

OVERVIEW

ENERGY EFFICIENCY FINANCING AND THE THREE COUNTRY ENERGY EFFICIENCY PROJECT

New or improved programs to better capture the enormous potential for energy savings in existing industries and buildings in the developing world have important roles to play for the environment and for economic development.

Many thousands of energy efficiency projects with strong financial rates of return remain unimplemented in the world at large, but especially in developing countries and emerging markets. The essential issue blocking the realization of the potential energy savings is the underdeveloped state of energy efficiency investment delivery mechanisms, adapted to be able to work well in national and local economic environments. Traditional investment delivery mechanisms operated by local banks and other financing organizations often have played useful roles in the energy efficiency business, but still only a fraction of the potential has been tapped. Renewed and strong efforts are required to develop financing programs that can combine effective technical project development with financial products appropriate for dispersed investments, with benefits focused on operating cost savings. Many programs in recent years have aimed to develop such delivery mechanisms. Some have succeeded and some have failed. Given the urgent need to mobilize large levels of investments in energy efficiency to help meet future energy requirements, this book evaluates the experience of past efforts, attempts to summarize lessons

learned, and provides suggestions on how these lessons may be applied in the future. The book concentrates on Brazil, China, and India, but also includes reviews of selected experiences in other countries.

This book draws extensively on the experiences of the UNEP-World Bank multiyear, technical assistance effort, “Developing Financial Intermediation Mechanisms for Energy Efficiency Projects in Brazil, China, and India” (also known as the Three Country Energy Efficiency Project), funded by the UNF and ESMAP. The purpose of this project was to generate new ideas and approaches for developing energy efficiency financing schemes, which then could be tried out by local institutions, with support from the World Bank and other international agencies and donors where necessary. Core groups of representatives from both the financing and energy efficiency development communities in each of the three countries implemented project activities. Energy efficiency and banking industry practitioners from each country also met in four formal cross-exchange workshops, and various informal meetings, to exchange lessons learned and ideas. This book attempts to synthesize the considerable practical knowledge generated from the project, which is applicable across countries, together with additional knowledge from other World Bank Group and donor efforts in other countries.

Following an introduction in chapter 1, chapter 2 summarizes the overall energy efficiency terrain and identifies the opportunities at which the recommendations of this book are directed. Chapter 3 explores the origins and persistence of energy inefficiency. Chapter 4 provides a framework for thinking about the basic organizational and institutional challenges and the basic types of energy efficiency investment mechanisms, and begins the discussion of the various mechanisms that have been used to meet these challenges. Chapter 5 discusses the need that all such investment mechanisms have for market identification and outreach, project development, and technical assessment of energy efficiency projects. Options are laid out for developing and incorporating needed local technical capacity within investment delivery mechanisms. Chapter 6 deals with arranging the financing flows that all investment mechanisms require, the issues

involved, and the available options for financing. Chapter 7 summarizes experience with the development and operation of a range of energy efficiency investment mechanisms, and some of the lessons learned from that experience. Chapter 8 provides some basic conclusions, including advice from the study team concerning each of the three countries' needs for strategic government support of the energy efficiency agenda and about the roles of international financial institutions, as well as some operational suggestions for those countries and organizations considering new energy efficiency financing programs.

Part II of the book provides 13 case studies of different types of energy efficiency financing mechanisms that have been implemented in China, Hungary, Romania, India, Lithuania, the United States, Canada, Brazil, and Sri Lanka. The case studies describe advantages and disadvantages of the different approaches adopted, and specific lessons learned. They provide a platform for presentation of the synthesized conclusions in the main report.

THE NEED FOR ENERGY EFFICIENCY INVESTMENT FINANCING INTERVENTIONS

The critical importance of improving energy efficiency globally, but especially in rapidly growing developing countries such as China, India, and Brazil, is well documented in other analyses. IEA's *World Energy Outlook 2006* forecasts in its reference scenario a 53 percent increase in global energy demand with matching large increases in carbon dioxide emissions between 2004 and 2030 (IEA 2006b). China, India, and Brazil represent three of the top 10 energy consuming nations in the world now, and their share in total consumption will certainly increase. In the world as a whole, but especially in these rapidly growing developing countries, efficiency improvements to generate more economic output with less energy input is essential for reasons of energy supply security, economic competitiveness, improvement in livelihoods, and environmental sustainability. In an Alternative Policy Scenario, developed to investigate how more sustainable global energy supply and use might be developed by 2030,

the IEA estimates that two-thirds of the hoped for carbon dioxide emission reductions in developing countries must come from improved energy efficiency, and the balance from changes in the mix of energy supply technologies.

To consider, specifically, how to achieve energy efficiency gains, the overall “energy efficiency terrain” must be dissected, as different aspects of the problem must be addressed in very different ways. At a basic level, reduction in energy use per unit of economic output can be achieved in two ways—through energy savings stemming from changes in economic structure, and through energy savings stemming from technical efficiency gains. Structural energy savings are the result of broad trends in economic development (for example, changes in sources of industrial value added) and are not very amenable to direct policy influence. Specific energy efficiency policies and programs, therefore, usually focus on achievement of technical savings—reducing energy use per unit of physical output, not output value.

When looking at technical energy savings potential, it is useful to separately consider new facilities and existing facilities. Improving technical energy efficiency in new facilities is especially important over the longer term, and especially in fast-growing economies. However, individual investors who build new power plants, transport systems, industrial capacity, or buildings must weigh many factors in deciding on technology and designs, and energy efficiency is only one factor—and often a minor one to them. The challenge for governments in this case is to influence the broad technology choice decisions of investors and encourage them to adopt energy efficiency solutions. The main tools that governments can use to intervene here are policy and regulatory tools.

When reviewing how to improve energy efficiency in existing facilities, it is important to further distinguish among different markets and types of projects to decide the most appropriate ways to intervene. Often, major energy efficiency gains can be achieved through investment in broad restructuring projects—to revamp entire production processes in industrial enterprises, or modernize urban transportation systems, for example. In these cases, too, energy efficiency is only one of many factors involved in the selection of technologies by investors,

and the tools available to promote energy efficiency are again primarily policy and regulatory tools aimed at influencing those choices. In other cases, however, there are specific projects aimed at just improving energy efficiency—by replacing outdated boilers, utilizing wasted heat or industrial gases, or installing more efficient electrical equipment, for example. Here, development and financing of specific energy efficiency investment projects is required.

This book considers solutions for expanding investment in specific investment projects where the primary objective is to achieve energy savings. These investments represent only a piece of the overall required effort to improve energy efficiency, but it is the piece most amenable to specific energy efficiency investment interventions, as opposed to policy and regulatory actions. This book focuses on how to expand investment in the thousands of energy efficiency projects dispersed through economies, rather than those concentrated in a few very large companies, such as energy supply utilities. Energy saving opportunities can be found in existing industries and buildings of all types, in projects that typically range from US\$50,000 to US\$5 million in size. As documented in many other studies, a wealth of such “standard” energy efficiency investment projects remains unimplemented, especially in Brazil, China, and India, despite high financial rates of return and payback periods between one and five years (with many in the one- to two-year range). Capturing these project opportunities, which are often winners from the perspective of enterprises, investors, and society at large, has long been an attractive target. However, success has been elusive.

Success in capturing a bigger share of the large numbers of financially attractive energy efficiency retrofit projects has proven stubbornly difficult, primarily because the intrinsic nature of the projects and their broader setting make it hard for effective markets to develop naturally. In some countries, price distortions may undermine incentives, but in most sectors in Brazil, China, and India, and many other countries, this is not the case, as project financial returns are high in most instances. Flow of information about energy efficiency opportunities is far from perfect, but it has improved. In some countries, the required technical or managerial expertise is lacking, but in the case

of Brazil, China, and India the issue is more how to bring existing strong expertise to bear.

Rather, the core of the problem in these and many countries lies in the intertwined problems of perceived high risk driving up implicit discount rates associated with projects, currently high transaction costs, and difficulties in structuring workable contracts for preparing, financing, and implementing energy efficiency investments. With their main financial benefits focused on savings of energy costs, these cost-saving projects rarely rank as equals with projects to expand production or capture new markets, especially in rapidly growing economies. Benefits in the form of calculated costs savings streams, as opposed to highly visible new production assets, appear as nebulous and inherently more risky to many. As project opportunities tend to be relatively small scale and dispersed, transaction costs can prove daunting unless mechanisms are put in place to take advantage of similarities among projects and bundle them. Some form of financial intermediation is usually required, unless enterprises use their own funds. Typically, therefore, implementation of energy efficiency projects involves interaction of both financing entities and technical experts with clients. Project delivery requires very efficient contracting to achieve this without driving up transactions costs—a challenge in any country, but especially where market institutions may be relatively weak, causing greater insecurities in contracting, as in Brazil, China, and India.

This poses two challenges for energy efficiency project developers. The first is to develop means to design, package, and finance energy efficiency investment projects efficiently, in ways which can overcome such problems in different local in-country settings. The second is to have those projects nudge forward changes in the local economic (institutional) environment so that energy efficiency investments arise spontaneously in the future—in other words, to “create” markets or to make markets for energy efficiency investment more “complete.” Experience shows that these two processes seldom happen naturally at levels corresponding to more than a small fraction of the potential. Specific, customized efforts are required to develop investment delivery mechanisms that can operate sustainably in local markets and that can help expand local markets for various

aspects of energy efficiency delivery services. This, then, is the primary focus of the agenda to expand uptake of financially viable energy efficiency investment projects.

DELIVERY OF ENERGY EFFICIENCY FINANCING IS AN INSTITUTIONAL DEVELOPMENT ISSUE

Development and operation of energy efficiency investment delivery mechanisms is an institutional development issue, and energy efficiency financing programs and projects must recognize this clearly. Lack of domestic sources of capital is rarely the true barrier; inadequate organizational and institutional systems for developing projects and accessing funds are actually the main problem. Therefore, mechanisms to capture the opportunities for energy efficiency investment need to be created or strengthened. This entails sustained efforts over years—new institutional constructs cannot be expected to develop and grow overnight.

Clearly, energy efficiency investment delivery systems must fit local institutional environments in order to be effective. This book finds that delivery systems developed in one institutional environment in one country often do not work effectively in a different institutional context. For success, local institutional environments must be well understood, and general solutions usually need to be at least partly customized for those environments.

Further, all energy efficiency financing mechanisms must successfully incorporate two functions: (i) a marketing, project development, and technical design function to efficiently package good projects; and (ii) a financing function. This book finds that a second common source of program failure is inadequate balance between these two functions, leading to insufficient project pipeline development to meet the needs of financiers, or inability to arrange and deliver financing for a series of well-developed projects. Both functions are discussed below, and in separate chapters of Part I.

Third, there must be sufficient incentives for the various players in a given energy efficiency investment delivery mechanism to undertake

the functions expected. Again, while this seems like common sense, such incentives are at times difficult to achieve, given the variety of contractual arrangements that can be dictated by differences among local institutional environments. (The conceptual model presented in chapter 4 is targeted at these three fundamental requirements.)

Generally speaking, there are three basic types of investment delivery mechanisms for energy efficiency investment projects that have been popular in recent years:

- Loan financing schemes and partial loan guarantee schemes. These operate either within the commercial banking system or as specialized development agencies or revolving funds.
- Use of energy service companies (ESCOs). In this book, ESCOs are defined to include any company using energy performance contracting as part of energy efficiency investment transactions. An energy performance contract (EPC) in the ESCO business may be broadly defined as a contract between an ESCO and its client, involving an energy efficiency investment in the client's facilities, the performance of which is somehow guaranteed by the ESCO, with financial consequences for the ESCO.
- Utility demand-side management (DSM) programs. In DSM programs, energy distribution utilities organize all aspects of energy efficiency delivery, including financing, technical development, and interface with users.

It is common, also, to mix these mechanisms.

DELIVERING INVESTMENT PROJECT DESIGNS AND TECHNICAL APPRAISALS

For energy efficiency investments to be made, energy efficiency concepts must be marketed to enterprises, and specific projects must be identified, designed, and appraised. This requires marketing, project development, and technical assessment skill, typically provided by local energy efficiency experts. Human and organizational capacity is needed to define target markets and market outreach strategies, identify project opportunities, design appropriate project packages

at end-user facilities, assess financial returns and the risks influencing delivery of the project cost savings cash flow, and understand the incentives to participate by each of the designated parties.

Early assessment of potential markets is important when developing energy efficiency delivery programs because different markets require different approaches. Selection of market segments for concentration will define organizational arrangements for technical work and the types of financial products developed. In addition, different stakeholders may have very different interests in market development strategies: one bank may be interested primarily in developing new small and medium-size enterprise (SME) clients, while another may be primarily interested in providing new services to existing large commercial customers.

Once target markets are defined, market outreach and marketing of project concepts needs to be conducted, followed by project development. Project development includes a series of key tasks including technical assessments, initial project identification and screening, customer enlistment and their acceptance of proposed project concepts, detailed design of project components, calculation of project economics, and identification and allocation of project risks.

Capacity to undertake project development work typically is found within project appraisal companies, energy survey and auditing firms, university or research institute departments, industry associations, equipment vendors, or ESCOs. In Brazil, China, and India, existing local capacity in the energy efficiency industry is fairly strong. In countries where local capacity is weak, development of this capacity then becomes a top priority—even a prerequisite—for energy efficiency project development. At times, capacity might be borrowed from neighboring countries, but experience has shown that excessive reliance on international consultants is generally unsustainable.

For countries such as Brazil, China, and India, the main issue is how to most efficiently access existing project development capacity. Almost always, both financiers and end users require some degree of independent assessment. For example, where a trusted ESCO might be able to fully meet the needs of both parties, usually the financier or the end user still wish to have some level of independent technical

assessment. Choices then need to be made concerning the degree of outsourcing. Among end users, major industrial enterprises often may conduct technical assessments largely in-house, with perhaps only some very specialized expertise acquired from outside. Building owners, on the other hand, usually outsource nearly all of the project development and assessment effort. The situation among financiers also varies: some development finance institutions (DFIs) may have quite sophisticated in-house technical assessment capacity, whereas many commercial banks will contract out such work to trusted partners.

In all cases, energy efficiency investment financing mechanisms must include efficient and cost-effective organizational and institutional arrangements for delivering marketing and technical assessment requirements in which incentives of all the parties are properly aligned. In each respective economic environment, this is likely to include differing combinations of in-house expertise and outsourcing arrangements. Two points are worth special attention:

- The evolution of different available project development groups is often a critical factor determining their immediate effectiveness in a given energy efficiency financing scheme. Such groups typically have complex historical and staffing relationships that heavily impact their effectiveness as contractors for different financiers or end users, especially in developing countries.
- Keeping transaction costs reasonable is often a major challenge, especially given the relatively small size of energy efficiency loans. Design of programs to achieve this requires creativity and innovation. For example, for their general and energy efficiency lending to SMEs, Indian banks have relied on new geographical and industry-specific clustering approaches.

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The main in-country options for financing energy efficiency investment projects include the internal resources of end users and outside sources

of finance such as local banks (including local branches of international banks), leasing companies, and other nonbank financial institutions. ESCOs may provide financing to end users, but then they also will require financing from others. Other occasional sources include export credits, equity capital financing through special-purpose companies, financing from utilities repaid through energy bills, or informal sources. Multilateral development banks may provide direct financing to especially large end users such as utilities, but otherwise financing from these banks is usually channeled through local intermediaries.

Despite the variety of sources for financing energy efficiency projects, it is clear that ultimately the key source of sustainable and sizable flows of finance in most countries is the local banking sector. Although circumstances do vary considerably, the following observations hold true in many cases and are important in how banks tend to view the kinds of energy efficiency investment projects that are the primary focus of this book:

- Energy efficiency projects often represent a relatively small niche business for major banks.
- Project finance for projects targeting operating cost savings is non-conventional. Most lending in Brazil, India, and China is for working capital, and if project finance is available, it is usually only offered for large projects focusing on capacity expansion. Term lending for projects to improve business efficiency and increase productivity is less common.
- Banks lack knowledge of energy efficiency technology, and (reasonably) consider such specialized knowledge outside of the scope of their operational interest.
- Existing procedural frameworks within banks vary and banks are reluctant to alter them. To be operationalized effectively, new lines of business must be fit into existing systems.
- Customer relations are important, and the strategies of banks to attract and retain customers often dictate areas of interest in new business lines.

- Transaction costs for small and/or non-replicable projects are often a key issue.

In some countries, the local banking sector may be close to dysfunctional, the policy environment may be distorted, or the sector may be in the midst of major transitory reforms, making it difficult to use local banks for financial intermediation. Developing energy efficiency financing efforts may then involve difficult choices between incurring high risks of working in an immature banking sector, developing independent solutions, or foregoing the opportunity to achieve energy savings. If the program intervention is to proceed, especially with an independent approach, the high risks and needs for intensive efforts during implementation, including flexibility to adopt major midcourse corrections, should be recognized up front.

In many cases, energy efficiency projects can be attractively financed using existing bank loan products, without special adjustments or development of new financial products. However, modifications of financial products to match the characteristics of energy efficiency projects can help expand the market for such loans and increase uptake of financially viable yet unimplemented projects. The main direction for developing more customized financial products is to develop mechanisms that recognize and define the cost-reduction cash flow benefits of the projects and use this flow of funds as a source of loan repayment and security. The key is for financiers to increasingly recognize the characteristics of the cash stream generated by the projects financed and to structure loans and repayment assurances to best take advantage of that stream. There is an art to developing such enhancements and modifications of existing primary loan products.

Some of the special tools used by financiers to partially mitigate repayment risks from borrowers for energy efficiency projects, using the generated project cash flows, include the following:

- matching loan repayment schedules to project cost-saving cash flow
- use of escrow accounts for loan repayment, into which borrowers deposit cash from energy cost savings

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- use of energy efficiency performance guarantees provided by third parties such as ESCOs
- use of ESCOs as project aggregators
- arranging for loan repayments to be made through utility bills
- development of build-own-operate or build-operate-transfer cogeneration projects under chauffage contracts.

MAKING INTEGRATED MECHANISMS WORK

For investment delivery mechanisms integrating project development and financing to be successful in increasing energy efficiency project investment, they should build upon the following principles:

- Delivery mechanisms need to be customized, based on a careful diagnostic review of the local institutional environment, including the financial sector, local capacities for technical assessment, the energy efficiency market, and the role of government. Such diagnostic review critically requires local expertise.
- End users should face commercial terms for the financing and technical services being provided as the best foundation for the creation of a sustainable energy efficiency market. End-user subsidies tend to ultimately undermine sustainable market development, because they are usually short-lived and can create market distortions and unrealistic expectations. However, concessional financing has often proven valuable to help buy down the high costs and risks of starting up new commercially oriented programs, build necessary new capacity, and assume risks with new approaches.
- Appropriate incentives must be included for the various actors in each mechanism to participate. Particularly important are incentives to generate deal flow. Combined with the previous bullet, this implies a focus upon organizational and institutional arrangements (“deal structuring”) that deliver positive incentives

for all actors without relying upon long-term market-distorting subsidies.

Suggestions resulting from operational experience with the main types of energy efficiency investment delivery mechanisms are summarized below.

Energy efficiency lending through local commercial banks offers the highest prospect of program sustainability and large-scale impact. Experience suggests the following approaches:

- Design of major operations might best begin with partnerships with the financial intermediaries, and cater to their business approach and market development strategies. The financial intermediaries should select the operational arrangements for project development and technical assessment that best meet their needs and match their business preferences.
- Not all banks are likely to be interested in promoting energy efficiency projects as a specific line of business. However, an energy efficiency lending business may be useful for some as a means to achieve broader strategic goals. Some banks may be interested in developing such products geared to enhancing productivity as an extra service for existing good customers. Others may use energy efficiency loan products as a tool for entering or strengthening the bank's position in specific markets or business lines, such as the SME market or medium-term maturity lending to large industries.
- Integration of operational arrangements for technical assessment work with the financial intermediation of the banks is essential. Development and control of these arrangements would preferably be led by the banks.

Partial-risk loan guarantee programs supported by international financial institutions have shown some success in recent years in jump-starting energy efficiency financing programs through local financial institutions. This instrument is designed to defray part of the risks of loan repayment for energy efficiency loans. Such risks are

often perceived initially to be high by local banks that are unfamiliar with energy efficiency business concepts or specialized means to mitigate those risks. The instrument also may provide a useful platform for delivery of a broad package of assistance to financial intermediaries. However, loan guarantee programs are not a broad panacea that can solve all the difficulties faced in efforts to expand energy efficiency investment. World Bank Group experience has shown that loan guarantees are especially useful where the banking system functions fairly well and the fundamental conditions that would allow energy efficiency lending to prosper are already in place.

Recent World Bank energy efficiency investment loan guarantee programs developed in Hungary and China show quite different approaches, although both have met with success so far.

The use of **DFIs and special revolving funds** is another common approach. An advantage is that DFIs and special loan funds can be designed as “one-stop shops,” combining financial intermediation with strong project development functions, as the institutions have a dedicated, specialized purpose. In some cases where the local financial sector is under stress or in the midst of transitional reforms and restructuring, setting up special entities dedicated to energy efficiency lending may be the only way to establish funding channels. Their separation from the banking sector, however, also carries major disadvantages and major risks. DFIs are often established to act as catalyzing agents to pioneer the new business and help develop take-up by commercial banks, but this can create additional, difficult operational challenges. In some cases, especially with special revolving funds that have been added as components to bigger projects, capacities to deal appropriately with the details of proper credit evaluation and loan processing are often insufficient.

ESCOs can be an important market-based mechanism involved in the delivery of energy efficiency investment. ESCOs that provide financing to clients may be viewed as a partial financing mechanism for energy efficiency investment, operating at the retail level. These ESCOs serve as project aggregators, to which financial institutions may provide financing for a package of projects, thereby reducing their

own direct involvement with end users. The mixed experience with ESCOs in developing countries suggests the following lessons:

- The ESCO model is not a magic bullet and does not solve basic problems of delivering energy efficiency project financing. Even when ESCOs provide financing to clients, the ability of the ESCOs themselves to obtain project finance is a central, difficult issue. The success achieved with ESCOs to date in China shows new ESCOs can play an important role if local institutional environments are suitable, but ESCO industry start-up is very complex, requiring complex contractual arrangements, staff with technical and financial and business experience, access to funding, and so forth.
- Long-term financing of ESCOs should be considered up front in any serious effort to promote local ESCO businesses. Programs that provide only technical assistance to build ESCO capacity alone have not proven very helpful in delivering large-scale sustainable impacts.
- Active government support for ESCO development is critical, especially in the early stages, as experience from both North America and China shows. This may include direct strategic support and/or assistance through market creation.
- The choice of ESCO business model should be determined by the local market, especially the choice between shared savings or guaranteed savings energy performance contracts. For some ESCO clients, such as building or commercial facility owners with little knowledge of energy saving technologies and their operation, the guarantee of energy savings may be very important. Clients in industrial facilities, on the other hand, may be very knowledgeable about energy savings of different investments and instead be interested in off-balance-sheet financing through ESCOs.

Utility DSM Programs. Although DSM programs were not one of the topics explicitly covered under the Three Country Energy Efficiency Project, these programs do represent another important option for promoting energy efficiency investments. DSM programs rely on the financial, organizational, and technical strength of major utilities to

deliver numerous small-scale energy efficiency investments, using the relationships of utilities with consumers. In principle, the combination of delivery of energy efficiency together with delivery of energy supply would result in providing energy services as efficiently as possible. However, energy efficiency per se runs counter to the general business interests of supply utilities, since a kilowatt-hour saved is a lost sale and reduced revenue. Thus, government or industry regulators usually must provide special incentives to utilities to pursue such programs when the programs have the effect of cutting the utilities' revenues. Such regulation is difficult to undertake efficiently, especially in developing countries and emerging market economies. Under these circumstances, utility DSM programs may best be promoted only (i) where the utility industry is relatively responsive to public sector mandates; (ii) when energy efficiency efforts are combined with power-factor correction or load-management efforts that are in the financial interests of the utility; and/or (iii) in certain cases where promotion of energy efficiency may provide major benefits to the utility, such as expanding its customer base or reducing sales to customers whose tariff is lower than the cost of service.

MOVING AHEAD

One clear message from the experience of the Three Country Energy Efficiency Project is the importance of establishing and maintaining practical, operationally focused dialogue between the banking community and the energy efficiency practitioner community. This dialogue helped generate new energy efficiency lending programs in a number of Indian banks, laid a platform for the proposed development of a new energy efficiency financing initiative with major Chinese banks with World Bank support, and fostered the development of a new ESCO loan guarantee program in Brazil. Each country hopes to continue to build upon the platforms created after the close of this project.

Another clear conclusion is the central importance of strategic government support to more aggressively promote new energy efficiency

financing mechanisms in each of these three countries. China's government has set an ambitious target to reduce energy use per unit of GDP by 20 percent during 2006 to 2010—and the challenge for the government is to mobilize effective implementation measures across the energy efficiency terrain. In Brazil and India, the study team recommends new, strategic reviews at the national level to consider medium- and long-term strategic priorities to improve energy efficiency. In the area of energy efficiency investment financing, a number of promising concepts have been developed in these countries, and it is important for the central governments to use their convening power and certain strategically focused but sustained institutional development support to enable new concepts to gain stronger operational footholds and to scale up initial experiences.

Well-targeted support from international financial institutions (IFIs) also can play an important role. The ability of IFIs to combine investment financing and project development support in multiyear packages is important in order to not just plan and train, but to implement promising new ideas. The IFIs also are able in principle to maintain a sustained presence, which is necessary to provide continuing support for new operational mechanisms from the design stage, through development and start-up, and finally operational rollout. However, because the problem to be solved is lack of adequate delivery systems for energy efficiency investment, and not lack of in-country capital, the success of IFIs should be measured in terms of energy efficiency results where possible, and not volumes of IFI lending, which is not directly relevant.

Project support from the Global Environment Facility (GEF) for commercially based energy efficiency financing programs has been especially critical and beneficial over the last decade. When introducing and developing new mechanisms, GEF grant financing for technical assistance and for investment support has been a critical tool—for trying new pilot projects, for covering part of the initially high transaction costs of schemes, and especially for helping defray initial risks. Continued strong support from the GEF can make a very big difference to the rate of success of developing and emerging market countries in this area in the coming years.

The authors hope that the analytical framework provided in this book and details concerning project implementation experience will be a useful contribution to countries considering development of specific new projects. Summarizing, the three biggest causes of operational failures in energy efficiency financing projects are (i) mismatches between the solutions attempted and local institutional environments; (ii) lack of proper balance between development of financial intermediation functions and project development functions; and (iii) lack of sustained effort and follow through, especially for adjusting institutional mechanisms and approaches during implementation in response to market changes or arising operational inefficiencies. To avoid these mistakes and to direct concerted efforts to achieve the best results possible in the future, the study team has the following broad suggestions:

- Careful diagnostic work on existing in-country conditions should form the basis for project design and interventions that fit within local institutional contexts.
- For projects involving financial intermediation, parallel attention is strongly recommended to (i) the details of developing capacities and mechanisms for financial intermediation, and (ii) project pipeline development and technical appraisal.
- It is important to incorporate periodic review and flexibility within the project design, so that programs can be adjusted during implementation.
- All of the above result in exceptionally high labor intensity for program management, operation, and technical support, not only during preparation but also during program implementation. High-quality and concentrated attention from program management and expert personnel is essential for new institutional mechanisms to be nurtured to success.

Energy efficiency financing operations are relatively costly and time-consuming to develop and implement. Development of the associated new institutional mechanisms requires intensive, multiyear

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efforts. If it is not possible to organize such efforts, it may be best to not attempt such ambitious programs. However, where possible, these programs can make a major, positive difference. With strong returns in terms of financial benefits to enterprises and energy consumers, and with very high potential returns per unit of public investment in environmental and energy security benefits to countries, further development of financing delivery mechanisms for sustainable energy efficiency undoubtedly has a major role to play in mitigating the energy development and climate change challenges of the future.

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