Financing of the Energy Sector in Developing Countries

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by

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Abstract

If the developing countries are to grow they will have to expand their use of energy in the whole range of economic and social activities. But the substitution of energy for labor requires capital—a commodity in very scarce supply in all of these countries. And as a scarce commodity, capital is expensive and efficiency demands its careful use. For electric power supply alone the annual investment bill for developing countries lies between US$60 and US$100 billion per year.

In addition to emerging constraints on the availability of international concessionary and commercial bank finance, domestic public resources are also seriously constrained. This leaves only the domestic and international capital markets as sources of significant amounts of new investment capital. Domestic capital markets are usually underdeveloped. While much of this underdevelopment is self-inflicted, in practice there are many ways in which domestic capital markets can be encouraged.

Before capital markets can be utilized to raise funds for the energy sector, the sector, particularly the electric power part of it, will have to dramatically improve the performance of its institutions. Fortunately, there is a growing awareness in developing countries and in the development community that fundamental change is needed to improve efficiency in the energy sector. It is clear that many problems relating to management accountability and inefficiencies in energy production, distribution, and consumption in developing countries can be attributed to inappropriate roles played by the public and private sectors.

A number of innovative financial options have been suggested which might involve the private sector in efforts to assist in improving sector performance and in maintaining energy investment programs while minimizing the accrual of new government debt. The World Bank is actively encouraging countries to seek alternatives to the traditional public monopolies in the energy sector and there are several success stories worth watching. One of the major constraints, however, on new approaches, is the lack of adequate regulatory systems in most developing countries. There must be a consensus on acceptable sets of "rules of the game" tailored to the differing circumstances of each developing country, in order to increase the willingness of all parties to reach the accommodations required.
Acknowledgement

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FINANCING OF THE ENERGY SECTOR IN DEVELOPING COUNTRIES

No matter what path of development is chosen by a country, ultimately development depends upon the effective substitution of other means of energy for human labor. Whether this energy is used to move water, make cement, heat or cool a house, move a truck, or cook food, it is an input into making the human condition more bearable.

Being a developing country, almost by definition, means being a consumer of little energy other than that generated by human labor. Even a relatively high income and industrializing developing country such as Brazil has only about one-tenth the per capita energy consumption of the United States or many European countries. There are few African countries, for example, that have the electric power consumption of a minor provincial town in Europe or North America.

Capital Requirements

If the developing countries are to grow they will have to expand their use of energy in the whole range of economic and social activities. But the substitution of energy for labor requires capital - a commodity in very scarce supply in all of these countries. And as a scarce commodity, capital is expensive and efficiency demands its careful use. For electric power supply alone the annual investment bill for all developing countries lies between US$60 and US$100 billion per year \(^1\) depending on one's assumptions on the rates of economic growth, and about improvements in energy production efficiency, pricing and end use efficiency. Three large countries, China, India, and Brazil account for nearly half this total. In addition to the capital requirements of the electric power sector, other forms of energy production and consumption are equally capital intensive. The requirements for investments in oil, gas, and coal are at least of similar orders of magnitude.

At a minimum some US$25 billion of the annual power investment requirement will be in the form of imported equipment. At the present moment the combination of bilateral and multilateral funds allocated for electric power investment is less than US$10 billion per year. The prospects for any significant increase in the amounts of aid funds available is slight. The pressure, in fact, is to reduce even these amounts both in response to declines in total funds available and to the priorities given other areas of concern. The same holds true for international commercial banks. They have sharply reduced their lending to developing countries since 1982.

In addition to constraints on international concessionary and commercial bank finance, domestic public resources are also seriously

\(^1\) This does not include the large additional investment needed to consume energy, i.e., motors, appliances, air conditioning, light bulbs, etc., and to improve the efficiency of consumption.
constrained. Most governments of developing countries are finding it difficult to raise sufficient funds to meet the pressing social and economic needs of their growing populations, yet alone the billions required by the energy sector.

This leaves only two alternatives, the domestic and international capital markets. Domestic capital markets are usually underdeveloped. But much of this underdevelopment is self-inflicted. The problem is not low savings rates but lack of financial intermediation between savers and investors. In many developed countries, the financing of public (although sometimes privately owned) infrastructure by attracting private savings was a major element in the development of their capital markets. In funding this infrastructure through the tax system, most developing countries have limited this important part of capital market development.

**Energy Enterprise Performance**

Before capital markets can be utilized to raise funds for the energy sector, the sector, particularly the electric power part of it, will have to dramatically improve the performance of its institutions. Institutional arrangements in the energy sector in developing countries are characterized by: (a) widespread ad hoc government involvement in most aspects of the management of energy supply enterprises and the sector as a whole; (b) rivalry and inadequate coordination among sector institutions and with other agencies; and (c) weak accountability of sector managers to both supervising ministries and their consumers. As a result, with a few exceptions, the energy sector suffers from a combination of poor pricing, investment and regulatory policies, and inefficient operating and maintenance practices. This has led to a situation in which the sector is not in a position to raise resources either in domestic or international capital markets because most of its institutions are unable to earn a return sufficient to attract private debt or equity investment.

For example, in electric power it is not uncommon to find total technical and non-technical system loss rates of over 30%; to find excess capacity in generation side by side with shortages in transmission and distribution systems; to find expensive capital operating at a fraction of its rated capacity; to find excessive employment, etc. In the oil and gas sector the inefficiencies of state monopolies are often covered up by the large rents earned by the state in this sector. This generally unsatisfactory performance will have to change if this sector is to meet its growing financial requirements.

Fundamental changes in the institutional structure often will be required to effect changes in performance. Almost everything else has been tried. The World Bank, for example, in over four decades of lending, has supported a broad range of measures to improve and modify existing institutional structures. At best the results have been mixed. Improvements in management structures or investment planning, for example, have been compromised over time by the unwillingness to change the business environment and incentive structures for most public institutions.
In fact, the performance of power utilities in developing countries has actually deteriorated over the past few decades. Accompanying this deterioration has been a shift towards large, monolithic government owned and operated utilities. The formation of these government power utilities was based on arguments relating to the need for: economies of scale in investment and operations, improvements in coordination and efficiency, reducing reserve margins and increasing reliability, larger and longer term investments, political pressures for nationalization and elimination of foreign ownership, and so on. Although some of these reasons may be valid, there is a growing awareness in third world countries and in the development community that fundamental change is needed to improve efficiency in the power sector.

Why a New Awareness—What Has Changed

First, as developing countries have expanded their economies, they have become more urbanized and more industrialized and have sharply increased their energy intensities. The absolute size of the capital requirements for the electric power sector alone are many times larger than those of primarily rural economies just beginning the growth process. Today there are single power projects which in real terms require more capital than the total funds available from the World Bank in any one year in the 1950s and 1960s.

Second, the growth process has placed enormous demands upon the limited financial resources of the public sector. The energy sector is only one of many claimants. Today it is not unusual to find from one quarter to one third of public resources available for investment going solely to electric power. And it is still inadequate.

Third, the experience of the last few decades has brought into focus the disadvantages as well as the advantages of relying on public ownership and public credit. In spite of valiant attempts it has not always been possible to isolate the power, oil, gas and coal sectors from the inherent inefficiencies of government. These inefficiencies can be costly in such capital intensive sectors. The failure to adequately maintain costly plant and equipment, for example, can result in not only

2/ In fact, in many instances potential for economies of scale and better coordinated operations have been negated by managerial/institutional inefficiencies, and their potential has been lowered by technological and regulatory change, i.e. combined cycle turbines and co-generated power sold to the grid.

3/ These inefficiencies stem partly from the fact that many developing country governments tend to take on more than their underdeveloped institutions can handle and from the fact that governments have multiple objectives which are not well suited for translation into managing commercial and technical ventures.
shorter equipment life but also loss in the output of other firms where energy is a critical input.

The Role of Government

It is clear that many problems relating to management accountability and inefficiencies in energy production, distribution, and consumption in developing countries can be attributed to inappropriate roles played by the public and private sectors. All too often the public sector has tried to undertake more than it can handle given its limited human and financial resources. An important principle must be recognized—that the complexity of energy problems and the scarcity of resources and managerial talent in developing countries requires that each set of issues be dealt with at that level of decision making and management best suited to analyzing the difficulty and implementing the solution. Thus, political decision makers, senior government officials, and ministry level staff should focus on critical macroeconomic issues and energy sector strategy and policy, in order to set out global expectations of energy enterprise performance.

The senior management of a power or gas company, for example, appropriately buffered by an independent board of directors and operating in a known regulatory framework, could then conduct its daily operations free from government interference, to meet the agreed service targets within the regulatory guidelines. As far as possible, the utility management should be assured of continuity at the top, subject to satisfactory performance, even in the face of political change. While the enterprise is provided wider autonomy, it would become more accountable in terms of performance measured against an agreed set of specific objectives and monitored indicators. The senior management of the energy enterprise would be well advised to meet regularly with government and consumer representatives, to discuss performance problems and successes.

Also, many developing countries need to reexamine the role of government in the energy sector with a view toward defining a more productive partnership between it and private operating companies. Complete privatization is too simple an answer. It would be naive to assume that the state would be willing to give up control of such an important sector where it has legitimate responsibilities for protecting general public interests. Compromises have to be found that both recognize the general public interests and at the same time provide incentives for efficient management of the sector. A new social compact between the state and consumers and producers is required, one which relies more on the state as a regulator and less as an owner of the means of production.

Options for Involving the Private Sector in Energy Financing

Institutional and legislative developments in both the developed and developing countries are indicative of the changes that are emerging as attempts are made to secure financing and improve the accountability and performance of enterprises in this sector. Many of
these institutional changes move in the direction of government acceptance of a greater degree of market forces and private sector participation.

For example, a number of innovative options have been suggested which might involve the private sector in efforts to assist in improving sector performance and maintaining energy investment programs while minimizing the accrual of new government debt. These options include some of the following:

- more International Oil Company farm-ins or other joint venture arrangements with National Oil or Gas Companies;
- financial leasing arrangements involving offshore companies, commercial banks, and suppliers;
- operational leasing arrangements in which the lessor also operates and maintains the installations;
- enclave financing arrangements for power generation in which the owner-operator sells power to a public grid or wheels it to specific consumers;
- sale of existing operating facilities by utilities to private operators under contracts to sell back or distribute power;
- the sale of electricity futures to consumers that desire longer term price contracts;
- conversion of some portion of country energy debt into leasing arrangements;
- conversion of some portion of country energy debt into equity with a possible put option to reconvert the equity into debt after a given period;
- other debt-equity swaps and related operating arrangements;
- direct, private equity financing;
- third party financing of energy conservation, whereby energy service companies carry out efficiency improving investments and are repaid from the realized savings;
- contracting out selected services of a utility to private firms, i.e. for rehabilitation, maintenance, accounting, collection, etc.; and
- the use of management contracts for operation and maintenance work.
Some countries are now encouraging industrial producers of energy to produce electric power and sell the surplus into the public grid as part of co-generation schemes. A few countries are considering breaking up large national distribution monopolies into regional or municipal groups. In some instances, governments are encouraging private investors to come forward and manage and invest in small, local, non-grid supplies. In many cases these measures are aimed at both domestic and foreign investors with the expectation of improving efficiency and inflows of capital.

**Domestic Capital Markets - Develop Them**

The capital markets of most developing countries are often more underdeveloped than necessary. There is generally a great shortage of readily tradable securities. Deposits in foreign banks are often the preference of local investors. Yet if one studies the history of North American and European capital markets, the issuing of securities by large public companies, most of which were in what today would be called the public utility business, was the foundation of the development of the capital market. Developing countries generally have precluded this possibility by making the financing of these public works an exclusive prerogative of the government Finance Ministry.

Could not the increased interest in private foreign investment be expanded to include local private investors? There are a number of advantages to all concerned. For the government the encouragement of a local capital market has to be an important developmental goal. For local investors, large and small, putting money in a large partially foreign financed domestic enterprise may offer an attractive alternative to foreign bank deposits. For the government the existence of local interests in utility finances may ease some political problems and at the same time provide some assurances to the foreign investor who would know that his interests coincide with local interests.

In practice there are many ways in which domestic capital markets can be encouraged. The degree to which special incentives have to be offered to local investors will depend on the current state of the local capital market. Local investors may be willing to accept shares valued in local currency as long as dividends receive the same type of treatment given the foreign owners—perhaps convertible to foreign exchange. The foreign shareholders could be permitted (or required) to sell (or buy) part of their shares each year in the local market. Foreign banks now holding non-performing government loans could be encouraged to swap these debts for equity or other forms of financial participation.

The objective is to establish a local market in which shares or debt instruments held by both local and fo- reign nationals can be traded. The existence of such a market will improve the liquidity and acceptability of private participation in electric power, gas and similar types of investments as well as providing a channel for encouraging local savings.
A Few Examples Worth Watching

The World Bank is actively encouraging countries to seek alternatives to the traditional public monopolies in the energy sector. However the pace of change is going to be highly dependent on local circumstances. Change will not come easily and there will be considerable opposition from both vested interests and those that see these moves as being primarily of an "ideological" nature. The speed at which these innovations are adapted will depend also on the perceived success, particularly in attracting additional capital, of those currently pioneering the process.

Progress has been slow because of lack of experience of many governments with the private sector, and existing cumbersome government administrative procedures. Private sector participants need to be encouraged by evidence of governments' willingness to support private developments. Since international capital markets are becoming integrated, investors in developing country energy projects will expect treatment similar to what they can get elsewhere. They will look for incentives such as tax breaks, access to land, exemptions from import duties and labor requirements, and simplified customs procedures. Government guarantees are needed that the power or gas produced will be purchased, prices will be set to provide adequate returns to investors, foreign investors can repatriate profits and service debt in hard currency, and fuel will be available at reasonable prices. Draft agreements will help to clarify such uncertainties such as access to foreign exchange for debt service and dividend payments and set out explicitly who bears what risks. In Turkey, for example, model agreements and an invitation have led to proposals by private sector consortia to build and operate large coal fired thermal plants in which Government proposes to take a 30% equity.

In Pakistan, under the World Bank's recent Public Sector Energy Development Project, coal thermal, hydro, and oil thermal power projects estimated to cost $1.9 billion have been approved or are under consideration or preparation. Loans to private investors of up to 30% of project cost are being provided from a fund initially of $520 million. The fund was created with money from bilateral and multilateral sources. It is being managed by the National Development Finance Corporation. The arrangements being established include a security package for private investors providing incentives and guarantees, co-financing agreements and proper appraisal of projects. These arrangements appear to be among the most progressive and encouraging currently being offered in developing countries.

Chile's efforts to encourage private sector participation are also worth attention. These efforts, which led to nearly 100% private ownership in the electricity sector by 1988, started in the late 1970s when generation/transmission and distribution activities were separated. In the case of ENDESA, Chile's largest power company, distribution activities were consolidated into economically and geographically coherent units which are open to distribute non-ENDESA generated power (e.g. by municipalities, large industrial users and/or
self-producers of electricity, and the public in general). CHILECTRA, another large power company mainly responsible for distribution in Central Chile, was reorganized into one generating and two distribution companies. Smaller generation/transmission units of ENDESA which could be independently operated were then auctioned off (e.g. small- to medium-sized hydro units below 50 MW). Subsequently, ENDESA and CHILECTRA were transformed into privately organized corporations whose shares were broadly distributed to company employees, public sector employees, pension funds, etc., and which are now traded on the local stock exchange.

The privatization of the electricity sector in Chile was greatly facilitated by important changes in the tariff system. Originally based on accounting criteria and aimed at providing a guaranteed return to the sector enterprises, irrespective of their efficiency, tariffs now are based on long-run marginal cost for generation/transmission and short-run marginal costs for distribution companies. The standard cost of an efficient "model company" serves as a yardstick. The application of technical criteria, which are revised only every four years, ensure automatic adjustments at the bulk tariff and distribution tariff levels, with a minimum of Government intervention. A system of node prices and wheeling charges for use of the ENDESA-run transmission network and an efficient load dispatch system allow rapid transactions of electricity between generation and distribution companies, large industrial users, and self-producers. Ownership and tariff reforms in Chile's electricity system thus have succeeded in (a) promoting competition among generating companies, (b) stimulating major consumers to seek least-cost sources of electricity, (c) optimizing the use of the transmission systems, and (d) establishing effective independent monitoring of electricity prices by electricity consumers.

In addition to the countries already mentioned, a build, own, and operate type project has been implemented in China and others are being actively considered in Indonesia, the Philippines, and Bangladesh. In Poland, the government is considering a new system of regulation of the energy sector during the transition from central planning to greater use of market forces. It is also considering separating power distribution from generation and is looking at models in other countries for developing future energy facilities. In the Dominican Republic, the government is considering a policy whereby most new power generation would be located outside of the public utility. Finally, a recent study showed Costa Rica's 900 MW public power system could be economically augmented with 100 MW of additional power purchased from private power sources including small hydro, bagasse fueled sugar mill plants, and surplus output from existing industrial thermal plants.

**Regulation--Spelling Out the Rules**

One of the major constraints on new approaches such as these is the lack of adequate regulatory systems in most developing countries. These countries, by relying primarily on ownership as the means of control, have not developed much experience with more indirect means of regulation. They also lack the institutional structure to undertake this
regulation. This means that for most investors, the "rules of the game" are unclear and, in fact, outside investors are usually excluded from the game. Undoubtedly, as investors gain confidence and governments gain experience, the number of private participation schemes will increase. But until this happens there is a tendency for all parties to be excessive in their demands for guarantees and controls of performance and income.

Generally, countries wishing to reform the institutional relationships and financing of the power sector fall into two categories. First, those which wish to retain predominant public ownership of the sector but which want to reduce government interference in operational matters, make regulation more transparent and predictable, and tolerate some private participation at the fringes, e.g. industrial co-generation, or contracting out of services such as revenue collection. Second, those willing to encourage much greater private participation such as build, own and operate schemes, build, own and transfer projects, large-scale divestiture of existing assets, franchising and leasing arrangements, and large-scale independent power production. Although both of these approaches encompass a wide spectrum of ownership and control, each has a common need for a regulatory framework that promotes economic efficiency, enterprise accountability, mobilizes domestic and foreign resources, and internalizes social and environmental costs with minimum impact on efficiency.

One of the unique features of private power generation sales is the existence of usually only one or at most a few purchasers of the output. This puts a great deal of stress on the negotiations over what quantities are to be sold, at what times, and at what price. Investors try to minimize the risk with some form of multi-part or take or pay contract with various provisions to insure the pass through of cost uncertainties such as fuel prices, general inflation or exchange rate changes. In some cases the investors are simply suppliers of a product where risks are minimized and profit margins guaranteed by the government. Incentives for improved efficiency and entrepreneurial activities are present but may not be large.

Such arrangements can be improved. Countries might well benefit from some loosening up of the market structure. Is it really necessary that foreign investors be only suppliers of base load? Many developing countries are far from the situation where the national grid extends to all parts of the country. Could not investors (both local and foreign) be invited to supply and distribute power or gas in isolated markets, perhaps in competition with the national monopoly? What about permitting private owners of plants to expand their markets at their own risk—perhaps to large industrial consumers? Or alternatively to invest with large industrial users in co-generation of heat and electricity with some of the power being sold to the grid or to other consumers.

There are undoubtedly numerous variations of regulatory and market structures that can be used to enhance the opportunities for entrepreneurial activities in the energy sector. Among the regulatory
options that might be analyzed to better understand their advantages, drawbacks, and potential applicability in individual situations are:

- regulation by contract, e.g. for gas or large unique base load power plants;
- a USA style independent regulatory agency;
- regulation by previously established legislation or decree;
- regulation through intent—openness and fairness are demonstrated in deliberations;
- regulation through pricing and taxation, e.g. through setting avoided cost or bidding;
- regulation by setting precedents; and
- hybrid or mixed systems.

There is little doubt that many existing enterprises in the energy sector will oppose change. Technical, safety, and other reasons will be given, some valid, some not. Experience in the developed countries suggests that many of the problems can be solved and that large gains in efficiency are possible. Again it requires that governments set out from a much broader perspective than is presently the case, a simple and transparent regulatory framework for the entire energy sector. All parties involved should be assured that their legitimate interests can be adequately taken into account and safeguarded within a framework that provides mutual benefits to all.

Begin Discussions Now

The diversity of the parties involved, (governments, domestic investors, foreign consortia, bilateral and multilateral aid agencies, commercial banks, power or gas utilities, etc.), and the complexity of the issues suggests it would be useful to begin to pull together some of this experience, to get the parties together to discuss their expectations and needs, in forum that are less pressured than those generated by immediate investment decisions. A consensus on acceptable sets of "rules of the game" would increase the willingness of all parties to reach the accommodations required by the differing circumstances of each developing country.
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