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**OVERVIEW FOR  
PRIVATE SECTOR PARTICIPATION  
IN THE  
ENERGY/POWER SECTOR OF JAMAICA**

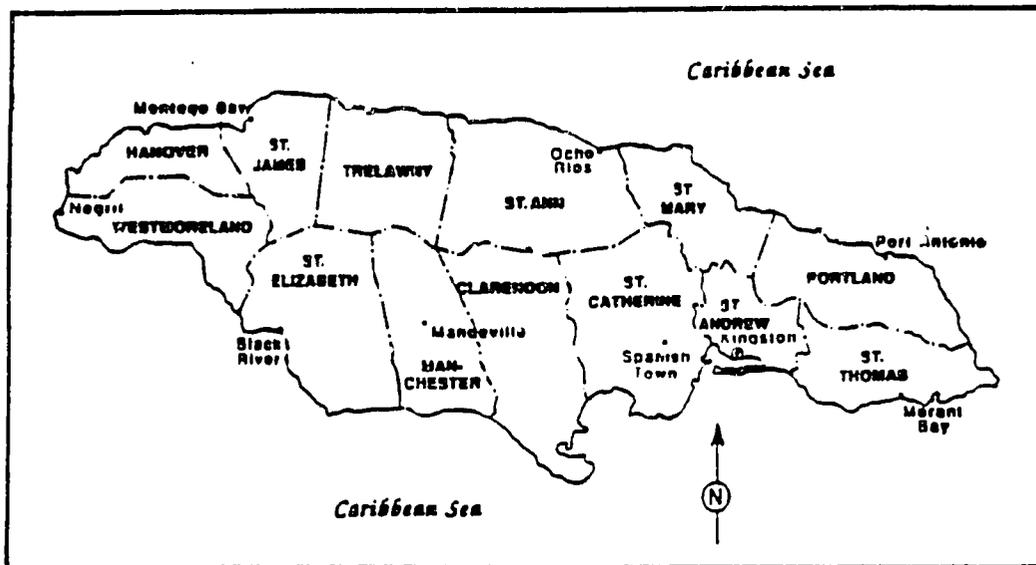
*Final Report*

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**OVERVIEW FOR  
PRIVATE SECTOR PARTICIPATION  
IN THE  
ENERGY/POWER SECTOR OF JAMAICA**



**JAMAICA**

Prepared by:

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**The views and recommendations expressed in this paper are those of consultants employed by the firm of T. Head & Co., Inc. and do not reflect the views and recommendations of the U.S. Agency for International Development or the Government of Jamaica.**

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### **1.0 INTRODUCTION**

The Government of Jamaica requires access to substantial amounts of capital to develop energy sector projects that ensure an adequate and reliable source of energy to support continued economic development. Given the fiscal constraints that the government faces, particularly in its ability to provide foreign exchange for development projects, it is not likely that the government alone can finance the amount of new energy production capacity necessary to satisfy the nation's increasing demand for energy. The Government of Jamaica is therefore examining ways in which private investment in the energy sector can supplement the publicly financed portion of the energy expansion plan.

This report provides an overview of the energy sector in Jamaica in addition to exploring the opportunities for private sector participation. The report is organized in the following manner:

Section 1.0 contains the *Introduction* to the report.

Section 2.0 provides an *Overview of the Jamaican Energy Sector*. This section discusses the organization of the sector, the expansion plans of the Jamaican Public Service Company, Ltd. and the Petroleum Corporation of Jamaica, and briefly outlines the potential for private participation.

Section 3.0 provides a *Rationale for, and Approach to, Private Participation*. This section outlines the approaches to private participation, including the Build, Own, Operate, Transfer (BOOT) and the Build, Own, Operate (BOO) models of project development. The second portion of this section discusses privatization of utilities.

Section 4.0 discusses possible *Impediments to Private Participation*. This section elaborates on the public policy, legal/institutional and contractual/financial impediments to eliciting private participation in the energy sector.

Section 5.0 provides *Recommendations* for implementing a private energy sector program in Jamaica. This section also examines a number of alternatives for pursuing private participation in the energy sector, both for the near- and medium-terms.

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### **2.0 OVERVIEW OF JAMAICAN ENERGY SECTOR**

A reliable source of electric power is essential for economic development. Such diverse activities as agricultural development, improvement of commercial services, and industrial and manufacturing expansion are closely linked to changes in the quantity and quality of energy consumed. Additionally, prospects for economic growth are closely tied to the provision of adequate supplies of energy.

Shortages of energy supply are common to most developing countries. Many countries already devote up to 25% of their capital development budgets to electric power and still have electric reliability problems. Estimates show that over \$60 billion US is being spent annually on the electricity sectors in developing countries. This number is expected to increase to over \$125 billion annually within the next 20 years. Currently, funds available from multilateral and bilateral agencies amount to approximately \$15 billion US per year. The ability of these agencies to meet the demand for electricity-related capital will be limited even if developing country governments could afford to borrow all the capital required. Jamaica alone will require approximately \$500 million US for electricity sector expansion over the next ten years.

The five year economic expansion plan of the Government of Jamaica calls for real economic growth of 6 percent per year. The government estimates that this will entail an annual growth rate in energy use of over 10 percent. Perhaps the most important factor in sustaining these levels of growth will be the significant amount of financing required, particularly in terms of foreign exchange for the energy sector. Foreign exchange reserves in Jamaica are already under extreme pressure as demand continues to outstrip supply. In fact, the Government of Jamaica currently allocates 25 percent of the nation's foreign exchange earnings to the energy sector for the purchase of fuel alone.

The Government of Jamaica, most recently through the Ministry of Mining and Energy, has traditionally overseen the development of the Jamaican energy sector. Jamaica Public Service Company, Ltd. (JPS), the state-owned utility, and the Petroleum Corporation of Jamaica, the state-owned company responsible for the exploration, development and management of Jamaica's petroleum and ethanol resources are the two principal companies responsible for supplying energy to Jamaica. The activities of both companies are coordinated by the Ministry.

In recent years these companies have experienced difficulty in providing reliable sources of energy for economic development. Shortages of energy, particularly of electric power, are becoming increasingly frequent throughout the island. Faced with a constraint on government expenditures, the Government of Jamaica may be unable to finance the additional energy production capacity that is required for continued economic development. As a consequence, the Government of Jamaica is examining ways in which to promote private sector participation in the development of the energy sector.

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### **2.1 Electric Power**

Although economic growth during much of the 1980s in Jamaica was slow, growth in the demand for electric power increased rapidly during the latter half of the decade. In 1987, for example, the peak demand for electricity increased by 8.4 percent over the previous year to reach a new peak demand of 286 MWs. In 1989, the gross domestic product grew by 4.6 percent, prompting an increase in the demand for electric power of 13.7 percent. The peak demand in 1989 increased to 305 Mws, and by January of 1990 it had reached 325 Mws.

The rapid growth in demand for electric power is attributable to the increased activity of large industrial and commercial consumers, and a rise in the overall number of electric power consumers. By 1990, JPS was serving 301,000 customers, up from 116,000 in 1970.

#### **2.1.1 Jamaica Public Service Company, Ltd.**

The Government of Jamaica purchased the Jamaica Public Service Company, Ltd. in 1974, and currently retains 99 percent ownership. The Jamaica Public Service Company, Ltd. operates under the Electricity Lighting Act and a license granted in 1978 for a period of 39 years. Under the license, JPS is responsible for supplying electricity to the entire nation, with the exclusive right to provide electricity for both public and private use. No firm or individual, however, may be prevented from providing power for its own use. Furthermore, the law permits JPS to purchase bulk power from private producers.

The electricity rates under which JPS operates are set by the Minister of Mining and Energy, upon recommendation by JPS. The electricity tariffs consist of one residential rate, three commercial/industrial rates, and a single street lighting rate. The average charge for electricity to residential customers is 13 cents/kwh. A variable fuel surcharge, based on a fuel index price, is passed through to the customer.

The Minister of Mining and Energy generally consults with several groups, including the Cabinet of Ministers, when setting consumer electricity rates and before making a decision on proposed rate increases. In determining the electric power rates, several political and social equity factors are considered in addition to the needs of JPS for increased revenue. These factors have worked against JPS in securing adequate revenue to undertake proper maintenance of existing facilities, and to expand generating capacity to meet future demand. (A Public Utility Commission is provided for in the legislation, but has been inactive since 1978.)

#### **2.1.2 JPS Generating System**

In July 1990, JPS had 443 MWs of installed capacity. The system reached a peak load of 325 MWs in early 1990. The daily peak demand occurs between 5 and 9 p.m. in Jamaica. The

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Kingston-St. Catherine area, on the southeast coast of the island, accounts for 60 percent of the total system load.

The existing generating capacity is shown in Table 2.1. The system consists of 40 MWs of diesel capacity, 303 MWs of steam turbine capacity, 74 MWs of gas turbine capacity, and a maximum of 23 MWs of run-of-the-river-hydroelectric capacity. Oil-fired steam turbines are located at Hunts Bay and Old Harbour. The Rockfort station, located just east of Kingston, is a 2 x 20 MW slow diesel, barge-mounted facility. Gas turbines are located at Hunts Bay in Kingston, in addition to the steam turbine facility, and at Bogue, where 37.5 MW of new gas turbines were installed in August, 1990. The run-of-the-river-hydroelectric facilities are located on rivers on the north side of the island. These units were installed between 1945 and 1988 and contribute less than 10 percent of the system's overall gross generation.

Over 60 percent of the existing generating capacity is over 15 years old. Much of the capacity is in poor mechanical shape which contributes to frequent outages. The reliability of the system is expected to decrease over the next 1-2 years due to continued deterioration of its aging capacity. Loss of Load Probability (LOLP) in 1988 was estimated at 12 days per year, but is expected to climb above 20 days per year before substantial amounts of new capacity can be added to the grid. This may further limit the ability of JPS to respond to the increasing demand for electricity and may also add to delays in securing new capacity.

### **2.1.3 JPS Expansion Plan**

According to the recommended expansion plan (Table 2.2) completed by R.W. Beck and Associates in July of 1989 for JPS, the JPS system will require an additional 1052 MWs by year 2008. This includes 198 MWs of gas turbine capacity expected to come on line through year 1994 to match the growth in demand for electricity and to replace existing units. JPS began operation of the first 40 MWs of gas turbine capacity during August of 1990. A second 40 MWs of gas turbine is expected to come on line the first half of year 1991. Tender offers for approximately 100 MWs of gas turbine (most likely in a combined cycle configuration) have been released with a closing date of 17 September 1990.

Following installation of the gas turbines, the JPS recommended expansion plan calls for an additional 305 MWs of new coal-fired capacity to be installed from year 1996 through year 2000. By 1996, 5 hydroelectric plants, with a total capacity of 15 MWs, would come on line.

The next increment of generating capacity to come on line would be a 61 MW coal-fired plant and a 33 MW gas turbine unit, both in year 2002. This increment would be repeated in year 2003. Three more coal facilities of 61 MWs each would be added consecutively during the period of years 2004-2006. The following year would see an additional 33 MWs of gas turbine and eight MWs of hydroelectric capacity. Finally, in year 2008, a 61 MW coal-fired facility would come on line.

Table 2.1

**JAMAICA PUBLIC SERVICE COMPANY, LTD.**  
**Installed Generating Units as of July 1989**

Station	Unit	Brand Name		Date of Commissioning	Name Plate MW (Net)	Normal CMR MW (Net)	Difference Due To	Totals
		Boiler	Turbine					
O/H	#1	Francotosi	Francotosi	1968	33.00	30.00	Boiler Capacity	213.5
	#2	Mitsubishi	Hitachi	1970	60.00	60.00		
	#3	Foster Wheeler	General Electric	1972	55.00	55.00	Boiler Capacity	
	#4	Foster Wheeler	General Electric	1973	68.50	68.50		
H/B	#1	Babcock & Wilcox	Brush	1953	12.50		On Cold Storage	
	#2	---	---	1955	12.50		On Cold Storage	
	#3	---	Parsons	1958	15.00		On Cold Storage	
	#4	---	---	1960	15.00		To Be Retired	
	#5	---	Assoc. Elec. Inc.	1962	20.00	20.00		
	#6	Foster Wheeler	General Electric	1976	68.50	68.50		88.5
Rockfort	#1	Mitsubishi	Medinsha	1985	20.00	20.00		40.0
	#2	Mitsubishi	Medinsha	1985	20.00	20.00		
G.T.	#1	General Electric		1968	16.50	14.00	Peaking for short periods only	
H/B Bogue	#2	General Electric		1969	16.50	14.00		88.0
	#3	John Brown		1973	22.75	20.00		
	#4	John Brown		1974	22.75	20.00		
	#5	John Brown		1974	22.75	20.00		
Maggotty		Harland Engineering		1959	6.37	6.30	Hydro output varies with stream flow	
L.W. Fliver		Harland Engineering		1952	4.75	4.70		
Roaring River		Harland Engineering		1949	4.05	4.05		
U.W. Fliver		Dominion Engineering		1945	3.60	2.60		
Rio Bueno A		Harland Engineering		1966	2.50	2.50		
Constant Spring				1988	0.77	0.77		
Rio Bueno B				1988	1.10	1.10		
Hams Horne				1988	0.64	0.64		
Morant River Bogue	#1	General Motors		1965	1.70	---	Defective/Retired	0.5
	#3	General Motors		1966	1.70	---	Defective/Retired	
	#6	General Motors		1966	2.10	---	Defective/Retired	
	#7	General Motors		1966	2.10	---	Defective/Retired	
	#8	General Motors		1966	2.10	---	Defective/Retired	
	#10	Mirrless		1959	2.00	---	Defective/Retired	
	#11	General Motors		1945	0.75	0.50		

Source: R.W Beck Co. Report on Near Term Options August 1989

**Table 2.2**

**JAMAICA PUBLIC SERVICE COMPANY LTD.  
GENERATION EXPANSION STUDY**

**Recommended Sequence of Additions**

YEAR	LOLP days/yr	LOAD FORECAST NET MW	PERCENT RESERVE	GENERATING UNITS ADDITIONS	NET MW ADDED
1989	11.2	301.3	43.4%		
1990	18.3	318.4	35.7%		
1991	27.5	333.8	29.5%		
1992	9.2	351.1	41.9%	2 x GT	66
1993	2.9	369.2	52.8%	2 x GT	66
1994	0.9	388.1	62.4%	2 x GT	66
1995	1.7	407.8	54.6%		
1996	0.6	428.3	64.9%	1 x COAL & 5 x HYDRO	76
1997	0.7	449.7	62.9%	1 x COAL	61
1998	1.8	471.9	54.0%	1 x COAL	61
1999	1.9	495.1	53.5%	1 x COAL	61
2000	0.9	519.1	58.9%	1 x COAL	122
2001	1.9	544.1	51.6%		
2002	1.7	570.0	52.0%	1 x COAL & 1 x GT	94
2003	1.9	597.0	49.9%	1 x COAL & 1 x GT	94
2004	1.1	625.1	53.0%	1 x COAL	61
2005	0.8	654.3	55.5%	1 x COAL	61
2006	1.9	684.7	47.9%	1 x COAL	61
2007	1.9	716.2	46.9%	1 x GT & 1 x HYDRO	41.4
2008	1.4	749.0	48.6%	1 x COAL	61

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An expansion plan study is currently being carried out by SWECO, a Swedish firm, based on a least-cost expansion model. This study, along with a power market survey and distribution master plan, should be completed in mid-1991.

### **2.1.4 Constraints on Public Sector Expansion**

Expansion of the electric power sector has historically been a public sector responsibility since the Jamaica Public Service Company, Ltd. is government-owned. In recent years, however, the Government of Jamaica has experienced difficulty in developing the energy sector to meet the growing demand for energy. As a result, over the last few years, there have been increasingly frequent shortages of electric power throughout the island, resulting in occasional blackouts.

JPS would prefer to maintain a reserve margin of 54 percent of its peak load in addition to meeting future demand. In fact, the Jamaica Public Service Company, Ltd. is operating with a reserve margin estimated to be 36 percent of its peak load based on its 443 MW of nameplate installed capacity. Current available capacity is presently between 410-385 MWs which further reduces actual reserve margins to between 15-25%. Due to the inherent isolation of island utilities, there is no opportunity for JPS to interconnect with other utilities. Therefore, JPS must maintain a reserve margin that is relatively high when compared to utilities located in countries with multiple grids or with the ability to import power from other countries.

However, when compared with other utilities serving remote areas, even a 54 percent reserve margin may be too low. For example, the Trinidad and Tobago electric utility maintains a 114.5 percent reserve margin over its peak demand. Similarly, the Fiji Electric Authority maintains a 75 percent reserve margin.

The unexpectedly high demand for electricity over the last several years is, combined with a number of other factors, diminishing the ability of JPS to maintain a safe reserve margin and to meet future demand. Primarily, a shortage of foreign exchange to purchase new generating equipment and spare parts has, and will continue to, constrain JPS. The Government of Jamaica already earmarks 25 percent of its annual foreign exchange earnings to purchase petroleum. This places constraints on the government in making additional allocations of foreign exchange to the energy sector.

Another limiting factor is an electricity rate structure that prevents JPS from generating sufficient revenue to cover its operating and expansion costs. Prior to April 1990, when rates were increased by 37 percent, the tariff had not been increased for six years. It was estimated that JPS was losing two cents on every kWh generated. Although the new tariff comes closer to covering the JPS' operating expenses, it is still not sufficient to cover all the required maintenance and expansion costs of the utility.

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Finally, the old tariff was structured in a declining block format that encouraged consumption rather than conservation. Following the tariff increase in April, a new flat rate structure was substituted for the declining block format in an attempt to slow the increase in demand. Recent economic growth, however, has served to increase demand, despite price signals to the contrary.

### **2.1.5 A Private Sector Role in Power Sector Expansion**

The continuing shortages of electricity are having a significant impact on the economy. Although no estimates of the impact of electricity shortages on the Jamaican economy have been completed, loss of productivity, spoilage of product, damage to equipment and expenditure of foreign exchange to buy standby generating sets could amount to millions of dollars per day. According to studies done in other countries, electric reliability losses can be as high as 4% of GDP in the short term. Many foreign investors are concerned about the reliability of electricity supplies, some so much that they have decided not to invest in Jamaica. Due to this, and other serious economic factors, creating and maintaining adequate energy supplies is a priority for the Government of Jamaica.

The private sector has demonstrated a substantial interest in supplying power to JPS. A role for the private sector, with its access to additional capital and experience with power generation, could include independent energy production for sale to JPS, and possibly a greater role in transmission and distribution. A second option for private participation could include the privatization of some or all of the assets of JPS.

Regarding the option for independent power production, Section 7 of the Electric Lighting Act of Jamaica states that the Jamaican Public Service Company, Ltd. shall have the right to purchase electricity in bulk from private suppliers. This right has not been utilized although there are several companies on the island that generate significant amounts of power for their internal use.

Recent events in Jamaica suggest that the government is encouraging the private sector to take a more active role in the development of the economy, particularly in industries where the Government has traditionally had primary responsibility, such as the hotel, banking and communication industries.

Policy in the power sector is being examined closely by the government. An Energy Sector Investment Program and Strategy Study, conducted for the Ministry of Mining and Energy, is scheduled for the near future. Its objective will be to develop an energy sector investment program and implementation strategy, including a comprehensive action plan for participation of the private sector in the energy sector. This plan will identify needed projects, sources of capital and time frames for implementation. A preliminary plan should be completed by early 1991.

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The Government of Jamaica recently announced that private proposals for future generating capacity are welcomed. JPS is also interested in proposals that feature the use of biomass, and municipal solid waste, or those that are configured in a cogeneration mode. JPS envisions the possibility of a foreign utility's entering into a cooperative relationship with JPS, eventually leading to an equity position.

In an era of reduced public sector access to foreign borrowing, the Honorable Hugh Small, Minister of Mining and Energy, succinctly summarized the rationale for private sector participation in the energy sector: "...if you have to choose between education and health on the one hand, and investments in the energy sector on the other, we [Government of Jamaica] have to choose health and education since private sector people can be involved in the energy sector. They cannot do what government has to do in health and education."

### 2.1.6 Non-JPS Power Generation

A substantial amount of self-generating capacity is installed on the island. This capacity, which is strictly for the internal use of industry, commercial and residential concerns, may equal or surpass that which is installed by JPS.

Many large commercial buildings and hotels have standby electric generating capacity, as do a large percentage of middle class homes. In addition, most large industries in Jamaica have some form of self-generating capability. Types of generating capacity for the internal use of industrial concerns range from units designed for emergency use only to generating units employed on a full-time basis. Estimates of the total generating capacity for the internal use of industrial concerns vary greatly, but many observers believe the self-generating capacity may exceed 400 MWs, including the bauxite industry and generator sets used only for emergency or standby power. Presently, however, there are no companies selling power to JPS, although exchange arrangements exist for the transfer of electric power to and from JPS.

Within the bauxite industry alone, total installed capacity is estimated to be 150 MWs. There appears to be little potential, however, for the sale of power from the bauxite industry to JPS because of the current prices offered by JPS. Additionally, much of the capacity within the industry is 60 cycle power, whereas the JPS system is 50 cycle. Secondly, the bauxite industry generally optimizes its generating plants to satisfy both its electric and thermal demands, leaving little excess power for sale to JPS. Nonetheless, many bauxite facilities could reconfigure their systems to supply as much as 30-50 MWs of electricity to JPS, given a JPS cost-avoided price for electric power.

A number of other industries also produce power for their internal use. The Caribbean Cement Company, Ltd. has 29 MWs of diesel capacity with a peak load of only 17 MWs. It is currently in the process of interconnecting its two powerhouses. This interconnection should be completed by January 1991. At that time the Caribbean Cement Company, Ltd. may be able to sell as

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much as 18 MWs to the JPS grid.

In the early 1980s, Jamaica Flour Mills, Ltd. (JFM) approached the Caribbean Cement Company, Ltd. in an attempt to purchase power. The Jamaica Public Service Company, Ltd. denied permission to the Caribbean Cement Company, Ltd. to sell power directly to JFM, claiming it could only sell excess power to JPS. However, the companies decided it was not feasible to move ahead at the purchase price quoted by JPS (avoided fuel cost only). Tropicana Ltd., which also directly approached the cement company to purchase power, ran into the same difficulty. More recently, the InterAmerican Development Bank approached the Caribbean Cement Company, Ltd. to offer its assistance in helping the company expand its operation, possibly by the installation of additional electric generating capacity for sale to the JPS grid.

The Jamaican sugar industry also generates its own electric power through the burning of bagasse. A number of studies have indicated that the potential for the sugar industry to produce electric power for the JPS grid may exceed 60 MWs of firm, bagasse-fired capacity.

The Government of Jamaica recently signed a Memorandum of Understanding with International Energy Finance Ltd. (IEF) of the United States which authorizes IEF to develop a privately owned cogeneration project at one of the largest sugar mills in Jamaica. The plant is expected to be a 20-30 MW bagasse and oil-fired facility that will provide the sugar mill with steam and electric power. The plant will also enable the mill to sell excess power to JPS. The project development team has initiated conceptual engineering work, project financial structuring, and preliminary negotiations with the Government of Jamaica.

For the future, there is significant potential for interconnection with self or cogenerating industry, once a realistic price for selling power to the grid has been established. The first steps towards setting an efficient price have already been taken with the completion of a cogeneration tariff study by P. W. Beck for JPS. Although an actual price has not been established, the use of an avoided cost methodology should make the price sufficiently attractive that self-generators will make power available to JPS.

## **2.2 Petroleum Sector**

### **2.2.1 Petroleum Consumption and Demand**

Jamaica is dependent on petroleum for 90 percent of its primary energy needs. With the exception of small amounts of hydro-electric capacity, bagasse used in the sugar mills and wood charcoal, all primary energy used in Jamaica is in the form of imported oil. Fuel imports have increased from 12 percent of all imports in the mid-1960s to nearly 25 percent of total imports by the end of the 1980s. This has placed a heavy burden on the national economy, particularly on the nation's foreign exchange reserves and earnings.

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In 1987, national petroleum consumption was 12 million barrels (see Table 2.3). Of that total, the Jamaica Public Service Company consumed three million barrels of fuel oil. The bauxite industry accounted for an additional three million barrels of fuel oil, gasoline consumption another 1.7 million barrels, and automotive and marine diesel oil combined approximately 1.4 million barrels.

### **2.2.2 Petroleum Sector Organization**

The petroleum sector falls under the supervision of the Ministry of Mining and Energy. Within this Ministry there is an Energy Division which promotes energy conservation and coordinates policy within the sector, among its other responsibilities.

#### **The Petroleum Corporation of Jamaica**

The Petroleum Corporation of Jamaica (PCJ) was established as a statutory corporation by the Government of Jamaica to carry out various functions, including the development of Jamaica's petroleum resources. Under the Petroleum Act, the PCJ has the ability to acquire and operate refining, processing or marketing facilities through subsidiaries or contractors.

The PCJ acts as the chief advisory body to the Ministry of Mining and Energy on energy issues, particularly those related to petroleum. Additionally, it provides assistance to the Ministry in drafting petroleum sector policy and oversees the operations of its subsidiary companies.

The PCJ functions as the liaison with the governments of Venezuela, Mexico and Nigeria to manage Jamaica's crude oil supply agreements with those countries. As Jamaica's inter-governmental contact for energy issues, the PCJ maintains relations with the state oil companies of other countries, including Canada (Petro Canada), Norway and Finland.

#### **Petrojam Limited**

A PCJ subsidiary, Petrojam operates a 36,000 barrels per day refinery acquired from Esso in 1982 and located adjacent to Kingston Harbour. A fully government-owned company, Petrojam Limited operates as an independent organization, complete with subsidiaries and operating and service divisions.

**Petrojam's Logistics & Shipping Division:** Petrojam, through its logistics Division, imports all crude oil under the San Jose Accord, and all deficit petroleum products for domestic usage. In addition, Petrojam handles term exports to a number of locations within the Caribbean and supplies one of the bauxite companies operating in Jamaica, even though bauxite companies are able to import on their own behalf.

The Logistics Division coordinates distribution and supplies for both island and export

Table 2.3

## JAMAICA : PETROLEUM DEMAND FORECAST 1988-1992

(Volume in Thousand Barrels)

PRODUCT	1984	1985	1986	1987	1988	1989	1990	1991	1992	AVG.* ANNUAL CHANGE
L.P.G	377	368	397	414	426	437	448	459	470	2.6
Avgas	15	12	7	9	10	11	11	12	12	6.0
Motor Gasoline	1,545	1,504	1,569	1,683	1,725	1,768	1,812	1,858	1,876	2.2
Turbo Fuel	770	986	921	1,035	1,201	1,282	1,368	1,425	1,486	7.6
Kerosene	292	353	406	422	367	374	382	390	397	2.0
A.D.O	1,177	1,143	1,167	1,170	1,391	1,431	1,453	1,475	1,498	5.3
M.D.O	178	178	171	185	220	227	233	240	248	6.2
Fuel Oil	8,242	7,082	6,460	6,901	8,284	10,179	10,575	10,752	10,866	9.9
Lubes	47	43	70	79	79	80	80	79	80	0.3
Asphalt	68	63	86	116	150	86	85	84	104	1.6
<b>TOTAL PETROLEUM</b>	<b>12,711</b>	<b>11,732</b>	<b>11,254</b>	<b>12,014</b>	<b>13,853</b>	<b>15,875</b>	<b>16,477</b>	<b>16,447</b>	<b>17,037</b>	<b>7.4</b>

\*1988-1992

Source : National Energy Outlook 1988-1992, Petroleum Corporation of Jamaica

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needs. A shipping operation using owned and time-chartered vessels, supplemented by spot charters and out charters of company-controlled vessels, is handled by Petrojam's Logistics Division.

Petrojam's Refining Division: This division operates the oil refinery and associated facilities, including the Industry Loading Racks, oil movement and storage and marine terminal facilities.

Petrojam Ethanol Limited: Ethanol production is handled by the refining Division on contract to Petrojam Ethanol Limited, a subsidiary of Petrojam.

Petrojam U.K. Limited: This company was established to purchase alcohol at EEC auction for processing into fuel ethanol by Petrojam Ethanol for the U.S. market.

Petrojam Belize: Petrojam Belize manufactures high test molasses for conversion to hydrous ethanol at Bernard Lodge, Jamaica. It is also responsible for petroleum marketing operations in Belize. Note: Petrojam has also developed a strong high test molasses market in the United States.

Petronol Limited: Petronol Limited is a subsidiary of the PCJ and operates both a sugar factory at Bernard Lodge, Jamaica and a fermentary/distillery which manufactures hydrous ethanol from molasses, some of which is obtained from Petrojam Belize.

The Petroleum Company of Jamaica (PETCOM): PETCOM is a PCJ subsidiary which operates a petroleum marketing company which owns retail service stations. It also bottles and markets cooking gas, and retails other petroleum products to industrial consumers.

### PCJ's Nigerian Crude Contract

PCJ has a crude oil supply agreement with the Nigerian National Petroleum Company (NNPC) which allots 15,000 barrels per day of Nigerian crude to Jamaica. The PCJ has used this allotment in the past as a basis for processing agreements and trading arrangements. A number of cargoes have been processed at Petrojam Limited for local consumption as well as for the export of low sulphur fuel oil. The PCJ recently requested an increase in the allotment of up to 30,000 - 35,000 barrels per day.

### Non - Energy PCJ Activities

These activities include the provision of low-cost public housing, tourism, development of nature reserves and parks, orchard farming, cane farming (in Jamaica) and other agricultural endeavors. Many of these activities have either been sold or are in the process of being sold as they do not pertain to the core business of the PCJ. The PCJ has also undertaken an in-house analysis to

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streamline its structure and activities, with the intent of bringing them more in line with purchasing, refining and distributing petroleum products.

### **2.2.3 Petroleum Sector Expansion**

In recent years the Government of Jamaica has experienced a decrease in the demand for heavy fuel and a coincidental increase in the demand for light petroleum products such as kerosene, gasoline, diesel, and turbo fuel. Demand for light oil products is expected to continue to increase over the next several years. The demand for fuel oil is also projected to increase over the short term as JPS adds new capacity to meet the growing demand for electric power on the island. (Table 2.3).

The Petroleum Corporation of Jamaica projects total demand for petroleum products to increase to 17 million barrels by 1992. Projections published by the PCJ estimate that the Jamaica Public Service Company, Limited will increase its consumption to 3.4 million barrels during this time period with consumption by the bauxite industry increasing to 7.3 million barrels. Demand for gasoline is also projected to rise to 1.9 million barrels while automotive and marine diesel consumption should rise to nearly 1.8 million barrels.

However, should oil prices continue at their present levels, it may be prudent for JPS to switch to the use of coal for new electricity generating facilities. The anticipated lower cost of coal would make such a conversion beneficial.

#### The Refinery Upgrade Project

Petrojam's refinery may need to be reconfigured should there be dramatic increases in energy demand or should coal become the fuel of choice.

The Petrojam refinery is basically a hydro-skimming unit designed to recover naturally occurring products in a given type of crude oil while reforming part of the naphtha yield to make high octane gasoline. The refinery has a small vacuum pipestill which is able to extract vacuum gas oil from pipestill bottoms. However, this unit was designed for the manufacture of asphalt and, as such, is not able to increase the clean product yield of a barrel of crude beyond what occurs naturally.

Over the last few years, Petrojam has developed an upgrading project for the installation of a larger vacuum pipestill and a Fluid Catalytic Cracking Unit (FCCU). This upgrading project, estimated to cost about US \$60 million, has shown good rates of return on investment and is expected to increase existing throughput capacity from 36,000 barrels per day to 50,000 barrels per day.

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### Refinery Storage Expansion

Additional storage would enable the refinery to more efficiently process and store third party crude oil in preparation for oil exchange transactions. The refinery's storage expansion project provides for the installation of two 95,000 barrel fuel oil tanks at an estimated cost of \$2.4 million.

In addition, the ability to store cracked fuel oil would give Petrojam the ability to supply some of the low API cracked fuel oil currently used by Jamaican bauxite companies.

### Expansion of Refinery Process Unit

This project, in conjunction with the FCCU Upgrade, is projected to cost some US \$25 million. Improving the efficiency and total capacity of the refinery would allow export of finished products to the immediate Caribbean area as well as greater foreign exchange earnings.

### Oil Terminal in Belize

Petrojam currently has a long-term agreement with the Belize Government to supply its fuel requirements for the generation of electricity. A marketing organization was established to facilitate the process of exporting fuel from Kingston to Belize. The opportunity now exists to expand this operation. However, a storage facility, estimated to cost US \$2.4 million, needs to be built in Belize City to permit such expansion. Estimates show that the savings/earnings from overseas marketing would pay for the cost of the terminal in approximately three years.

Petroleos de Venezuela S.A. (PDVSA) has offered Petrojam assistance through its subsidiary, Lagoven S.A., the largest oil company in Venezuela. Such assistance is presently taking the form of funding the storage tank expansion and assisting in the development of the proposed storage terminal in Belize, using San Jose Accord credits.

### Reformer Upgrade Project

Upgrading the Catalytic Reformer at the refinery would allow the refinery to achieve the following objectives:

- Increase the nominal capacity of the reformer unit by approximately 2800 barrels per day to approximately 4500 barrels per day. This capacity increase would increase the refinery's production capability to meet current and projected future gasoline demand.
- Allow for the production of a higher octane gasoline blendstock component, thus allowing for reductions in the production of unleaded gasoline.

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- Increase the cycle length of the plant to approximately one year runs before the plant needs to be shut down for catalyst re-activation.

The capital investment required for implementing this project is estimated to be US \$3,000,000, with a discounted cash flow return on investments of over one hundred percent.

### Installation of a Rectifier for Petrojam Ethanol's Dehydration Facility

Engineering specifications were drafted for the installation of a small rectifier adjacent to the APV column of the Petrojam Ethanol Dehydration Plant. In fact, Petrojam has already completed the engineering work for the rectifier. This rectifier would enable Petrojam to convert to the lower quality, and therefore lower cost, wine ethanol feedstock available under the EEC auction arrangement. Cost of installation, including using retired light ends equipment on hand, is \$250,000, with recovery of the investment projected to take less than a year.

### Shipping

Petrojam is looking at increasing its tonnage through the use of its own shipping capabilities instead of employing outside chartering. An assessment of Petrojam's shipping needs and operations is currently being conducted.

### Bernard Lodge Distillery

Tentative plans are in place to increase the hydrous ethanol output at the Bernard Lodge Distillery. Petrojam currently processes hydrous ethanol, along with European wine alcohol and fuel grade ethanol, for export to the U.S. Legislation recently passed in the United States provides for exports of ethanol of up to 65 million gallons from the CBI region as long as it meets a thirty-five percent local value-added criteria. Studies also show that a market exists for sugar cane-derived hydrous ethanol with sufficient potential to justify continued operation of the distillery at Bernard Lodge.

#### **2.2.4 Constraints to Petroleum Sector Expansion**

One of the major constraints to the government-financed expansion of the petroleum sector is the lack of foreign exchange to purchase crude oil and to invest in new refinery equipment. The energy sector already consumes approximately twenty-five percent of the foreign exchange earnings of Jamaica making it difficult to allocate additional foreign exchange to the energy sector. The Government of Jamaica is looking for private investment to assist in the expansion of the petroleum sector, particularly in the development of the catalytic cracking unit.

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### **2.2.5. Petroleum Marketing Companies**

Several petroleum marketing companies operate within Jamaica, including affiliates of three large multi-national corporations--Esso, Shell and Texaco. These three companies possess over ninety percent of the market share of petroleum products. Petrojam supplies them with fuel products, LPG and asphalt. However, specialty products, such as lube oils and aviation gasoline, are supplied by the companies themselves.

### **2.2.6. Deregulation of the Petroleum Industry**

The petroleum industry in Jamaica was recently deregulated and all price controls, except in the case of domestic kerosene, removed. The subsidy for domestic kerosene was not affected by deregulation because of its widespread domestic use. (It is used by many of the less affluent in Jamaica for cooking and lighting, especially in the rural areas. The price is kept low to avoid switching to wood or charcoal, with their resultant danger of deforestation.)

It is anticipated that deregulation will encourage entrepreneurs to enter the petroleum business at the retail level due to less restrictive requirements on filling station start-ups. Another expected outcome of deregulation should be more marketing opportunities at the Refinery for new players.

## **3.0 RATIONALE FOR, AND APPROACH TO, PRIVATE SECTOR PARTICIPATION**

### **3.1 Rationale**

The Government of Jamaica needs more electric power for sustainable social and economic development than it is currently able to produce. It lacks sufficient financial resources to expand its supply systems fast enough to keep pace with the growing demand. Many countries with situations similar to that of Jamaica have turned to the private sector to provide additional energy production capacity. The Philippines, Thailand, Indonesia, Pakistan, the Dominican Republic and Costa Rica have instituted laws and national policies that allow and encourage private sector investment in their energy sectors. Independent power projects are currently operating in the Dominican Republic, China and the Philippines.

Developing countries are pursuing private participation in the energy sector for two reasons. First, the private sector can bring additional sources of finance to the energy sector that are not accessible to the government-owned energy companies. This financing may not require a sovereign guarantee by the government for repayment, and therefore, private investment can reduce the amount of government borrowing for the energy sector. Second, through its expertise

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and the introduction of market forces and competition, the private sector can raise the overall efficiency of the energy sector.

### **3.1.1 Additional Resources**

As government-owned corporations, both PCJ and JPS are limited in their ability to borrow on foreign markets by the credit capacity of the Government of Jamaica. The government is under severe foreign exchange borrowing limitations imposed by the International Monetary Fund and international financial markets. Borrowing on domestic markets is difficult, as interest rates are currently in the 30 percent range. The private sector, however, can access sources of capital that are not available to the energy sector and can assist the Government of Jamaica expand its energy production capacity. Most importantly, the financing provided by the private sector would not require a government guarantee, thus reducing the overall debt burden in the energy sector for the Government of Jamaica.

### **3.1.2 Efficiency**

Developing countries are also looking to the private sector to improve the managerial and operational efficiency of the energy sector. Public sector energy companies are usually monopolies with little incentive for efficiency improvements. If the private sector is brought into the energy supply operation as a competitive force, it may be possible to increase the incentive for efficiency improvement in the sector. Moreover, private companies may be able to bring needed energy production capacity on line in a more rapid and efficient manner than public companies. Such improvements become even more of a possibility if government procurement procedures and regulations in selecting contractors and suppliers, mandatory for public companies, are removed for private companies.

## **3.2 Approaches to Private Power**

Developing countries have followed one or both of two possible routes to increasing private sector participation in their power sector: independent power or privatization.

Independent power facilities are privately owned and operated electric power plants that sell bulk power to the national grid. This category includes cogeneration facilities, generally as grid connected systems. Independent power facilities can be developed through several approaches. The most commonly discussed is the Build-Own-Operate-Transfer (BOOT) model as developed in China at the Shajiao plant and the Hab River project in Pakistan. The Philippines, Turkey, Indonesia, Thailand, Dominican Republic, and Costa Rica are also following this approach. Under the BOOT scheme private developers construct a power generating station, sell power to the utility for an agreed-upon price, and transfer the project to the utility at a nominal price once

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the project debt has been repaid. Variations on this theme are Build-Own-Operate (BOO), in which no transfer takes place, and Build-Own-Lease (BOL). These, and other options, are discussed below.

Privatization entails the entire or partial sale of a publicly held electric utility to private investors. Chile has undertaken perhaps the most advanced privatization program in the developing world. Malaysia has committed itself to this path as well. This divestiture can take the form of selling shares of the public utility to private investors, selling part of the national system to private owners including discreet units of generation, transmission and distribution, or selling only one or two of these functions.

### **3.2.1 Independent Power Approaches**

There are two basic approaches under which the private sector can participate in a government-controlled electric utility or energy facility, including;

- o Build, Own, Operate, and Transfer (BOOT) and Build, Own, Operate (BOO) schemes; and
- o Lease of an existing utility generating plant or energy facility.

There are several variations of these options, particularly the BOOT/BOO scheme. A description of each of these options is provided below.

#### **Build, Own, Operate, and Transfer and Build, Own, Operate Projects**

The independent power options given the widest consideration are the Build, Own, Operate, Transfer (BOOT) and the Build, Own, Operate (BOO) schemes. There are many variations on the basic BOOT/BOO concept that depend on the final ownership disposition of the facility--whether it is transferred to the utility or whether it remains the property of the private company.

The BOOT/BOO approach developed as a means for countries with limited hard-currency and sovereign borrowing or severe budgetary constraints to acquire needed infrastructure by attracting foreign private investment. In the past, BOOT/BOO type projects have been used to finance power plants, toll roads, water supply facilities, and port facilities.

These projects are of the limited recourse nature and are financed on the basis of the cash flow and risks associated with each project. Creditors and providers of debt financing have only limited recourse to the project owners. These projects tend to be complex and usually require detailed risk analyses to insure that all risks are satisfactorily covered. Financial analyses to insure adequate rates of return and cash flow coverage are also required. Debt is raised by the project company from commercial sources, often with the backing of export credit guarantee

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agencies or multilateral or bilateral donors. Lenders are typically not covered by direct full sovereign guarantees. Debt-to-equity ratios are typically in the range of 70 to 85 percent debt and 15 to 30 percent equity.

All BOOT/BOO projects to date have been complex both from a legal and financial viewpoint because of the need to minimize risks to the various participants in the project. As a result, they have been expensive projects to develop. A typical project structure is shown in Chart 3.1 which describes the relation of all the entities involved in a BOOT/BOO project.

The project company is typically characterized by a consortium of project developers, foreign and local investors, equipment suppliers, and contractors who form a private company to build and operate the power facility. Government support has been critical in guaranteeing the performance of government entities (i.e., the electric utility, national petroleum company, customs and immigration officials) and for guarantees to cover foreign exchange. Government intercession is also crucial for removing potential legal and regulatory constraints.

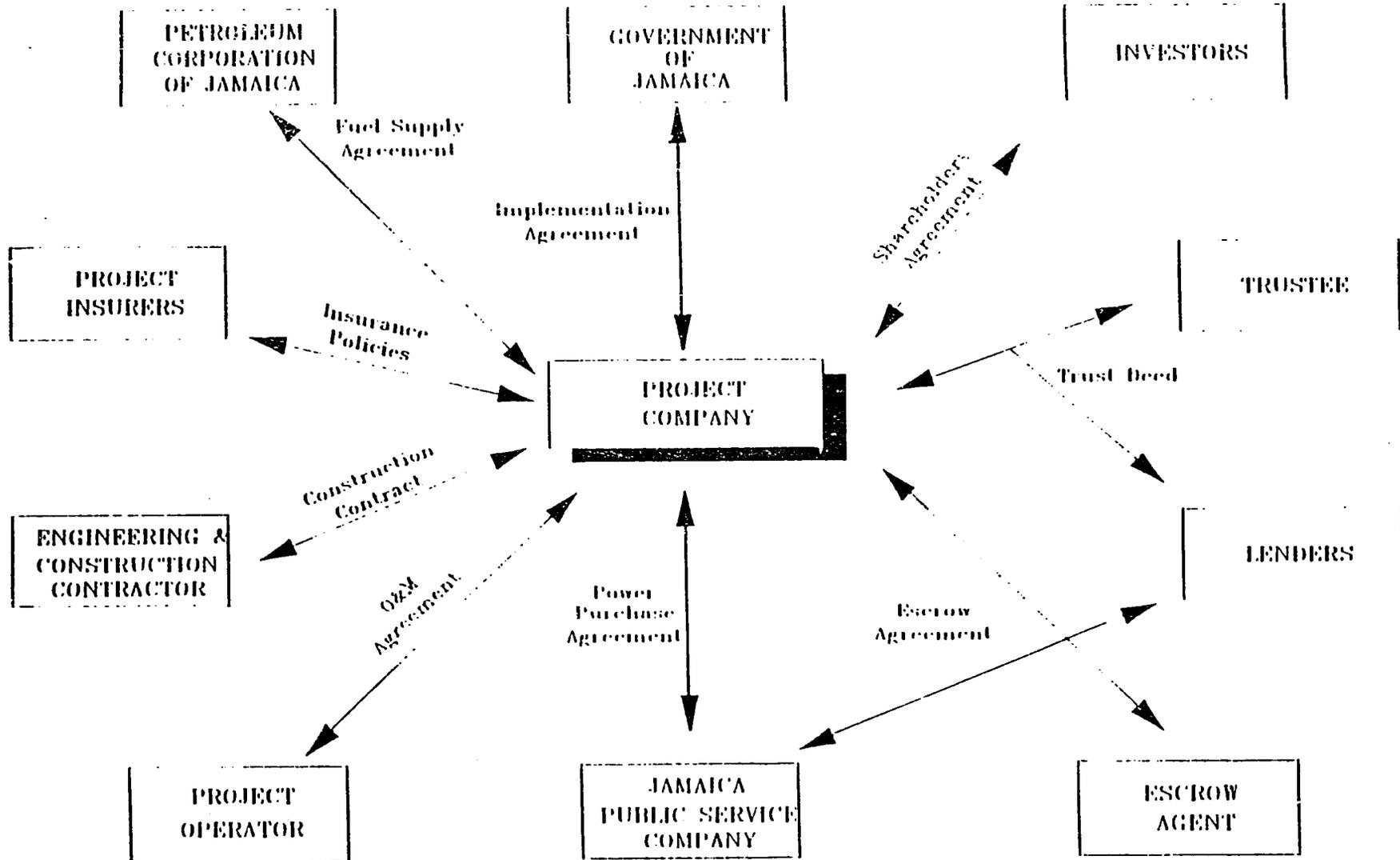
There are a number of factors and risks unique to BOOT/BOO projects that typically do not occur with private sector projects. The project company is often given only a finite concession/franchise period in which to operate. There are political and economic risks associated with a single purchaser of their product since the electric utility is owned by the government. The risk of convertibility of revenues into foreign exchange can be significant. The ability to react to risks such as force majeure, changes in legislation, and changes in taxation are limited, relative to the changes in resources or structure available to private sector companies.

These factors further emphasize the unique nature of a BOOT/BOO project company. On the basis of the BOOT/BOO projects completed to date, there are a number of lessons to be learned. Most countries interested in developing BOOT/BOO projects "re-invent the wheel" which results in high costs and long delays. It is critical to learn from the mistakes and progress of others, and to involve parties with experience in structuring private power projects.

There is also a need to provide long-term guarantees, especially in the context of a regulatory framework, so that investors have the necessary protection to offset the major risks of changing energy prices, exchange rates, and interest rates. In addition, a dispute resolution facility providing a mechanism for resolving or preventing confrontations should be established to maintain relations not only between the project company and the utility or suppliers, but also among the project sponsors.

Chart 3.1

# PROJECT STRUCTURE



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### **Power Project Leasing**

Another option for increasing private participation is the long term lease of a discreet, existing public utility generating facility to prove its operation as a basis for upgrading and privatizing the facility. Although this option has been widely discussed in several developing countries, it has not yet been put into practice for two reasons. First, leasing does not lead to any net capacity addition to the utility grid. Second, it does not remove financial obligation for the capacity from either the government or the utility.

There are, however, some potential benefits associated with this mechanism. The private sector reduces its up-front investment cost through leasing. In addition, the utility is able to turn over some of the maintenance and operational problems to a non-utility/government group. Finally, leasing can be a simple first step towards a larger role for the private sector in the utility sector.

In the case of Jamaica, the lease option may hold little promise given the government's stated objective of attracting foreign investment to the energy sector. It does nothing to remove the foreign exchange obligation of JPS from the government nor secure any additional capacity, both of which are immediate goals of the Government of Jamaica.

### **3.3 Privatization Approaches**

Privatization of the electric utility represents the most complete involvement of the private sector. In this case a discreet portion, or the entire assets of the utility operations including generation, distribution and transmission are taken over by a private company.

Chile and the United Kingdom have recently privatized their utilities, and Malaysia is currently in the process of privatizing its utility. A number of other countries such as Brazil, Argentina, Venezuela and Thailand are considering privatization of their state-owned electric utilities.

#### **3.3.1 Utility Privatization**

Privatization requires a strong commitment on the part of any government. In the case of an electric utility it becomes even more important because of the central role it plays in the economy. Electric utilities have traditionally been difficult to privatize. This, in part, has been due to the tendency of governments to use the utilities to achieve socioeconomic goals. These activities are not always in keeping with the running of an efficient business.

In Jamaica, there is established precedent for privatization of government controlled activities. The privatization of the National Bank, a group of hotels owned by the government and the partial privatizing of the phone company all provide a good precedent for the electric utility.

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Successful privatization of JPS would require an improvement in the condition of the company's financial position. Privatizing a company in relatively poor financial condition often results in an undervaluation of the assets and the entire company. Guarantees or provisions for insuring that electricity rates are adequate to cover operation of the company are necessary.

The government, through JPS, has expressed an interest in having a foreign electric utility form a cooperative relationship with JPS to promote improved management, coordination, and efficiency in the operation of JPS, with the eventual goal being investment in JPS. The government has announced its willingness to consider selling shares in JPS to the public or foreign investors.

### **3.3.2 Partial Privatization**

The purchase by a private developer of a unit of existing capacity and/or a service area would provide a cash infusion and relieve some of the foreign exchange pressures on JPS or PCJ; however, it provides little or no additional generating capacity. Purchase of existing utility generating capacity and/or service areas by the private sector carries the following considerations. The utility removes the debt from their books and may obtain some foreign exchange in the process. The utility may also realize an incremental gain in capacity, either through expansion or repowering. The private sector group is purchasing what is likely to be a proven generating unit and may lower its risks associated with construction and start-up delays. In addition, the purchase price may be low relative to new capacity additions.

In the case of Jamaica, a number of the facilities that require repowering or rehabilitation may be candidates for purchase by the private sector. Once the reconditioning takes place, the potential for improved reliability and more efficiently produced electricity would be greatly enhanced.

## **4.0 IMPEDIMENTS TO PRIVATE SECTOR PARTICIPATION IN THE ENERGY/POWER SECTOR OF JAMAICA**

Currently, the Government of Jamaica appears convinced of the merits of private sector participation in the energy sector. Without the sustained and fully supportive involvement of senior government officials, private sector involvement in the energy/power sector will not take place.

Numerous decisions must be made to overcome the policy, regulatory, institutional, contractual and financial impediments that exist. While these impediments are not insurmountable, they will require the full commitment and serious attention of senior officials in the Government of Jamaica, Ministry of Mining and Energy, PCJ and JPS.

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There is no recent precedent for private sector participation in the energy/power sector of Jamaica. Therefore, a lack of knowledge and experience of how to proceed can work to delay decisions that are essential. While private participation in power generation offers substantial benefits, it is also a complex and difficult undertaking that requires a clear understanding of the concept and trust between the public and private sectors. The government must be prepared to learn from the experience of other countries.

Based on an analysis of the Jamaican energy sector and the activities of other countries, this section describes some of the potential impediments to private participation in the energy/power sector in Jamaica.

### 4.1 Formal Public Policy Impediments

For the near term -- i.e. next one to two years -- there appears to be no specific formal public policy impediment to the establishment of independent power projects. The basic authorizing legislation for Jamaica Public Service Company, Ltd., as written, permits independent power generation facilities to supply electric power to JPS. Section 7 of the Electric Lighting Act reads as follows:

"Any Local Authority (*i.e.* JPS) which has obtained a license (*The All-Island Electric License 1978*), order of special Statute, for the supply of electricity, may contact with any company or person for the execution and maintenance of any works needed for the purpose of such supply, or for the supply of electricity within any area mentioned in such license, order or special Statute, or in any part of such area;..."

*(Parenthetical text added for clarification.)*

The All-Island Electric License 1978, issued by the Government of Jamaica on August 31, 1978, grants Jamaica Public Service Company Limited the right and privilege "to sell and supply electricity for public and private purposes in all parts of the Island of Jamaica,..." Additionally, Section 7 of the license authorizes JPS to purchase privately generated power:

"The Company shall have the right to purchase electricity in bulk from private suppliers for transmission and distribution through the All-Island Integrated Electrical system."

For the near term, the current laws governing JPS should prove adequate authority for JPS to solicit and contract for the purchase of power from independent generators. Existing laws, however, prohibit private sector involvement in transmission and distribution. JPS has sole authority and responsibility for these functions. The private sector could not undertake these activities without explicit additional authorizing legislation.

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Many private sector investors, however, may not want to risk their capital in independent power generation without further and more positively worded expressions of commitment by the Government of Jamaica, such as a specific "independent power" law. Additional legislation could significantly bolster the efforts of the Government of Jamaica to obtain electric power from independently owned, financed and operated generators.

The following public policy questions need further clarification:

- a. Are there specific declarations that independent power is in the public interest and that it is official government policy?
- b. What types of projects qualify as independent power facilities?
- c. Are there any long term policy commitments to a specific amount of future generating capacity that will be set aside for provision by the private sector? (This is generally expressed as a certain amount of megawatts of capacity over a one- to five-year planning period.)
- d. Are there financial and non-financial incentives for investments in independent power facilities, e.g., income and property tax exemptions, import duty and excise tax exemptions, certain investment tax exemptions, guarantees of foreign currency exchange and repatriation of revenues, etc.
- e. Is the government committed to the establishment of a clearly defined institutional framework for soliciting proposals, determining prices and contracting for independent power?

### **4.2 Regulatory and Institutional Impediments**

For the near term, the existing regulatory and institutional authorities, and the technical standards of JPS appear adequate to implement legally binding power purchase arrangements. Current Jamaican laws and procedures for project selection, contracting and electricity pricing - although not clearly designed to encourage private power -- should be sufficient. The present technical standards of JPS could also be adapted for interconnection with independent power facilities.

Obviously, a strong connection exists between the regulatory framework and the potential contractual and financial impediments to independent power development. Consequently, many matters elaborated on in regulations and guidelines will of necessity become the basis for provisions in the contractual and financial agreements. Examples of these include, payment terms, technical specifications and interconnection requirements, and dispute resolution procedures.

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### **4.2.1 Regulatory Impediments**

In the medium term, without some more explicit regulations or guidelines, JPS may be unable to convince the private sector that the government has a clear understanding of how to promote the development, finance and operation of independent power plants.

The following regulatory questions need further clarification:

- a. Precisely how to qualify as an eligible independent power producer: what size facilities are wanted, what ownership requirements, must power be dispatchable, what cogeneration facilities will qualify, are there restrictions on fuels, etc.?
- b. When and how JPS will solicit and evaluate proposals?
- c. What price for capacity and energy is JPS willing to pay? How is this price determined?
- d. What investment incentives and guarantees are available?
- e. What precisely are the interconnection requirements?
- f. How will disputes between the public and private sector be resolved?

### **4.2.2 Institutional Impediments**

The exact institutional framework for independent power in Jamaica is unclear. This is a potential impediment to private investment, as it adds uncertainty about role and authority of government agencies. Clearly, JPS can contract with private sources for the supply of power. Beyond this point, however, matters are not quite so clear. Also, government personnel often lack adequate knowledge and training in how to administrator new private sector power arrangements.

For example, the following institutional questions need clarification:

- a. If the Minister of Mining and Energy has authority to set power prices, must he also be a signatory to any power purchase agreement by JPS?
- b. Since repatriation and convertibility of revenues from the power purchase agreement are essential, what role must the Ministry of Finance and the Central Bank play?
- c. What will be the role of the Board of Investments and Jamaica Promotion Limited in providing investment incentives?

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- d. Who will be responsible for conducting environmental compliance reviews and assuring timely approval of necessary permits?
- e. What government agency will be involved in fuel supply arrangements if the fuel source is oil, coal, biomass, or hydro?
- f. Who will review and approve the legality of the contracts? Attorneys from each government agency? Attorney General's Office?
- g. Who will assure compliance with applicable labor and employment laws?

Despite the apparent length of this list of questions, the best approach to resolving them in the near term is to commence an actual selection and negotiation of a real independent power generation project. Attempting to resolve these questions beforehand in the abstract has proven to be not only confusing and time consuming, but also fruitless since many matters have to be reevaluated and restructured based on experience with actual projects.

### **4.3 Contractual and Financial Impediments**

#### **4.3.1 Contractual Impediments**

Independent power projects are wrapped in complex layers of mutually reinforcing contractual agreements. Firm contracts for the purchase of power must be executed by the utility, in this case JPS. These are often back stopped by agreements with collateral government agencies. Fuel supply contracts, operation and maintenance contracts, insurance agreements, and many other legally binding agreements are also required for independent power projects.

Since these projects typically last 10-20 years, all parties must rely on the long term sanctity of these contracts. However, due to political and country financial risk, private sector investors will frequently seek to backstop or guarantee as many contractual agreements as possible to insure against the consequences of default. The fact that the only purchaser for their product is government owned (i.e., JPS) usually will require guarantees over the life of the project insuring that the terms of the contract will be met.

The most serious financial impediment to independent power projects is the need to provide sufficient security for the project revenues to attract investors. Assuming the project generates the amount of power agreed upon, the project debt and equity investors must be completely confident of repayment of their investment. Likewise, equity participants must be assured of an acceptable return on their equity. The repayments under the power purchase agreements with JPS must be made on time and be convertible into the currencies in which the investments are denominated over the 10-20 year life of the project.

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Some of the key contractual issues that will need clarification are the following:

- a. How long will the contract run? Can it be extended or renewed?
- b. What is the purchase price, how will payments be made and will it escalate for uncontrollable changes, such as inflation, fuel price changes, labor rate increases, etc.?
- c. How will the facility be controlled and dispatched?
- d. Will the developer be required to transfer the facility to JPS, or retain ownership at the end of the contract period?
- e. What are the minimal functional requirements and technical specifications for the facility?
- f. Who will pay for interconnection equipment? How will the accuracy of metering be assured?
- g. What types of insurance will be required?
- h. What rights will JPS have to monitor construction and operation?
- i. How will force majeure be handled?
- j. How will disputes be resolved?

### **4.3.2 Financial Impediments**

Since independent power facilities are project financed, i.e., they depend solely on the operation of the project for revenues to repay long term debt and equity investments, these projects are supported primarily by an interlocking network of complex contractual and financial agreements.

This is in contrast to public projects that rely on publicly raised revenues and external borrowing secured by a sovereign guarantee for repayment from the Government of Jamaica.

One of the most serious impediments is the availability of long term debt financing for independent power projects. For the last 20 to 30 years, nations such as Jamaica have had state utilities own, finance and operate their electric power systems. The traditional power sector lenders have been multilateral development banks, bilateral donors and commercial banks with export credit agency guarantees. These loans have required sovereign guarantees from the recipient governments.

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Project financing without complete sovereign guarantees for the power sector is a new concept. The export credit agencies of the donor nations have been slow to enter this type of financing arrangement since there is little repayment experience from the independent power sector, especially under power purchase contracts with nations that have problems in obtaining adequate foreign currency exchange.

Also, project equity investors have very serious concerns regarding the repatriation of foreign exchange and guaranteeing of payment terms (insuring both that a sufficient revenue stream is allowed for and that those revenues are collected). Often a major financial impediment is the need to assure that foreign exchange is available to the project in order to pay down debt and pay a return to the equity investors.

The issue of lowering risk due to uncertain availability of foreign exchange is critical to the development of foreign private sector involvement in the energy sector. A number of options exist to assure the foreign exchange is available, most of which involve various guarantees by the host government, export credit agencies, or facilities being discussed by some multi-lateral donors. Guarantees by the host government are often a problem as this would obligate the government to cover payments on debt; exactly what they are trying to avoid through development of private sector participation.

Many of the independent power project companies do business in the form of joint ventures. There is currently no Jamaican law regarding joint-ventures; in some cases partnership law is applied. It may be appropriate to consider developing laws relating to joint-ventures, since the potential in Jamaica for having local investors involved in power projects is considered high.

Some of the key financial issues that must be clarified are the following:

- a. What are the sources of debt and equity? What interest rates and rates of return are needed?
- b. Who will guarantee the foreign loans made for the project?
- c. Who will assure that JPS meets its obligation to pay for power?
- d. Who will assure the convertibility and repatriation of the revenues earned by the private investors?
- d. Who will assist the project developers to obtain needed government permits and clearances?
- e. Who will assure that exemptions from taxes and duties are provided?

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The Jamaica Public Service Company, Ltd. has a number of independent power project proposals. These proposals range from 50 MWs of diesel fired capacity that could be installed within 6 months to gas turbine combined-cycle projects of over 100 MWs per unit. No coal fired proposals have been received. These projects have not advanced because there has been no precedent for JPS to buy independent power nor any clear mandate from government that this was an approach they wanted to follow.

### **4.4 Summary**

In the near term, there appear to be no insurmountable impediments to the Government of Jamaica entering into agreement(s) for independent power generation to supplement the capacity of JPS. Sufficient legal authority exists and government officials possess sufficient knowledge to solicit, negotiate and execute the necessary contractual and financial arrangements. In the process of developing near term agreements for independent power, the Government of Jamaica should find acceptable long term solutions to many of the impediments identified above.

For the medium term, however, private investors will want a more explicit elaboration of national policy, the regulatory and institutional framework, and the contractual and financial requirements.

### **5.0 RECOMMENDATIONS**

Clearly, Jamaica has an extreme immediate need for additional power. The situation, however, is tempered by the numerous private sector companies which have already expressed interest in undertaking private power projects in Jamaica.

Given these two factors, it is recommended that the Government of Jamaica consider a two-step approach to private sector participation in the energy/power sector. First, for the near term, the government should proceed to attempt to resolve its shortage problem by immediately proceeding to select and execute an agreement(s) with private power developer(s).

Second, for the medium and long term, the government should proceed to develop a full framework for private participation, especially in the power sector. This framework would encompass public policy, regulatory guidelines, institutional arrangements, contractual requirements and financial incentives. The following discussion elaborates on the

These recommendations focus on reducing the risks of investment to foreign investors and in some cases providing incentives. Many of these recommendations contribute to the development of a positive business environment. A key aspect of any government energy policy should be the correct pricing of energy. The efficient pricing of energy is very important in promoting private power investment and energy conservation. Conservation, although not the focus of this

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paper, should be a major portion of the governments energy policy, in which the private sector can also play a major role.

### **5.1 Near Term Recommendations**

The objective of the near term recommendations -- i.e., for the next one to three years -- to help relieve the immediate power shortage problem of Jamaica through private sector participation. Loss of load probability must be brought down to an acceptable level. Public confidence in the ability of JPS to distribute to it users reliable power must be restored.

#### **5.1.1 Commit a Specific Amount of Immediately Needed Generation Capacity to the Private Sector**

The future generation capacity expansion plan for JPS should provide explicit opportunities for private sector participation, such as the recommendations below.

##### **a. Convert the Recently Tendered 100 MWs of Gas Turbine Capacity into an Independent Power Project**

JPS has issued a tender for 100 MWs of gas turbine capacity to be built to JPS specifications and turned over for JPS ownership and operation. This presents a clear and immediate opportunity for Jamaica to stimulate private participation in the energy sector.

It is recommended that the current tender for the provision of 100 MWs for JPS should be withdrawn. JPS should then seek proposals from private companies to provide this capacity. This could be handled informally, which would allow for JPS to accept and select an unsolicited proposal(s) and proceed to negotiate a power purchase agreement. Alternatively, JPS could reissue the tender for as a public competitive bid under a revised tender document that calls for independent power proposals. Both approaches have their pitfalls. The government would well advised to select the approach that would meet or beat JPS's deadline for having the units on line.

##### **b. Solicit Private Sector Proposals for Additional Required Capacity**

The R.W. study recommended generation expansion plan calls for 1052 MWs by year 2008, with 198 MWs of gas turbines to be brought on line by 1994 or sooner. The current tender accounts for 100 MWs. Also, the plan identifies the need for an additional 76 MWs to go into operation by 1996 -- a coal-fired plant of approximately 61 MWs and five hydroelectric projects totalling 15 MWs. Given the long lead times for coal and hydroelectric facilities, project selection decisions should be made in the next two years.

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For the near term, it is recommended that JPS solicit independent power proposals from the private sector for the additional 98 MWs of gas turbines, the 61 MWs of coal-fired capacity and the 15 MWs of hydroelectric capacity.

### **5.1.2 Expedite Independent Power Projects Utilizing Indigenous Fuels**

The recent increase in oil prices serves as a further warning to all countries to strive more vigorously for energy self reliance. Therefore, the government should place high priority on private sector energy projects based on indigenous resources.

The government should provide substantial encouragement -- through preferential pricing and other incentives, for hydroelectric projects and biomass power projects. Private sector participation in these types of projects should be solicited at once.

### **5.1.3. Create a Special Independent Energy Financing Fund for Private Energy Projects**

The government must seek to help the private sector overcome the difficulty of obtaining long term financing for energy projects in Jamaica. The World Bank has displayed interest in establishing such a special lending facility with Bank and other donor funds. This facility could provide long term financing for up to 30 percent of independent power and other energy projects. Given its experience with establishing a similar fund in Pakistan, the World Bank with strong support from the Government of Jamaica could possibly create the fund swiftly enough for it to help finance a private sector company(ies) to install and operate the 100 MWs of combustion turbines.

### **5.1.4 Establish a Temporary Interministerial Independent Power Committee**

The government should move to establish a temporary, high level Interministerial Independent Power Committee authorized to expedite (1) independent power projects, including those using indigenous resources (2) the creation of the independent energy financing fund and (3) the adoption of a national policy framework for independent power.

Given the complexity of independent power projects and the need for numerous agreements involving many government agencies, the Committee is needed to insure that decisions are made and agreements reached in a timely fashion. The first independent power project(s) will encounter many foreseen and unforeseen problems that will necessitate decisions by many government agencies.

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Therefore, it is recommended that the Minister of Mining and Energy chair the Committee. The following should be considered as members of the Committee:

Minister of Mining and Energy, Chair  
Minister of Finance  
President of Bank of Jamaica  
Attorney General  
Chairman and Managing Director of JPS  
Executive Chairman of PCJ  
President of Jamaica Promotion Ltd.

### **5.1.5 Seek Private Sector Proposals for Expansion of the Petroleum Sector**

#### **a. Solicit Proposals for Refinery Expansion**

PCJ has an interest in expanding the PetroJam refinery from 35,000 bbls/day to 50,000 bbls/day by adding a catalytic cracking tower costing \$50-60 million. It is recommended that the government request proposals from the private sector for the addition of the cracking unit and possibly for the assumption of the refineries operations by the private sector.

#### **b. Solicit Proposals for Expansion of the Petroleum Storage Capacity**

To serve the PetroJam refinery near Kingston, PCJ Has considered the need for two additional storage tanks of 95,000 bbls each at an estimate cost of \$2.4 million.

It is recommended that either separately or in conjunction with the refinery expansion, the government request proposal from the private sector for the two needed storage tanks to serve the PetroJam refinery.

## **5.2 Medium and Long Term Recommendations**

### **5.2.1 Institute a Public Policy that Promotes Independent Power**

The government should enact a statute that explicitly declares independent power as consistent with the national public interest and that its encouragement be the policy of country. To insure the commitment to independent power, the government should provide a commitment of the amount of power to be sought in the future. Also, the act should generally define what types of projects qualify as independent power projects, such as stand alone plants, self-generation plants with excess capacity and cogeneration plants. Also, the use of indigenous fuels should

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be given high priority. The act should set forth specific financial and non-financial incentives that will be available for independent power projects.

The act should then identify who in government is responsible for each activity and that the Ministry of Mining and Energy has final authority over the matter. Consideration should be given to establishing a regulatory commission with the authority to set the power purchase rates and resolve disputes.

### **5.2.2 Adopt Clear Regulatory Guidelines for Independent Power**

Formal regulatory guidelines will provide the private sector with a better understanding of how to participate with the Government of Jamaica in supplying the nation's energy needs. The regulations should address the following:

- o Eligibility determination
- o Competitive and noncompetitive solicitation procedures
- o Purchase price determination methodology
- o Functional and technical specifications
- o Interconnection requirements
- o Dispute resolution procedure

### **5.2.3 Commit a Specific Amount of Future Generation Capacity to the Private Sector**

To support a six percent annual growth of GDP is projected that JPS will have to double its generating capacity over the next 15 years. To attract sustained private investment in their power system, the Government of Jamaica should send a clear signal to the private sector that a specific quantity of the proposed JPS expansion will be reserved for the private sector.

Possibly 50 percent or more of the proposed 1990-2008 expansion in gas turbines, hydroelectric facilities, and coal-fired plants could be reserved for private participation. Also, all future capacity from cogeneration, biomass-fired plants and other facilities using renewable resources and/or indigenous resources might be from the private sector.

### **5.2.4 Establish a Permanent Institutional Framework**

At a minimum, within the Ministry of Mining and Energy and within JPS and PCJ, special private sector energy/power organizational units must be organized and staff. Thought might be given to also having special units within the Bank of Jamaica, the Ministry of Finance and the Attorney General's office. If the special financing fund for independent energy projects and a public utility regulatory commission are created, they must have clear assignments and

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relationships with the other units. The staffs of all of these units should receive training in how to administer independent energy/power programs.

### **5.2.5 Commence Analysis of the Partial or Complete Privatization of JPS and PCJ**

Though not a solution to the immediate power shortage, the privatization of part of all of JPS and/or PCJ could result in an improved energy system and reduced public financial commitments to the energy sector. This analysis would provide an assessment of the potential for the privatization of the assets of the corporations. What is their value, and is there really a market for them? What would be the best and most equitable way to proceed? How can the interests of all affected groups be taken into consideration? The analysis would seek answers to these and other questions.

## The Office of Energy

The Agency for International Development's (A.I.D.) central Office of Energy plays an increasingly important role in providing innovative mechanisms and approaches for solving the growing energy and environmental crisis in A.I.D.-assisted countries. Situated in A.I.D.'s Bureau for Science and Technology, the Office helps to set energy policy direction for the Agency, while making its projects available to meet the generic and short-term needs of A.I.D.'s field offices in assisted countries.

Three problems drive the Office's programs: high rates of energy demand and economic growth accompanied by a lack of energy, especially power in rural areas; severe financial problems, including a lack of investment capital, especially in the electricity sector; and growing energy-related environmental threats, especially global climate change, acid rain, and urban air pollution.

To address these problems, the Office of Energy leverages financial resources of multilateral development banks such as the World Bank and the Inter-American Development Bank, the private sector, and bilateral donors to increase energy efficiency, expand energy supplies, and enhance the role of private power. The Office strategy involves implementing novel energy sector approaches through research, adaptation, and innovation. These approaches include improving power sector investment planning ("least-cost" planning) and encouraging the application of cleaner technologies that use both conventional fossil fuels and renewable energy sources. Promotion of greater private sector participation in the power sector and a wide-ranging training program also help to build the institutional infrastructure necessary to sustain cost-effective, reliable, and environmentally sound energy systems that are integral to broad-based economic growth.

Much of the Office strategy focuses on abatement of the increasingly severe environmental problems associated with the energy cycle, especially those involving fossil fuels, which pollute land and water during the extraction stage and cause atmospheric degradation--air pollution, acid deposition, and global CO<sub>2</sub> buildup--principally from power plant emissions during the conversion process. The Office's environmentally related assistance efforts have also anticipated and support recently enacted congressional legislation directing the Office and A.I.D. to undertake a "Global Warming Initiative" to mitigate the increasing contribution of key developing countries to greenhouse gas emissions. This strategy includes the following elements: expanding least-cost planning activities conducted in collaboration with the multilateral development banks to incorporate environmental concerns; increasing support for feasibility studies in renewable energy, end-use energy efficiency, and cleaner fossil energy technologies that focus on site-specific commercial applications; launching a multilateral global energy efficiency initiative; and enhancing training of host country nationals and A.I.D. staff in areas of energy that can help to reduce expected global warming and other environmental problems.

To pursue all of its activities, the Office of Energy implements the following seven projects: (1) The Energy Policy Development and Conservation Project (EPDAC); (2) The Biomass Energy Systems and Technology Project (BEST); (3) The Renewable Energy Applications and Training Project (REAT); (4) The Private Sector Energy Development Project (PSED); (5) The Energy Training Project (ETP); (6) The Conventional Energy Technical Assistance Project (CETA); and (7) its follow-on Energy Technology Innovation Project (ETIP).

Further information regarding the Office of Energy's projects and activities is available in our Program Plan and our Office Directory (both updated annually), which can be requested by using the following address:

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