework (*logframe*). The latter approach will frequently be appropriate to GEF's purposes. Multiple quantitative and qualitative methods may be used in evaluation. The intent here is not to urge specific types of evaluation methods, but rather to recommend the consideration and incorporation of an appropriate mix of formal evaluation activities into every full project's design and budget, and to recommend that evaluations (among other tools) be used to determine the values of performance target indicators identified at project outset.

Project evaluation plans are included in newer GEF project proposals with increasing frequency. An explicitly broken out evaluation budget should be part of every full project proposal (as well as of proposals for other activities that are costly or that are expected to have large impacts).

Scoring or Rating Performance

Finally we address GEF's need to assess how well individual projects are performing relative to one another. To assist in this assessment, project achievements relative to performance indicator targets may be scored using a simple system. At the outset, each project would identify the performance indicators on which it would propose its near-term and longer term success to be judged. Target values for those indicators would be set as discussed above. Attaining or exceeding the target value of a chosen indicator would warrant a "1," while failing to attain the targeted value would be scored "0." The average value for all indicators committed to at the point of project approval would be calculated, then multiplied by 100 percent to create a project impact score. This would map onto the project ratings GEF currently requests from implementing agencies—Highly Satisfactory (75%+), Satisfactory (50-75%), Unsatisfactory (25-50%), and Highly Unsatisfactory (<25%).

Each project would then have a score based on verified results as soon as performance indicator values began to be measured (see Table 7). Measurement would begin at once for some indicators, while for others it would be delayed, in accordance with the monitoring and evaluation plan of the project. An illustration is provided on the next page; this is a hypothetical climate change program consisting of three projects. The example assumes the scoring system is used for the impact ratings GEF collects.[8] In the example, program impacts are "satisfactory" at both Year 4 (53 percent) and Year 8 (67 percent). (In actual implementation, measurement of at least some indicators would occur in each year, not just in Years 4 and 8.) Projects would likely use more than the number of indicators assumed in the example. Using such a scoring system, the average score of any grouping of projects that were of interest could be determined. Similarly, the portfolio of efficiency, renewable, or all climate change programs could be scored.

Table 7. Project and Program Rating: Illustrative Example

Project and Indicators	Unit of Measurement	Target		Measured		Rating	
		@4 yrs.	@8 yrs.	@4 yrs.	@8 yrs.	@4 yrs.	@8 yrs.
Rooftop PVs in Islandia							
Financing availability	Number of lenders	1	2	1	3	1	1
Businesses in market	Number of vendors	5	10	6	12	1	1
Installed capacity	Total kW	5,000	10,000	5,050	11,000	1	1
Installed price	Real price in x	115	100	120	95	0	1
Consumer awareness	Unit to be specified	30	40	30	45	1	1
Total project rating	Score					0.8	1
	Percent					80%	100%
Efficient Lighting in Centralia							
Financing availability	Number of lenders	5	7	4	7	0	1
Businesses in market	Number of vendors	20	40	20	35	1	0
Market share	Percent of total sales	30	60	60	85	1	1
Installed price	Real price in x	20	10	25	15	0	0
Institutional development	DSM dept. established	1	1	1	0	1	0
Total project rating	Score					0.6	0.4
	Percent					60%	40%
Wind Power in Mountainia							
Financing availability	Number of lenders	2	4	0	1	0	0
Businesses in market	Number of vendors	4	8	2	3	0	0
Market share	Number of systems	500	1,500	200	1,500	0	1
Installed price	Real price in x	800	500	1,100	500	0	1
Regulatory reform	Tariffs restructured	1	1	1	1	1	1
Total project rating	Score					0.2	0.6
	Percent					20%	60%
Total program rating	Score					0.5	0.7
	Percent					53%	67%

Ratings: 0 = Below target; 1 = Greater than or equal to target

Note: For installed price indicator, ratings are switched: less than or equal to target = 1; above target = 0.

Monitoring and Evaluation Responsibilities and Activities

In the previous section, we addressed monitoring and evaluation from a *functional* viewpoint, describing ways to implement a range of monitoring and evaluation activities, including use of performance indicators. In this section, we address the same issues from a *structural* viewpoint, suggesting steps that different agencies associated with GEF might take to implement and integrate these activities. Measurement and synthesis of program performance indicators implies joint efforts by GEF's Monitoring and Evaluation Unit, implementing agencies, executing agencies, government counterparts, consultants, and other parties. Some of the information needed to compile and aggregate indicator measurements can be provided by ongoing project monitoring and evaluation activities built into individual projects and by the annual Project Performance Review (PPR) process. Other information can be gleaned from special evaluation studies conducted for individual projects or clusters of projects.

It is useful to place the proposed performance indicators and performance assessment process in an explicit framework describing the logic of the climate change programs. Such a logical framework can link objectives, activities, immediate results, and longer term or more fundamental results in a hierarchy descriptive of expected causal chains and effects. Table 8 puts the seven indicators used at the project, national, and international levels in a logical framework. It also addresses the means of verification and potential responsibilities and activities by GEF, implementing agencies, and governments.

GEF Secretariat

The GEF secretariat should develop additional requirements regarding the monitoring and evaluation elements to be included in GEF projects. These requirements should be simple and explicit, building on existing elements of the GEF project cycle. For the *design and approval* stage, the following requirements should be specified by the GEF secretariat:

1. Identify the categories of data that should be included in a common program-level tracking and reporting format across all projects in the portfolio. (See "Generate Production Reports of Direct Project Results" subsection.)

2. Help implementing agencies identify project-level performance indicators that will be used by the project. This would include measures of each of the seven core indicators as well as unique indicators specific to the project. (See "Select Appropriate Project Performance Indicators" subsection.)

3. Elaborate the methods to be used to measure indicators. (See "Select Appropriate Project Performance Indicators" subsection.)

4. Establish multiyear target values of those indicators whose measurement will be used to assess program performance. (See "Establish Baselines and Targets" subsection.)

5. Conduct programmatic impact evaluation studies, drawing on individual project evaluations, that

inform project design and strategy. (See "Conduct Project Impact Evaluations" subsection.)

During and after *project implementation*, the results of ongoing monitoring and evaluation are used by the implementing agencies to assess project progress, and are also reported to GEF. A logical framework for assembling and integrating performance information is the annual PPR. The GEF secretariat should, as necessary, extend the *guidelines* for information for the PPR so that the *results* from the procedures listed above are assembled by each implementing agency and provided to GEF.

To implement enhanced monitoring and evaluation including performance indicator measurement, the GEF secretariat has direct responsibility for integrating, interpreting, and reporting information on the overall performance of the climate change programs. Relevant activities may include:

- Synthesizing performance data from individual projects into overall performance studies
- Conducting periodic thematic reviews by project cluster
- Evaluating relevant technology, market, and policy trends in GEF client countries
- Evaluating program performance against national and international trends
- Drawing plausible linkages between direct GEF results and national and international trends
- Aggregating project results into production reports as one measure of program performance
- Providing guidance to implementing agencies on monitoring and evaluation practices and requirements.

Implementing and Executing Agencies

Project performance indicators are primarily measured in the context of overall project monitoring and evaluation. Process evaluations during projects, and impact evaluation studies conducted once a critical mass of project activity has occurred, should be standard practice. The selection of measurable performance indicators and associated performance targets as part of the project design process promotes good project design practices. It fosters a focus on achievable impacts and on post-project sustainability. Once implemented, project-level indicator measurement provides a source of feedback on project effectiveness. Finally, good project-level indicators and measurement provide basic data that can be added to and combined with information from similar projects to develop program-level performance information.

The following types of information should be collected and reported by implementing and project executing agencies to the GEF secretariat:

- Baseline information—relevant technology, market, and policy trends
- Measurement of the seven indicators at the project level
- Measurement of the seven indicators at the country level (i.e., for projects that target country-level impacts)[9]
- Evidence of replication or linkages between project results and broader trends
- Other country-specific market trends not captured in information above, but relevant to project sustainability.

There are five primary vehicles through which agencies can make their reports:

- In the text of project briefs and project documents during project development
- As supplementary reports during project implementation (usually mid-term reports)
- As part of the annual PPR
- As a final report upon project completion
- As a follow-up report one or two years after project completion.

Project briefs in particular should include baseline characterizations of existing conditions and relevant technology, market, and policy trends. Project designs should identify the linkages between this baseline information and the project's elements, as

well as the selection of target values for the key performance indicators. (Again, see "Establish Baselines and Targets" subsection.)

Each implementing agency's responsibility for project evaluations should be the same as it is for other aspects of its projects. Given the emphasis on market transformation and other sustainable and replicable results, an evaluation a few years after each project's conclusion should be budgeted for, with the funds escrowed in some fashion until the evaluation is performed. Post-completion evaluation should be designed to answer questions about the degree to which market and institutional development has occurred, as evidenced by the degree to which market transformation has occurred in the project's target market. Ideally, project evaluation studies should usually be done by parties other than those directly implementing the project. Project managers may therefore elect to use local consultants to help with these evaluations. In addition, executing and implementing agencies should provide the GEF secretariat with any available market studies or other data that provide measurements of the seven indicators.

Table 8. Program Indicators and Monitoring Activities in the Logical Framework

Level	Indicators	Means of Verification/Measurement	Risks and Assumptions
Program Objective OP5 OP6 OP7	**A. International-level indicators** 1. Total capacity installed 2. International technology costs 3. Involvement and activities of key multinational corporations (MNC business mainstreaming) 4. Overall portfolios/activities of international private financiers, MDBs and bilateral aid agencies 5. International policies (e.g., of World Trade Organization, Kyoto Clean Development Mechanism, export credits) 6. Awareness and understanding among international agencies and NGOs 7. Energy consumption and fuel-use patterns (e.g., industrial energy intensity, household fuel use) **B. Aggregate of country-level indicators for specific groups of countries** 1. Capacity installed 2. Costs per measure 3. Business development and supporting services 4. Financing services for end users 5. Country policies (e.g., energy tariffs, import duties, FDI [spell out]policies, taxation, research and development) 6. Awareness and understanding among users, policymakers, and other stakeholders 7. Energy consumption and fuel-use patterns	By GEF secretariat, implementing agencies, government counterparts, or other monitoring and evaluation agencies, generally through special studies (i.e., market surveys) beyond project reports: • Define the market scope for each specific technology/cluster and the relevance/meaning of the international market compared to national markets (OP7 likely to be different from OP5 and OP6) • Establish baselines for international market and measure trends over time • Seek partners to create a multiparty program of studies to measure international markets across all countries in an ongoing fashion • Aggregate and synthesize national market indicators (from next lower level) to obtain program-level performance • Collect evidence that changes in national markets (and even direct project interventions) are influencing broader trends and activities in the international market (replication) • Relate market trends to expected replication from program objectives (e.g., mainstreaming) • Collect evidence that project outputs and outcomes are influencing market development trends and related activities in other countries • Conduct cross-cutting studies for key technologies/clusters over the next 2-3 years and thereafter (e.g., solar home systems, ESCOs, investment funds)	*Replication.* Replication occurs across countries and from national markets to international markets *Leverage.* GEF activities have leveraged financing from other sources Relevance. The most appropriate technologies, markets, and countries have been included in the portfolio GHG emissions. Changes in market indicators correlate with reductions in GHG emissions over time *Causality*. GEFs influence can be discerned among overall trends and the influence of other agencies *Complementarity.* GEF activities complement those of other donor agencies

Table 8. Program Indicators and Monitoring Activities in the Logical Framework (continued)

Level	Indicators	Means of Verification/Measurement	Risks and Assumptions
Project Outcomes (Program Outputs)	Country-level indicators for a specific country (same as seven indicators under part B above)	By implementing agency as part of project preparation, implementation, and evaluation; project reports are usual source of data, but may need to be supplemented with field studies: • Define the national market scope Establish national market baselines and relate trends to expected or targeted replication in project designs • Collect evidence that project interventions are influencing market development trends and related activities at the national level • Measure trends and changes over time (such as annually, post-project, medium term, long term; may require special market surveys)	*Causality*. Trends and changes over time in national markets can be linked to GEF project interventions *Relevance.* National market changes support GEF program objectives *Timing and resources.* National market changes can be observed in a meaningful time frame, and monitoring and evaluation resources and agencies exist to measure changes after project completion
Project Outputs	Project-level indicators of installed capacity, costs, skills, etc., directly installed, financed, strengthened, or related to GEF project interventions (these are generally restricted to a specific group of organizations and regions within a country)	By implementing agency as part of project preparation, implementation, and evaluation: • Conduct project-level evaluations of direct project outputs • Conduct project performance scoring (if targets are set for new or ongoing projects) • Conduct selective field inquiries to fill gaps	Project outputs influence national markets through expected replication mechanisms Project outputs are necessary and sufficient to achieve project outcomes

Annex A. GEF Climate Change Strategies and Programs

The activities that GEF finances conform to guidance from the Conference of the Parties (COP) to the UNFCCC. In 1995, the COP endorsed orienting GEF activities to a mix of short- and long-term program priorities, and agreed with GEF that, over the longer run, projects reflecting long-term priorities would have the greatest impact as these "would drive down costs, build capacity, and start to put in place the technologies that can ultimately avoid (rather than merely reduce) greenhouse gas emissions—such as fossil-fuel-free technologies in the energy sector" (GEF 1995, p. 5).

GEF priorities are set forth in its *Operational Strategy*, which states that:

> Long-term measures will constitute the largest share of the GEF climate change portfolio, with enabling activities in support of national communications a relatively small and declining share. Short-term mitigation projects will constitute only a small share of the portfolio, in order to maintain the operational emphasis on long-term measures (GEF 1996a, p. 32).

When GEF adopted its operational strategy it also designed three long-term operational programs designed to promote energy efficiency and renewable energy by removing barriers, reducing implementation costs, and reducing long-term technology costs (GEF 1997a). A significant goal of these programs is to catalyze sustainable markets in the long term and enable the private sector to finance and diffuse technologies. The operational programs for climate change are as follows.

Operational Program 5: Removal of Barriers to Energy Conservation and Energy Efficiency. This program is designed to remove market barriers to the large-scale application and dissemination of least-economic-cost, commercially established, or newly developed energy-efficient technologies and to promote more efficient energy use where a reduction in GHG emissions will result.

Operational Program 6: Promoting the Adoption of Renewable Energy by Removing Barriers and Reducing Implementation Costs. This program is designed to remove market barriers to the use of commercial and near-commercial renewable energy technologies, as well as reduce additional implementation costs for renewable energy technologies that result from lack of practical experience, initial low-volume markets, or the dispersed nature of applications.

Operational Program 7: Reduction of the Long-Term Costs of Low-Greenhouse-Gas-Emitting Energy Technologies. This program is designed to accelerate technological development and increase the market share of low-GHG-emitting technologies that have not yet become commercial lower cost alternatives to fossil fuels but that show the potential to become so.

The programs are referred to in this paper as OP5, OP6, and OP7, respectively. The goals of the first two programs are similar. Both aim to reduce long-term carbon dioxide or equivalent emissions associated with energy consumption and production by promot-

ing increased use of commercial or near-commercial technologies, removing barriers to market-oriented transactions and policies, and catalyzing public and private sector investments in profitable mitigation projects. Although the two programs address different technologies that often face different specific barriers, both have long-term market transformation objectives.

The goal of OP7 is cost reduction. GEF expects that technological learning and economies of scale (also called *cost buy down*), achieved at least in part through GEF projects, will reduce long-term costs to commercially competitive levels. For many technologies in this program, the buy down process will take years or even decades; GEF's goal is to accelerate this process. Some technologies in this program are renewable energy technologies, while others are transitional technologies that reduce GHG emissions. The technologies promoted by the three operational programs may be referred to collectively as *climate-friendly energy technologies*.

Additional programs for sustainable transport and integrated ecosystem management related to climate change are also being developed.

GEF's three long-term operational programs in the climate change area are designed to promote energy efficiency and renewable energy by removing barriers, reducing implementation costs, and reducing long-term technology costs. Programs are designed to build sustainable commercial markets, leverage financing from public and private sources, and facilitate technology diffusion. With its limited resources, GEF cannot significantly affect GHG emissions in the short term; rather, GEF promotes the development and use of technologies that are critical for addressing the climate change problem in the long term.

GEF climate change projects represent an emerging body of experimental, case-oriented information on innovative approaches to promoting energy efficiency and renewable energy technologies in developing countries and countries in transition. The first GEF Assembly in 1998 agreed that "GEF should remain a facility at the cutting edge, innovative, flexible and responsive to the needs of its recipient countries, as well as a catalyst for other institutions and efforts" (GEF 1998d, p. 9). Indeed, GEF projects are often the first of their kind in the countries where they occur (Martinot and McDoom 2000).

Individual project proposals are developed by country governments and experts. Proposed projects are then reviewed by the GEF Council, GEF's Scientific and Technical Advisory Panel, GEF secretariat staff, all three implementing agencies, and the UNFCCC secretariat. The many types of organizations implementing these projects in the field include national and local governments, private sector entities, NGOs, and community organizations. The range of project beneficiaries, cofinancing sources, and other stakeholders is equally diverse.

Note that GEF assists countries with some climate change activities that are not core projects of the operational programs—activities such as developing GHG inventories, building national planning capacities, communicating with the UNFCCC, and implementing small projects that realize immediate environmental benefits as opposed to longer term ones. This paper does not address such activities, for it focuses on the cumulative impacts of programs and projects aimed at achieving longer term results through market transformation.

Replication of direct impacts to produce indirect impacts is integral to GEF climate change strategies. Replication occurs when market actors learn things from projects that lead to market changes such as increased consumer acceptance and demand for a technology or more domestic firms or joint ventures supplying a technology. Replication may occur from local to national markets, from one private sector firm to others, from one local government to another, and from one country to another. Although mechanisms to promote dissemination of accomplishments can be incorporated into projects, replication ultimately depends on the actions of governments, consumers, NGOs, and/or the private sector after a project is completed.

Annex B. Indicators Used by Other Organizations

The performance indicator study team examined information on indicators from a variety of development agencies, other governmental energy/environment agencies, and NGOs, as well as the information on indicators compiled by the consultant team investigating performance indicators for GEF's Biodiversity Programs in 1999. The indicators for selected projects of these organizations were summarized in an internal report to GEF.

Monitoring and evaluation activities are conducted at some level by most organizations engaged in programmatic activities designed to influence levels of carbon accumulation in the atmosphere, whether directly through energy market interventions, or more indirectly, such as through capacity building and institutional strengthening related to energy and climate activities. Some of these organizations employ explicit logical frameworks (logframes). Logframes link objectives, activities, immediate results, and longer term or more fundamental results in a hierarchy that describes logically expected causal chains and effects.

Most of the logframes that have been developed presume an already developed project—specifically, project inputs and the activities they support—then posit chains of results from activities to outputs, from outputs to project objectives, and from project objectives to ultimate goal. Rugh (1998) has prepared a table comparing several logframes, reproduced in Table B.1. Table B.2 gives another example, one used by the former UK Overseas Development Administration (now DFID).

Not all agencies use explicit logframes. For example, in North American domestic energy projects conducted by governments and utilities, there is extensive and varied experience with performance indicators in the context of reporting, monitoring, and evaluation. In this venue, however, explicit overarching strategic logical frameworks have been the exception rather the rule. Project logic and the logic of performance measurement have, up to now, been mostly worked out on a case-by-case basis. Implicit logframes can be inferred from the total context of policy and program design. On the other hand, large organizations with several goals and program areas may use several strategic frameworks and sets of indicators. Such is the case, for example, at the U.S. Agency for International Development (USAID).

The organizations and types of indicators examined in most depth by the study team are summarized in Table B.3. Points from the survey of indicators emerge at four levels:

1. *Inputs and activities.* These are indicators that are measures of the project's inputs and the direct activities involved in its implementation.

2. *Outputs.* These are indicators that move beyond project boundaries to measure the immediate results of or outputs from the project's activities. They are intervention indicators.

3. *Intermediate outcomes.* These are indicators that seek to measure the extent to which the project's objectives or purposes have been attained.

4. *End outcomes.* These are indicators that measure the project's contribution to attainment of the organization's strategic objectives or overall goal.

Activity Indicators

Activity indicators measure performance within the boundaries of project activity and are the most straightforward kinds of indicators to use. Indeed, many of the indicators summarized in the this annex are simply project activities that are designated as performance indicators. Worth noting is the fact that activity indicators presuppose that the organization conducting a project is in fact tracking ongoing implementation of the project. Often, inputs to databases track the business activitiesof the project(expenditures, staff hours, services procured, and "sales" (e.g., devices sold, loans made, workshop participants, researchers funded, etc.). Scoping out the range of data to be collected and ensuring data quality are challenges that must be met in establishing an activity/participation tracking system. Adequate tracking is fundamental for subsequent monitoring and evaluation exercises.

Output Indicators

Technology, Energy, and Emissions

Physical output indicators are widely employed and extensively verified. Some organizations use output indicators as *targets*—i.e., the quantitative level to be attained is set out in advance—against which subsequent results are measured. We discuss energy efficiency and renewable energy technology separately.

Energy efficiency. Organizations supporting energy projects typically track the physical outputs from their market interventions. Much experience in measuring these outputs was gained by the utilities that conducted DSM projects in North America and elsewhere in the 1990s. In DSM programs and projects, the number of measures (technologies or practices) implemented by participants is almost always tracked; usually, it is combined with estimates of energy savings per measure to produce aggregated energy savings estimates for projects. When a project causes multiple implementations of similar measures, savings are usually calculated on a per-measure basis and aggregated over total measures. When a project is a one-of-a-kind installation, its unique energy savings will be calculated making use of one or more of a variety of measurement and estimation techniques. For projects affecting electric demand, savings are typically calculated over various time periods ranging from the point of system peak demand to the entire year. Methodologies for establishing measure savings vary and can be quite detailed. For a thorough discussion of these issues, see Vine and Sathaye (1999).

Emerging national and international measurement and verification protocols provide methodologies and options for calculating savings from efficiency projects (see Vine and Sathaye 1997). In energy efficiency projects operated by or through energy distribution utilities, pains are typically taken to net out "free riders" in order to arrive at a net estimate reflecting energy savings that are additional to the non-project, counterfactual scenario. The utilities typically aggregate the net savings from their particular projects (individual programs) to calculate savings from the entire DSM program, which are often reported on an incremental, annual, and cumulative basis.

In energy efficiency projects undertaken by entities other than utilities, such as governmental agencies, the attention given to netting out free riders has been more sporadic. When the managers or evaluators of an energy efficiency project undertake to estimate savings *without* taking into account an explicit counterfactual scenario, they do not avoid the intellectual and technical difficulties involved in trying to determine what would have happened without the project. Rather, they explicitly or implicitly make the assumption that in the counterfactual scenario, the project's efficiency measures would not have been implemented.

Reductions in GHG impacts from efficiency projects are calculated with increasing frequency, given the global interest in climate change issues. This is reflected in some of the indicators in the Annex. Emissions factors based on the characteristics of end-use equipment and of the energy production and distribution system are used in making such calculations. Calculations of the quantity of GHGs reduced from efficiency projects, when made, are always based on prior calculations of energy saved through project measures implemented. These issues are, of course, highlighted by the discussion of implementing a Clean Development Mechanism in connection with the Kyoto Protocol.

Renewable energy. Relatively few of the indicators reviewed related to renewable energy projects per se. In our experience with utility DSM and renewable

energy projects of government agencies, we have found that the most obvious performance indicator (the sum of the generating capacity ratings of renewable generation technologies installed) is virtually always employed. Other common indicators are annual energy produced by renewable energy technologies installed, and environmental impacts, including GHG emissions, avoided as a result. Measurement of capacity added and generation produced is simple and straightforward. Calculation of emission impacts requires a counterfactual scenario describing electricity production with and without the project. Curiously, there has been little effort among organizations operating renewable energy projects to identify the net additions of renewable capacity, i.e., increments above and beyond the capacity that would have been added by the unaided market.

Socio-Institutional Changes

Market changes. Energy efficiency and renewable energy projects usually have as objectives the installation of additional technologies over and above the levels that would be expected based on market forces and structures alone. For many years, this physical objective (procuring additional renewable or energy efficiency resources) was seen as primary, and market transformation objectives were commonly secondary. In recent years, however, there has been an increased emphasis among domestic government agencies and development agencies, banks, and organizations on transforming market structures and functions to facilitate a greater continuing level of market penetration of sustainable energy technologies. This emphasis is reflected not only in the market transformation objectives of GEF's climate change programs (OPs 5, 6, 7), but in the evolving paradigms of other organizations as well.

Market changes from projects can be relatively proximate and immediate, or they can appear further out from a project in space and time, promising more long-lasting and sustainable changes. Labels for these immediate and longer term effects vary. Martinot (1998) has called the former *market intervention* and the latter *market development*. Energy efficiency policymakers in California call the former *market changes* and the latter *market effects*. Feldman (1995) proposed that market changes first reveal themselves in *leading indicators* of change, observable early on, and can later be confirmed through *lagging indicators* of market transformation. We turn to the former of these variously named aspects of market change, those detectable through project output indicators.

Many types of output indicators for market changes have been proposed. On the buyers' side of the market, general and technical information can be received, the understanding of and satisfaction with sustainable technologies by consumers and other energy users can increase, and their purchasing plans and preferences can shift toward these technologies. On the sellers' side of the market, the number of technology providers and their capability to make, sell, and service sustainable technologies can grow; and contracting protocols, financing mechanisms, and credit availability for sustainable technologies can develop. Governmental and policy changes that facilitate market transactions in sustainable technologies can occur—regulatory reform, enhanced capability in relevant agencies, new plans and programs.

Development of market intervention indicators has lagged behind the growth of the market transformation paradigm. Some market intervention indicators are included within specific GEF projects, particularly those of more recent vintage. A slowly growing number of other organizations now set out specific market intervention indicators and/or targets that are potentially capable of measurement. Examples are the project indicators used by the Northwest Energy Efficiency Alliance in the United States and by New South Wales in Australia.

Capacity building and institutional strengthening. Capacity building and institutional strengthening are objectives of many energy projects operated by organizations around the world. There appear to be few true output indicators in use relating to these project objectives. The indicators organizations generally use are really activity or implementation measures, or very close thereto. An example of this may be seen in the performance monitoring package of the USAID's Climate Change Initiative. Capacity-building indicators are numbers of NGOs provided with strengthening services (by type of NGO) and numbers of individuals trained.

Policy strengthening more readily lends itself to output indicators. Policy actions can be specified in advance, and (regardless of whether they are achieved) can later be observed and reported, for the most part on a yes-or-no basis.

Intermediate Outcomes/Market Development

Technology, Energy, Emissions

The same kinds of indicators that were described as *output* indicators above are also employed as *outcome* indicators. Primarily these are estimated efficiency savings, installed renewable generating capacity, and the associated changes in carbon emissions. The difference is in the level at which these indicators are measured. Where a broader market than the immediate market segment or area directly affected by project activities is considered(for example, renewable generating capacity installed at the country level—the indicator is at a higher level than an output measure.

In contrast with output indicators, which are often verified, there is very little actual verification (measurement) of variables at what we would consider to be the outcome indicator level. We posit that this lack of measurement is due to the difficulties in establishing causality or even plausible influence. Suppose that there is a set of energy efficiency projects within a country or state which achieve a certain degree of market penetration and for which energy savings outputs are calculated. There are two distinctly opposing possibilities for considering energy efficiency trends for similar end uses *outside* the project areas:

- These trends, uninfluenced by the projects, are a benchmark for measuring what would have happened in the absence of the projects.

- By contrast, the efficiency projects cause spillover benefits that are reflected in efficiency gains outside the project areas too.

Issues such as these can be addressed through carefully designed evaluation studies, but such studies take time and money. In the future, we expect that the issues around establishing and verifying plausible outcome indicators through appropriate evaluation studies may be addressed more frequently.

Socio-Institutional Change

As indicated earlier, there has been some development of market impact indicators, many of which fall into the market development level insofar as they are logically linked to project objectives and augur shifts in the market that may be self-sustaining. Other than market development indicators, few outcome-level indicators of capacity building or institutional strengthening have been identified in the survey of other organizations at this writing. Apart from the market development area, indicators of socio-institutional development outcomes from climate change projects appear to be largely undeveloped at this time.

End Outcomes/Goal Attainment

In principle, performance indicators may be developed to measure (quantitatively) or judge (qualitatively) the progress of *any* project, program, or organization toward achieving its stated end *goals*. Some organizations use macro-level indicators (carbon intensity is an obvious example), not so much as performance indicators, which poses large issues of causality or at least plausible influence, but as measures of how much more remains to be accomplished to attain end goals. In practice, most of the explicitly articulated performance indicators that we have found address “lower” levels of performance.

Conclusions and Implications

The text of this paper makes recommendations regarding project-level monitoring and evaluation, including the systematic use of performance indicators for individual projects. If GEF decides to implement these recommendations, a particularly good framework to consult while drawing up the indicated procedures is that developed by the German Technical Cooperation (GTZ). Its objectives-oriented project planning and implementation framework (ZOPP) provides a practical approach to explicit linkages between project objectives, selection and measurement of indicators, and monitoring and evaluation, including identification of unintended as well as intended impacts (Deutsche Gesellschaft für Technische Zusammenarbeit 1997).

The overall conclusion is that other organizations’ performance indicators vary greatly. There is a growing number of performance indicators used by different organizations at different levels. However, institutionalization of market change indicators, and especially *market development* indicators, is in its infancy, as is development of qualitative capacity development/institutional strengthening indicators.

Table B.1. Terminologies of Different Donor Agencies for Results/Logical Frameworks

Framework	End Outcomes	Intermediate Outcomes	Outputs	Interventions
				Process
CARE terminology	Impact	Effects	Outputs	Activities and Inputs
CARE logframe	Final goal	Intermediate goals	Outputs	Activities and Inputs
PC/LogFrame	Goal	Purpose	Outputs	Activities
USAID	Strategic objective	Intermediate results	Outputs	Activities and Inputs
USAID Logframe	Final goal	Strategic goal/ objective	Intermediate results	Activities
DFID (ODA)	Wider objectives	Immediate objectives	Outputs	Inputs
DANIDA + DFID	Goal	Purpose	Outputs	Activities
CIDA	Overall goal	Project purpose	Results/outputs	Activities and Inputs
GTZ	Overall goal	Project purpose	Results/outputs	Activities and Inputs
European Union	Overall objectives	Project Purpose	Results	Activities
FAO & UNDP	Development objective	Immediate objectives	Outputs	Activities and Inputs
NORAD	Development objectives	Intermediate objectives	Outputs	Activities and Inputs
World Bank	Long-term objectives	Short-term objectives	Outputs	Inputs

Source: Compiled by Jim Rugh for CARE and InterAction's Evaluation Interest Group (Rugh 1998).

Table B.2. DFID Logframe Guide

Objectives	Measurable Indicators	Means of Verification	Key Assumptions
Goal: Wider problem the project will help to resolve	Quantitative ways of measuring or qualitative ways of judging claimed achievement of goal	Cost-effective methods and sources to quantify or assess indicators	(Goal to Supergoal) External factors necessary to sustain objectives in the long run
Purpose: The immediate impact on the project area or target group, i.e., the change or benefit to be achieved by the project	Quantitative ways of measuring or qualitative ways of judging claimed achievement of purpose	Cost-effective methods and sources to quantify or assess indicators	(Purpose to Goal) External conditions necessary if achieved project purpose is to contribute to reaching project goal
Outputs: The specifically deliverable results expected from the project to attain the purpose	Quantitative ways of measuring or qualitative ways of judging timed production of outputs	Cost-effective methods and sources to quantify or assess indicators	(Outputs to Purpose) Factors outside of project control that, if present, could restrict progress from outputs to achieving project purpose
Activities: The tasks to be done to produce the outputs	Inputs: A summary of the project budget (sub-budgets and total)	Financial outcomereport as agreed in grant agreement	(Activity to Output) Factors outside of project controlthat, if present, could restrict progress from activities to achieving outputs

Source: As received via CARE UK, December 1997.

Table B.3. Performance Indicators Used by a Selection of Other Organizations

Organization	Indicators
New South Wales Sustainable Development Authority (Australia)	Activity and output indicators for energy efficiency projects
Northwest Energy Efficiency Alliance (United States)	Output and outcome indicators for energy efficiency projects
USAID	Activity, output, and outcome indicators for the Climate Change Initiative project
USAID Global Bureau, Environment Center	Outcome indicators
Energy Savings Trust (United Kingdom)	Output indicators for efficiency projects
Electrobras (Brazil)	Outcome indicators for National Electricity Conservation Program (PROCEL)
National Energy Conservation Center (ENERCON) (Pakistan)	Output and outcome indicators for transportation efficiency project of ENERCON and UNDP
Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)	Activity and output indicators for selected energy efficiency and renewable energy projects

Annex C. Examples of Performance Indicators

Possible performance indicators that can be used in assessing climate change project and program performance are listed here. Project designers should select project-specific indicators to be consistent with expected outputs and project objectives. Also, to conduct cross-cutting evaluations of several projects to provide information about climate change program impacts, evaluators should select an appropriate set of indicators based on the nature of the cluster of projects selected for study. The possible indicators that follow were suggested by the review of projects conducted for this paper and are provided as a resource.

Possible Indicators for Energy Efficiency (EE) Projects

These indicators were suggested by a review of the following groupings of projects:

- Cluster 5, EE-Product Manufacturing and Markets (primary template)
- Cluster 6, EE Investments in Industry
- Cluster 7, Building Codes/Construction
- Cluster 8, District Heating EE Improvements.

Financial

1. Number and dollar volume of completed EE project transactions using financing (e.g., amounts borrowed) [broken out by sector: utility, government, industry, consumers, etc.]
2. Number and dollar volume of completed EE projects (total installed costs) [broken out by sector: utility, government, industry, consumers, etc.]
3. Number of innovative financial and contracting mechanisms (packages) [broken out by sector: utility, government, industry, consumers, etc.]
4. Market acceptance of innovative financial and contracting mechanisms (packages) [broken out by sector: utility, government, industry, consumers, etc.]
5. Number of commercial financial institutions participating in EE projects
6. Pipeline of EE (portfolios of) projects ready for implementation and financing by commercial parties
7. Level of EE investment activity in domestic and commercial sectors in country [broken out by sector: utility, government, industry, consumers, etc.]
8. Level of EE investment activity in other countries [broken out by sector: utility, government, industry, consumers, etc.]
9. Revolving fund to support financing of incremental investment costs
10. Equipment leasing program

11. Number and type of financial incentives offered [broken out by sector: utility, government, industry, consumers, etc.]

12. Amount of financing leveraged [broken out by sector: utility, government, industry, consumers, etc.]

13. Number of grants issued [broken out by sector: utility, government, industry, consumers, etc.]

ESCOs

1. Number of ESCOs formed

2. Level of ESCO activity (number and value of contracts with customers)

3. Business advisory services for facilitating development of an ESCO industry

4. Pilot energy performance contracting program (loan guarantees to support performance contracts)

5. Training of ESCOs and NGOs on providing EE services [could go under training]

6. Cluster 6: Number of business plans developed for ESCOs

EE Programs, Projects, and Measures

1. Number of buildings retrofitted (percent of building population)

2. Number (percent) of EE measures installed

3. Number of EE projects implemented and evaluated

4. Number of DSM programs

Labeling [could go under policymaking]

1. Number and type of EE products tested, labeled, and certified

2. Nationally certified EE label [could go under policymaking]

3. Labeling of new equipment

4. Information or labeling system for equipment [could go under information]

Awareness and Acceptance

1. Level of awareness and understanding of EE products, services, and/or actions [broken out by sector: utility, government, industry, consumers, etc.]

2. Awareness of business opportunities in EE field

3. Increased awareness of codes and standards by consumers, architects, engineers, construction companies, and building owners and developers

4. Public acceptance of EE measures

Availability

1. Number (percent) and type of EE products and services available

2. Cluster 6: Use of locally made EE equipment

Information

1. Information network (clearinghouse; newsletters, Internet, and conferences/workshops) developed

2. Dissemination of results of EE projects

3. Number of demonstration projects: (1) of EE measures; (2) with key actors (e.g., ESCOs) [broken out by sector; includes monitoring and verification]

4. Number of energy audits (in particular facilities, or by sector)

5. Guidelines on identifying and developing EE projects

6. Number of workshops for retailers and distributors to encourage sales of EE equipment

7. Cluster 7: Communication plan

Capability Building

1. Support office created to coordinate and support institutional and capacity-building activities in EE

2. Offices established for identifying EE opportunities in operations and developing and implementing programs for EE

3. Number of training programs for staff, experts, industry personnel, energy managers, and ESCOs

4. Training of architects, engineers, owners of construction companies, and building owners and developers

5. Strengthened institutional capabilities (including information management, evaluation, and dissemination) of organization promoting EE

6. Improvements in marketing capabilities

7. Cluster 6: Energy auditing instituted as a regular activity [could also apply to other activities: e.g., energy labeling]

8. Cluster 6: Accreditation program for energy auditors

9. Cluster 7: Least-cost planning and DSM methods for energy sector operators

Regulatory Policymaking

1. Model energy policy and guidelines (for municipalities)

2. Strengthened environmental standards

3. (Stricter) EE equipment standards

4. Elimination of subsidies encouraging energy consumption

5. Cluster 8: End user metering for district heating systems

6. Time-of-use tariff to encourage load shifting

7. Reduction of custom duties on EE equipment

8. Design, implementation, and enforcement of EE code for new buildings (or at least a code of practice)

9. Life cycle government procurement policies that consider energy costs associated with purchase of energy-using equipment

10. Legal, financial, institutional, and regulatory policies instituted to ensure large-scale, sustainable financing of EE investments [could go under financing]

Studies/Proposals

1. Number of feasibility studies

2. Number of proposals

Market Infrastructure Development

1. Number (percent) of EE measures manufactured by in-country manufacturers

2. Number (percent) of dealers and distributors stocking and selling EE equipment

3. Number of manufacturers producing EE models

4. Number of dealer incentive programs

5. Increased local manufacturer capabilities to produce equipment in compliance with standards

6. Number and type of EE models stocked by appliance and equipment vendors

7. Manufacturer investments in/production of EE equipment

8. Cluster 7: Number of contractors purchasing EE building materials

9. Cluster 7: Number of contractors incorporating EE building design in their activities

Other

1. Improvements in engineering, operations, production management

2. Increased utility support of EE technologies

3. Independent testing laboratories

4. Consumer purchases of EE equipment

Possible/Additional Indicators for Renewable Energy Projects

Additional indicators were suggested by review of the following types of renewable energy and fuel swithcing projects:

- Capital costs per kW of demonstrated renewable or low-GHG-emitting technology (in host/other countries)

- Installations of demonstrated technologies outside of project (in host/other countries)

- Regulatory policymaking: specific tariffs/policies to provide incentives/remove disincentives to adoption of renewable technologies

Possible/Additional Indicators for Cross-Cutting Types of Projects

Cluster: Sustainable Energy Technology Investment Funds

1. Indicators for particular projects financed through the funds

2. Indicators for the financial performance of the funds themselves:

    - Number of subprojects and/or business plans funded

    - Repayment rates for loans extended

    - Financial returns to financial intermediaries (average and aggregate)

Cluster: Capacity or Knowledge Building

1. Capability-building indicators from above

2. Additional indicators:
    - Declining use of external consultants (amount of donor receipts used for foreign/expatriate technical assistance)

    - For NGOs: enhanced capacity to do research and advocacy work (number of staff with these skills)

    - Organizational restructuring from bureaucratic to networking organizational paradigm (business, government)

Possible/Additional Indicators for Social Impacts

1. Affected population (number and percentage of end users and/or beneficiaries to total population)[10]

2. Off-grid renewable energy systems in rural areas:

    - Number of affected households or villages and percent with installed renewable energy services relative to total relevant population

    - Changes in energy use (e.g., reduction in use of kerosene and woodfuels)

    - Estimated changes in livelihood and income, including other social parameters (e.g., increase or decrease in household income, reduction in women's labor time for gathering fuel, power provided to rural village health and education facilities, etc.)

    - Acceptance and satisfaction among (1) direct beneficiaries, (2) those indirectly affected

3. Off-grid renewable energy systems with poverty alleviation components:

    - Linkage of rural renewable energy project/scheme to national poverty alleviation programs

    - Anticipated impacts on the poor (e.g., improving service delivery for health, family planning, education; improving infrastructure for farm- or fishery-based livelihoods, etc.)

The following tools are examples of those that can be used to measure these additional social impact indicators:

- Collection of secondary socioeconomic information: published government reports (statistical yearbooks, subnational government surveys and

censuses); community information, village histories, reports from NGOs, churches, etc.; published research reports (books, articles, technical papers, etc.)

- Key informant interviews: checklist format; informal, consensus building techniques; formal meetings; life histories

- Community mapping, including production and livelihood diagramming and gender analysis

- Social surveys: non-random sampling; random sampling; purposive, stratified sampling

Bibliography

Ahuja, Dilip. 1993. *The Incremental Cost of Climate Change Mitigation Projects*. Washington, DC: Global Environment Facility.

Anderson, Dennis, and R.H. Williams. 1993. *The Cost-Effectiveness of GEF Projects*. Global Environment Facility Working Paper Number 6. Washington DC: Global Environment Facility.

Ashford, Michael S. 1999. *Contingent Finance as a GEF Financing Modality. Part 1: Conceptual Issues*. World Bank Environment Department White Paper. Washington, DC: World Bank.

Deutsche Gesellschaft für Technische Zusammenarbeit. 1996. *ZOPP: Objectives-Oriented Project Planning.* Eschborn, Germany.

——. 1997. *Project Cycle Management (PCM) and Objectives-Oriented Project Planning (ZOPP).* Eschborn, Germany.

Feldman, Shel. 1995. "Measuring Market Effects." *Proceedings of the 1995 AESP Annual Meeting.* Boca Raton, FL: Association of Energy Service Professionals.

Feldman, Shel. 1996. O*n Estimating the Value Added through Market Transformation*. Oak Ridge, TN: Oak Ridge National Laboratory.

Geller, Howard, and Steven Nadel. 1994. "Market Transformation Strategies to Promote End-Use Efficiency." *Annual Review of Energy and the Environment* 19:301-46.

Global Environment Facility (GEF). 1995. *Report by the GEF to the First Conference of the Parties of the Framework Convention on Climate Change*. Washington, DC.

——. 1996a. *Operational Strategy*. Washington, DC.

——. 1996b. *Public Involvement in GEF-Financed Projects.* Washington, DC.

——. 1996c. *Promoting Strategic Partnerships between GEF and the NGO Community: A Report from the GEF-NGO Working Group*. Washington, DC.

——. 1996d. *Incremental Costs.* Washington, DC.

——. 1997a. *Operational Programs.* Washington, DC.

——. 1997b. *Project Implementation Review 1996.* Washington, DC.

——. 1997c. *The Global Environment Facility Small Grants Program.* Washington, DC.

——. 1997d. *Medium-Sized Projects.* Washington, DC.

——. 1998a. *Operational Report on GEF Programs.* Washington, DC.

——. 1998b. *Study of GEF Project Lessons (Summary Report)*. Washington, DC.

——. 1998c. *Project Implementation Review 1997.* Washington, DC.

——. 1998d. *Proceedings of the First Assembly of the Global Environment Facility, New Delhi, 1-3 April 1998.* Washington, DC.

——. 1999a. *Project Performance Report 1998.* Washington, DC.

——. 1999b. "Engaging the Private Sector in GEF Activities." Information note presented to GEF Council May 5-7. GEF/C.13/Inf.5. Washington, DC.

Herman, Patricia, Shel Feldman, Shahana Samiullah, and Kirsten Stacey Mounzih.1997. "Measuring Market Transformation: First You Need a Story…" *The Future of Energy Markets: Evaluation in a Changing Environment.* Proceedings of the International Energy Program Evaluation Conference, Chicago, pp. 319-26. Washington, DC: American Council for an Energy-Efficient Economy.

Intergovernmental Panel on Climate Change. 1996a. *Climate Change 1995: Impacts, Adaptations and Mitigation of Climate Chang: Scientific-Technical Analyses*. Contribution of Working Group II to the second assessment report of the Intergovernmental Panel on Climate Change. New York: Cambridge University Press.

——. 1996b. *Technologies, Policies and Measures for Mitigating Climate Change.* Working Group II of the Intergovernmental Panel on Climate Change. Geneva.

——. 1996c. *Climate Change 1995: Economic and Social Dimensions of Climate Change.* Contribution of Working Group III to the second assessment report of the Intergovernmental Panel on Climate Change. New York: Cambridge University Press.

——. 2000. *Special Report on Methodological and Technological Issues in Technology Transfer.* Working Group II of the Intergovernmental Panel on Climate Change. Geneva. Forthcoming.

Kammen, Daniel M. 1999. "Promoting Appropriate Energy Technologies in the Developing World." *Environment* 41(5):11-15, 34-41.

Kozloff, Keith, and Olatokumbo Shobowale. 1994. *Rethinking Development Assistance for Renewable Energy*. Washington, DC: World Resources Institute.

Kushler, Martin, J. Schlegel, and R. Prahl. 1996. "A Tale of Two States: A Case Study Analysis of the Effects of Market Transformation." *Proceedings of the 1996 ACEEE Summer Study on Energy Efficiency in Buildings*. Washington, DC: American Council for an Energy-Efficient Economy.

Lee, Allen D., and R. Conger. 1996. "Market Transformation: Does it Work?—The Super Efficient Refrigerator Program." *Proceedings of the 1996 ACEEE Summer Study on Energy Efficiency in Buildings*. Washington, DC: American Council for an Energy-Efficient Economy.

Liebenthal, Andres, Subodh Mathur, and Herbert Wade. 1994. *Solar Energy: Lessons from the Pacific Island Experience*. World Bank Technical Paper No. 244, Energy Series. Washington, DC: World Bank.

Martinot, Eric. 1998. *Monitoring and Evaluation of Market Development in World Bank/GEF Climate-Change Projects: Framework and Guidelines*. World Bank Environment Department Paper 66. Washington, DC: World Bank.

——. 2000. "Renewable Energy Markets and the Global Environment Facility." *Financial Times Renewable Energy Report* 12(February):18-22.

Martinot, Eric, and Omar McDoom. 2000. *Promoting Energy Efficiency and Renewable Energy: GEF Climate Change Projects and Impacts*. Washington, DC: Global Environment Facility.

Nadel, Steven, and H. Geller. 1994. "Market Transformation Programs: Past Results, Future Directions." *Proceedings of the 1994 ACEEE Summer Study on Energy Efficiency in Buildings*. Washington, DC: American Council for an Energy-Efficient Economy.

Porter, Gareth, Raymond Clemencon, Waafas Ofosu-Amaah, and Michael Philips. 1998. *Study of GEF's Overall Performance*. Washington, DC: Global Environment Facility.

Prahl R, and J. Schlegel. 1993. "Evaluating Market Transformation." *Energy Program Evaluation: Uses, Methods, and Results*, pp. 469-77. Chicago: National Energy Program Evaluation Conference.

Reed, John H., and Nicholas P. Hall. 1997. "Methods for Measuring Market Transformation." *The Future of Energy Markets: Evaluation in a Changing Environment,* pp. 177-84. Chicago: International Energy Program Evaluation Conference.

Richards, David, Kane Thierno, Moises Leon, and Tina Liamzon. 1995. *Report of the Independent Evaluation of the Global Environment Facility Small Grants Programme (GEF/SGP) Pilot Phase*. New York: UNDP/GEF.

Rogers, E. 1995. *Diffusion of Innovations.* New York: Free Press.

Rugh, James. 1998. *An Overview of Program Design, Monitoring and Evaluation (DME) in CARE*.

Saxonis, William P. 1997. "Market Transformation: Real Problems, Real Answers." *The Future of Energy Markets: Evaluation in a Changing Environment,* pp. 171-76. Chicago: International Energy Program Evaluation Conference.

Sjöberg, Helen. 1994. *From Idea to Reality: The Creation of the Global Environment Facility*. GEF Working Paper 10. Washington DC: Global Environment Facility.

Suozzo, Margaret, and S. Nadel. 1996. "Learning the Lessons of Market Transformation Programs." *Proceedings of the 1996 ACEEE Summer Study on Energy Efficiency in Buildings*. Washington, DC: American Council for an Energy-Efficient Economy.

United Kingdom, Department for International Development. 1993. *Project Evaluation: A Guide for NGOs*. Glasgow, UK: Overseas Development Administration.

——. 1994. *A Guide to the ODA Evaluation System.* Glasgow, UK: Overseas Development Administration.

United Nations. 1992. *Framework Convention on Climate Change*. New York.

——. 1993. *Agenda 21: Program of Action for Sustainable Development*. New York.

United Nations Development Program. 1997. *NGO Participation in UNDP-GEF Projects*. New York: UNDP/GEF.

United Nations Development Program, United Nations Environment Programme, and World Bank. 1994. *Global Environment Facility: Independent Evaluation of the Pilot Phase.* Washington, DC: World Bank.

Vine, Edward, and Jayant Sathaye. 1997. *The Monitoring, Evaluation, Reporting, and Verification of Climate Change Mitigation Projects: Discussion of Issues and Methodologies and Review of Existing Protocols and Guidelines*. Berkeley, CA: Lawrence Berkeley National Laboratory.

——. 1999. *Guidelines for the Monitoring, Evaluation, Reporting, Verification, and Certification of Energy-Efficiency Projects for Climate Change Mitigation.* Report LBNL-41543. Berkeley, CA: Lawrence Berkeley National Laboratory.

Violette, Daniel, Shannon Ragland, and Franklin Sterm. 1998. *Evaluating Greenhouse Gas Mitigation through DSM Projects: Lessons Learned from DSM Evaluation in the United States.* Prepared for the World Bank. Washington, DC: Hagler-Bailly.

Wells, Michael P., Delfin J. Ganapin, and Francine Trempe. 1998. *Report on the Second Independent Evaluation of the GEF Small Grants Program (SGP/GEM).* New York: UNDP/GEF.

Williams, Robert, Stephen Karakezi, Jyoti Parikh, and Chihiro Watanabe. 1998. *The Outlook for Renewable Energy Technologies.* GEF Working Paper 14. Washington DC: Global Environment Facility.

Wirtshafter, Robert M., and A. Sorrentino. 1994. "Proving Causality in Market Transformation Programs: Issues and Alternatives." *Proceedings of the 1994 ACEEE Summer Study on Energy Efficiency in Buildings*. Washington, DC: American Council for an Energy-Efficient Economy.

World Bank. 1994. *Greenhouse Gas Abatement Investment Project Monitoring and Evaluation Guidelines*. Environment Department White Paper. Washington, DC.

——. 1996. *Rural Energy and Development: Improving Energy Supplies for 2 Billion People.* Washington, DC.

——. 1998. *Greenhouse Gas Assessment Handbook: A Practical Guidance Document for the Assessment of Project-Level Greenhouse Gas Emissions.* Environment Department Working Paper 64. Washington, DC.

Endnotes

[1] Annex C includes a menu of project-level indicators. Some of these are forms of the core indicators that may be useful at the project level. Many are additional indicators that can be used to express project performance in more detail.

[2] Martinot and McDoom (2000) define and utilize these nine clusters in describing the climate change project portfolio. Clustering was also suggested by many of the interviews mentioned in the first section of this paper.

[3] Two sources for electricity data are *Projected Costs of Generating Electricity*, prepared by the Nuclear Energy Agency and the International Energy Agency (update 1998); and *Developing Countries & Global Climate Change: Electric Power Options for Growth*, 1999, prepared for the Pew Center on Global Climate Change. Data from these sources are being put into a Technology & Environment Data Base that will be available through the Stockholm Environment Institute-Boston (www.leap2000.org). A source covering all energy forms is *International Energy Outlook 1999* from the U.S. Department of Energy's Energy Information Administration.

[4] As a multiyear multicountry project, the Efficient Lighting Initiative will be subject to ongoing assessment by evaluation consultants hired by the IFC. We refer here, however, to cross-cutting evaluation that would include additional lighting project markets.

[5] The scope of a production report can be all of the activity that occurs within the boundaries of all GEF climate change efforts—not only projects, but also enabling and adaptation activities and short-term response measures. Thus, communications enabled, GHG inventories supported, and research performed could be reflected here. In addition, a production report could be an apt vehicle for capturing the activities of projects that have important objectives in addition to or other than market development. For example, the United Nations Environment Programme has been the implementing agency for GEF projects aimed at building countries' methods and capacities for assessing climate change mitigation and adaptation strategies rather than at directly removing market barriers to sustainable energy technologies.

[6] For example, the target values of an indicator may be based on the assumption that growth in a country's gross domestic product will fall between 2 and 4 percent per year on a rolling average basis over the next decade. If economic growth is much stronger or weaker than that, targets should be revised. Another example might be if the entity and staff position assigned measurement responsibility were abolished by a government restructuring; measurement responsibility would subsequently need to be reassigned. These are simple illustrative examples of assumptions. It is not practical to reflect all of the conditions that bear on project outcomes in explicitly identified key assumptions. Rather, these identified assumptions recognize conditions that are believed to be closely related to project outcomes and that are known to be subject to risk of variation. Other unanticipated developments that significantly affect the

validity of performance indicators must also be taken into account if and as they occur.

[7] Ideally, these baseline studies should be performed before a project is fully designed. One solution to this potential conundrum may be the use of project development funds to ensure that targets for full projects —and, indeed, their strategic designs as well—are based on essential market information. Another approach could be two-phase projects in which performance targets are adjusted after baseline research is done during the first phase.

[8] A similar approach could also be taken for the implementation success ratings that GEF collects for its PIRs, moving those reports too from a subjective to an objective basis.

[9] "Country level" can also include impacts at regional (subnational) levels that also extend beyond the project level.

[10] End users or consumers are differentiated from beneficiaries in that the latter is a broader stakeholder term that may include capacity-building recipients in government and NGOs, for example, who may not necessarily be receiving energy services directly.