Joint World Bank-USAID Discussion Paper

Mobilizing Private Capital for the Power Sector:

Experience in Asia and Latin America

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United States Agency for International Development
The World Bank
November 1994

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A collaborative study between

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World Bank Industry and Energy Department
USAID Office of Energy, Environment and Technology

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Acknowledgments

This study is the result of a collaborative effort between the World Bank's Cofinancing and Financial Advisory Services Department, and Industry and Energy Department, and USAID's Office of Energy, Environment and Technology. An Advisory Committee was formed in June 1993 to guide the effort and comprised representatives from the World Bank's Cofinancing and Financial Advisory Services, Industry and Energy, and Financial Sector Development Departments, the Technical Departments of the Asia and Latin America and Caribbean Regions, IFC's Infrastructure Department, and USAID's Office of Energy, Environment, and Technology.

The analysis was performed primarily by David Baughman of the Project Finance Group in the World Bank's Cofinancing and Financial Advisory Services Department and Matthew Buresch of RCG/Hagler Bailly for USAID. Several others made contributions to this study, including: Suman Babbar, Peter Cordukes and Ranjit Lamech of the World Bank; Jenifer Wishart of IFC; and Alain Streicher, John Armstrong, Suzanne Smith, Amit Dalal, and Ashraf Laidi, of RCG/Hagler Bailly. Antoinette Burnham of the World Bank provided editorial and design assistance.

Foreword

This study examines the recent experience of independent power projects in developing countries. Governments world-wide are increasingly looking to the private sector to provide infrastructure, after decades of public sector dominance in securing financing as well as ownership and operation. The main objective of the study is to analyze a sample of projects to understand the key financing structures, risk sharing arrangements, and host government support that enabled the project sponsors to mobilize private capital. The study focuses on Asia and Latin America, which have the most widespread experience to date, but the insights gained from the projects examined can apply more generally to other regions as well.

The study looks at eight projects, all of which involve significant amounts of private sector financing, in eight countries with varied macroeconomic environments, power sector characteristics and regulatory systems. The countries are: China, Chile, Colombia, Philippines, Jamaica, Pakistan, Guatemala, and Belize. The projects examined have a range of technologies, sizes, financing needs and sponsorship arrangements and thus illustrate the breadth of experience to date with independent power. Nonetheless, the comparative analysis in the study highlights the similarities among the projects as well as evolving trends in this growing industry.

Both USAID and the World Bank have important functions as clearinghouses for the experience around the world in the area of private sector development, especially in the rapidly changing infrastructure sectors. This study is a part of that dissemination.

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Acronyms

ADB	Asian Development Bank
BLT	Build, Lease, Transfer
BOO	Build, Own, Operate
BOT	Build, Operate, Transfer
CDC	Commonwealth Development Corporation (U.K. development agency)
ECA	Export Credit Agency
GW	Gigawatt (one million kilowatts)
IDB	Inter-American Development Bank
IFC	International Finance Corporation
IPP	Independent Power Producer (or Project)
LRMC	Long-Run Marginal Cost
MW	Megawatts (one thousand kilowatts)
NPC	National Power Corporation of Philippines
OECD	Organization for Economic Cooperation & Development
PPA	Power Purchase Agreement
ROE	Return on Equity
USEXIM	US Export - Import Bank

Glossary of Terms Used in the Study

Commercial Risk	Generally, those risks under the control of the project owner. This may include project development, construction of the plant within budget and on time, efficient operation of the plant within budget, employment of qualified personnel, etc.
Debt Service Cover Ratio	The ratio of 1) cash available (i.e., after all operating and other expenses are paid) to pay debt service to 2) the amount of debt service due (principal and interest).
Development Period	This includes the time it takes to complete all studies, conclude negotiations, and arrange the financing required to achieve financial closure. The starting date of this period varies depending on how the project is initiated (e.g., bidding process, issuance of letter of intent). The ending date would be financial closure.
Dispatch	The process of drawing electricity by the utility from a range of available plants to meet demand. Normally, this is done on a merit-order basis; that is, the plant that is capable of producing electricity at the lowest cost is chosen first, followed by the next lowest, etc., so that the plants with the highest operating costs are only utilized to meet peak demand requirements.
Financial Closure	The point (normally a specific date) when the legal documentation for all project agreements and financial commitments (debt and equity) are executed. In most cases, disbursements are made very soon after financial closure and construction begins.
Force Majeure	Uncontrollable events, generally defined to include a range of occurrences, including natural events (e.g., lightning, floods) and political events (e.g., revolution, civil unrest). Whether these latter events are controlled by governments is often debated during negotiations.
Grace Period	The period of time under a loan agreement that principal amounts are not payable.

Investment Grade	Indicates that the investment is of good quality in terms of the ability of the obligor to meet debt service obligations. It is normally indicated by an assigned rating; for Standard and Poor's, the designation is BBB.
Least-Cost Planning	A planning method to determine the optimal sequence and timing of new plants to meet the future needs of the power system. It is derived from expected demand, and the cost and operational characteristics of candidate plants; it is normally calculated using optimization software.
Limited Recourse	Generally refers to limitations on lenders' ability to seek payment or other benefits from the equity parties. It can also refer to limitations on a project entity's recourse to the host government for support in certain circumstances.
Political Risk	Generally, those risks under the control of the government. This will vary depending on the circumstances and the perceptions of project participants. They may include the performance of government-owned entities (including the purchasing utility), regulatory environment, issuance of critical permits (customs, environment), and foreign exchange convertibility.
Private Risk Capital	The amount of private sector financing provided for a project that is not directly guaranteed by government. This is divided by the total amount of financing to arrive at a percentage figure.
Project Finance	A financing approach whereby debt is mobilized on the basis of the performance of a specific project rather than on the strength of an existing company's balance sheet. It involves a careful assessment of the project's cash flow performance under various scenarios to ensure a high probability of repayment on the project's debt. Sometimes referred to as non- or limited-recourse financing.
Senior	Indicates an order of payment that has priority over other creditors.
Sponsor	Party that takes a leading role in structuring the project, negotiating the project agreements (PPA, etc.) arranging the financing, negotiating and securing the construction contract, and other tasks associated with project development. This party also quite often supplies the majority, or a significant portion, of the equity financing.
Subordinate	Indicates an order of payment that is junior to other creditors. This may include debt. Payments to equity would always be subordinate to all debt.
Term (Loan)	The number of years until the final maturity of principal.

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Abstract

Given the rapidly evolving conditions in the market for private power and continuing privatization efforts, new financing models and approaches to risk allocation are emerging. The study examines private power projects (often referred to as independent power projects or IPPs) in a range of countries with varying degrees of country risk, access to international capital markets, and regulatory environments.

To assess private power initiatives under varying circumstances, three groups of low- to middle-countries were considered: Category 1—countries with high country risk profiles and little or no access to capital markets (Pakistan, Jamaica, Belize, Guatemala); Category 2—countries with moderate country risk profiles and some access to capital markets (Philippines, Colombia); and Category 3—countries with good country risk profiles and access to capital markets, but which may be constrained by amounts and/or terms (Chile, China).

Eight project finance transactions were analyzed and compared to identify the similarities in risk sharing and the extent to which the country and sector environments required particular levels of government support. This is important because of the close interface between the public and private sectors that is often present in infrastructure projects and which can pose a significant political risk. The study also looks at power pricing issues, the role of multilateral and bilateral guarantees, financing sources and structures, levels of private risk capital mobilized, and competitive bidding, least-cost planning and environmental compliance issues.

The results suggest that while private power projects alone are not likely to fill the large gap in financing the power sectors in developing countries, they will have an important role in many countries and offer substantial amounts of private capital. Basic structures (e.g., BOO/BOT) can be replicated across countries, but each project will have its own unique set of circumstances that will lead to different solutions regarding risk sharing between private and public entities. Projects can proceed in countries without fully established private sector power policies, as specific private sector projects can be regulated through contractual arrangements. The sector's long-term development, however, will hinge on the success of power sector reforms.

Government guarantees and the involvement of multilateral and bilateral agencies played a critical role in enabling project sponsors to mobilize private debt and equity in countries with higher levels of country risk. Reducing, or eliminating, these guarantees and various forms of credit enhancement will only occur over time, as power sector reforms take hold and utilities improve their creditworthiness in well-functioning regulatory environments. The projects examined involved substantial levels of private risk capital not guaranteed by government, while most of the capital was foreign with generally little or no involvement of domestic private investors.

Private power pricing seems to be broadly in line with public alternatives, despite the existence of power tariff subsidies. Additionally, sponsors of privately-owned projects tend to be selected through a competitive process, follow international environmental standards, and were generally compatible with least-cost expansion programs.

After a slow start, the IPP market appears to be accelerating, and the complex project models in these cases are being replicated and modified in many countries. Project development, however, is costly and time consuming. In some of the larger countries, the gap between the power sector's demand for capital and the level of investor/lender interest is large and will likely be slow to diminish.

Note on Source Material

This study drew information from numerous sources. The tables in the text provide some reference citations, but generally, project-specific information was taken from the loan documentation of multilateral financing institutions, including the World Bank, IFC and ADB. U.S. Government sources were also utilized. Supplementing this material, and where these agencies did not participate, is publicly available information from magazine or journal articles. Financial and other project-specific data were also obtained from project sponsors and lenders, and export credit and investment insurance agencies. This information was obtained primarily through personal interviews.

Figures 3 and 6 were formed using judgments based on all available information. Figure 6 is also drawn from information provided during personal interviews with project participants. The tariff data in Table 5 were taken from the following sources:

- *Chile:* IFC loan documentation; Chilectra Annual Report.
- *Colombia:* K&M Engineering (project sponsors).
- *Philippines:* IFC and ADB loan documentation.
- *Pakistan:* World Bank data and loan documentation.
- *Guatemala:* IFC loan documentation.
- *Jamaica:* Coopers & Lybrand, *Power Sector Regulatory Framework and Privatization Study,* 1993.
- *Belize:* IFC Loan documentation; World Bank data.

Section I
Background

This study examines the recent experience of eight Asian and Latin American countries in mobilizing private financing for power sector investments. The capacity requirements of these two regions loom large in the rapidly expanding global demand for infrastructure. This is particularly true for electricity service, where, after decades of public sector dominance, many countries in these and other regions are now looking with increasing interest to the private sector to provide critical investments as well as to own and operate power plants and other power-related facilities.

While all the countries examined in this study are trying to achieve similar objectives of expanding capacity and increasing efficiency, each has taken a slightly different approach. All have encouraged entry in the generation market by way of build-own-operate or transfer (BOO/BOT) projects. Many have also pursued far-reaching sectoral reforms to varying degrees.

The countries examined are: Chile, China, Philippines, Colombia, Jamaica, Guatemala, Belize, and Pakistan. They were selected primarily to reflect a range of circumstances with respect to two criteria: level of country risk and degree of stability and coherence in power sector regulation. These countries also provided a sample of projects involving different technologies, fuels and sizes. They thus provide a range of settings and project-specific characteristics with which to examine the experience of private investment in the power sector. They were also chosen because they are among a select group of countries with actual experience in mobilizing large amounts of private capital for independent power projects (IPPs).

Power Sector Financing Needs

The extraordinary financing needs of the Latin American and Asian power sectors derive from a broader need to expand infrastructure generally in these two regions. As the economies of these regions try to sustain their recent rapid economic growth, the need for adequate supporting infrastructure such as roads, telecommunications, and electricity is becoming critical. Typically the demand for infrastructure services outstrips the growth rates of the economy when countries are at low income levels. The investment requirements in many countries also reflect the need to upgrade or replace fully depreciated assets, or facilities that have not been well-maintained and are being retired prematurely.

At the project level, power sector investments, like infrastructure investments generally, tend to be large, which means large financing packages are required. This results from two factors. First, there are scale economies in both the development of these projects and their operation. Second, their long lead times require significant capacity additions in order to keep pace with rapid growth in demand. Financing packages also exhibit some scale economies, making larger projects generally more efficient.

Over the past few decades, most large public sector projects have been financed by multilateral development banks and bilateral aid, often by securing several sources of finance based on the government's sovereign credit. Mobilizing similar amounts of private financing for private sector projects in recent years, however, has been prob-

lematic. This stems from the unwillingness of private lenders and investors to assume significant exposure in any one country, because of perceived sovereign or political risks. This is particularly true for projects that earn local currency and feature a close connection to regulated public sector entities, as in power projects. Development banks, given their predominance in meeting many countries' financing sources, are in a better position to assess and control these risks, which private lenders cannot.

Given its rapid growth and large populations, Asia holds a large share of the developing world's demand for new power sector investments. The World Bank's Industry and Energy Department estimated in 1990 that Asia will require about 244 Gigawatts (GW) of new generation capacity by the end of the decade to meet expected demand. Translated into dollar terms, this represents almost US$280 billion (constant 1989 dollars) of new investments, or about US$28 billion per year. Including financing costs, the needs amount to well over US$30 billion per year.

If China's rapid economic growth continues, it alone is expected to account for 36% of this demand, or about US$10 billion per year. India's generation investments will represent an even larger portion of the region's needs; the Bank has estimated India's investment requirements at about US$12 billion per year for the decade, not including financing costs. Although India's needs are large and its market for private power is developing rapidly, it had not undertaken any privately funded projects at the time of this study, and is thus not examined here.[1] Because many projects are at an advanced stage of development in India, it will be worth revisiting once a few projects have reached financial closure.

Latin America, while not as large as Asia, is another very dynamic region with favorable economic prospects and an imposing requirement for power sector investments. Recent World Bank assessments indicate that this region will require some 40 GW of new generation capacity for the remainder of the decade, amounting to US$75 billion in new investments, or roughly US$15 billion per year. Much of this capacity will be installed to exploit the region's hydro resources.

Probably more than any other region, Latin America has experimented with new regulatory regimes and industry structures that encourage private sector participation. The region is led by Chile which privatized its electricity sector during the 1980s, followed more recently by Argentina and Peru, which are undergoing similar transformations. Power sector reforms in these countries are aimed at stimulating private sector investments and encouraging improvements in electricity service. These changes have occurred within the context of macroeconomic reforms designed to liberalize economic activity and spur growth. As a result, Latin America has become a prime market for IPP investors, from both within and outside the region.

Trends in Power Sector Financing

Notwithstanding the tremendous need for power sector financing, many governments have found that mobilizing the amounts required is extremely difficult given the severe fiscal constraints they face. Traditional sources of funding are not sufficient as the needs far outstrip the ability of multilaterals and bilaterals to meet the requirements, even assuming reasonable mobilization of utilities' internal resources. For the two regions examined in this study, the major multilateral lenders are the World Bank, Asian Development Bank (ADB) and the Inter-American Development Bank (IDB). Power sector lending from these institutions averaged roughly US$4 billion in 1991-1993, which represents only a fraction of the US$45 billion per year required in generation alone.

Consequently, a growing number of countries are turning to the private sector to provide these facilities, as well as arrange financing and take on operation and maintenance responsibilities. This comes at an opportune time given the recently renewed flow of private capital to developing countries spurred by opening markets and improved macroeconomic conditions. The challenge is to promote sector reform and project structures that facilitate the channeling of this capital to the power sector.

Private sector participation in the power sector represents a broader trend toward unbundling some utility services that have traditionally been provided by one vertically integrated entity. Until recently, these services have been seen as natural monopolies and were heavily regulated and/or controlled by the state. Unbundling has created new entry points for private investors in these sectors. In the power sector, this has been realized mostly

1 There are several privately-owned electrical utilities in India. This study, however, is focused on project finance transactions normally undertaken on a BOO/BOT basis.

through new entrants into the generation business, and has resulted from a number of factors such as:

- Governments and utilities can secure large amounts of capital and significant capacity additions by contracting with one plant;
- The interface between the IPP and power purchaser (utility) is relatively well-defined; and
- The precedents established in the United States and United Kingdom which provide a pool of investors with experience in developing independent power projects.

The deregulation of the U.S. and U.K. markets serves as a model for a number of developing countries and inform the debate in many others. The experiences of private investors, many of which originate from these two countries, have certainly influenced their approach to the power business.

Private sector participation can take many forms, including: privatization (change of ownership); build, own, operate (BOO) schemes; and operations and maintenance contracts. Corporatization is another approach that, while not necessarily involving private sector participation, can lead to better performance and may, in fact, represent a transitional phase and make subsequent privatization easier.

In the end, long-run solutions involving sector reform are preferable and will be the most durable. But establishing new regulatory systems and the corporatization of existing entities can take a long time. Because of this, many governments are opting for two-track strategies. This involves promoting entry in generation as a way to meet pressing capacity requirements through private sector participation, while at the same time devising regulatory arrangements to encourage sector-wide operational and financial improvement as well as new investment to meet future requirements.

This study examines new entry through BOOs. The basic approach to BOO schemes is by now well-known. Typically, they involve the government awarding a concession, or right, for a specified period of time, to a private investor to arrange financing, and construct, own and operate a facility to provide a service, such as electricity. Included in this study are eight projects that match or vary only slightly from this approach: Shajiao C in China, Pangue in Chile, Pagbilao in Philippines, Mamonal in Colombia, Hub in Pakistan, Rockfort in Jamaica, Puerto Quetzal in Guatemala, and Macal River Hydro in Belize. These projects represent a good cross-section of experience with BOOs and reveal both elements common to BOOs and unique aspects that influence the outcome of the negotiated risk sharing arrangements and financing packages.

Key Issues Addressed in the Study

During the mid and late 1980s, numerous private developers applied the BOO/BOT model to infrastructure projects, particularly private power projects. Initial attempts in several countries, however, met with long delays or were abandoned, leading many observers to question the appropriateness of this model. Recently, activity has accelerated and after much debate, a consensus is beginning to form on the key questions facing those involved in the emerging independent power market. Most of the issues fall into one of three categories: linkage to country and sector context, financing structures and sources, and public and private sector risk sharing issues.

The answers to these questions affect the activities of all the main actors in the private power business including developing country governments, multilateral and bilateral development institutions, developers, investors, and lenders. By analyzing the actual experience of eight projects, this study brings together a range of issues that can be framed by the following questions:

Linkage to Country and Sector Context

- **Country Risk and Regulatory Environment:** How does country risk influence IPPs? And, to what extent is a well-developed policy, legal, and institutional framework supporting privately owned power companies essential to the development of individual projects and an overall IPP industry?
- **Bidding/Environment/Least-Cost Planning:** To what extent are IPP sponsors selected through competitive bidding, and to what extent do IPPs comply with environmental guidelines, and fit into least-cost plans?
- **IPP Pricing Issues:** How do IPP tariffs compare to some common benchmarks associated with public sector provision of electricity? What are the key pricing issues?

Financing Structures and Sources

- **Extent of Private Risk Capital:** What level of private risk capital is mobilized by successful

IPPs? What is an appropriate measure of "risk capital" in the context of IPPs?

- **Foreign versus Domestic Capital Mobilization:** What proportions of foreign versus domestic capital were mobilized and how important a role do domestic capital markets play?
- **Risk versus Equity Return Tradeoff:** What range of risk-adjusted equity returns is typically called for by IPP projects in developing countries?

Public and Private Sector Risk Sharing

- **Government versus Private Risk Assumption:** What level of government support and/or guarantees of specific risks are required in order to enable the development of IPPs in a particular country? What are the necessary conditions for eliminating the requirement for such government guarantees?
- **IPP Replicability:** How replicable are these projects; are they special cases, or the basis for more rapid development of an independent power market?

Section II summarizes and compares the main project characteristics of the eight projects studied. Section III discusses the relationship of these IPPs to country risk environments and power sector policies. Section IV looks at financing structures and sources. Section V analyzes the risk sharing arrangements and discusses the similarities and differences among the projects. Last, Section VI provides some observations on the future development of the industry.

Section II
Project Characteristics

Table 1 presents some key characteristics of the projects studied. They include a range of technologies, and both hydro and thermal plants using different fuel sources. The thermal projects were all land based, with the exception of Puerto Quetzal in Guatemala which is a barge mounted facility.

Typically, IPPs are baseload plants due to the desire of purchasing utilities to maximize their utilization in order to realize the benefit from expected greater operating efficiencies compared to existing plants in service. Most projects are also fully dispatchable and therefore compensate the project entity for the amount of capacity available for dispatching during the payment period.[2]

For most projects, revenues are secured through long-term Power Purchase Agreements (PPAs), ranging from 14 years (Mamonal) to 40 years (Macal River Hydro), with the average being about 20-25 years. This follows traditional "project finance" structures, whereby revenues are secured by contracts that at least match the term (maturity) of the debt and often extend beyond the maturity of project loans to account for any potential interruption in cash flow during the life of the contract (see discussion on project finance on page 16).

There is also a wide range in plant sizes, which somewhat depends on the capacity requirements in each country. As mentioned above, the arguments for large plant size include economies of scale in development, operations, and financing. Economies of scale in operations will vary, however,

2 In dispatchable projects, the utility compensates the project for all fixed costs (debt service, fixe d O&M, and equity returns) in a "capacity payment" if it meets agreed technical performance standards (e.g., amount of capacity and availability). In return, the utility controls the dispatch of the plant to meet system needs. To the extent the utility dispatches the plant, it compensates the project for fuel consumption and other variable costs in an "energy payment." The project is also subject to agreed efficiency standards, for example, in terms of heat rates and O&M costs.

Table 1: Project Profiles

Project	MW/Fuel	Fuel Source	Base or Peak Load	Total Cost (US$ millions)	PPA Term (years)
China: Shajiao C	1,980/Coal	Domestic	Base	2,000	20
Chile: Pangue	450/Hydro	Domestic	Base	437	n.a.
Colombia: Mamonal	100/Gas	Domestic	Base	70	14
Philippines: Pagbilao	700/Coal	Imported	Base	933	25
Pakistan: Hub	1,292/Oil	Imported	Base	1,900	30
Guatemala: Puerto Quetzal	110/Oil	Imported	Base	92	15
Jamaica: Rockfort	60/Oil	Imported	Base	130	25
Belize: Macal River	25/Hydro	Domestic	Base	60	40

n.a. Not Applicable

depending on the type of plant (i.e., steam, gas turbine, etc.). Thus, the optimum plant size threshold may be different for individual projects. Even if the threshold is relatively low, economies in development and financing can reduce the cost of power when the alternative to meeting expected capacity needs is developing several IPPs simultaneously. In addition, negotiating several IPPs would, in many countries, severely tax the administrative capabilities of government agencies.

For some countries it has been pointed out that small plants (relative to the size of the total system) are a less risky approach than large projects, given the complexities in raising financing for IPPs in many developing countries, and the often arduous learning and negotiating process that ensues once the developer is selected. Where there are difficulties in raising financing for IPPs, the risk is manifested in project implementation delays and the resultant unmet power needs.

The balancing factors in this trade-off are best determined based on the specific circumstances in each country and for each project and the expected transactions costs incurred in developing and negotiating the first one or few projects. It has been suggested that it may be prudent for the first few projects to be relatively small, provided the plant size is economic in the context of system requirements. This reduces the impact on the system in the event of delays while at the same time may accelerate project development and financing given the smaller financing needs. Once a precedent has been set in terms of risk sharing between the IPP and the government as well as financing arrangements in a particular country, project size could be increased.

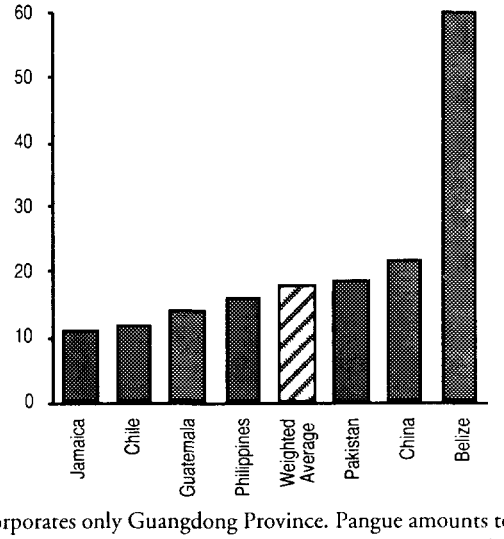
Most of the projects examined here, however, did not seem to follow this strategy. As Figure 1 shows, on average, these eight projects added about 18% (weighted by size) to the existing capacity, indicating the large stakes governments and utilities have invested in these ventures to meet pressing needs. This may have occurred because project size was dictated more by system requirements, rather than considerations of economies in development and financing.

Figure 2 shows that there can be a wide variance in the time from the beginning of project development (defined as the start of negotiations or bidding) to financial closure and the commencement of construction. In general, however, for large projects selling to public utilities for public supply (which includes all the projects with the exception of Pangue and Mamonal), the average time to develop IPPs was two and a half to three years. This includes several months to bid the project and select a developer, one to two years to complete negotiations on a PPA, and several months to a year to arrange financing.

It should be noted that, for lack of consistent information, the timelines in Figure 2 have somewhat different reference points for the starting date. It is difficult to pinpoint an exact starting date for a project, whether it is the submission of a proposal by a developer, the award of a bid, or initial contact

Figure 1: Additions to System Capacity

(Percent)



Notes: China system size figure incorporates only Guangdong Province. Pangue amounts to about 12% of Chile's total capacity, but 23% of Endesa's capacity (Endesa is the parent company of Empresa Pangue, S.A., the project company). Colombia is not included as Mamonal is an enclave project not primarily for public supply.

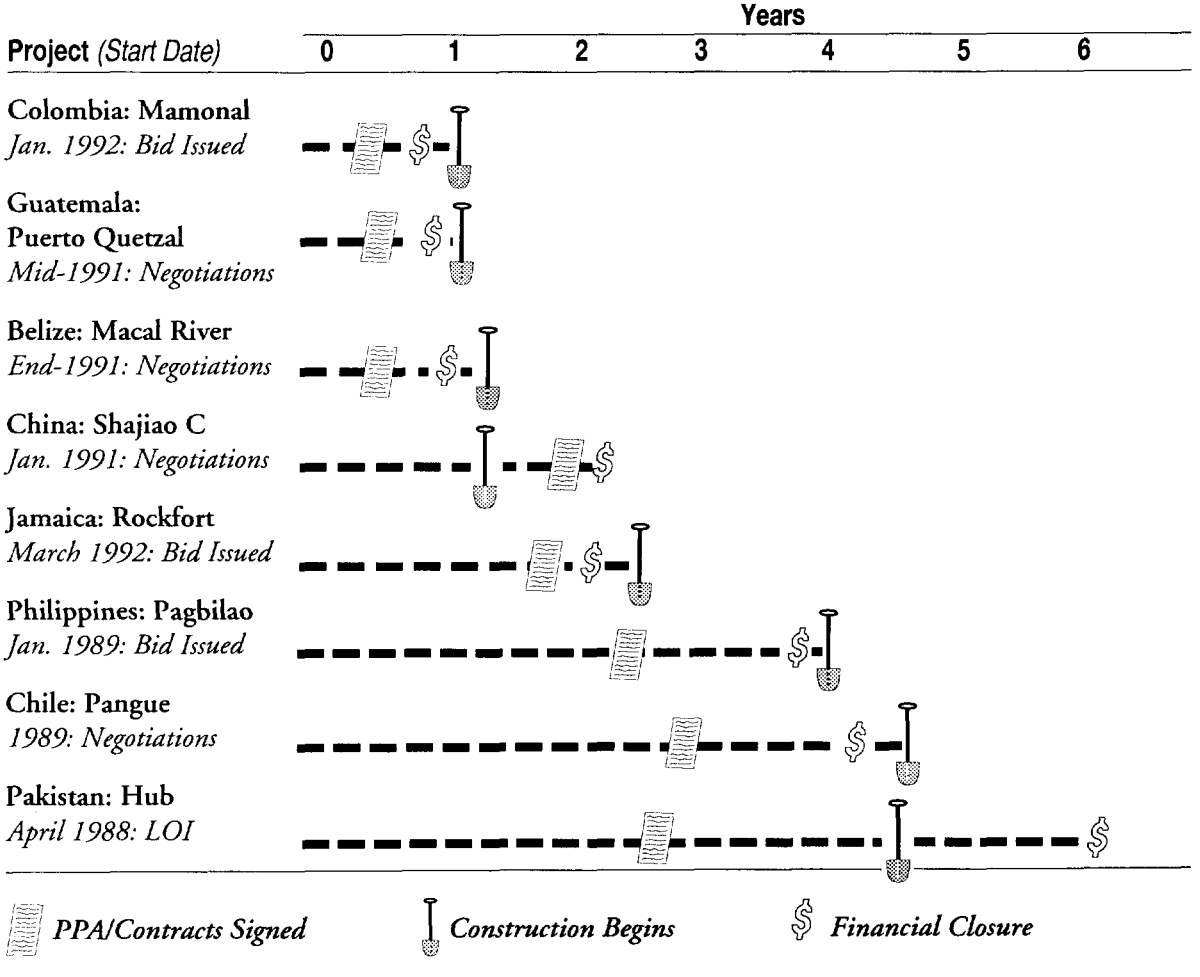
between the sponsor and the government or utility. Hence, the timelines may not be directly comparable in all cases, although they do provide a general indication of development periods.

Development time depends on several factors, including country risk, project size, the complexity of the financing plan and the difficulty in mobilizing private debt sources. With the exception of Shajiao C, the large projects tended to have longer development times than the small projects. The relation between development time and other factors such as extent of government involvement, and number of financiers is less clear. Thus, aside from size, there does not appear to be a strong relationship between development times and specific country, project or sectoral factors.

Many observers expect average development time to diminish over time as subsequent projects are developed. The experience of two countries in this study, however, suggest that development time may not necessarily decrease over time, at least during the initial phase of IPP involvement. For example, Shajiao B (Shajiao C's predecessor) was developed over two years, or about the same time as Shajiao C, although it should be noted that C was approximately three times as large as B. Navotas 1, the first IPP in Philippines, was developed over two and one half years, compared to Pagbilao which took four years, or about one and a half years longer than Navotas. Again, Pagbilao was a significantly larger and more complicated project than Navotas. This suggests that achieving noticeable reductions in development time may, in fact, require more than just one or two projects and that development time will depend on the nature of the project. The indications will become clear as more projects are completed in China and Philippines, as well as in other countries.

Hub's extended timeline may be a special case to some extent, given the number of new initiatives being undertaken by the Government of Pakistan, as well as in the financing of the project. Various political difficulties in Pakistan also delayed the project at several points. This latter factor effec-

Figure 2: Estimated Project Development Time



tively added several months to the development time.

At the other extreme is the Mamonal Project in Colombia, which involved both a much smaller project and private sector purchasers in a private commercial transaction, and no direct government involvement. It was also undertaken in a far more creditworthy country, which facilitated the mobilization of financing. This structure may account for the compressed development time indicated.

Table 2 shows the sponsoring parties for each project and the origin of the sponsors (i.e., headquarters or primary domestic market). Only two projects involved domestic sponsors (Pangue and Shajiao C), while the rest involved foreign sponsors. Half of the foreign sponsors are U.S.-based, the country where the IPP market is most developed.

Various participants in a project (government, utility, developer, lenders, multilaterals, etc.) will be involved and/or more active at certain junctures of project development, while others will be engaged throughout. For instance, lenders to IPPs, including some multilaterals such as IFC, begin analyzing the potential for their participation only once a PPA has been negotiated by the developer and the utility or is close to signature. Developers, on the other hand, as the project promoters, are involved in the process for the entire development period and often invest large sums in "development costs" such as legal and other advisory fees, travel, and their internal costs.

Table 2: Project Sponsors

Project	Sponsors	Origin
China: Shajiao C	Guangdong General Power Corp./Hopewell	China/Hong Kong
Chile: Pangue	Endesa	Chile
Colombia: Mamonal	K&M Engineering	U.S.
Philippines: Pagbilao	Hopewell	Hong Kong
Pakistan: Hub	National Power/Xenel Industries	U.K./Saudi Arabia
Guatemala: Puerto Quetzal	Enron	U.S.
Jamaica: Rockfort	Hydra-Co Enterprises/ U.S. Energy/ International Energy Finance	U.S.
Belize: Macal River	Dominion Resources	U.S.

Section III
Linkage to Country and Sector Context

Country Risk and Regulatory Environment

The first item investors look into when contemplating a power sector investment is the country risk and regulatory environment they will face. The countries analyzed in this study represent widely divergent circumstances, which allowed for comparison of different levels of creditworthiness and sector regulatory development.

The eight countries were classified in three categories from a country risk perspective: low, medium and high risk. While somewhat arbitrary, this classification is useful for comparing experiences. Table 3 provides some indicators of country risk, gleaned from various market and other sources.

The table broadly indicates the degree of country risk, with China and Chile topping the list (indicating a lower degree of country risk), Colombia and Philippines in the middle range, and Pakistan, Jamaica, Belize and Guatemala toward the lower end. Four of the eight countries have S&P sovereign ratings, with Chile and China having investment-grade ratings of BBB. Colombia and Philippines have less than investment-grade ratings of BBB- and BB respectively, but are nonetheless attractive to many IPP investors from a country risk standpoint. For non-rated countries, IPP investment opportunities are conditioned on the market size and the existence of specific policies and programs that encourage private investment in the

Table 3: Country Risk Profiles

Country	Average Country Ranking (%)	Standard & Poor's Sovereign Rating	Debt Service to Exports 1992 (%)
China	18	BBB	11
Chile	28	BBB+	21
Colombia	34	BBB-	39
Philippines	52	BB	18
Pakistan	60	..	21
Guatemala	62	..	28
Jamaica	63	..	30
Belize	..	..	8

.. Not rated

Note: Average country rankings are based on the average percentile ranking of Euromoney, Institutional Investor, and Bank of America country rankings. Lower number indicates higher average ranking.

power sector. Also, countries with higher country risk profiles may offer good diversification potential for developers with a portfolio of IPP investments in several countries. Of course, investors will undertake assessments of country risk, regardless of whether or not the sovereign credit is rated.

Even small countries (like Belize, Guatemala and Jamaica) with limited opportunities in scope offer advantages to some IPP investors. They may appeal to developers who wish to limit their exposure by virtue of the generally smaller project size, or to smaller developers with limited financial resources for equity investments. Also, the generally smaller units required in these countries may entail less risks in construction and operation, thereby possibly enhancing their appeal. The larger countries such as China and Pakistan obviously offer greater potential given in larger market and project sizes, which in general tend to attract larger developers with greater financial strength, although they face the challenge of raising large amounts of debt financing. Chile offers a third scenario with its sound economic policies, good growth potential, and well-structured and established regulatory environment. This combination of factors has appeal to many developers, provided electricity demand is sufficient.

Adding to the overall macro framework, many of these countries adopted specific policies to encourage private power investments, whether or not broader sectoral regulatory arrangements are in place for private sector ownership and operation. Other countries have dealt with increased private sector involvement on an ad hoc basis without explicit and uniform criteria or processes.

The cases examined here indicate that the existence of a fully developed policy and institutional framework for the power sector is not essential to the development of the first few IPPs, but is critical to the long-run development of a power market with substantial private sector participation. In most of the cases studied, governments have established the broad legal and institutional framework, sometimes with development assistance from donor organizations. Policy formulation and project development, however, often proceed simultaneously, where the policy, legal, and regulatory framework influence the market, while experience with projects in turn refines the policy and institutional development process.

Figure 3 provides an overview of the policy framework facing investors in the sample countries. As is clear from the figure, most of the countries in the study have adopted policies relating to IPPs, at least to some extent. The benefits of these policies, if maintained in a consistent manner, are that they can provide a clear framework for developers to pursue projects. In reality, these policies have evolved over time (e.g., in Pakistan, Philippines, and China), which has resulted in uncertainties for developers as to the rules regarding risk sharing and other provisions. In the end, the greatest benefit of IPP policies

Figure 3: Private Power Policy Framework

Country	IPP Policies or Law	Independent Regulator	Competitive Bidding Framework
China	◑	○	○
Chile	●	●	●[1]
Colombia	◑	◑	◑
Philippines	●	●	◑
Pakistan	●	○	●
Guatemala	◑	◑	○
Jamaica	●	○	●
Belize	◑	○	○

● Established
◑ Developing
○ Limited or None

[1] Chile's power sector is primarily privately owned. Competitive bidding is not mandatory for utilities purchasing power from independent generators, although they can bid on their own accord.

may be that they send a strong signal to investors about the opening of the power market.

The market in the Philippines, which is the most developed, evolved from a number of factors. Foreign investment laws, which provide favorable treatment to power investments, combined with a severe power sector crisis brought on by plant closings, drought and poor maintenance gave developers an opportunity to enter the market. The Philippines launched its private power policy in 1987. While the first private power project, Hopewell's Navotas 1, began operation in 1991, other private power proposals failed to progress in large part because of poor coordination between government agencies and inadequate regulations.

In 1993, in response to continued severe electricity shortages and resultant outages, as well as some difficulty in attracting investors following Navotas, the government issued a decree that established fast-track procedures for screening and negotiating IPPs and allowing for tariff adjustments which ordinarily would involve a time-consuming process. Since then activity has picked up and several projects have reached financial closure. The lessons from this experience caused the government to establish the Investment Coordinating Committee and adopt new BOT laws and implementing regulations. Since these improvements, the Philippines has seen an increase in the projects reaching financial closure, and continued strong interest on the part of developers.

In Jamaica, the first IPP (Rockfort) achieved financial closure in October 1994, about two and a half years after the government first called for bids from developers. Based on this experience, the Jamaican utility is now negotiating with several other private sector projects to add more capacity, which the government hopes to bring on line relatively quickly. In Pakistan, several projects long identified by the government as priority private sector projects are now proceeding after several years of relative inaction as developers awaited the outcome of the Hub Project, which is also expected to close in 1994.

The transformation of Chile's power sector also proceeded gradually. The privatization process began in the early 1980s with the passage of new power sector legislation and pension fund reform while the actual privatization of the largest state-owned utility, Endesa, occurred over several years during the 1980s. Regulation of the sector has been efficient and transparent, although the framework continues to evolve. The Pangue project discussed in this report is an important milestone in the development of the sector as it is the largest new private investment in the sector since privatization.

With the exception of the Philippines and Chile, the power sectors in most of the sample countries are regulated at the ministry level with no independent regulator. While several countries are establishing independent regulators, developers tend to look at established practice in structuring their risk mitigation arrangements, and do not grant much importance to the intended impact of government policies. This means that only regulatory systems that have solid track records will have credence with developers and hence allay their fears of political interference or arbitrary changes in procedures or laws that negatively impact their projects.

In all cases except Chile and Colombia, the entities that purchased the power were publicly owned and operated electric utilities. This is the case for most power sectors world-wide, and, to the extent the utility is financially unstable, this presents a risk from the point of view of the developers who will rely on that entity to fulfill the financial and operational commitments made to the IPP. Often, other providers of inputs (e.g., fuel) and other facilities (e.g., transmission interconnection) critical to the successful operation of the project are publicly owned entities as well. For example, fuel supply for the thermal projects was provided by a public entity in four out of six cases. This public-sector interface complicates investor risk mitigation strategies to the degree that it heightens the perceived political risk to the project.

In virtually all the projects studied where the purchasing utility is a publicly-owned entity, governments "regulated" IPPs through contractual arrangements. In turn, investors have a clear framework for doing business, embodied in the contracts, and do not have to rely on unproven sector regulatory arrangements. In China, for instance, the Shajiao C project and Shajiao B before it, were implemented on the basis of contractual agreements in the absence of an established policy framework, let alone specific laws and regulations. It has even been argued that waiting to establish the policy framework may impede IPP development, if investors have to wait through the complications and delays involved in passing legislation and building regulatory capacity. In the Philippines and Pakistan for example, the executive and legislative debates around independent power policies could be regarded as having complicated and delayed some of the negotiations with developers.

Given this situation, a dual track effort that involves simultaneous policy and project development can be a viable approach to independent power market development. Contractual provisions can be designed to cover the gaps in the policy and legal framework. The structure of these initial projects, however, needs to be regarded as transitional. As the market evolves and more utilities are privatized, project development will move away from special contractual provisions with one purchasing entity to more reliance on sector regulatory provisions. This can be seen in the Pangue project in Chile which relies on the sale of energy that is not under contract for about 40% of its expected revenue. This kind of arrangement requires that generators have the right to access the grid to allow them to sell to distributions companies and other large users.

As demonstrated in such countries as the US and the UK, there are, of course, some basic provisions that should be in place, such as the right of independent generators to enter the generation business. The existence of an independent regulatory body to limit the monopoly power that can arise in the power sector is useful, but often there are other means to insure against monopolistic practices. Long-tern development of sector requires open access to transmission, and close coordination between economic dispatch and the settling of accounts among generators with varying commercial obligations. In turn, management of the dispatching and transmission function generally calls for careful regulatory oversight.

The evolution of a policy and institutional framework that accommodates private participation often takes time to reach a stage that inspires investor confidence. As shown in Figure 4 the development of the US IPP industry took several years from the initial passage of the Public Utilities Regulatory Policy Act (PURPA) to withstand legal challenges and utility/regulator intransigence and to realize major growth.

Competitive Bidding/Environment/Least-Cost Planning

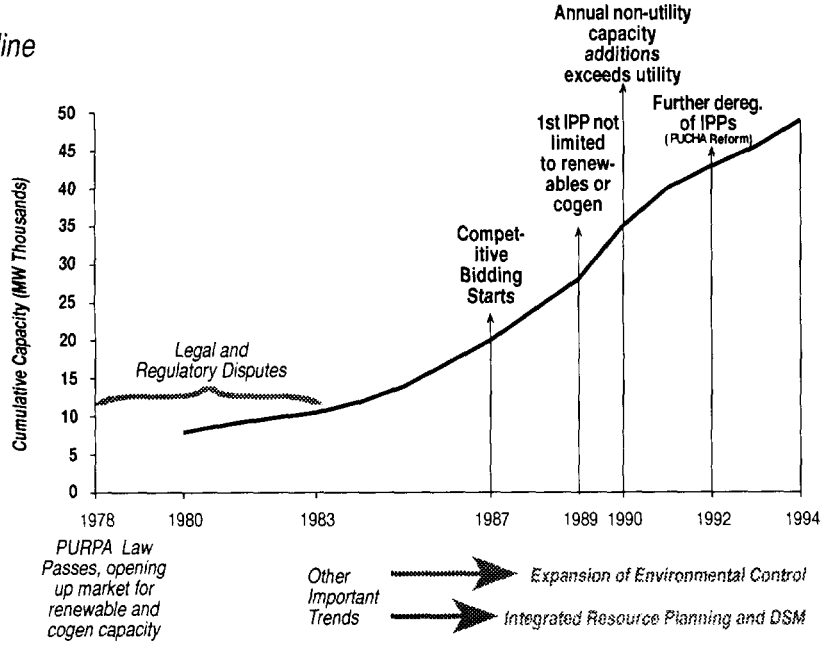
Table 4 provides information on the use of competitive bidding for the selection of sponsors, each project's adherence to environmental standards, and whether the project was the least-cost alternative.

Competitive Bidding. Jamaica and Pakistan, in addition to articulating policies toward IPP investments in generation, have also adopted policies to promote competitive bidding for the right to develop new plants. This may reflect a growing trend in developing countries to cope up-front with the influx of new proposals for BOO plants and the desire to achieve competition.

In many cases, the scope for competition among generators is limited given the current state of most regulatory systems. Competition in energy and

Figure 4: US Independent Power Framework

Development Timeline



capacity requires sophisticated regulatory oversight, which in many countries is not currently practical. Financial constraints based on the need to secure a steady cash flow stream to service loans and provide a return on equity can also hinder competition in generation, which may inject too much uncertainty with regard to revenues, particularly for IPPs. Hence, many governments are turning to competitive bids to capture savings from competition up-front.

The use of competitive bidding for selection of sponsors in the sample of projects studied was not universal, but nonetheless was relatively common. Out of eight projects, five involved some formal competitive bidding process. The degree of competition and the formality of the procedures utilized undoubtedly varied among the five projects that were selected competitively, although lack of information makes it difficult to compare the degree of rigor used for each projects. In Jamaica, the competitive bidding procedure used was approved by the World Bank and IDB, as they provided a portion of the funding for the project. Because of this, the Banks did not require a subsequent competitive bid for equipment.

In general, the use of competitive bidding for sponsors will depend on several factors that will be influenced by local conditions and policies. Some of the most prominent of these include:

- Legal requirements: some countries have laws or regulations that oblige utilities to tender the right to develop new plants on a competitive basis;
- Institutional Capabilities: the ability of a utility or government to develop complex bidding documents and procedures will vary. Thus, the rigidity of the process, and hence the objectivity of the criteria and transparency of the procedures, will depend on the circumstances.
- Power Sector Needs: the more urgent the need for new generation, the more likely utilities and governments will streamline bidding, with the line between competitive bids and negotiated deals growing blurred as selection criteria become more general.

Projects funded by most multilaterals normally require competitive bidding for the sourcing of equipment, as distinguished from selecting the project sponsor through a competitive process, although the Jamaica example has provided a precedent for some flexibility. Some multilaterals, such as IFC, do not require competitive bidding for either sponsor selection or equipment sourcing, although they insist on good business practices.

Environmental Standards. The experience of the projects analyzed in this study suggests that most BOO/BOT projects adhere to international (often World Bank) environmental standards. Those projects involving IFC or the World Bank did meet World Bank guidelines. Other projects are reported to meet these standards as well although this could not be verified. In general, however, foreign private power developers are likely to be as responsible in their compliance with environmental standards as local governmental entities. In addition, private lenders are increasingly looking to the environmental standards of multilateral institutions in those circumstances where local standards are not yet developed.

Table 4: Bidding/Least Cost Option/Environmental Standards

Project	Competitive Bidding for Sponsor	Least-Cost Option	Environmental Standard
China: Shajiao C	No	..	World Bank†
Chile: Pangue	No	Yes	World Bank
Colombia: Mamonal	Yes	..	World Bank†
Philippines: Pagbilao	Yes	Yes	World Bank
Pakistan: Hub	No	Yes	World Bank
Guatemala: Puerto Quetzal	Yes	Yes	World Bank
Jamaica: Rockfort	Yes	Yes	World Bank
Belize: Macal River	Yes	Yes	World Bank

.. Unknown

† Reported to comply, but existence or content of Environmental Impact Assessment is uncertain.

Least-Cost Option. The extent to which each project fits into a least-cost expansion plan in each country's power sector is less clear. While integrated resource planning (i.e., least-cost analysis combined with demand-side management) practices are evolving and being applied to varying degrees in developing countries, the selection of most projects reviewed generally did fit into some form of formal or informal least-cost planning framework. It is important to note that, aside from the least-cost question per se, limited data on privately developed projects suggests that they do achieve high levels of operational performance, which enhances the economic and environmental performance of the power sector overall. Shajiao B in China averaged 95% availability in its first three and a half years of operation. Navotas 1 in Philippines averaged 90% availability in its first two years of operation. Availability in the second year was reduced due to a failure in one unit for which insurance proceeds were sufficient to repair in a short period of time.

IPP Pricing Issues

Power pricing is a complicated and much debated subject, and one that has been widely discussed with respect to IPPs as more projects achieve financial closure and attention is focused on the "price" for introducing private power.

From the available information, the price of independent power for most projects studied was generally far below the average retail tariff at the time the project came on line, which should allow the utility to pass through these costs to consumers without major disruptions. It was also generally below the economic long-run marginal costs (LRMC) of providing power, although the degree to which the utility's retail tariffs reflect marginal costs varied among countries.

One would expect IPP tariffs to be below both system LRMC (the figure that is commonly available) and the utility's retail tariff. They should be below system LRMC because it represents the marginal cost of generation, transmission and distribution, while IPPs costs are at the generation level.[3] Generation generally accounts for about 60% of LRMC. Thus, ideally IPP tariffs should be compared to the marginal costs of generation, but this figure was not available in most cases. IPP tariffs should also be below utility retail tariffs because the utility must recover the financial costs of providing transmission and distribution service in addition to generation.

To some extent, it can be argued that IPPs, because of their need to fully recover all costs, including all financing costs, introduce pressure on utilities to adjust tariffs to realistic levels and therefore assist in moving pricing mechanics and levels to more market-based systems. On the other hand, the degree to which utilities can impose these tariffs on consumers who are accustomed to subsidized rates is often in question.

Table 5 provides some pricing data for both the IPPs and for the relevant public utility if applicable, or the closest proxy to the price of publicly supplied electricity.

3 In this context, it is important to note that LRMC is an economic calculation, while IPP pricing reflects financial costs.

Table 5: Private vs. Public Power Tariffs

(Per Kilowatt Hour)

Power Pricing Factor	LRMC[1] per kWh	Average Retail Utility Tariff	Tariff Charged by Independent Power Project: Nominal	Tariff Charged by Independent Power Project: Levelized	IPP Levelized Tariff/LRMC	IPP Nominal Tariff/ Utility Average Tariff
Chile: Pangue	..	$.074	..	$.029	..	39%
Colombia: Mamonal	..	$.08[2]	$.045	..	..	56%
Philippines: Pagbilao	$.08	$.072	$.076	$.06	75%	106%
Pakistan: Hub	$.066	$.051	..	$.058	88%	114%
Guatemala: Puerto Quetzal	$.062	..	$.054	$.064	103%	..
Jamaica: Rockfort	$.12	$.14	..	$.069	57%	49%
Belize: Macal River	..	$.19	..	$.11	..	58%

.. Not applicable or available

[1] Long Run Marginal Cost, the weighted average long-run cost of generation, transmission, and distribution.

[2] Average tariff in Colombia (1993), i.e., estimate of what the power purchaser would be paying to public supplier of electricity.

This table, to the extent possible given data limitations, shows four pricing figures: system LRMC per kilowatt hour (kWh); the utility's average retail tariff per kwh; the tariff charged by the IPP at the time of project start up; and the levelized IPP tariffs over the life of the PPA.

In all of the projects for which there are data, the levelized and nominal IPP tariff was approximately at or below LRMC, ranging from 57% to 103%. As explained above, this is expected, although one would expect IPP tariffs to be closer to 60% of LRMC as a general rule.

In four out of six cases, the IPP tariffs were well below the utility's retail tariff. Again, one would expect the ratio to be close to 60%, considering recovery of transmission and distribution cost. IPP tariffs were about 50% below retail tariffs on average for the four projects that are below the utility's retail tariff. Where IPP tariffs are greater than retail tariffs (Pakistan and Philippines), it indicates a low retail tariff rather than high IPP tariffs, given the fact that LRMC is above the retail tariff in both countries.

These figures are provided only as indicative measures of IPP tariffs and utility pricing. IPP pricing and its relationship to utility pricing in developing countries is an area which needs closer attention now that several projects have been concluded. Two issues should considered when analyzing tariff data for public and private entities, particularly in the case of IPPs:

- Transparency: IPPs often provide a more transparent accounting of costs than state-owned utilities, since investors (equity and debt) require returns on all costs. Also, governments and therefore public projects do not account for risk-adjusted returns on equity investment, and in fact they often do not provide any return to the shareholders (government). While the government's "return" is presumably passed through in the form of low tariffs, the process is not transparent, making cost comparisons with IPPs difficult at best.
- Data Limitations: Gaps in the data limit cost comparisons of projects in many ways. Public sector accounting and cost data are often substandard and not current. In addition, indirect costs (for instance, the use of staff from other ministries or agencies in developing a project and general overhead expenses) are generally not accounted for.

While the cost of private sector capital is higher than public sector capital, better availability of privately owned plants , greater efficiency in operations, and efficient management systems can off-set these costs. The extent to which private investors can emphasize the latter measures to offset the former will determine the competitiveness of private power. While in the US, IPPs have, on balance, resulted in a reduction in the cost of power generation, the ability to make these precise calculations in developing countries is constrained by the lack of a sufficient track record and the required data. This points to the need for additional analysis of this question. Projects could be compared in several ways. One way would be to examine the same cost category for public and private sector projects side-by-side, imputing public sector costs with market proxies when necessary. In this event, adjustments would also have to be made for risk-adjusted financing terms and costs.

Section IV
Financing Structures and Sources

Project Finance Approach

BOO/BOT projects are generally undertaken on a "project finance" basis.[4] Project finance refers to a range of financing structures whereby lenders depend on the performance of the project itself for repayment, rather than the credit of the sponsor. It is also sometimes referred to as non-recourse or limited recourse financing. These terms refer to the fact that lenders either have no or limited recourse to the sponsors for repayment of loans.

Project finance normally involves the following elements:

- Lenders' reliance on the cash flow of the project for repayment without full recourse to the sponsor;
- Thorough technical and financial evaluation of the project by lenders, including the source of revenue stream, construction contractors, operating arrangements and other project features that are key to maintaining adequate cash flow for debt service;
- Complex loan and security documentation, often involving several lenders and investors;
- A detailed process of risk allocation amongst project participants including sponsors, lenders, equipment suppliers, contractors, operators, purchasers, input suppliers, and insurers, among others.

Project finance structures have appeal primarily because they allow sponsors to undertake investments that they otherwise would not be able to make on the strength of their own balance sheet. In this way, it allows them to leverage their resources and expertise in pursuing profitable investment opportunities. A second important reason is the risk sharing which is achieved through project finance structures, where sponsors share project risks with lenders. If the project fails, lenders absorb any losses suffered along with the sponsors. Other reasons for project finance include tax benefits for the sponsors, and favorable accounting treatment resulting from categorizing project finance investments as off balance sheet, thereby limiting a company's debt exposure.

Governments, of course, also attempt to limit the recourse of lenders to their credit, except to the extent that they may guarantee the performance the performance of a state-owned entity, for example through a sales contract. Nevertheless, they are often closely linked to the operation of the project, if they are not a direct participant in the project in some capacity.

Table 6 provides an overview of the financing structure for the projects studied. Generally, all the projects were structured as some variation of BOO/BOT, and were financed on a project finance basis. The primary source of capital for most projects was foreign private investors and commercial banks along with multilateral and bilateral agencies. The percentage foreign capital was between 80% and 100% in all but two cases. Given that the prime motivation for independent power policies is to address a capital shortage by attracting foreign investment, this relationship is to be expected.

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[4] The general discussion of project finance in this secton is partly drawn from the publication, *Project Finance* by Clifford Chance.

They were also highly leveraged transactions, with debt-equity ratios ranging from 80/20 to 70/30, with the exception being the Shajiao C Project, and to a lesser extent Pangue, which had debt-equity ratios closer to 50/50. Foreign capital played a dominant role in funding these projects, primarily stemming from the underdeveloped nature of domestic capital markets in most of the countries examined, and the large foreign exchange requirements for equipment, which is usually imported from industrialized countries.

Extent of Private Risk Capital

Table 6 also shows an estimate of the private risk capital provided by these projects. This was measured as the amount of private debt and equity financing provided (in dollar terms) that does not benefit from direct government guarantees taken as a percentage of total (dollar) funding. Measured as such, the percentage of risk capital ranged from a low of 25% to 100% in several cases.

The level of private capital was substantial in most of the projects examined. More than 80% of the total funding requirements was met by private risk capital in five out of eight cases. Most of the projects involved some form of government guarantees to cover the utility's performance under the PPA (where the purchaser was state-owned), the supply and price of fuel, and the availability of foreign exchange. Under these conditions, the private investor or lender was at least covering most, if not all, of the commercial risk.

It is important to put this measure in the context of the country risk, government policies and financing structures that result from specific project-related needs, financing amounts and debt service cover ratio considerations. The alternative to private sector involvement is public sector sponsorship and financing of projects. Traditionally, under these arrangements, the government guarantees the financing required for a project, which would then typically be undertaken by a government-owned entity. The extent of private risk capital provided through private sponsorship of power projects is then the degree to which government does not directly guarantee repayment of debt or equity return to financiers. Some projects, although they do not involve 100% private risk capital, do nonetheless represent a significant step forward in terms and amounts, given the country and sector risk environments.

There are two observations on the concept of private risk capital worth highlighting:

- As noted in Table 6, many governments provided a guarantee of the purchasing utility, as in the case of Philippines, Jamaica, Guatemala and Pakistan. It is, however, important to distinguish between indirect guarantees like these which are one step removed, versus direct guarantees of loan repayments. In the latter case, governments take both commercial and political risks, as the debt service obligation must be met regardless of the project's performance. A guarantee of utility performance, on the other hand, can be seen as a political risk guarantee, given that the performance of government-owned entities is often controlled in some fashion by the government itself. In these cases, the government is gener-

Table 6: Financing Structure

Project	Type	Debt Equity Ratio	Foreign Capital *(Percent of Total)*	Private Risk Capital *(Percent of Total)*[1]
China: Shajiao C	BOT	38/62	44	25[2]
Chile: Pangue	BOO	60/40	42	100
Colombia: Mamonal	BLT	80/20	100	100
Philippines: Pagbilao	BOT	75/25	100	100[2]
Pakistan: Hub	BOO	80/20	85	48 (Political)/67 (Commercial)[2]
Guatemala: Puerto Quetzal	BOT	77/23	100	92[2]
Jamaica: Rockfort	BOO	70/30	98	100 (Yrs 1-5)/35 (Yrs 6-17)[2]
Belize: Macal River	BOT	77/23[3]	100	100[2]

[1] Financing that has not received direct sovereign guarantees.
[2] Government guarantees provided to cover one or more of the following risks: utility performance, fuel supply, and foreign exchange.
[3] 17% of debt is subordinated and convertible into equity.
Note: BOT-Build, Operate, Transfer; BOO-Build, Own, Operate; BLT-Build, Lease, Transfer

ally not obligated to repay the loan in the event the project does not perform to agreed availability and operational standards, and lenders and investors assume these and other risks related to the technical and commercial management of the project, which can be significant. Of course, the more risks the government guarantees beyond merely the performance of government entities, the closer these indirect guarantees are to repayment guarantees.

- As discussed below, the extent of risk capital provided must also be analyzed and judged in the context of overall project risk sharing. Low levels do not automatically mean the host government is "overexposed." It may be the case that the underlying project agreements pass many risks from the public sector to the private sponsor, notwithstanding levels of less than 100%. This can be judged by analyzing the sponsor's commitments and the penalties contained in the PPA. It can also be assessed by analyzing the degree to which other obligations, like fuel supply, are placed in the hands of sponsors.

The Mamonal and Pagbilao projects illustrate the latter point. While both feature 100% in private capital, Mamonal has virtually no government involvement and support while Pagbilao, by virtue of a government guarantee of NPC's purchase and fuel supply obligations, as well as provision of foreign exchange, involves a greater degree of "indirect" government guarantees. These outcomes were determined based on a specific set of circumstances, and thereby exemplify the range of potential structures. It is not possible, however, to precisely quantify the risks covered by government guarantees in those cases where the government provided indirect guarantees. Therefore, the distinction between these projects needs to be kept in mind when making comparisons.

As country creditworthiness improves and power sectors become more attractive for investors, one can expect even higher proportions of private risk capital in the future for most countries. Others may be constrained for some time due to sovereign creditworthiness considerations.

Debt Financing

Table 7 provides an overview of the debt terms achieved in the projects. Most private debt financing was provided by commercial banks, while two projects involved bond issues. The sponsors of Rockfort in Jamaica, tapped medium-term bond financing available in Puerto Rico to fund construction.[5] In Chile, the sponsors of Pangue are

[5] The bonds were issued by the Caribbean Basin Projects Financing Authority, a Puerto Rican institution which channels investment funds from US corporations operating in Puerto Rico to private sector projects in Caribbean countries. These bonds are tax-advantaged under the US tax code and offer below LIBOR interest rates.

Table 7: Financing Structure—Summary Debt Terms

Project	Debt Rank	Weighted Avg. Grace (years)	Weighted Avg. Term (years)	Percentage of Debt Enhanced/ Guaranteed[1]
China: Shajiao C	Senior	3	7.5	100
Chile: Pangue	Senior	5	14	20
	Subordinated	14	15	0
Colombia: Mamonal	Senior	1	8.5	0
Philippines: Pagbilao	Senior	4	13	80
Pakistan: Hub River	Senior	4	12	70
	Subordinated	8	23	100
Guatemala:	Senior	0.5	8.7	0
Puerto Quetzal	Subordinated	0.75	10.75	0
Jamaica: Rockfort	Senior	5	8.5	100
	Subordinated	2.5	10	0
Belize: Macal River	Senior	4	12	0
	Subordinated	4	14	0

[1] This includes: loans made by governments, loans made by bilateral agencies and institutions; and private loans guaranteed by export credit agencies or multilateral institutions.

seeking to tap the long-term domestic market through a bond issue (see page 21).

The maturity of the loans ranged from 5 year construction financing in Jamaica to 23 years for government subordinated debt from the in Pakistan. The average term for senior commercial debt was just over 9.5 years, with an average grace period of 3.5 years. A significant share of this financing benefited from partial risk guarantees from export credit agencies or multilateral development banks. Additionally, commercial financing was mobilized through IFC's B-Loan program for three projects.[6] The terms of this debt tend to be somewhat shorter than IFC loans, but are normally much longer than previous commercial loans to these countries.

The challenge for developers in structuring financing packages for IPPs is to secure debt with maturities long enough to accommodate a reasonable tariff profile. This is especially important for those projects selling electricity to a public grid, given the difficulties of increasing tariffs on a regular basis. Shorter maturities would "front load" tariffs, making it very difficult for utilities to meet their payment obligations in the early years of a project.

Equity returns are normally constrained in the early years by minimum debt service coverage ratios and restrictions on dividend distributions imposed by lenders. These are specified in loan agreements and represent threshold levels for lenders. In the early years of a project's operations, debt repayment dominates dividend distributions. Over time, loan repayments diminish, however, leaving larger cash balances for distributions.

Generally, the tariff will fluctuate over time according to the revenue requirements of the project for operational expenses plus debt service and equity returns, and does not remain fixed. Project sponsors must structure their revenue stream such that annual tariffs remain reasonable on a year to year basis, as well as over the life of the project (i.e., levelized). Several of the projects utilized subordinated debt in the financing plan as a way of providing a cushion to senior lenders in terms of debt service coverage. For their part, providers of subordinated funds sometimes receive options to convert their claim into an equity stake at some point or higher interest rates to compensate for the greater risks associated with a subordinate position.

Export credit agency (ECA) participation was an interesting feature of several projects. ECAs played a significant role in Pagbilao and Hub, where the purchaser is a public utility, and a lesser role in Pangue, where the purchasing entities are privately owned. The ECAs providing coverage for commercial banks under these arrangements for the sample projects include those of France, Italy, Japan, the U.S., Sweden, Canada and Germany, which provide the bulk of export credit cover globally.

ECAs traditionally have provided political and commercial risk coverage for public sector projects in developing countries. While the need for this type of coverage remains, particularly for political risks, the nature of the borrower and financing structures are beginning to change rapidly. Given the importance of their participation in many IPPs, ECAs have therefore had to reassess their coverage policies, the pricing of their risk coverages, and the extent to which they can rely on host government counter-guarantees. For the projects in this study, the extent and nature of these counter-guarantees was not clear from available information.

Many ECAs are willing to support project finance transactions because of the expanding business opportunities for electrical equipment suppliers in projects being financed on this basis. As experience accumulates with the risk sharing provisions, coverages and documentation involved with these arrangements, one can expect to see ECAs become even more active in IPP project financing. The U.S.- Eximbank's recent reorganization and emphasis on project finance reflect a broader move in many ECAs to adjust policies and practices to accommodate this approach.

ECA cover and other forms of enhancement through multilateral guarantees or programs like IFC's B-Loan syndication facilitate the extended maturities necessary for IPP financings. ECA cover is generally limited to 10 years, but for power projects it can extend maturities for up to 12 years under the OECD rules that govern ECA policies. By comparing the terms of the "enhanced" debt financing with what had been achieved in the country without enhancement, one can get an idea of the benefit of the comfort provided by the guarantee. On average, based on the terms of debt financing achieved for the projects in the study, ECA and multilateral support extended maturities by about 7 years. This unquestionably played an important role in enabling the IPPs to offer competitively priced power to the purchasing entity, as well as achieve an acceptable pay-back period for their equity investments.

6 Where IFC, in addition to providing a loan for its own account, is the lender of record for a syndicated commercial bank loan.

What is becoming clear, and is amply demonstrated in Tables 6 and 7, is that for many of these projects to go forward, it has been necessary to involve one or more of the multilateral agencies, or bilateral export credit agencies. For those projects which show little or no direct government guarantees (i.e., Pangue, Mamonal, Pagbilao, Puerto Quetzal, Macal River), three out of five involved commercial funding mobilized under IFC's de facto preferred creditor (B Loan) umbrella (Pangue, Pagbilao, Puerto Quetzal), which was a significant factor in making the investment possible. There have been IPP-type projects that have reached financial closure without multilaterals or ECA involvement; the YTL project in Malaysia, which is being financed from domestic sources, is a good example. To that extent, the project sample may be somewhat biased, although most of the successful IPPs not covered in this study are either in countries with relatively low country risk environments, or involved bilateral and multilateral support.

Although the demand for IPPs is large and expanding, private lenders have demonstrated an across the board reluctance to enter these markets without some form of political risk cover, given the domestic orientation of infrastructure projects and the difficulty of absorbing cross-border risks on their balance sheets. Commercial lenders, particularly banks, are willing in general to assume commercial risks, such as the ability of a contractor to provide a technically acceptable power plant and efficient operation of the plant by the owners. They are not, however, well-positioned to assume political risks, or those risks under the control of the government. These risks need to be addressed for both the pre-completion and post-completion periods to the satisfaction of lenders for the investment to be viable.

The reluctance of lenders is due to many factors, including lack of confidence in commitments made by governments and a lack of familiarity with the capabilities and reliability of the key public sector agencies involved. The weak credit standing of many governments also undermines the attractiveness of government commitments. Many countries have implemented new regulatory systems to enhance the attractiveness of the power sector to investors, but investors look for a track record to assess the effectiveness and predictability of these arrangements, which will take time to develop.

Multilaterals and bilateral agencies are uniquely positioned to assist commercial parties to enter these new and complex markets in the meantime, given their long presence in these countries as development agencies and their widespread experience in power sector development. Multilaterals may support IPPs in a number of ways, including the provision of a portion of the financing, guarantees against political risks, and support to public sector entities designed to improve their creditworthiness (e.g., commercialization initiatives). The financial commitments of these agencies, however, are limited by their own exposure guidelines. Hence, for larger projects it will be necessary for several agencies to participate in order to mobilize enough financing to complete the financing plan.

Equity Financing

Table 8 provides some details on equity financing. The equity structure is most influenced by the objectives and business strategy of the sponsoring

Table 8: Financing Structure—Equity

Project	Sponsor's Equity (% of Total Equity)	Domestic Equity (% of Total Equity)	Estimated Equity Return (%IRR)
China: Shajiao C	100[1]	60	>20
Chile: Pangue	98	98	19
Colombia: Mamonal	<50	0	>20
Philippines: Pagbilao	87	0	24
Pakistan: Hub	26	26	18
Guatemala: Puerto Quetzal	100[2]	8[3]	20
Jamaica: Rockfort	35	6	25
Belize: Macal River	100	5	..

.. Unknown

[1] Project entity is a joint venture between Guangdong General Power Corp. and Hopewell.

[2] The sponsor, Enron, will retain 50% of equity as a long-term investment and will bring in suitable partners for the remainder.

[3] EEGSA, the power purchaser, will purchase an income note of US$7.25 million from the project company at start-up, repayable between years 8-12 interest free.

party, the degree of sovereign risk and the level of domestic capital market development. From the figures in Table 8, two strategies are apparent. In the more common strategy, the sponsor's equity (as opposed to more passive equity participants) played a dominant role, accounting for greater than 50% of total equity in six out of eight projects. Hopewell, the sponsor of Pagbilao and the foreign joint-venture party in Shajiao C offers a good example of a sponsor that generally provides a significant equity stake and does not leverage its own equity position. In the second strategy, the sponsors sought to leverage their participation by seeking passive equity partners for the majority of the equity financing required. The sponsors of the Rockfort, Mamonal and Hub projects followed this strategy, providing less than half of the total equity in the project.

Foreign vs. Domestic Capital Mobilization

Domestic participation in equity tends to be small with some exceptions. Most foreign sponsors see local equity participation as potentially helpful in terms of familiarity with the business environment and regulations, but not absolutely essential. Scarcity of risk capital inhibits local participation as well, particularly for a new industry such as power generation.

The Shajiao C project in China was an anomaly with the provincial utility, the Guangdong General Power Corporation, taking a 60% equity stake. In addition, Pangue in Chile had a large domestic stake through the sponsor Endesa, which provided almost 40% of total financing through its equity investment. In all the remaining cases, both a majority of the debt and equity came from foreign investors and lenders, with bilateral and multilateral institutions providing not only financing but also various forms of credit enhancement in the form of guarantees and insurance.

The limited or non-existent role of domestic capital in these initial projects may present a barrier to market development should it persist over the long term. Ultimately, a framework must be established to channel domestic savings into long-term investment opportunities provided by infrastructure projects. The establishment of domestic capital markets will no doubt be an evolutionary process in view of the need for the requisite policy, regulatory, and institutional frameworks. Nonetheless, this will greatly facilitate the formation of a more active market for power generation in the future.

This market may be encouraged if power projects could be refinanced after construction. This would allow institutional investors, comprising pension funds, insurance companies, and mutual funds, to replace commercial banks as the primary long-term lenders. While this investor group is immeasurably larger in developed countries, there are potentially large amounts of capital to be tapped in developing countries through these intermediaries. To enable this, many countries will need to reform their capital markets, and pension fund systems specifically, in conjunction with power sector reforms that establish sound regulatory arrangements to free up such resources for private sector investment.

When an IPP is structured as a BOT project, where ownership is ultimately returned to the power purchasing utility, the prospects of the project being sold on the secondary market may be limited, and the ability of domestic and institutional investors to participate is inhibited. Of the eight projects evaluated, four are BOTs, three are BOOs, and one is a Built, Lease, and Transfer project. Given the initial dominance of the BOT model, the existence of three BOO projects in the cases examined may indicate a trend toward the more open-ended BOO as a preferred approach.

In the U.S. the market has evolved to the point that debt securities issued by at least one project have been rated prior to completion (i.e., the Sithe/Independence Project in New York State). While this type of rating may be a long way off for many developing countries, it is now conceivable that well-structured projects with strong sponsors in countries with a sovereign rating could be rated in the future. The problem for many countries today is that, without adequate credit enhancement, the poor or non-existent sovereign credit rating creates a ceiling on the creditworthiness of projects in that country. Rating projects is also made difficult by the rating agencies' lack of familiarity with the varied regulatory and operating environments in most developing countries.

The Pangue project in Chile provides an interesting case of local capital market development and the role of domestic rating agencies, of which there are several in Chile. The sponsors are currently attempting to tap the domestic bond market for long-term funding, but need to access the institutional market. In order to do this, the sponsors have requested the rating agencies for a rating to allow them to market the issue in the public markets. The rating agencies, in turn, are grappling with the difficulties of rating a project finance transaction in

which the issuing entity has no track record. If successful, this could set a precedent for bringing together long-term investment opportunities with pension funds and other investors with extended investment horizons.

Equity Returns

Surprisingly, the expected (*ex ante*) rate of return for all projects was very similar, in the 20-25% range, with none higher than 25%. This is somewhat unexpected because of the diversity of risk environments faced by developers in the countries examined, which, all things equal, would suggest a broader range of returns as investors appropriately adjust their returns commensurate with the risk they face.

There are several caveats to this finding. First, in a few cases, *ex post* returns may be higher because of efficiency incentives built into the tariff formula in the PPA (e.g., Pagbilao, Hub). Second, the sponsoring investors often earn a premium given their earlier funding commitment for development costs (and hence assumption of higher risks) compared with investors who subscribe equity later in the development process, or even after construction begins. Therefore, there may be a range of equity returns embedded in Table 8, which shows average equity returns for all equity holders. Last, it is difficult, due to confidentiality, to uncover precisely what ROE is expected on some projects, so the figures for at least half of the projects are rough estimates. These estimates are based on discussions with developers as well as published sources.

The narrow range of equity returns required by investors (20% - 25%) may be attributed primarily to an implicit "cap" due to substantial levels of implicit and explicit credit enhancement by government, bilateral, and multilateral institutions. There are also constraints on utilities in absorbing (i.e., passing through) high tariffs.

IPP investors in the U.S. market, while earning very high returns (>30%) in the early years of PURPA, are now realizing returns more in the 10-15% range, due to increased competition and some standardization in financing structures and risk allocation. For some countries in the sample, the premium over U.S. investments inherent in the observed 20-25% range may not seem adequate to compensate for the substantially higher risks developers face in markets which are yet to be developed on a large scale. This is particularly true of those investors who bear the costs of "development risks" during the negotiations of project agreements and the arrangement of financing. However, increasing competition among developers in developing countries is beginning to exert downward pressure on equity returns.

More fundamentally, quantifying the risks in large infrastructure projects is difficult and poses substantial complications in determining a fair return. Rather than focus the negotiations on the tariff, countries such as China, and initially India, announced caps on the return investors can earn on power projects based on the rationale that these caps serve the public interest by preventing excessive profits. There has been speculation that the policy in China could in part be attributed to the perceived high returns that Hopewell realized on the Shajiao B project. Some observers have suggested that the Chinese appeared not to want to establish this project as a model, and thus insisted on majority ownership and less attractive terms on the Shajiao C project. India has since adopted a more flexible approach.

The argument put forward by investors is that governments should focus on negotiating a competitive tariff for power and allow investors to earn an appropriate risk-adjusted return at a tariff the utility can absorb. Although the level of the tariff is partially a function of the return on equity, it has been suggested that the existing policies oriented toward capping equity returns limit investment and do not give investors the incentive to optimize their performance. In this way, many investors argue that the regulation of IPP returns rather than tariffs is posing a significant barrier to attracting private capital.

Section V
Public vs. Private Sector Risk Sharing

Introduction

Risk sharing, in one form or another, is at the heart of most of the reservations about BOO/BOT projects generally, and specifically for IPPs, where some observers have questioned the "real benefits" of this approach. While there is no one way to measure these benefits and the costs of IPPs, some key areas of risk sharing are highlighted here for each project. Risk sharing does not easily lend itself to quantitative analysis; thus much of the following discussion is qualitative in nature. Nonetheless, by looking in some detail at how risks are mitigated across several projects and in different country and sector environments, one can pinpoint areas of divergence and similarity to form an overview of the range of experiences.

In countries with high country risk levels and electric utilities that are seen as uncreditworthy, the targeted role of government, bilateral, and multilateral guarantees and credit enhancement is often critical to the successful financing of at least the first projects. This support can either cover country (political) or project (commercial) risk; governments and multi- or bilateral agency guarantees have focused on the former risks, over which investors and lenders have little or no control.

For instance, in Shajiao C, Hub, Pagbilao, Rockfort, Puerto Quetzal, and Macal River, government undertakings were essential to mobilizing private investments. In these cases (with the exception of Shajiao C), and also Pangue, the role of the IFC, World Bank, ADB, CDC and other development agencies was important in mitigating risks to commercial investors and lenders. In addition, export credit agency and bilateral financial support played a key role in various projects (i.e., Pagbilao, Mamonal, and Hub). This results in large part from projects' needs to secure long-term funding, which is difficult to arrange in today's market, particularly for non-export oriented projects in high risk countries.

It is important to note that the analysis of these cases represents a snapshot in time in what is the early stage of an evolutionary process in most of the countries examined. The development of the independent power market has brought more experience and some standardization across countries. This means that the role of multilateral and bilateral institutions will also evolve and is likely to diminish as the commercial framework improves.

Approach to Analysis

This study analyzed the main project-specific characteristics within the various country and sector settings, in order to identify key similarities and differences in project structures. In each case, the focus is on the particular arrangements that were necessary to secure private financing for the project, the terms of the financing, and the level of government support required to achieve a satisfactory credit package acceptable to lenders and investors.

The level of country risk can be captured through indicators such as those presented above in Table 3. Based on these indicators, the projects included in the sample were allocated to three country risk categories:

Low:	Pangue, Shajiao C
Medium:	Mamonal, Pagbilao
High:	Hub, Rockfort, Macal River, Puerto Quetzal

Depending on circumstances, IPPs may require a range of government support to mitigate country risk or more project-specific risks that confront investors. Examples of this support include:

- financial guarantees backing payment obligations of government-owned entities (particularly where the sole purchaser of output is government-owned)
- provision of fuel
- guarantees of foreign exchange.

Government support in these areas is designed to lessen risks to the private investors and lenders. These risks are heightened in less creditworthy countries given the uncertainties in economic policies, changes in governments, and other factors that may cause an interruption in project cash flows. In these countries, investors, generally look to the sovereign government to cover these risks (e.g. insurance) since private arrangements may not be available, or government-owned entities are themselves not creditworthy. In addition, in most high-risk countries, the government is usually in the best position of any party involved to influence or correct policies that may be detrimental to the project and are thus the logical party to insure against these events.

Alternatively, there may be times when a government wishes to provide specific financial and other commitments to the project. This is especially true if the price for covering a certain risk is too high, either in terms of returns demanded by investors to absorb the risk, or prohibitively expensive private insurance. Also, in many instances private insurance is not available for periods beyond one year or less. This type of government support allows countries to realize the benefits of IPPs in private financing, development and operational expertise, while achieving a tariff that can be accommodated in a utility's revenue stream without a major disruption in tariff levels.

Given this situation, one would expect that in high-risk countries, investors would look to government for greater levels of support. The expected scenario is illustrated in the left side of Figure 5, which depicts the country risk on one axis and the level of government support on the other. The right side of Figure 5 shows actual outcomes (see below).

To arrive at the right side of Figure 5, the role of the government in mitigating several risks was examined. While the number of risks in a project financing are numerous given the range of unknowns that may adversely affect the project in the future, the study focused on eight specific risks.

The approach followed identified areas in which the projects may diverge (rather than areas of broad acceptance) in order to determine the degree of government support and to test the above relationship. Other areas where specific approaches to risk sharing have become common in BOO/BOTs were not analyzed.

Figure 5: Country Risk and Government Support: Expected and Actual

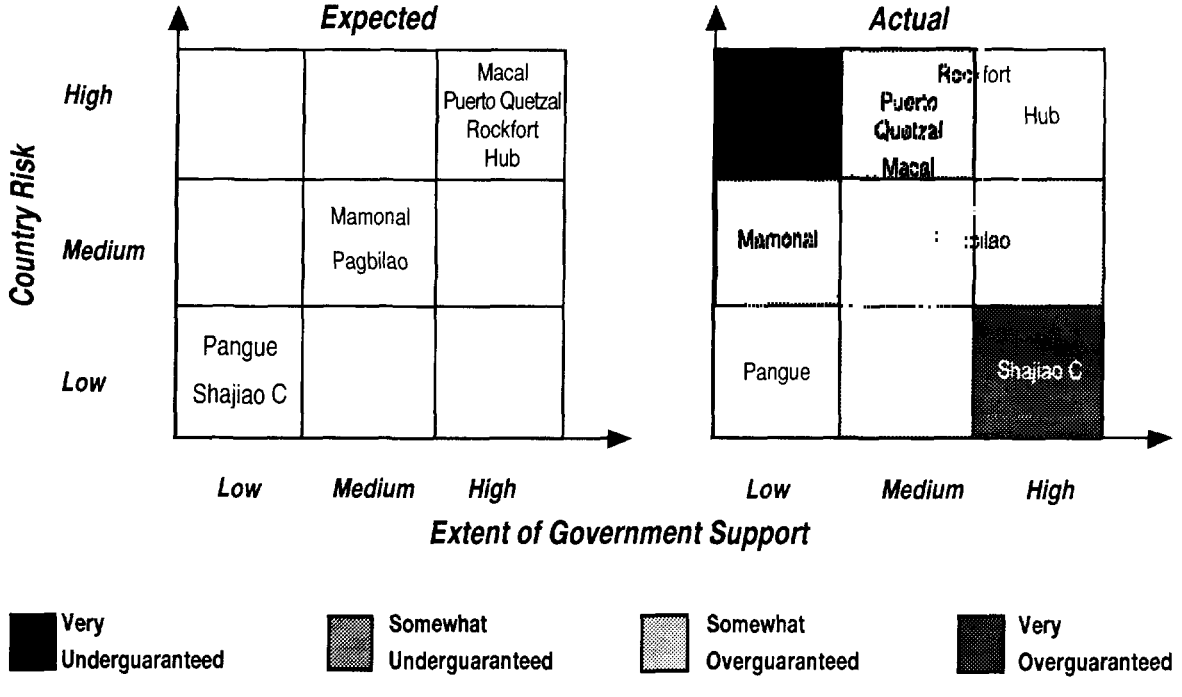

Figure 6 shows the extent of government risk assumption associated with certain identified risks, including the extent to which governments took an equity stake in the project and provided some portion of the debt financing for the project. The eight areas examined include:

- Project Completion
- Project Technical Performance
- Utility Performance
- Fuel Supply
- Foreign Exchange
- Force Majeure
- Equity Financing
- Debt Financing

As shown in Figure 6, there was a wide range of experience in terms of the degree to which government took on a major risk for each item identified. The extent of overall government support for the projects ranged from Mamonal and Pangue, where there was no government involvement, to Shajiao C where the provincial government played a significant role across the board from financing, to operations, and part ownership of the facility. Several of these items are highlighted below.

Completion and Technical Performance

Project completion and technical performance are generally seen as strictly commercial risks, and are thus normally borne by the private lenders and investor and not the government. In the sample of projects studied this was generally the case. Sponsors will normally put at risk their portion of the funding while construction lenders assume completion risks for the debt portion. To a large extent, these risks are passed on to a construction contractor(s) who provides a performance bond up to a fixed amount (i.e., percentage of the contract), to back their commitment to complete the project on time and within budget. Lenders often also seek insurance from ECAs or other agencies to cover political risks during construction. This is the case for Pagbilao and Hub for a portion of the debt provided by commercial banks.

Occasionally, sponsors will back completion beyond their equity contribution, but this is the exception. Two examples are Pangue and Puerto Quetzal. In Pangue, the parent company, Endesa provided a completion guarantee that was released by securing a certain portion of the project's revenues through long-term sales contracts and operating the project at levels agreed with the lenders for one year. This guarantee was for the benefit of the lenders. In Puerto Quetzal, the sponsor (Enron) provided a completion guarantee with the lenders disbursing only at completion of the facility. As in Pangue, the project had to operate for one year at agreed levels for the guarantee to be released.

As shown in Figure 6, governments do on occasion play a role in these areas for different reasons.

Figure 6: Extent of Government Risk Assumption

Project	Completion	Project Technical Performance	Utility Performance[1]	Fuel Supply	Foreign Exchange	Force Majeure	Financing: Equity	Financing: Debt
China: Shajiao C	◑	◑	●	●	●	●	●	●
Chile: Pangue	○	○	○	○	○	○	○	○
Colombia: Mamonal	○	○	○	○	○	○	○	○
Philippines: Pagbilao	○	○	●	●	●	◑	○	○
Pakistan: Hub	◑	○	●	●	●	●	○	●
Guatemala: Puerto Quetzal	○	○	●	○	●	○	○	◑
Jamaica: Rockfort	◑	○	●	○	◑	●	○	●
Belize: Macal River	○	○	●	○	●	●	○	○

● Major risk to government
◑ Some risk to government
○ Little or no risk to government
[1] Includes payment obligations.

In the case of Shajiao C, the provincial government of Guangdong is a joint venture partner, and in this capacity is acting as part owner of the facility. As such, any commercial risk generally assumed by an owner, such as "completion risk," would be borne by the province given its ownership stake. In Figure 6, this is shown as a partial risk to the government due to its ownership share.

In the case of Hub, the government has committed to pay a specified amount when a project agreement is terminated due to a government default. To the extent this may occur before project completion, the government is assuming completion risks. This is shown as a partial risk due to the limited nature of government commitment, i.e., only in the event of a government-caused default, and only for a specified (capped) amount.

Utility Performance

In all six projects which involved government-owned purchasers, the government provided a guarantee of the utility's obligations. This is common where there is no clear division between the government as owner and operator of the utility and there is no independent regulator. As such, it is very difficult for investors to assess the creditworthiness of the utility, which may be subject to government interference in its financial and operational management. In addition, where data is available, quite often investors discover that the utility is in poor financial condition and hence is not creditworthy. In these cases the government's credit is sought in place of the utility's.

One might expect that, where the utility's financial condition is reasonably good, there would be no need for a government guarantee. This was, in fact, the case for Pakistan, Jamaica, Guatemala, and China. However, even in these cases, the investors sought government guarantees, presumably because of the lack of independent regulation and the consequent uncertainties regarding the ability of the utility to meet its obligations in the future. Until both the utility's financial condition is acceptable and the regulatory arrangements are independent and well-established, investors will continue to require sovereign guarantees of purchasing utilities. Where the sovereign credit itself is weak, they may also seek credit enhancement from third party guarantors.

On the other hand, in Mamonal and Pangue, the government did not provide a guarantee. For Pangue, project revenues are provided through long-term contracts with private distribution companies and large industrial consumers, and through sales in the short-term market to other generators. About 60% of forecast sales will be secured though contracts, which is approximately the proportion of debt in the financing plan. The choice of customers in this case was a business decision influenced by the need for steady cash flows (i.e., creditworthy buyers) and the desire of lenders to secure long-term commitments. It was not dictated by the existence of a single buyer, which is often the case when projects produce for public supply. In addition, Chile's regulatory system has been functioning well for several years, both thereby obviating the need for government intervention both from the point of view of the government and the investors and lenders. This is a unique situation in developing countries, but one that may become more common as power sector reforms take hold.

Mamonal in Colombia benefited from the fact that it was primarily an enclave operation selling to a consortium of industrial customers. The project was developed as an enclave partly as a result of a power crisis in Colombia and the consequent need for reliable electricity. The investors were able to assess the buyers' creditworthiness and also could sell power at unregulated prices, thereby reducing their regulatory risks, which governments normally would be expected to cover by guaranteeing the performance of the utilities. In a sense, Mamonal was able to target what would be the utility's better customers and hence isolate a better credit risk than that of the utility, which serves a broader customer base. If this approach were to be replicated more broadly, however, the result would be a fragmented industry, possibly with some loss of efficiency and flexibility in meeting total system needs. It would also eventually relegate customers with higher credit risks to the public utility.

Fuel Supply

In three of the six thermal projects examined, the government assumed a substantial fuel supply risk. Fuel risk is a critical part of a project's risk profile, as a reliable supply of fuel of acceptable quality is fundamental in order for the plant to meet its supply obligation to the purchaser. In many countries fuel is imported; this adds foreign exchange exposure to the project owner, who may have to source fuel from overseas markets. This can be alleviated by sourcing locally if feasible, but there remains reliability and quality risks with these

arrangements. Where the government controls the fuel supply in a country through regulation or government-owned entities, investors may seek a government guarantee of the supplying entity.

In the case of Shajiao C, the provincial utility is responsible for fuel supply, thereby putting the province of Guandong at substantial risk for non-fulfillment of this obligation. In the Philippines, the government has pursued a policy of contracting IPPs under an "energy conversion agreement," where the government, through NPC, provides the land and fuel, and contracts with private investors to "convert" the fuel into electricity. While this arrangement has proven attractive to many IPP developers, it transfers significant risks from the private sector to the government in terms of meeting fuel commitments under the conversion agreement. In Hub, the government is exposed through its performance guarantee of PSO, a majority state-owned fuel marketing company that has contracted with the project company to supply fuel.

In the Rockfort project in Jamaica, the fuel supplier is a Jamaican government-owned entity (Petrojam refinery), However, the government did not provide a guarantee of its performance. The investors are instead relying on a fuel supply contract under which they will look to enforce their rights in accordance with Jamaican law if necessary.

In hydro projects (Pangue and Macal River) water rights, rather than fuel supply, become important, and raise a different set of issues. In this case, access to water rights becomes paramount, which has implications regarding monopoly rights to the water, but is not necessarily a risk-sharing issue. In the case of Pangue, the water rights had been owned by Pangue's parent company Endesa for many years prior to its privatization.

Foreign Exchange

None of the projects studied had export sales with which to earn hard currency. This results in foreign exchange risk to the project's foreign owners and lenders, given the expectation that the revenue stream will be in local currency. There are three aspects to foreign exchange risks. These include exposure to depreciation of the local currency, the risk of non-availability, i.e., that there may not be foreign exchange for the investor to buy in the short run, and the ability to transfer exchange out of the country.

IPP investors cover these risks in many ways, sometimes through a combination of measures. In the sample of projects in this study, investors utilized three methods to overcome this risk, or at least minimize it:

- **Payment in Hard Currency:** The best way to overcome exchange risk, from the investors' and lenders' points of view, is by arranging for payment in hard currency. This effectively eliminates foreign exchange risk to the project, although there is still a possibility that hard currency will not be available. This solution was negotiated for the Pagbilao and Mamonal projects. For Shajiao C, a substantial portion of the payments from the provincial utility is payable in hard currency, while the rest is payable in local currency. Given the large portion of domestic funding for Shajiao C, this arrangement effectively eliminated the exchange risk to the foreign investors (principally the sponsor Hopewell and foreign banks). Investors in all of these projects, however, are still left with the payment risk of the purchasing entity, although this is no different than if the payments were made in local currency.
- **Foreign Exchange Risk Insurance:** Some investors arranged for foreign exchange risk insurance from bilateral or multilateral agencies. The investors in Mamonal, for example, obtained this insurance from the Overseas Private Investment Corp., the U.S. investment insurance agency. Investors in Rockfort have arranged inconvertibility insurance through MIGA. Investors in Hub also arranged foreign exchange insurance, but in this case through a scheme offered by the State Bank of Pakistan, which is the country's central bank.
- **Indexed Local Currency Payments:** Where the payment is made in local currency, investors negotiated adjustment clauses in the PPAs to compensate them for currency depreciation. PPAs for the Hub, Rockfort and Puerto Quetzal projects were denominated and paid in local currency and featured adjustment clauses to account for local currency depreciation. While payments are normally made on a monthly basis, they are made on a weekly basis for Puerto Quetzal, which is designed to lessen the impact of tariff adjustments on the utility's cash outlays and therefore increase the probability of payment.

Risk sharing differs among these alternatives. The greatest exposure to government is obviously payment in hard currency, as the obligation to

secure foreign exchange rests with the government (either directly or through the utility). The least exposure is indexation arrangements; while compensating the project for depreciation, they do not oblige governments to actually provide foreign exchange. Local currency costs incurred because of depreciation are quite often recovered through adjustment provisions in customers' monthly bills, which greatly facilitates this solution. The degree to which this arrangement is acceptable to all financiers depends on many factors, especially the capacity of the foreign exchange market to meet the needs of a large power project, and the availability of back-up measures employed such as inconvertibility insurance.

Government Financing

Some projects (Shajiao C, Hub, and Rockfort) also benefited from partial government funding, as is depicted in the last two columns of Figure 6. The rationale for such funding is grounded in the desire of governments that have little or no access to long-term commercial debt financing to leverage their own funds to facilitate private financing. Government funding can facilitate private financing in three ways.

- **Leverage:** Governments Lending can leverage government resources to attract private capital. For instance, a 30% government funding contribution would be expected to mobilize equity of 25-30% plus additional debt for the balance of 40-45% of total funding needs. This is an especially appropriate strategy for large projects in less creditworthy countries, where the sheer magnitude of the required financing is limited by the exposure considerations of banks and other lenders. Also, considering the alternative is a public sector project, 30% government funding can achieve a significant incremental reduction in public sector financial commitments to the power sector. In Hub, the government is providing approximately 35% of the funding through the Private Sector Energy Development Fund (PSEDF), which is funded by multilateral and bilateral agencies. In Rockfort, the government is providing a take-out loan which will replace five year commercial debt raised for construction. This long-term debt amounts to 65% of project funding requirements.
- **Lessen Foreign Exchange Burden:** To the extent that the repayment of government funding is met with local currency, it alleviates a portion of the foreign exchange constraint most projects face. The larger the proportion of funding, the less burdensome the obligations become, although it could also at the same time diminish the amount of commercial funding in certain cases. Where long-term commercial debt financing is constrained, however, it is difficult to say that any financing is displaced, especially where none has been provided previously. In the case of multilateral and bilateral loans channeled through governments, as in Pakistan and Jamaica, repayment from the private borrowers to the government will be in local currency for which the government charges the borrowers a premium over its cost of borrowing.
- **Subordination:** Governments may subordinate their funding to commercial lenders to provide private lenders additional incentives to finance priority projects. Subordination has the important effect of increasing the debt service coverage ratios of senior lenders based on expected cash flows from the project. For assuming a higher risk as a result of its subordinate position, the government can charge a premium on its subordinated loan. The PSEDF loan to Hub is a subordinated facility.

Notwithstanding the rationale for government funding, it is clear that the IPP market is rapidly evolving, particularly in the financing area. It is reasonable to expect a diminishing role for governments in IPP financing, resulting from improvements in both country creditworthiness and power sector regulatory environments, as well as the privatization of key purchasing entities. Barring specific policy considerations with regard to IPPs, the need for government funding will no doubt be greater in less creditworthy countries with very limited access to private financing. Once the first one or few projects are successfully implemented, it is conceivable that lenders will be more amenable to participating. Even if this scenario is realized, however, some form of credit enhancement will likely be required for the high-and even medium-risk countries.

Summary Project Comparisons

Project comparisons in the right side of Figure 5 reflect the outcomes examined above, after examining the eight factors shown in Figure 6.

Contrary to the expected alignment set out in Figure 5, many of the projects did not exhibit a clear relationship between country risk and government support. In some cases, government support was beyond what might be expected. These are termed "over-guaranteed" in Figure 5-right, and include Shajiao C and to a lesser extent Pagbilao.

Some projects were "under-guaranteed" (such as Puerto Quetzal and Macal River, and to a lesser extent Rockfort). The Mamonal project in Colombia is shown as very under-guaranteed based on the fact that there is no government exposure in this project. On the other hand, some projects did exhibit the expected relationship as outlined in the left side of Figure 5; these include the Hub and Pangue.

This figure reveals the range of experience to date with IPPs, in terms of project structures required to secure financing in varying circumstances in different countries. It is important to realize that these relationships are determined based on a variety of factors and that each divergence shown in Figure 5 can, however, be accounted for by project-specific factors or particular policy factors.

For instance, the Chinese government's promotion of joint ventures with foreign private investors for new IPPs, instead of accommodating projects with only private shareholders, partly accounts for the significant extent of government involvement in the Shajiao C project. Other factors influencing the Shajiao C project's "over-guaranteed" categorization include guarantees of payment in foreign exchange and provision of fuel by the government utility.

Mamonal veers from its expected relationship primarily on account of the nature of the project, which is designed to service a small group of private industrial customers rather than a broader client base through a public utility. In this sense, it is by definition isolated from some country risks and most sector risks, and therefore it may be somewhat of an overstatement to term Mamonal "under-guaranteed." Thus, the projects' placement in Figure 5 is derived more from its enclave structure rather than risks sharing between government and the private investors, as in the other projects.

For other projects that are either somewhat over- or under-guaranteed, the deciding factor was fuel, foreign exchange or financing, though these projects are close to expected levels of government support.

Puerto Quetzal and Macal River had little or no government funding (8% for Puerto Quetzal), and fuel supply risks for the former were assumed by private investors and lenders. As a hydro project, Macal River had no fuel supply risks. Though the government is providing funding to the Rockfort project, it is structured as a take-out loan, replacing commercial loans secured by the project company for the first five years of the project from financial closure. In addition, fuel supply risks are solely the responsibility of the sponsor, and payment from the utility is made in local currency. The government does not undertake to guarantee foreign exchange.

Pagbilao was categorized as somewhat over-guaranteed primarily based on the government's obligations for fuel delivery and providing foreign exchange, which are significant risks.

Section VI
Future Developments

Several observations on the future development of private power are summarized below.

Supply vs. Demand for Capital

The global gap between the supply of capital and the demand for power is large and cannot be expected to diminish significantly through IPPs alone in the near term despite the recent upsurge in IPP financings. Developing countries will need to tap many sources of public and private finance to fund the expected annual additional generation requirements of about 40-60 GW. The capacity that does get financed will no doubt be met through a combination of publicly-owned utilities through traditional funding sources, newly-privatized utilities borrowing as corporates in international and domestic markets, and IPPs.

Currently, no more than 2-4 GW of new private generation capacity, through IPPs and cogeneration, is being brought on line each year. While this is only a fraction of total demand, it is important to remember that India and China comprise a large share of these needs. Thus, for some smaller countries IPPs may meet a substantial share of their future requirements. The case analyses of Guatemala, Chile, Jamaica and Belize demonstrate this possibility. This may also be the case if one considers regional requirements at the state or provincial level in the larger countries.

IPP Approach and Replicability

This study has focused on private capital mobilization for the expansion of generation facilities. While opportunities exist for private financing of transmission and distribution resulting from the recent privatizations of many electric utilities, financing of generation using IPP structures will undoubtedly remain a major market for private investment. From the investor's point of view, this stems partly from the desire of many IPP sponsors to undertake projects on a non-recourse basis. Utilities can also benefit from the potentially significant amounts of financing that can be secured in one transaction for large segments of their expansion needs using this approach.

While transferring the IPP model across countries is not as straightforward as might be expected at first glance, the experience with basic project structures and contracts has to a large extent been transferred from one country to the next. In some cases, this has been facilitated by the involvement of multilaterals and bilaterals, who bring international experience. These institutions also play an important role in advising governments on policy matters which has been helpful in the transfer of experience. Also, by supporting external advisors through technical assistance, multilaterals and bilaterals have a very useful role in helping to lessen the development time of IPPs by enhancing the efficiency of the negotiation process. A well-informed government will generally prove a more responsive and flexible negotiator than an uninformed one.

Perhaps more importantly, within a particular country, the establishment of a policy and institutional framework and/or the development of the first few projects may facilitate a more rapid development of follow-on projects. The experiences of the Philippines, Pakistan, and Jamaica demonstrate this possibility (see page 11).

As the power sector becomes more diversified over time in many countries, a sound regulatory framework will enhance the financing possibilities not only for IPPs, but also for privatized utilities looking to finance rehabilitation of existing assets, as well as capacity expansion. Utility financing on balance sheet would generally add flexibility to their financing strategies by broadening their sources and types of financing.

For the long-term, the implications of integrating IPPs into more diversified power sectors must be considered, including the link between commercial arrangements (i.e., long-term sales contracts), and dispatch practices, and the potential role of IPPs in meeting the intermediate load of a system. An investigation of the experience in developed country markets may provide insight in this area.

Financing Structures and Sources

While the private debt financing mobilized for the projects examined in this study primarily involved commercial bank lending, some sponsors are beginning to look seriously at the broader capital markets to fund IPPs. Enron's US$105 million financing in the U.S. capital market of the Subic Bay project in the Philippines may set a precedent. Funding for U.S. IPPs in the capital market on a corporate or project finance basis is well-established, though it is still not common to raise construction financing in this way. More often, commercial banks provide construction financing, but are taken out by long-term institutional investors at completion. The reason for this is that banks are generally better able to assess and analyze the risks involved in construction projects than other providers of debt finance and also are not eager to tie up their capital for long periods of time.

Developing countries pose country risk barriers to tapping these markets. But with the large amount of long-term financing available in the capital market, this financing avenue will likely be critical to meeting the large demands for infrastructure financing in emerging markets.

Power Pricing and Sector Development

Perhaps the most important issue for developing countries is the price they pay for private power. Passing through the full cost of generation is already difficult in many countries, and this situation may be exacerbated as commitments to purchase from IPPs multiply. While it is recognized that access to longer-term finance would help assuage this pressure on retail tariffs, more empirical investigation of the precise link between financing terms and power pricing is required.

Although all of the projects studied achieved much longer maturities in general than had been realized before in each country, the impact of a project's debt service commitments on tariff levels would be further moderated with longer maturities. This highlights the need to establish new financing mechanisms and to tap new sources of funding to stretch out maturities beyond what has been achieved to date. Raising this funding in domestic markets would not only have the benefit of aiding the development of the local capital market, but would also alleviate some of the foreign exchange burden imposed by large repayment commitments to foreign banks.

Need for Credit Enhancement

Government guarantees and credit enhancement from bilateral (e.g., ECA) and multilateral institutions will continue to play an important role in IPP financing during the transitional phase from state-dominance to a more market-oriented system. Governments generally prefer to minimize their exposure to political risks only, but the precise scope of political risks may often be in question, particularly from the point of view of investors and lenders.

As a policy matter, the provision of limited government guarantees in certain critical areas (e.g., utility performance, fuel supply, access to foreign exchange) may be the best option in the short run to bring on line new IPP investments, while efforts are made to change the policy and institutional environment in the power sector. Assuming public sector financing options are either not feasible or favored, this is especially applicable when new capacity needs are pressing and not meeting these needs will seriously impair future economic growth prospects.

A transparent and well-functioning regulatory environment and creditworthy power purchasing utilities will greatly enhance the mobilization of IPP funding in the long-term and eventually lessen the need for government support. This environment will no doubt need to be sustained for many years in order to be considered "tested" by private investors—only then will the need for government involvement diminish.

Note on Source Material

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