

GL014710

Foreign Competition

- ~~and~~ strong advocacy by their govts
- better financing terms
- LCD legal/reg environment

1. work up govts to open markets

- couple w/ ECRÉ &
- Select countries - complete coal in Peru. Consider next Chile, Argentina, Costa Rica, Mexico???

2. Formulate a worldwide geothermal ^{update} database start w/ Indonesia, Philippines, Peru

- Database to be operated by GEA for ^{benefit of} _{under} _{Capex}
- Include

- resource info
- legal/regulatory info
- Exempt from FOI to protect content
- put together by govts consultants

- includes both grid and non-grid
- is based on careful selection of a few target countries

- 15 integrated with programs of ECAR, AID, DOE, EPA and other Fed agencies
- is defined by ad
- Provides major support to U.S. industry

Barriers

1. Legal/regulatory framework
2. Resource inputs
3. Get support by Japanese, I. makers better than ours!

Opening foreign markets

- Legal/reg.
 - govt. Support
- } ⇒ legislative agenda

Geoth. Information Data Base

APRIL 17, 1989

THE U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT

ADMINISTRATOR OF

AMBASSADOR ALAN WOODS

TO

POWER SHORTAGES IN
DEVELOPING COUNTRIES

ON

THE ENERGY INDUSTRY REVIEW
GROUP

REPORT OF

**ENERGY INDUSTRY REVIEW GROUP ON
POWER SHORTAGES IN DEVELOPING COUNTRIES**

April 17, 1989

Ambassador Alan Woods
Administrator
Agency for International Development
Washington, D.C., 20503

Dear Ambassador Woods:

We are pleased to submit the results of our review of the power shortages situation in developing countries and our suggestions for possible actions by your Agency and the U.S. Government. The enclosed report presents our findings and recommendations based on the information we obtained during our fact-finding missions to the Dominican Republic, the Philippines, and Indonesia, as well as our own experiences working in developing countries.

We concur fully with your Agency's Report to Congress on "Power Shortages in Developing Countries" (March 1988) that power shortages are seriously constraining economic growth and social development in most A.I.D.-assisted countries. We found, however, that without a significant change in the way A.I.D. views the relationship between the energy/power sector and economic growth, A.I.D. will not be able to effectively help developing countries achieve self-sustaining economic growth. Furthermore, without increased assistance from A.I.D. and the U.S. Government in general, the United States stands to lose a significant opportunity for economic cooperation with these countries. Such a loss would be a serious detriment to both the developing countries and to the United States. In this light, we believe increased assistance by A.I.D. to provide reliable supplies of electricity and efficient use of energy is a good investment by the U.S. Government.

It is our hope that this report represents the first step in a long and productive partnership between A.I.D. and the U.S. energy industry. We look forward to meeting with you to discuss our findings and recommendations in more detail.

Sincerely yours,

Energy Industry Review Group
(List of members attached)

cc. Nancy K. Ellis, Assistant to the Administrator for International Trade and Promotion
Jack Vanderryn, Director, Energy & Natural Resources
James B. Sullivan, Director, Office of Energy

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The views, interpretations and opinions in this publication are those of the Energy Industry Review Group and do not necessarily represent those of the U.S. Agency for International Development.

INTRODUCTION

One year ago, the United States Agency for International Development (A.I.D.) submitted to Congress a report on the serious imbalance between the supply and demand of electric power in developing countries, and the fact that this imbalance was constraining efforts to achieve sustainable social and economic growth. Subsequently, the Administrator of A.I.D. asked for a private sector perspective on steps that A.I.D. might consider taking to improve the power shortages situation in A.I.D.-assisted countries. Ten companies from the energy industry agreed to participate in this review.

The Administrator asked the Energy Industry Review Group to address three key questions:

o What should be A.I.D.'s role in helping countries provide adequate energy supplies for their economic development? What mechanisms, resources and programs are needed?

o What are the most feasible approaches for the private sector to become more involved in resolving the problem of energy shortages?

o What are the impediments to increased private sector participation in the energy sector? What are the impediments to increased system efficiency and cost effective approaches to increasing such system efficiency in developing countries?

This report summarizes the Review Group's findings and presents its recommendations and proposed actions for A.I.D. and the U.S. government. The Review Group focused primarily on the first question because it is a prerequisite to properly addressing the other two questions.

SUMMARY

Background

Last March 1988, A.I.D. found and reported to Congress that (i) substantial electric power shortages exist in over half of A.I.D.-assisted countries and that (ii) these shortages of adequate and reliable supplies of energy/power are directly threatening sustainable social and economic growth. A.I.D. also acknowledged that assistance to solving power shortages in developing countries was important for the United States for both U.S. development and foreign policy objectives and U.S. trade.¹

Concerned about the development-constraining impacts of energy shortages, particularly for electric power, Alan Woods, the Administrator of A.I.D., asked executives from the U.S. energy industry to review the situation and suggest steps that could be taken to solve the problem. This dialogue resulted, last December, in the formation of the Energy Industry Review Group on Power Shortages in Developing Countries. Ten suppliers of power equipment goods and services responded to the Administrator's request and agreed to contribute their time and effort to this review. The companies were: Arco Solar, Inc.; Bechtel Power Corp.; Combustion Engineering, Inc.; General Electric Corp.; Hadson Corp.; Quatec, Inc.; RCG International, Inc.; Stone and Webster Engineering Corp.; United Engineers and Constructors, Inc.; and Westinghouse Electric Corp. A list of the members of the Review Group is appended to this report.

The Energy Industry Review Group conducted three fact-finding missions, travelling to the Dominican Republic in December of 1988 and to the Philippines and Indonesia in January of 1989. In each country, members of the Review Group interviewed representatives from private sector companies, energy ministries, finance ministries, state-owned utilities, legislative bodies, U.S. Embassies, U.S.A.I.D. Missions, multilateral development agencies, and U.S. firms operating in these countries.

Findings

The Energy Industry Review Group strongly reaffirms A.I.D.'s findings that investment in the energy/power sector of developing countries provides an essential element for economic growth, social well-being and political stability of

¹ Power Shortages in Developing Countries: Magnitude, Impacts, Solutions, and the Role of the Private Sector, Report to Congress, A.I.D., March 1988.

these countries, and also presents the United States with increased opportunities for economic cooperation and trade.

Although A.I.D. has made valuable contributions to several fields vital to international development, we discovered, in the energy/power sector, a serious disparity between the critical development needs expressed by leaders of developing countries and the current priorities of A.I.D. The current development activities of A.I.D. no longer recognize the critical linkage between energy, particularly electric power, and economic and social growth. Less than 4% of A.I.D.'s annual budget is now committed to energy/power development activities. Yet, in the three countries visited by the Review Group, electric power development ranked among the top priorities of each country.

This situation is particularly disturbing since the U.S. energy industry, with its experience in efficient operation and technology development can help developing countries alleviate power shortages - through state-of-the-art new equipment or rehabilitation of existing systems in the developing countries - and meet increased environmental concerns. It can help inject expertise, leadership and additional financial resources into the energy/power sectors of developing countries. Assistance to developing countries includes technology transfer.

The energy/power market in developing countries provides significant opportunities for economic cooperation and trade for U.S. businesses. Yet, U.S. exports of power generation equipment and services to developing countries have been declining from over 20% of the market in the late 1970s to less than 10% today.

Without a significant change in the way A.I.D. views the relationship between the energy/power sector and economic growth, we found that it is unlikely that A.I.D. can help developing countries meet the development challenge confronting them. Without increased assistance from A.I.D. and the U.S. government in general, the United States stands to lose a significant opportunity for economic cooperation with developing countries. Such a loss will be a serious detriment to both the developing countries and to the United States.

Recommendations

Overall, the Review Group concludes that assistance by A.I.D. to help developing countries provide adequate and reliable supply of electricity is a good investment for the United States for four major reasons. First, this assistance would address a high development priority area that is critical for developing countries to achieve self-sustaining economic and social growth. Second, it would also benefit important U.S. national security, foreign policy, and trade

development goals. Third, it would offer the U.S. the opportunity to cooperate with developing countries in addressing global climate and other environmental issues. Finally, it offers substantial opportunities for cooperative actions between A.I.D. and the U.S. energy industry.

The Energy Industry Review Group offers four general recommendations:

1) A.I.D. should place a greater emphasis on energy, particularly electric power, and on the transfer of proven U.S. technologies and services. It should make the necessary organizational and budget changes to achieve this objective and seek, if necessary, additional Congressional authority.

2) A.I.D. should provide more leadership within the U.S. government to coordinate energy/power development assistance programs and trade policy for developing countries. It should also attempt to bring about a more equitable balance between trade and aid assistance among donor nations.

3) A.I.D. should be more active and innovative in helping to promote, market, and finance U.S. energy/power equipment and services that can support sustainable economic growth in developing countries in ways that are environmentally sound.

4) The U.S. energy industry should respond with a more active interest and take a long-term perspective toward developing country energy/power markets.

In the following pages, we elaborate on our overall conclusion and major recommendations. Under each recommendation, we propose specific actions. These are categorized as (1) actions that the Administrator of A.I.D. can directly implement, and (2) actions which involve Congress or other government agencies. Although many of the actions can be implemented using existing resources, certain actions will require additional staff and funding.

OVERALL CONCLUSION

CONCLUSION: Investment in the energy/power sector of developing countries is good for the United States. It provides an essential element for the economic growth, social well-being and political stability of these countries, and also presents the U.S. with increased opportunities for economic cooperation and trade.

Electricity, as an especially high-grade form of energy/power plays a large role in the development process. According to World Bank and United Nations statistics, over the past two decades the ratio of electric power consumption to economic growth rate has been 1.4 to 1 in developing countries. Statistics show that for Indonesia, the Philippines and the Dominican Republic, energy consumption growth rates are commensurate with GDP growth. In Indonesia for example, the average annual energy growth rate of commercial energy consumption between 1980 and 1986 was 3.9%. During the same period, the GDP grew at an average annual rate of 3.4%.

"To support economic growth and avoid power shortages on the island of Java, we will need an additional 27,000 megawatts of electric generating capacity by the year 2015 – a five-fold increase over our current capacity."

**His Excellency Dr. B.J. Habibie,
State Minister for Research and
Technology, Republic of Indonesia**

**"The shortage of power is one of our most serious problems.
Solving this problem has the highest priority."**

**Manuel E. Gomez, Vice Governor,
Central Bank, Dominican Republic**

Similar patterns are evident in the Philippines and in the Dominican Republic. During the economic recovery of 1987-1988, GDP in the Philippines grew at a rate of 6.7%, while overall energy consumption grew at an annual rate of 8.9%. Electric power consumption during the same period grew by 10.7%. In the

Dominican Republic the GDP growth rate for 1980-1986 was 1.0%. The energy consumption growth rate was 2.6%.

"As far as electric power is concerned, the Dominican Republic is on the critical list. Everyone here is calling it a 'crisis'."

**The Honorable Paul Taylor, U.S.
Ambassador to the Dominican
Republic**

A large percentage of total electricity consumption in these countries occurs in the industrial/commercial sector. The industrial sector in the Dominican Republic consumes 37% of the electricity produced by the national utility. In Indonesia, nearly 70% of the electricity consumed is used by the industrial sector. In the Philippines, the industrial and commercial sectors accounted for over 51% of electricity consumption in recent years.

In meetings with representatives of U.S. and local private companies in the Dominican Republic, the Philippines and Indonesia, we found that the provision of a reliable source of energy, especially electric power, plays a major role in future investment decisions. Many companies are forced to spend substantial resources to install their own power generating plants due to the unavailability or unreliability of power from the state-owned utilities. This reduces the capital they have available for their primary activities, such as steel, aluminum, fertilizer, textiles and electronics production. Also, many interviewed by the Review Group told of new investments and plant expansions delayed or cancelled due to the unavailability of power.

"The first thing that businesses look at when considering investments in Indonesia is the reliability of electric power. "

**Harvey Goldstein, President, American
Chamber of Commerce, Republic of
Indonesia**

"Free Trade Zones in the Dominican Republic employ over 85,000 people. Yet, many of our FTZ's have serious problems obtaining reliable power and this has begun to curtail their expansion. It is a very, very serious problem."

**Manuel Tavares, President, Free Trade Zone
Association of the Dominican Republic**

In the Dominican Republic, the peak demand for electricity exceeds the national utility's supply by 60 MW. Brownouts occur on the average of one to

four hours each day. The National Power Corporation in the Philippines is planning to geographically rotate scheduled load shedding for industry. Consequently, companies served by NPC will lose 10% of their power requirements once a week. NPC hopes to avoid severe power shortages that could result from the 8.8% increase in demand for electricity that is expected in 1989. Twenty-four Indonesian industry representatives in a meeting with the Review Group indicated that their companies suffer power disruption 5 to 6 times a month. We found that for these countries to sustain their current economic growth rates, they must alleviate their power shortage problem.

"Infrastructure, especially electric power, drives development."

Ernesto M. Aboitiz, President, National Power Corporation, Republic of the Philippines

Assistance by A.I.D. to help developing countries provide an adequate, clean and reliable supply of electricity is a good investment by the United States. It directs assistance to a high priority development need of these countries. Growth in demand for electricity is high in these countries. Satisfying that demand is critical to the ability of those countries to achieve economic growth and maintain political stability. The experience and capabilities of the U.S. power industry can be directly applied to the needs of developing countries. The economic growth resulting from improved power systems will, in turn, offer the prospects of increased exports of U.S. products and services. Finally, assistance by the U.S. to help these countries provide a reliable source of electric power to their citizens now, could avoid the need for larger levels of assistance to meet basic human needs in the future.

"We are looking to the private sector to provide power to our utility system. We believe that the private sector can build plants quicker at lower cost and can operate them more efficiently."

**Senator Vicente T. Paterno
Republic of the Philippines**

According to the **Power Shortages in Developing Countries** report of A.I.D., U. S. current exports represent less than 10% of total power generation exports to developing countries, while they accounted for over 20% in the late 1970's. Developing countries will need to import an estimated \$370 billion to \$900 billion worth of power equipment and services between 1988 and 2008, to sustain GDP growth rates of 3.5 to 5.5% per year over the same period. If U.S. suppliers raised their market share in developing countries to their 1970s levels, the value of U.S. power exports would be equivalent to \$80 to \$180 billion.

The power crisis also presents A.I.D. and the U.S. energy industry with significant opportunities to influence environmental policy in A.I.D.-assisted countries, a major concern of U.S. foreign assistance policy. U.S. companies are among the world's leaders in designing and constructing energy efficient power systems. A.I.D. and the U.S. energy industry can work collaboratively to transfer the technology and know-how behind successful U.S. energy conservation programs. A.I.D. can assure that appropriate technologies are applied to developing countries' needs. Also, the U.S. energy industry remains a leader in renewable energy technology as well as new and innovative, environmentally beneficial technologies including advanced coal cleaning techniques, gas reburning, and advanced flue gas cleanup.

RECOMMENDATIONS AND PROPOSED ACTIONS

RECOMMENDATION 1: A.I.D. should place a greater emphasis on energy, particularly electric power, and on the transfer of proven U.S. technologies and services. It should make the necessary organizational and budget changes to achieve this objective and seek, if necessary, additional congressional authority.

A.I.D.-assisted countries need and welcome increased assistance in the energy/power area from the U.S. government and private companies. Yet, A.I.D. central policy directives do not require nor sufficiently encourage its Regional Bureaus and country Missions to undertake energy/power development activities. Apparently, policy makers in A.I.D. have been concerned that such assistance can only be undertaken by financing massive energy/power infrastructure projects, which is unrealistic given the declining budget of the Agency.

A.I.D. views its few remaining energy/power activities as isolated projects moving toward project close out. Lost is the understanding adopted by other donor nations that energy/power improvements correlate directly with improvements in economic growth for the assisted country and trade benefits for the donor nation. In the traditional A.I.D. view, capital intensive power projects are assisted by A.I.D. only in a few countries with large Economic Support Fund (ESF) budgets, such as Egypt and Pakistan. Consequently, other developing countries do not expect from A.I.D. significant energy and power sector assistance. When A.I.D. does provide assistance to power development projects, the assistance is often restricted to funding for definitional activities.

Due to this traditional view of energy and the Agency's shift to a budget support focus, A.I.D./Washington and the U.S.A.I.D. Missions have devoted increasingly less attention and fewer resources to energy/power activities. Policy guidance from Washington does not sufficiently emphasize energy/power as a necessary component of Mission portfolios, nor does it identify how energy/power assistance can be used to further A.I.D.'s goals dealing with private sector development and capital markets reform.

The Review Group concluded that more A.I.D. resources should be applied to energy/power activities. We believe this reallocation could yield higher returns in economic and social development than some competing activities in the current A.I.D. portfolio.

PROPOSED ACTIONS

The Administrator of A.I.D. should:

1-A. Issue (i) a strong energy policy directive that emphasizes the link between increased energy availability, particularly electric power, and economic growth with a strong emphasis on involving the private sector and (ii) provide strong guidance to the country Missions to address the energy/power needs by supporting specific energy/power development activities. It should address the total system's design and efficiency issues in developing countries. It should also address the rehabilitation and efficiency improvement needs of the total existing system. The implications and importance of U.S. energy trade an investment to developing countries should be emphasized in these directives.

1-B. Create within A.I.D. a senior level position with "line" operating authority for energy, infrastructure and trade programs. This new position should be at least at a Deputy Assistant Administrator level.

1-C. Provide the A.I.D. regional development offices, located in the Africa, Latin America, and Asia/Near East regions, with energy/power program advisors with private sector background that are experienced in the energy/power field. This could be accomplished initially on a contractual basis.

1-D. Provide additional resources, both economic support funds and development assistance funds, to give emphasis to energy, infrastructure, trade and investment even if this requires a reallocation of existing resources within the A.I.D. budget.

1-E. Encourage private sector participation in power supply and investment through continuous policy and institutional reform, creation of private sector financing windows, funding of prefeasibility studies and other mechanisms.

1-F. Expand A.I.D.'s current limited energy/power activities in policy development assistance, preproject planning assistance, training, and energy/power technical assistance. To accomplish this, the Administrator might consider creating an "Energy/Power, Infrastructure and Trade Institute" as a

public-private partnership to promote energy and infrastructure-related activities in A.I.D.-assisted countries.

RECOMMENDATION 2: A.I.D. should provide more leadership within the U.S. government to coordinate energy/power development assistance programs and trade policy for developing countries. It should also attempt to bring about a more equitable balance between trade and aid assistance among donor nations.

Power shortages in developing countries are constraining social development and economic growth. With its experience in efficient operation and technology development and transfer, the U.S. energy industry can work with the U.S. government to help developing countries reduce their power shortages. However, in recent years the U.S. government has de-emphasized the developing country energy/power market in its programming activities, reducing the number and the scope of its activities in that sector.

In cases where A.I.D. has provided assistance it has not adequately coordinated its efforts with the many U.S. agencies dealing with developing countries. Therefore, efforts by the U.S. government to improve the energy/power sector in developing countries have been inconsistent. As a result, U.S. suppliers of energy/power services and equipment have faced increasing difficulty winning major assignments in that sector, causing a significant decline in economic cooperation between the U.S. and developing countries. A recommendation of the Review Group is that a more coordinated approach to energy development assistance is required to make it effective.

Another of our findings is that other bilateral donors are using development assistance, in the form of long term concessionary financing, to promote power exports while U.S. aid is not. We found that other bilateral donors are reluctant to provide budget support or funding for social development programs with little potential for trade. Traditionally, funding for social development has been left to the United States, while other donors have preferred to provide development assistance in areas that lead to exports. By dividing development assistance in this manner, the U.S. loses a significant opportunity for trade with developing countries.

A more equitable approach to development assistance activities would be for all donors to provide an equal proportional share of overall budget support and funding for social programs. This would allow the U.S. to pursue a more project specific approach to energy/power sector assistance. It would also provide the U.S. with an opportunity to increase its economic ties to A.I.D.-assisted countries.

PROPOSED ACTIONS

The A.I.D. Administrator should:

2-A. Continue the dialogue now begun with private sector groups by establishing an informal or formal energy industry advisory group.

2-B. Ensure that economic and not only political and strategic concerns shape A.I.D.'s program. This could mean coordinating an interagency group that includes other arms of the U.S. government, for example, DOE, DOC, USTR, TDP, EXIMBANK and OPIC, to develop a U.S. government-wide and country-specific approach to the energy/power sector. These efforts might be initially targeted at selected countries, such as the Dominican Republic, Costa Rica, the Philippines, Egypt, Thailand, Indonesia and Pakistan.

The Department of the Treasury should:

2-C. Set up arrangements with multilateral development banks for A.I.D. funding of energy sector feasibility studies to be conducted by U.S. companies. Countries with high market potential for U.S. goods and services should be targeted.

The Department of State should:

2-D. Press other bilateral donors to provide more untied, general budget and more direct support for social programs in order to release more U.S. funds for energy/power infrastructure project development.

RECOMMENDATION 3: A.I.D. should be more active and innovative in helping to promote, market, and finance U.S. energy/power equipment and services that can support sustainable economic growth in developing countries in ways that are environmentally sound.

U.S. energy/power supply equipment is often superior to foreign equipment. U.S. technologies frequently set the world standard for reducing environmental impacts of power generation systems and current U.S. programs promise further advances in these areas. Nevertheless, the U.S. energy industry's share of exports to the power sector of developing countries has declined in recent years. For example, the U.S. share of the world market for gas turbine generators declined from 51.3% in the 1970-1973 period to 45.4% in the 1978-1981 period. Since the U.S. equipment is on a technical par with that of competitive nations, the deterioration in energy/power sector exports reflects primarily financial, cost, and political factors. In particular, other donor nations have very successfully used concessionary financing to promote their exports.

The U.S. Government has been unwilling to play an aggressive role in neutralizing mixed credit competition in the export markets. As a result, the share of the U.S. electrical manufacturers in the major export markets has dropped drastically. Through Eximbank, the U.S. provides small amounts of mixed credit support only in those instances where the OECD agreement is violated by the competing governments. This, however, happens very rarely. The competing governments are following OECD rules and offering mixed credit packages and the U.S. firms are losing jobs as a result. The European and Japanese governments are well assured that their mixed credit packages will go unchallenged by the U.S., if their agencies adhere to the notification requirements of the OECD agreement and observe the 35% minimum grant element rule.

We realize that the current economic climate will not allow the U.S. government to fully finance capital intensive energy/power projects in developing countries at concessionary rates. Nevertheless, the Review Group believes that an opportunity to leverage private investment with government funds does exist. Such an approach would serve to reduce the overall cost of energy/power projects in developing countries. Since the energy/power sector consumes 25% of the development budget of many A.I.D.-assisted countries, any reduction in the cost of energy/power projects could free-up resources for development activities in other sectors. This approach would also strengthen the ties of economic cooperation between the United States and A.I.D.-assisted countries.

We learned that governments from other industrialized nations cooperate more closely with industry than does the U.S. government. As a result, foreign companies enjoy a higher level of political support than U.S. companies. The Review Group believes A.I.D.'s energy program planning could benefit from a more open dialogue with U.S. industry as to (i) appropriate power technologies, programs and projects, and (ii) effective assistance measures to reduce the risks in those projects.

We concluded that to promote development in A.I.D.-assisted countries and to increase economic cooperation between them and the United States, A.I.D. should be more active and innovative in promoting, marketing, and financing U.S. energy trade interests that support economic growth.

PROPOSED ACTIONS

The U.S. government should revise its export promotion and financing support programs to help make U.S. goods more competitive in the world marketplace. This would serve to place U.S. companies on a level playing field in their competition with other exporters for trade in energy/power goods and services. In particular,

The Administrator of A.I.D. should:

3-A. Together with other U.S. government agencies, provide funding to support feasibility studies and project development activities for electric power and other "commercial" energy projects in developing countries.

3-B. Establish a fund to help finance energy/power and other infrastructure projects on concessionary terms or provide funds that would leverage private capital for such projects with large export potential. The development fund could loan to both public and private sector projects.

3-C. Explore and employ innovative financing approaches to support energy/power projects, possibly including loan guarantees and additional risk insurance.

3-D. Designate increased portions of economic support funds for electric power projects. In particular, target the Philippines (through the Philippines Multilateral Assistance Initiative), the Dominican Republic, Indonesia, and other countries with power supply constraints.

3-E. Target activities to develop local capital markets in developing countries for private sector energy/power infrastructure projects.

3-F. Review and help streamline U.S. procurement regulations that hinder U.S. private sector efforts or place U.S. companies at a disadvantage with foreign competitors.

3-G. Encourage the placement of U.S. citizens in key energy/power, financial and technical positions within the multilateral development banks and in the utilities of host countries.

The U.S. Congress should:

3-H. Appropriate additional funds specifically for electric power projects in developing countries.

3-I. Support additional funding for the direct lending program of the Eximbank and mixed credit programs of Eximbank and TDP. U.S. policy should be revised to adopt proactive use of mixed credit authority.

RECOMMENDATION 4: The U.S. energy industry should respond with a more active interest and take a long-term perspective toward developing country energy/power markets.

The inability of U.S. energy industry companies to win major assignments in developing countries in part results from their short term focus upon specific project opportunities rather than longer term export market development. Energy/power project development in A.I.D.-assisted countries can be a lengthy process. Market intelligence is scarce, so project opportunities must be created. Drawn-out bureaucratic reviews during the development of energy/power projects are common, and in certain cases legislative reform is required.

We found that companies in other industrialized nations view the developing country energy/power market as a long term investment. With assistance from their governments, they pace their investments to establish durable relationships based on a long term presence in the country. They station

qualified energy/power system and business development experts to gather market intelligence and help create project opportunities.

U.S. firms, on the other hand, are known for intensive marketing over fairly short periods directed at specific project opportunities. Frequently, major efforts must be directed at gaining an advantage over other U.S. firms only to learn that the relationships established by the foreign competitors with the client over a long period of time are a dominant factor in the ultimate selection.

We concluded that U.S. energy industry needs to adopt a longer term perspective in developing country energy/power markets. U.S. assistance programs could help U.S. firms in the formation of long term working relationships with public agencies and local private sector capabilities. This would materially strengthen market intelligence and the ability of U.S. firms to compete.

PROPOSED ACTIONS

The U.S. energy industry should:

4-A. Work with A.I.D. toward (i) designing and implementing well conceived energy/power sector projects and (ii) conducting activities that will establish durable long term relationships with the power sector of A.I.D.-assisted countries.

4-B. Show senior U.S. government officials and Congress a strong corporate commitment to participate in the energy/power sector activities of A.I.D. and other U.S. trade assistance programs.

4-C. Work with A.I.D. and other government agencies in developing risk sharing assistance mechanisms.

4-D. Commit resources to pursue those energy/power sector business opportunities that result from A.I.D. program initiatives.

ANNEX
MEMBERS OF THE
ADMINISTRATOR'S
ENERGY INDUSTRY REVIEW GROUP

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BECHTEL POWER CORPORATION

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OPPORTUNITIES IN PRIVATE ELECTRIC POWER GENERATION & ENERGY CONSERVATION IN ASIA & CENTRAL AMERICA

BRIEFING MATERIALS

Sponsored By:

**U.S.-ASEAN CENTER FOR
TECHNOLOGY EXCHANGE, INC.**

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT

**Bureau for Asia and Near East
Office of Energy, Bureau for Science & Technology**

**Boston, Massachusetts — June 29, 1989
Washington, D.C. — July 12, 1989
Indianapolis, Indiana — July 14, 1989
San Francisco, California — July 18, 1989
Phoenix, Arizona — August 18, 1989
New Orleans, Louisiana — August 21, 1989**

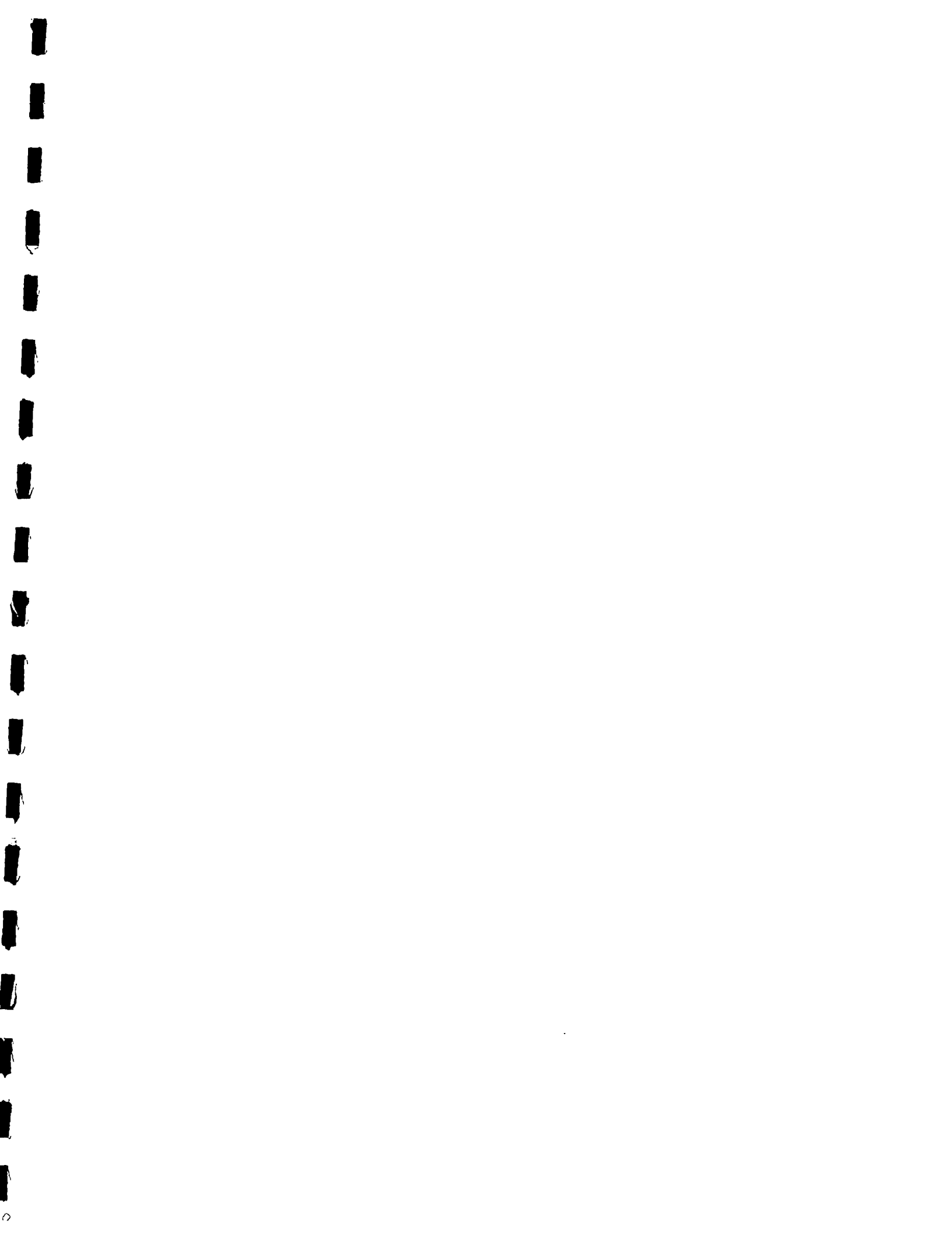
OPPORTUNITIES IN PRIVATE ELECTRIC
POWER GENERATION & ENERGY CONSERVATION
IN ASIA & CENTRAL AMERICA

Briefing Materials

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**POWER SHORTAGES IN DEVELOPING
COUNTRIES: MAGNITUDE, IMPACTS,
SOLUTIONS, AND THE ROLE OF THE PRIVATE
SECTOR**

A Report To Congress

EXECUTIVE SUMMARY

BACKGROUND AND PURPOSE

Recognizing that "energy shortfalls are causing a serious constraint to development in over half of all A.I.D.-assisted countries," the Committee on Appropriations of the U.S. House of Representatives requested a report from the U.S. Agency for International Development (A.I.D.) on the "magnitude of the crisis, its implications for future economic and social development and the potential for U.S. technologies and services to address this problem," including an assessment of "appropriate incentives for private sector participation and the feasibility of an Energy Guaranty Program modeled on A.I.D.'s Housing Guaranty Program."

The need to provide adequate electricity in developing countries is of critical importance to the U.S. Energy is critical for sustainable economic development. As growth proceeds, developing countries require more electric power to satisfy the requirements of their agricultural, industrial, transport and commercial sectors. As a prerequisite for economic development, electric power is vital to efforts to improve living standards in the Third World and to satisfy the demands of their citizens within a stable political context. Also, the electric power market in developing countries provides significant trade opportunities for U.S. businesses.

In response to the Congressional request, this report highlights the dilemma faced by developing countries and seeks to initiate a discussion about potential solutions, the appropriate role of the private sector, and implications for the U.S. foreign assistance program.

1. MAGNITUDE OF THE POWER CRISIS

An adequate and reliable supply of electricity is essential for the continued development of the Third World. Demand for electricity has been growing at over 7 percent per year over the past 20 years. Yet, developing countries -- with a population of 3.4 billion, over 75 percent of the world's population -- account for only 18 percent of all the electricity used in the world. A.I.D.-assisted countries are among the poorest developing countries, consuming only 250 kWh (kilowatts hours) per capita per year. By contrast, developed countries consume substantially more -- 10,500 kWh per capita in the U.S. and 6,000 kWh per capita in Europe and Japan.

Faced with high demand growth rates, many countries now experience power shortages of over 10 percent of their generation capability. In Pakistan, for example, during the past five years, power shortages have been over 25 percent of demand; in India, over 10

percent; and in the Dominican Republic, over 15 percent. The impact of these shortages has been severe.

The fundamental problem is that developing countries need more electric power for sustainable socioeconomic development than they are now able to produce. They lack the financial resources to rely primarily on the further expansion of generation capacity alone.

To avoid serious environmental and financial consequences, developing countries with grossly inefficient systems face major challenges in improving pricing and other policies, mobilizing capital for new investments, implementing more cost-effective and environmentally benign technologies, and improving management and organizational systems.

The Outlook for the Future

To determine a general level of magnitude of the future demand for electric power, the report projects future growth scenarios from 1988 to 2008. The Current Trend Scenario assumes that the performance of the power systems will remain the same as today with no major conservation or efficiency improvements. To clearly illustrate the power problem, it analyzes the existing prevalent view of new generating capacity as the primary means to satisfy future demand.

Under this Current Trend Scenario, with a medium rate of economic growth of 4.5 percent per year, 1,500 GW (gigawatts) of additional generating capacity and related transmission and distribution facilities would be needed by the year 2008. This would cost over \$2.6 trillion, or an average of over \$125 billion per year (compared with the estimated \$50-\$60 billion currently being spent per year).

The report, however, proposes an alternative future, the Conservation Scenario that incorporates substantial improvements in generating plant operational efficiencies, sharp reductions in transmission and distribution losses, and considerable improvements in electricity conservation and end-use efficiency. Under the Conservation Scenario, based on a medium economic growth rate of 4.5 percent per year, developing countries can satisfy the demand for electricity and reduce the need for additional generation capacity from 1,500 GW under the Current Trend Scenario to only 700 GW. The conservation scenario with high economic growth would reduce the need for additional generation capacity to approximately 1,200 GW.

With typical costs of conservation equipment, the conservation scenario would reduce capital requirements to \$75 billion to \$110 billion per year. Thus, conservation could have considerable impact. It should be noted, however, that even with conservation, other sources of capital -- private capital -- will have to be mobilized to forestall electric power induced restrictions on economic growth.

2. THE IMPACT OF INADEQUATE ELECTRIC POWER SYSTEMS

While not sufficient unto itself, reliable electric power is necessary for economic development in the Third World, just as it is in developed countries. Despite the major changes since the Arab oil embargo, the overall relationship between energy growth and gross domestic product growth in industrial countries has been close to one-to-one. Expansion of developing countries agriculture and industry, in particular, depends heavily on electricity in all but the most primitive economies.

As these nations modernize, electricity use in the commercial and residential sectors is rising sharply, and in some countries has outstripped industrial-sector consumption. Also, most developing countries have adopted aggressive plans for rural electrification in an effort to decentralize their populations and to distribute the benefits of economic growth and modern services.

Consequently, the demand for electric services has risen more rapidly than supply, and many developing countries now face critical power shortages of over 10 percent of their generation capability (e.g., the Dominican Republic = 15 + percent, Sierra Leone = 10 percent, India = 10 percent, and Pakistan = 25 + percent).

These power shortages and unmet demands for power present significant economic problems. In Pakistan, for example, estimates are that load shedding in the industrial-sector alone has led to a 1.8 percent decrease in Gross Domestic Product and a 4.2 percent decrease in the country's foreign exchange earnings. In India, the current 10 percent average supply cut to the industrial-sector is estimated to cause an annual production loss of over \$6 billion -- equivalent to 12 percent of the country's industrial output.

Environmental Impacts of Electric Power Systems

An expansion of electric power production in developing countries based on the current trend scenario could threaten significant environmental damage. Projections of power supply expansion show large increases in hydropower and steam thermal (mainly coal) facilities. Large-scale hydropower plants often require the relocation of sizable populations and alteration of river basin ecosystems. Coal-fired power generation has historically been associated with emissions of particulate materials, sulfur dioxide, oxides of nitrogen and other pollutants from related mining, cleaning, generating, and storage operations. The problem of global climatic change will accompany any substantial expansion of coal-burning plants.

Systematic conservation and the use of innovative renewable and conventional technologies, however, offer opportunities to reduce significantly the environmental impacts associated with the current trends that concentrate primarily on the expansion of generating capacity.

Financial Impacts

Due to inadequate economic growth rates and substantial debt burdens, developing countries lack the financial resources needed to satisfy the \$1.7 trillion to \$4.0 trillion investment projected under the Current Trend Scenario.

Developing countries already have had to devote up to 25 percent of their development budgets to electric power. Further increases would adversely affect agriculture, transportation, education, housing, and health care.

The report projects the level of future funds that can be contributed by developing countries, multilateral development banks, and bilateral development agencies. Based on the Conservation Scenario, these combined sources of funding can provide only 40-60 percent of the capital needed -- leaving a potential shortfall of \$900 - 1,200 billion over the next 20 years, or \$45 - 60 billion per year. Additional sources of funds will be needed to fill this power finance "gap."

Importance of Third World Power Development to the U.S.

The power situation in developing countries directly concerns the U.S. in several ways:

- Foremost is a humanitarian concern for the living conditions of people in these countries, their employment opportunities, and their prospects for achieving sustainable socioeconomic development.

- Electric power -- in sufficient supply and efficiently used -- is needed for A.I.D.'s development assistance efforts as infrastructure to support agricultural, health, housing, and economic development.

- Power shortages and the limited availability of power, especially in rural populations, have become issues affecting sociopolitical stability in developing countries.

- The electric power sector in developing countries provides a major market opportunity for U.S. suppliers of equipment and services to increase their export sales and a potential location for private capital investment.

Importance for U.S. Trade

The Committee on Appropriations specifically asked for an analysis of the potential for U.S. technologies and services to address the power problems of developing countries. The report projects the total export market for power generation, transmission and distribution equipment and related services to range from \$370 billion to \$900 billion over the next 20 years, depending on the growth scenario.

The competitiveness of U.S. suppliers in the power industry, however, has declined dramatically in recent years. U.S. exports now represent less than 10 percent of the total power generation equipment and services exports to developing countries, down from 17 percent just 5 years ago and down from over 20 percent in the late 1970s. If this trend were to continue, the United States' share of developing country power market sales would be limited to about 5 percent of the estimated export potential through the end of the century. Reversing the trend is possible. With recent changes in the value of the dollar, U.S. products are becoming more competitive with equipment sold by European and Japanese manufacturers. However, the limited availability of export financing for U.S. companies remains a problem. The U.S. export position could be improved substantially if additional export financing assistance -- loan guarantees and other incentives -- were made available. The U.S. position could also be improved by targeting incentives toward those technologies and services where U.S. suppliers have a competitive edge.

3. APPROACHES FOR IMPROVING POWER SITUATION

Utility authorities in developing countries have traditionally attempted to solve their electric-power supply problems primarily by expanding generating capacity. Given the enormous financial and environmental costs of this approach, it is not sustainable. Consequently, developing countries must seek to:

- Improve the ability of utility authorities to raise capital by reforming tariffs and encouraging private sector involvement
- Reduce demand through conservation and end-use efficiencies
- Provide electricity at least cost by considering improved forms of generation
- Reduce production costs by technical, managerial, and operational efficiency improvements.

Policy Approaches

Policy reform can play a major role in improving the quality of electricity supply, increasing the efficiency of electricity use, and alleviating adverse environmental impacts. Reform is needed in pricing policy, environmental policy, energy conservation policy, and private sector policy.

Institutional Approaches

Existing institutional structures in most developing countries are not well matched to the present and future power situation, which will require innovative approaches, an emphasis on conservation, involvement of the private sector, and more efficient operation. Efforts are needed on :

- Utility management improvements
- Research and development
- Strengthening financing institutions appropriate to the power sector
- Strengthening institutions related to conservation and end-use efficiency
- Private sector participation in utility functions.

Technological Approaches

Increasing efficiency and power output from existing and future facilities can be achieved by technological improvements:

- Power plant performance improvement
- Transmission and distribution loss reduction
- End-use efficiency improvement
- Load management
- Cogeneration
- New generation technologies.

Private Sector Approaches

Directly involving the private sector in the power development of developing countries promises part of a realistic answer to the power problem. The private sector has greater incentive and ability than does government to manage and operate efficiently and productively. The private sector has access to private sources of financing that are unavailable to state-owned utilities. In the limited instances where private companies are generating and selling power in developing countries, there is clear evidence of their greater efficiency and reliability.

4. PRIVATE SECTOR ROLE AND APPROPRIATE INCENTIVES

Given the serious financial and operational problems of publicly owned and controlled utility systems, there is a significant opportunity for the private sector in developing countries and the United States to contribute to alleviating the power crisis. Over the past few years, interest in private sector participation has expanded considerably.

The major benefits that private sector involvement can bring to developing countries are the introduction of market forces of competition and efficiency and the attraction of additional financial resources.

Approaches for Private Sector Involvement

Participation by the private sector can take a variety of forms:

- Ownership and operation
- Contracting out
- Lease-back
- Investment in debt.

Since the power sector has been publicly controlled, the traditional role of the private sector has been restricted to selling goods and services to utilities. For the U.S., this has contributed to the declining trade in electric equipment and services. Recently, developing countries have begun to express interest in having the private sector own and invest in new generating plants that would sell power to utilities on long-term contracts.

Need for Incentives

Despite the advantages of private sector participation and the expressed interest of private firms and developing countries, numerous obstacles still exist:

- Policy and institutional barriers
- Weak domestic economies
- Political risk
- Technical risk
- Financial risk.

PRIVATE SECTOR ELECTRIC-POWER STRATEGY

A.I.D.'s private sector electric-power strategy is designed to facilitate developing country efforts to use the financial and technical resources of the private sector, both domestic and international, to expand their electric generation capacity. While no private power projects have yet been completed, the immense interest in the concept and the clear benefits to potential investors and developing countries make it apparent that projects soon will be implemented.

Four specific objectives are being pursued by A.I.D.:

- Improve public policy and institution climate
- Facilitate development of power projects and trade
- Assist in financing power investment and trade opportunities
- Coordinate with other U.S. agencies and other donor agencies.

Initially, A.I.D. is focusing on removing policy and institutional barriers to private sector participation in the power sector and on assisting the implementation of a limited number of projects to provide some experience with this innovative approach.

As this report describes, A.I.D. will continue to :

- Provide technical assistance and training to both the public and private sectors related to the institutionalization of private power policies
- Integrate private power into national energy power policies and investment programs
- Stimulate interest on the part of the World Bank, regional development banks, and other donors in private power projects
- In special cases where A.I.D. has substantial resources, for example, Pakistan, fund project development and even the capital costs of U.S. companies
- Promote communication with the Trade and Development Program, Department of Commerce, Eximbank, Overseas Private Investment Corporation, and Department of State on opportunities for investment and financial needs vis-a-vis competitors.

The Committee on Appropriation's emphasis of the energy loan guarantee program warrants a specific recommendation on this option. After analysis of the A.I.D. Housing

Guaranty Program, the OPIC and Eximbank loan guarantee programs, and the status of numerous private sector power projects, it appears premature for A.I.D. to establish a separate loan guarantee program. There are not yet enough private sector power projects being considered to require the establishment and funding of a new loan guarantee program, although the situation could change in the near future.

In the near term, A.I.D. should help project developers and developing countries work with existing loan guarantee programs in OPIC and Eximbank. A.I.D. should use these opportunities to explore the sufficiency of existing loan guarantee funding authority and to further study the financial and administrative details of implementing an energy loan guarantee program at A.I.D.

The central issue is clearly the need to rely on investors to assume normal commercial risks associated with power development projects while providing incentives to reduce political and other risks associated with doing business in developing countries. A.I.D. is in the nascent stage of developing a program in this area and its approach will undoubtedly evolve as it learns from experiences in Turkey, Pakistan, and elsewhere.

5. ROLE OF A.I.D.

Energy development, including electric-power, to support socioeconomic growth in developing countries has been a priority of A.I.D. Over the past five years, A.I.D. has provided slightly less than an average of \$200 million per year in energy-sector assistance to developing countries. In the FY 1986 budget, \$180 million was spent for electric-power out of a total of \$254 million for all forms of energy. Rural electrification assistance accounted for 22 percent of the funds invested in power. Funding for energy activities in 23 countries included energy planning, demand management, fuelwood reforestation, resource assessments, and renewable energy.

A.I.D. will continue to play a pivotal role in assisting developing countries to alleviate their electric-power problems. Building on its experience, the Agency can contribute in the following areas:

Policy Dialogue

- **Pricing policy.** Based on its efforts in Egypt, Bangladesh, Pakistan, and elsewhere, A.I.D. will continue to focus its activities on inducing pricing reform policies that reduce or eliminate uneconomic pricing and alleviate current and projected demands for power
- **Conservation policy.** A.I.D. will continue to assist developing countries to develop and implement national energy conservation plans that address generation, transmission and distribution, and end-use consumption of power

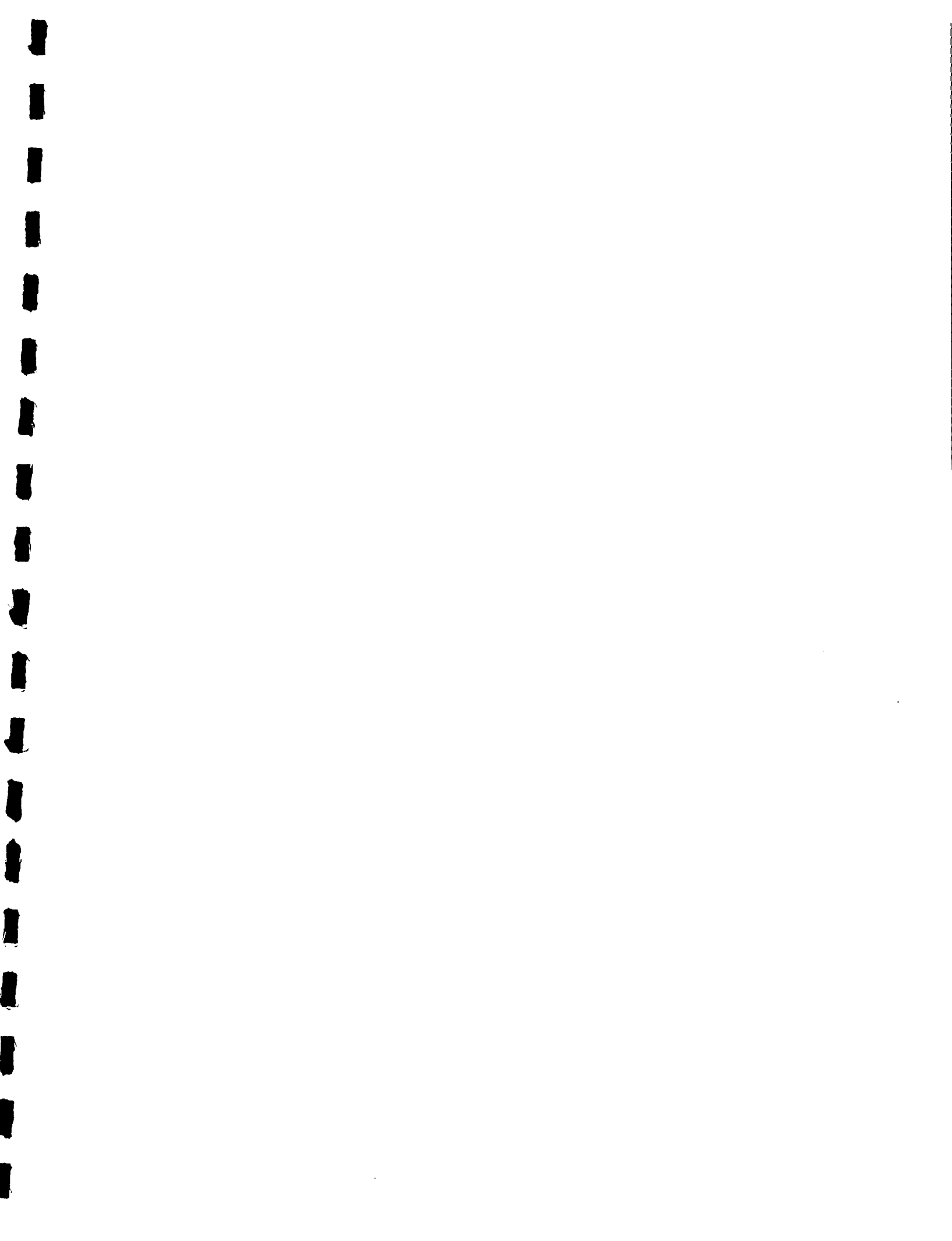
- **Environmental policy.** A.I.D. will assist developing countries to develop, adopt, and implement systematic policies, standards, and practices for environmental management for power sector activities
- **Private sector policy.** A.I.D. is expanding its current efforts to encourage the implementation of policies, laws, and regulations that encourage private sector participation in the power sector.

Institutional Improvements

A.I.D., through the technical expertise it has available and its ability to provide effective training, is focusing particular attention on improving electric utility institutions in developing countries. The Agency is concentrating resources on the following:

- Improving utility management
- Supporting development of innovative and improved technologies suited to developing countries
- Assisting institutions involved with conservation and end-use efficiency.





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INTRODUCTION AND OVERVIEW

ENERGY CONSERVATION AND COGENERATION

TRADE AND INVESTMENT IN

OPPORTUNITIES FOR U.S.-ASEAN

In late 1988, the U.S. Agency for International Development provided assistance to the U.S.-ASEAN Center for Technology Exchange to assess the opportunities for increased trade and investment between the U.S. and ASEAN in energy conservation and cogeneration, and private power development.

This report presents the conclusions of that research. It also includes information on the energy situation, in particular the status of electric energy, in the ASEAN countries. Data was organized with the goal of preparing concise, informative reports on opportunities for American companies in energy conservation and cogeneration in ASEAN. Data gathered addresses the following energy related topics, among others: pricing, supply, uses, generating capabilities, availability of fuels, government policies and conservation. Estimations of the market are given, where possible; although dollar amounts were frequently not available.

Emphasis is placed on determining the level of interest in ASEAN governments and private firms in investments in cogeneration and conservation. The country reports attempt to identify the current status and prospects for respective ASEAN energy markets, as well as motivating factors affecting governments and private companies.

The study relied on existing research work, some sponsored by USAID, and interviews with government officials and private business people in ASEAN and the United States.

There is less concern with the availability of electricity in Malaysia, and none in Singapore and Brunei Darussalam. Cost of electricity is the key factor driving investment in cogeneration and energy conservation in these countries.

Much of the current interest in cogeneration and energy conservation in ASEAN stems from perceived crises in the capacity of government owned utilities to generate enough electricity to meet current and future demand. This is particularly a concern in Indonesia, the Philippines, and Thailand, where economic growth and consequent rising demand for electricity has outstripped the generating capacity of the utility.

Like cogeneration, the market for energy conservation in commercial buildings and industry cannot be determined with any certainty. However, this research has found that, with the exception of Brunei, all of the governments of the region are serious about energy conservation, and have established, or are enacting, laws to achieve greater energy efficiency. These laws range from stringent building codes, to higher tariffs for electricity, to tax reductions and other financial incentives for investments in energy conservation equipment.

No dollar amount has been determined for the cogeneration market in ASEAN. However, the potential of the market has been assessed from the perspective of generating capacity that could be built. For Indonesia, Malaysia, the Philippines, and Thailand, there is potential for as much as 3,000 MW of new capacity through additional and retrofit cogeneration installations through 1995. There does not appear to be a large potential for cogeneration in Singapore or Brunei Darussalam, although there are now operating cogeneration projects in both of these countries.

There are opportunities for U.S. and ASEAN companies in investment in private power generation projects (cogeneration as well as privately financed BOT -- Build, Operate, Transfer -- projects). According to the size of the market for power generation equipment in a country, there may also be sufficient potential for American firms to consider investment in assembly and manufacturing of equipment, controls, and machinery for power plants.

The energy sector offers opportunities for increased trade and investment between the United States and ASEAN. This has historically been true for large, government sponsored and financed electricity generating plants. The Center's research concludes that there are also good opportunities in privately financed cogeneration, private power projects, and energy conservation.

OPPORTUNITIES

This report is divided into seven sections. The first section summarizes the conclusions of the study from an ASEAN perspective. Reports on each country follow this overview.

BACKGROUND

The economies of ASEAN are among the most dynamic and fastest growing in the world. In 1988, gross national product rose by 11 percent in Singapore, 10 percent in Thailand, 8.2 percent in Malaysia, 6.7 percent in the Philippines, 4.9 in Indonesia, and 2.5 percent in Brunei Darussalam.

ASEAN industrial production also grew rapidly in 1988. Manufacturing was up 17 percent in Thailand, 16 percent in Indonesia, 15 percent in Singapore, 12 percent in Malaysia, and 11 percent in the Philippines.

Economic growth has placed extraordinary pressures on the electric generating utilities in ASEAN. In 1987 and 1988, total energy demand rose an average of 8-10 percent throughout the region. In manufacturing, demand for electricity increased by 16 percent in some countries, and by over 10 percent on average.

Government owned public utilities are struggling to keep pace with rising consumption. Reserves for peak load requirements have fallen below acceptable levels; loadshedding systems have been established and used with increasing frequency, particularly in the Philippines.

While power shortages have not limited the growth of industry and manufacturing to date, there is concern that future expansion cannot take place without large investments in energy production and conservation.

Singapore and Brunei have sufficient generating capacity to meet current and expected demand. However, the need for an immediate expansion of generating capacity is a primary concern for Indonesia, the Philippines and Thailand, and to a lesser extent Malaysia.

It is estimated that immediate and long term investments in electricity production in the ASEAN region will be massive. Thailand projects investments in the next five years at \$4.6 billion, the Philippines is looking at an investment requirement of in excess of \$11 billion over the next decade. The government of Indonesia has estimated that it will need to invest \$27 billion in the next thirty years in electricity generation.

Given the magnitude of these investment requirements, governments are seeking alternative and innovative financing

The region also has a large supply of renewable fuels. Among the resources available are agro-wastes, industrial wastes,

the oil companies. heavy oils in the Philippines, and others are being considered by generation. At least one project is under development using heavy oils, which could be economically used in electricity of the oil refining capacity in the region produces residual ASEAN has abundant sources of fuels for cogeneration. Much

power by the national utilities. and rules are being developed to provide for buy-back of surplus investment in generation is now encouraged throughout the region, in ASEAN, at least in the policies of governments. Private Since 1985, there has been a significant change in private power many electric utilities discouraged private power development. generators. Little power was sold to the grid systems. Indeed, In the past, most cogeneration plants were captive power

private power. familiar with the need for, and potential of, cogeneration and 50 percent (in Indonesia). Most industries in the region are percentage of total power capacity (in Singapore), to more than throughout ASEAN. Private power ranges from a very small there has been substantial investment in private power projects, Private power is not new to the region. As Table 1.1 shows,

utility. requirements, as well as sell excess output to the national to use industrial waste to generate their own power and heat processing, among others. These industries are well positioned cement, food processing, textiles, agro-industries, wood and wood number of energy intensive industries, including pulp and paper, through retrofit and new systems. The region is base for a there is potential for at least 3,000 MW of generating capacity As noted, in Indonesia, Malaysia, the Philippines and Thailand, The potential for cogeneration in ASEAN is well established.

COGENERATION

required for these industries to flourish. being developed. More efforts at education and training are and government policy. The latter is in either in place, or is Changing this viewpoint is a function of educational efforts

can improve profitability. forcing industry to consider new options. Yet, expenditures in these areas are still perceived as costs, not as investments that

Recent technical developments have made rice husks and rice straw sources of fuel for cogeneration systems. These developments have also made it possible for smaller systems to be financially attractive. It is estimated that there is 7.8 million tons and 3.8 million tons of rice husks available in Indonesia and Thailand annually. Given that very few rice mills now cogenerate, there is good potential for this industry to develop in ASEAN.

Rice: In 1986, Asia produced about 90 percent of the world's rice harvest (between 436 and 475 million metric tons). In ASEAN, Indonesia and Thailand are the major rice producers, with 1986 outputs of 39 million metric tons and 19 metric tons, respectively.

Most of the existing systems are only sufficient to meet the immediate demands of the sugar mill itself. There is scope to increase energy production using bagasse and other wastes, particularly for sale of surplus power into the grid. There are also opportunities to improve the efficiency of existing cogeneration systems through retrofit.

Sugar: Sugar is a major industry in Indonesia, the Philippines and Thailand. Cogeneration in the sugar industry is already well developed. The majority of private power in Thailand is generated by the sugar industry, and the use of bagasse for generation of electricity and heat is common in the Philippines.

Among the agro-wastes readily available for cogeneration are sugar (bagasse and other wastes), rice husks and straw, timber, palm oil effluent, and rubberwood.

Agriculture and agro-industries are major contributors to the ASEAN economies. In some nations, more than 50 percent of the workforce is employed by agro-industries, and the sector contributes as much as 25-30 percent of GNP.

Agro-Waste Fuels

Geothermal energy holds excellent potential in Indonesia and the Philippines. There have been investments in geothermal development in both countries. Some have been developed by private investors, although the scope for private investment in geothermal projects in the Philippines appears to be limited by the current production sharing arrangement.

This section will not discuss other renewable energy sources such as solar and wind power, although there is potential for development of these resources.

Utility rate structures have been, or are being, adjusted to encourage energy management. In most countries, peak and off-peak hours have been set, and tariffs charged accordingly. Further, there is a demand charge, which essentially is a penalty for excess usage during high demand periods. This charge can be quite high in some countries. For example, the penalty is a 100 percent surcharge per unit for peak usage in Malaysia.

The changes in laws and utility rate structures make it financially feasible to invest in energy conservation in commercial buildings and industry. Another factor affecting decisions to invest in conservation is usage. On average, one third of electricity consumed in the region is for commercial buildings, and 40-50 percent for manufacturing industries.

ENERGY CONSERVATION IN BUILDINGS

Interest in energy conservation in commercial buildings has been increasing in ASEAN over the past several years. With the assistance of the U.S. Agency for International Development, the ASEAN governments have begun to analyze energy use in commercial buildings, profile the potential savings from the application of more efficient technologies, and identify policies to encourage private investment in such measures.

Design standards have been enacted, or are being considered, in most ASEAN countries. Incentives have also been introduced to encourage investment in energy conservation equipment. In Thailand and the Philippines, for example, the governments provide tax reductions for the importation of equipment and low interest loans.

There is potential for retrofit of buildings, but it is difficult to predict the extent of this need. The energy conservation market for commercial buildings is clearly tied to new construction, which has been a leading sector in nearly all ASEAN countries.

The principal obstacle to the development of this industry in ASEAN is resistance by building owners and operators to investing in new equipment and to incurring operating expenditures for energy management services. This is particularly true for multi-tenant office buildings. However, there is greater incentive, and considerably more interest in conservation and management in single tenant buildings.

The approach of many U.S. energy conservation companies -- to earn the bulk of their fees out of energy savings -- may be attractive to ASEAN business executives.

Opportunities

The opportunities for U.S. and ASEAN companies are in the following areas:

- o consultancy services, including energy management services, energy audits, design services;
- o equipment sales, including controls, high efficiency lighting, cooling, etc.; there is also some potential for solar applications, particularly in the larger hotels, and;
- o manufacturing of some types of equipment in the region for the Asian regional market. ASEAN offers a well developed industrial infrastructure which can serve as a base for manufacturing and assembly.

ENERGY CONSERVATION IN INDUSTRY

Energy conservation in industry offers a wide scope of opportunities for trade and investment between the United States and the region.

Many of the same industries that offer strong potential for cogeneration can also benefit from the application of energy conservation measures.

Measurements of the potential for energy conservation in industry vary by country. In the Philippines, it is estimated that at least 10 percent of energy costs could be saved through simple housekeeping measures. Potential savings in Thailand range up to 20 percent. The savings could be even higher when energy consumption per unit of output in Thailand is compared to world averages. In some industries, energy consumption is double the world average.

There is also a need for improving efficiency in electric generating plants in ASEAN. Many are older, and do not use high efficiency boilers, combined cycle, or other advanced technologies.

As steps are taken to shift the mix of fuels used in electricity generation, there will be an increasing need for new technologies, and a related interest in environmentally sound generation systems. Indonesia, Malaysia, the Philippines and Thailand are all seeking to reduce their use of oil in generating plants. Use of coal is on the rise, and consideration is being given to converting some oil-fired units to coal.

A consequent consideration for governments is the environmental impacts of coal fired generation. An ASEAN working group has been established to look into "clean" energy and environmentally sound generation technologies. There is particular interest in improved technologies for the burning of coal.

Opportunities

There are opportunities in the following areas:

o consulting services, including design and engineering for retrofit and new plants;

o equipment sales, process controls, high efficiency equipment, and advanced generation equipment;

o manufacturing: as the region invests more in industry and electricity generation, there may be scope for investment in manufacturing machinery and equipment in ASEAN.

The opportunities mentioned in this report may be pursued through joint venture investments with local firms, and in some instance through wholly owned affiliates. The proper partner can provide access to the local business community; essential to the success of venture in energy conservation, which must convince a local business person of the value of the investment. Joint venture is also an option because, in many countries, consultancy and engineering services are not open to 100 percent foreign owned companies.

RECOMMENDATIONS

The energy conservation and cogeneration industries appear poised for a take-off in ASEAN. Interest in these areas is increasing in both the private and public sectors.

USAID and other donor agencies are working actively on the policy issues affecting private power and energy conservation. These efforts appear to be resulting in more interest in the ASEAN governments in enacting laws and implementing regulations on private power, cogeneration and conservation. These regulations, if enforced, will serve as the basis for the expansion of these industries in the region.

American companies are generally under represented in the cogeneration and energy conservation markets in ASEAN. The

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major U.S. suppliers of generating plants, equipment, engineering and consultancy services are active in bids for government and public utility contracts for new power stations. While they face very competitive adversaries, they are aware of the opportunities, and are in position to bid on most projects.

Opportunities in energy conservation and cogeneration appear to be under exploited by both U.S. and ASEAN firms. While the ASEAN market is still in the early stages of development, the potential is substantial.

Efforts need to be made to help American companies recognize this potential, and assess how they might participate in the development and expansion of these industries in the region. At the same time, educational programs are required to assist ASEAN business people in realizing the favorable impact of cogeneration and conservation on profits.

For a more detailed description of activities that would assist in the promotion of U.S.-ASEAN trade and investment, see the overview section of the Center's report, entitled, "Opportunities for U.S.-ASEAN Trade and Investment: An Industry Opportunity Analysis."

BRUNEI DARUSSALAM

SECTOR IDENTIFICATION REPORT

Brunei Darussalam is financially the wealthiest ASEAN country. It also has the smallest population. The nation has been governed by the Sultan of Brunei Darussalam since it gained independence from the United Kingdom in 1984. The country is located on the island of Borneo between Malaysia and Indonesia.

Brunei Darussalam is economically dependent on the production and export of oil and gas. The country's economy has experienced three years of decline in GNP, but is expected to achieve real economic growth in the range of 2-2.5 percent in 1988. The new growth is led by the non-oil sector which has been expanding at a rate of over 10 percent; the oil sector remains sluggish and depressed due to low prices of oil and the government's conservation policy.

Oil and gas production accounted for 64 percent of Brunei's gross domestic product (GDP) and 99 percent of export revenues in 1987. GDP is determined more by the international oil market -- which determines the pace of production from wells, subject to government policies on conservation of energy resources, and affects the prices received -- than by domestic economic activity. Oil and gas exports, representing the government's revenues, remained steady in 1987. Brunei is expected to maintain its substantial budgetary surplus.

Brunei's merchandise trade surplus was \$1.7 billion in 1987, up from \$1.6 billion in 1986. The country's exports are nearly four times the value of its imports. Brunei's trade balance with the U.S. in 1987 was \$5.83 million, and is projected to be \$4.79 million for 1988. Primary exports from the U.S. included aircraft and space equipment, civil engineering services, internal combustion engines, general merchandise, and meat. Primary exports to the U.S. included crude petroleum and petroleum products.

Brunei's foreign exchange reserves exceed \$20 billion, trailing only Japan and Taiwan in East Asia. However, the country's GDP slipped substantially after 1984; increased oil and gas production only partially offsetting world price declines. The non-petroleum sector in Brunei is underdeveloped, but is receiving increasing governmental attention.

In its fifth five-year development plan (1986-1990), Brunei has called for investments of \$1.7 billion. Its development goals include export growth, some import substitution, and economic diversification from the current focus on oil and gas.

Although Brunei's economic mainstay will continue to be oil and gas extraction, the government has recognized the need for diversification of the local economy. Aside from oil, the country is not rich in natural resources. However, there is potential in agriculture, forestry, fisheries, and silica sand. Commonly discussed small scale industrial projects include ceramics, beverages, building materials and textiles.

In October, 1986, the Sultan reorganized the cabinet, shifting responsibilities among ministers. For instance, the Ministry of Development was split in two. A new agency, the Ministry for Industry and Primary Resources was formed with a mandate to promote efficiency and development in the non-oil sector. This change was welcomed by the commercial and industrial communities, and resulted in increased business confidence in the country.

The Commercial Section of the U.S. Embassy in Bandar Seri Begawan reported that local business leaders believe that the new cabinet will improve bureaucratic efficiency, enhance decisions on major projects and diversification efforts, and increase business activity.

Non-oil sectors are dependent on both the health of the oil sector and government spending. Analysts suggest that government spending ultimately has more influence on the development of these sectors than the oil sector does. Non-oil economic growth has been strong, and unrelated to overall GDP changes (GDP changes mainly reflect changes in the petroleum sector because of its relative size).

Government projects, the main support for the construction and other non-oil sectors in Brunei's economy, slowed beginning in 1983, and with the soft market continuing through 1984 and 1985 as the pre-independence building boom came to an end. Government spending began to pick up at the end of 1986 and local businessmen are optimistic for continued growth. The government encourages stable rather than rapid growth, and has the means to control the rate of expansion through procurements.

Brunei's large trade surplus is due to substantial crude oil and natural gas exports and the limited absorbtive capacity of a small domestic market. Japan was by far Brunei's most important export customer, taking 68 percent of the total including all of the natural gas exported. Singapore and Thailand followed with 7.2 and 6.5 percent respectively. The U.S. ranked fourth consuming 5.5 percent of the country's exports.

Major imports came from Singapore (24 percent), Japan (19 percent), and the United States (15 percent) and Thailand (9.2 percent) in 1987. U.S. imports were valued at \$95 million. Brunei's imports encompass all types of manufactured goods and agricultural consumables because there is little domestic manufacturing or agricultural production. Further, the farming population has been drawn into urban centers, lured by the well-paid jobs in the government and private sector.

There are opportunities for U.S. firms in Brunei, but with a population of only 250,000, the market is very small. Perhaps the best approach is to consider Bruneian partners in the ASEAN Industrial Joint Venture Scheme (AIJV). The best prospects for U.S. business enterprises and exporters include agricultural products, educational materials, and franchising (especially fast food franchises as the country adapts to Western consumer trends). Construction, banking and other financial services are areas being developed by the government.

There are several major projects either going forward or nearing completion in Brunei which may indicate opportunities and scope for interested U.S. companies. These projects include building stadiums for the 1991 ASEAN Games, a proposed new university, a convention center for the ASEAN Ministers Meeting in June, 1989, and housing programs. Major projects such as these are very competitive.

COUNTRY FACTS: Brunei Darussalam

LAND

Area: 2,226 square miles
Cultivated: 1%, Forest: 85%, Pasture: 1%
Resources: oil, natural gas, timber

POPULATION

1987 Estimate: 249,961
Annual Population Growth: 3.67%
Projected Population in 2000: 300,000
Life Expectancy: 74 years Literacy: 45%
Infant Mortality: 12/1000
Religions: Muslim: 60%, Christian: 8%; Buddhist and local: 32%

WORKFORCE: 90,000

Commerce and Services: 25%
Manufacturing: 4%
Construction: 19%
Agriculture and Fishing: 5%
Government and Public Authorities: 47%

ECONOMY

Economic System: free enterprise
Currency: Brunei Dollar, 1 US\$ = 2.04 B\$
Major Industries: crude petroleum, liquefied natural gas, construction
Major Imports: machinery and transport equipment, manufactured goods, foodstuffs, consumer goods, chemicals
Major Exports: crude petroleum, petroleum products, liquefied natural gas
Per Capita GNP: US\$ 15,556 (1986)

Economic Statistics (Billions \$US and percentages)
Brunei is a minor trading partner of the U.S.

	1981	1982	1983	1984	1985	1986	1987
GNP	4.63	4.09	4.16	3.89	3.97	3.42	3.400
GNP Growth	na	11.7%	3.0%	2.0%	-10.0	-10.0%	-10.0%
CPI Rise	9.1%	6.4%	0.3%	3.1%	4.0%	2.3%	na
Exports	4.00	3.78	3.37	3.18	2.93	2.16	2.32
to US	0.34	0.22	0.02	0.01	0.01	0.01	0.02
Imports	0.59	0.73	0.72	0.62	0.60	1.11	1.16
from US	0.04	0.79	0.06	0.03	0.05	0.20	0.93

INDONESIA
SECTOR IDENTIFICATION REPORT

OVERVIEW OF THE INDONESIAN ECONOMY

Indonesia is the largest ASEAN country, both in terms of population (over 180 million) and land (741,101 square miles). The country is an archipelago of 13,677 islands stretching like a cornucopia from the southern border of Malaysia to the western border of Papua New Guinea, north of Australia.

The country recorded the largest gross domestic product among ASEAN nations in 1987, \$66.5 billion, yet had the lowest annual per capita income, \$390. Due to its large population, more than half of all of ASEAN, the country represents the largest single country market in ASEAN.

The Indonesian economy was hurt severely by the sudden collapse of international oil prices. Indonesian total export earnings plunged to \$14.80 billion in 1986; a reduction of 20.3 percent from 1985. The poor performance was primarily the effect of the 35 percent fall in oil and natural gas export receipts from \$12.71 billion in 1985 to \$8.27 billion in 1986.

Oil and gas account for 50 percent of export revenues and 40 percent of government revenues. The drop in oil revenues had a severe impact on expenditures for development projects, and many capital intensive ventures were shelved. Pressure against the rupiah necessitated a major devaluation of 31 percent against the dollar in September, 1986.

Indonesia's economy grew about 4.9 percent in real terms in 1988, up from 3.5 percent in 1987. Energy continues to dominate the export sector, although its share of export earnings has fallen from over 80 percent to 50 percent over the past three years. This is due to government efforts to stimulate the non-oil export sector through various policies ranging from the devaluation of the rupiah in 1986 to reducing tariff and non-tariff barriers (and deregulation) to offering fiscal and non-fiscal incentives to encourage domestic and foreign investment.

BKPM (Capital Investment Coordinating Board) data for the first 9 months of 1987 indicated that approvals to undertake non-oil investments totaled \$903 million, up from a total of \$826 for all of 1986. More than half of the approvals were for new projects.

The government encourages domestic and foreign private investment. To that end, the recent reform packages offered by the government include the following significant incentives:

- o Changes in the licensing system which governs manufactured goods. Product by product permits were replaced with blanket categories, enabling companies to produce a varied product line within the overall product category without requiring new permits;
- o Foreign joint venture companies with manufacturing operations in Indonesia are now permitted to establish separate joint ventures to distribute products locally at the wholesale level;
- o Reduction of non-tariff barriers, e.g. import restrictions and sole distributorships were eliminated for 318 products in chemical, metal, textile and agricultural sectors;
- o New copyright and patent legislation was passed;
- o Shipping licensing and restrictions were lifted;
- o Imports for production were liberalized; and
- o Deregulation of the banking and financial services sectors including insurance, capital markets, was enacted.

COUNTRY FACTS: Indonesia

LAND

Area: 741,101 square miles
Cultivated: 14%, Forest: 67%, Pasture: 7%
Resources: oil, tin, natural gas, nickel, timber,
bauxite, copper

POPULATION

1987 Estimate: 180,425,500
Annual Population Growth: 2.0%
Projected Population in 2000: 219,800,000
Life Expectancy: 54 years Literacy: 62%
Infant Mortality: 88/1000
Religions: Muslim: 83%; Christian: 6%, Hindu: 5%,

WORKFORCE

Commerce and Services: 18.2%
Manufacturing: 9.1%
Construction: 3.3%
Agriculture and Fishing: 53.5%
Government and Public Authorities: 13.0%

ECONOMY

Economic System: free enterprise
Currency: Rupiah, 1 US\$ = 1,710 Rs.
Major Industries: petroleum, textiles, mining, cement,
chemical fertilizer, timber
Major Imports: rice, wheat, flour, cereals, textiles,
chemicals, iron and steel products,
machinery, transport equipment
Major Exports: petroleum, liquified natural gas, timber,
rubber, coffee, tin palm oil, tea, copper
Per Capita GNP: US\$390 (1987)

Economic Statistics (Billions \$US and percentages)
Indonesia is the 24th largest U.S. trading partner

	1981	1982	1983	1984	1985	1986	1987
GNP	85.52	90.16	81.05	83.74	87.62	94.20	104.00
GNP Growth	7.9%	2.2%	4.2%	6.5%	1.6%	1.9%	3.0%
CPI Rise	12.2%	9.5%	11.8%	10.5%	4.7%	6.0%	8.0%
Exports	23.81	22.33	21.15	21.88	18.58	14.82	17.60
to US	6.41	4.51	5.66	5.87	4.93	3.66	3.72
Imports	13.27	16.86	16.35	13.88	10.23	10.72	13.10
from US	1.30	2.02	1.47	1.22	0.79	0.95	0.77
US/Indonesia Trade Balance (US\$ M)					(4,151)	(2,756)	(2,900)
IInvestment/GDP Ratio					26.4	26.2	
23.8%							

OVERVIEW OF THE MALAYSIAN ECONOMY

SECTOR IDENTIFICATION REPORT

MALAYSIA

Malaysia is the fourth largest ASEAN nation with a population of about 16 million. The government is a federal constitutional monarchy. Malaysia has a free enterprise economic system. The economy is rapidly industrializing. There are many opportunities for American investors to participate and assist in the country's new growth.

Over the past two decades, the Malaysian economy has evolved from an one dominated by agriculture, dependent on exports of commodities such as rubber and palm oil, to a more diversified economy emphasizing new agricultural commodities and manufacturing. Malaysia is the world's largest producer of natural rubber, palm oil, and tin, and the fourth largest source of cocoa.

Manufacturing and assembly have grown dramatically in the 1970's and 1980's. Malaysia is the world's largest exporter and third largest producer of electronic components. It also exports electrical products, petroleum and natural gas, timber and wood products, and textiles.

Malaysia has an open, trade-based economy with a relatively free flow of goods, services and currencies. Although its population is relatively small, the country is consumer oriented with a per capita income of \$1,800. It has a tradition of sound financial and budgetary management, a trainable and productive labor force and competitive incentives for foreign investors.

The economy grew by 7 percent in 1988, and by 4.7 percent in 1987, showing strong recovery from the 1985-86 recession. From 1965 to 1984, Malaysia experienced sustained economic growth and diversification. Despite gains by the manufacturing sector, six commodities -- petroleum, palm oil, rubber, tin, timber and cocoa -- accounted for two-thirds of Malaysia's total exports and one-third of its GDP in 1985. Thus, when world commodity prices bottomed out in 1985, the economy drifted into recession. Nominal GNP declined 3.2 percent in 1985 and 7.3 percent to \$25.8 billion in 1986.

Malaysia had a trade surplus of \$2.7 billion in 1988. Agriculture, minerals (including petroleum), and manufactured products each accounted for one-third of exports.

Electronics is now the largest export earner, as the transition is made from commodities to light manufacturing. Malaysia's government is encouraging industrialization and the indigenous private sector is responding by expanding and investing. There is increasing business confidence in Malaysia by both foreign and domestic investors. According to U.S. Embassy estimates, American companies have invested nearly \$5.0 billion in Malaysia, with \$2.0 billion invested in the past five years. Nevertheless, the U.S. is only the fourth largest investor in Malaysia, behind Japan, Singapore and the United Kingdom.

Manufacturing is now Malaysia's largest sector accounting for 22 percent of GDP in 1987. Growth is estimated at 8 percent for 1988. Real output grew 8 percent in 1987, following an increase of 7.5 percent in 1986. Conditions in local manufacturing, dominated by U.S. and Japanese multinationals, have improved sharply since mid-1986. The top performers in 1987, in terms of exports, were semiconductor devices, electronic and telecommunications equipment, and textiles. Other expanding export-oriented businesses include timber-based products, rubber-based goods and iron and steel.

Malaysia is an attractive low-cost production center for foreign manufacturers because of its high availability of natural resources; well trained labor; and government incentives and support.

The United States is Malaysia's second largest trading partner (following Japan) taking 17.5 percent of Malaysia's exports and supplying 18.3 percent of imports in 1987. U.S.-Malaysian trade grew in 1987: exports to Malaysia increasing 9.6 percent (\$1.9 billion) and imports from Malaysian expanding 20.5 percent (\$3.1 billion).

COUNTRY FACTS: MALAYSIA

LAND

Area: 127,316 square miles
 Cultivated: 14.3%, Forest: 70%, Pasture: 1%
 Resources: tin, rubber, timber, petroleum, copper, iron, palm oil

POPULATION

1987 Estimate: 15,820,000
 Annual Population Growth: 2.3%
 Projected Population in 2000: 20,700,000
 Life Expectancy: 67 years
 Literacy: 72%
 Ethnic Division: Malay: 50%, Chinese: 36%, Indian: 10%, other: 4%
 Religions: Muslim, Buddhist, Hindu, other

WORKFORCE: 5,917,100

Commerce and Services: 23.1%
 Manufacturing: 14.6%
 Construction: 6.6%
 Agriculture and Fishing: 34.3%
 Government and Public Authorities: 14.9%

ECONOMY

Economic System: free enterprise
 Currency: Ringgit (Malaysian dollar), 1 US\$ = 2.59M\$
 Major Industries: rubber and palm oil processing and manufacturing, tin mining, logging, petroleum production
 Major Agricultural Products: natural rubber, palm oil, rice, coconut, pepper
 Major Imports: machinery and transport equipment, manufactured goods, crude petroleum, food
 Major Exports: electronics and electronics components, natural rubber, palm oil, tin, timber, petroleum, light manufacture
 per Capita GNP: US\$1,574 (1987)

Economic Statistics (Billions \$US and percentages)
 Malaysia is the 24th largest U.S. Trading Partner

	1981	1982	1983	1984	1985	1986	1987
GNP	25.09	26.84	30.11	33.97	31.41	47.74	na
GNP Growth	7.1%	5.6%	5.9%	7.3%	-1.5%	1.0%	na
CPI Rise	9.7%	5.8%	3.7%	3.9%	.3%	1.5%	na
Exports to US	11.73	12.04	14.13	16.56	15.41	14.00	na
Imports from US	11.58	12.41	13.24	14.06	12.30	10.30	na
US/Malaysia Trade Balance (US\$ M)	1.54	1.74	1.68	1.86	1.54	1.73	na
Investment/GDP Ratio	27.5%	27.5%	27.5%	27.5%	27.5%	25.7%	24.1%

THE PHILIPPINES

SECTOR IDENTIFICATION REPORT

OVERVIEW OF THE PHILIPPINE ECONOMY

The Philippines is an archipelagic nation of over 7,000 islands with a population of approximately 58 million. The country is a democratic republic which, for the past two years, has been led by President Corazon Aquino. Mrs. Aquino came to power in February, 1986 as the head of the "People's Power" revolution. The Aquino government has initiated many economic and political reforms and the Philippine economy is experiencing a period of recovery and growth.

Economically, the transition to a new government has been marked by reform and a significant turn-around in growth. Tax reform, monopoly break-up and partial trade liberalization have been accomplished. Privatization of several government owned industries is underway under the Asset Privatization Trust (APT) Program. In 1987, the government enacted the Omnibus Investments Code to simplify investment regulations and provide incentives to new foreign direct investment. A Comprehensive Agrarian Reform Law (CARL) was passed by the Congress in June, 1988; however, there is continuing debate regarding its implementation.

Reforms have led to economic growth and renewed business confidence in the economy. The Philippines gross national product (GNP) was up 5.7 percent in 1987 after two and a half years of negative growth. According to the latest estimate, GNP increased by 6.5 percent in 1988. Per capita GNP rose (by 2.7 percent) for the first time since 1981, and unemployment fell below 10 percent in 1987 for the first time in four years.

Imports of capital goods increased 32 percent in 1988. Inflation has remained under 8 percent; it had been reduced to 2.8 percent in 1986 from a high of 50.4 percent in 1984. Growth in trade, with imports outpacing exports by about 10 percent, is expected to continue into 1989 as import restrictions continue to be eased for some 1,500 products under an IMF mandated import liberalization plan. The Philippine debt service/exports ratio was reduced to 25 percent in 1987 from a high of 31 percent in 1985. Still, external debt remains a serious problem, and is a major concern of the Government.

In the ASEAN context, the Philippines is the second most populous nation next to Indonesia. English language proficiency at all levels of the work force and the availability of highly skilled and trained workers familiar with American management styles has attracted investors to the Philippines. Labor rates are among the lowest in Asia.

U.S. and other foreign investors increased their equity stake in the Philippines in 1988. For the first nine months, domestic investment was up 38.6 percent to \$448.7 million, while direct foreign investment increased 61.6 percent, to \$107.6 million. The total value of projects registered with the Board of Investments (BOI) during the first three quarters of the year reached more than \$1 billion; more than double the \$466 million recorded in 1987. This level is the highest registered in the 21 year history of the BOI.

The largest share of registered equity investments (\$218 million) came from Asian countries: Taiwan accounted for \$107 million; Japan, \$74.3 million; and Hong Kong, \$22.3 million. The United States was the second largest investor behind Taiwan with \$88.6 million. In terms of total investments, the U.S. continues to hold the lead.

The major areas in which new investments were registered in 1988 included aquaculture (\$55.3 million), textiles (\$53.3 million), electrical and electronic components (\$51.4 million), automotive spare parts manufacturing (\$28.4 million) and food processing (\$25.0 million).

COUNTRY FACTS: REPUBLIC OF THE PHILIPPINES

LAND
 Area: 115,831 square miles
 Cultivated: 39%, Forest: 37%, Pasture: 4%
 Resources: timber, petroleum, nickel, iron, cobalt, silver, gold

POPULATION

1987 Estimate: 58,091,000
 Annual Population Growth: 2.2%
 Projected Population in 2000: 75,500,000
 Life Expectancy: 64 years
 Infant Mortality: 50/1000
 Literacy: 88%
 Religions: Roman Catholic: 83%, Protestant: 9%, Muslim: 5%,
 Other: 3%

WORKFORCE

Commerce and Services: 30.3%
 Manufacturing: 9.5%
 Construction: 3.3%
 Agriculture and Fishing: 49.6%
 Government and Public Authorities: 10.5%

ECONOMY

Economic System: free enterprise
 Currency: Philippine Peso, 1 US\$ = 20.4 Pesos
 Major Industries: textiles, pharmaceuticals, wood products,
 food processing, electronics assembly
 Major Imports: petroleum, industrial equipment, wheat
 Major Exports: coconut products, sugar, logs and lumber,
 copper, concentrates, bananas, garments, nickel, electrical
 components, and gold
 Per Capita GNP: US\$575 (1987)

Economic Statistics (Billions \$US and percentages)
 The Philippines is the 27th largest U.S. trading partner

	1981	1982	1983	1984	1985	1986	1987
GNP	37.02	36.57	27.09	27.35	31.91	30.13	33.40
GNP Growth	3.9%	2.9%	1.1%	-5.5%	-3.9	1.5%	7.4%
CPI Rise	13.1%	10.2%	10.0%	50.3%	6.8%	0.7%	7.4%
Exports to US	2.16	1.96	2.16	2.62	2.33	2.15	2.48
Imports from US	1.79	1.85	1.81	1.77	1.38	1.36	1.60
US/Philippine Trade Balance (US\$ M)	8.48	8.26	7.86	6.26	5.35	5.89	7.17
Investment/GDP Ratio	37.02	36.57	27.09	27.35	31.91	30.13	33.40

SINGAPORE

SECTOR IDENTIFICATION REPORT

OVERVIEW OF THE SINGAPORE ECONOMY

Singapore is an industrialized city-state with a population of 2.6 million people. The country is a stable democracy, governed by an elected parliament and prime minister.

Singapore had a per capita income of \$7,500 in 1987, one of the highest in East Asia. The country's annual GNP growth averaged 9 percent from 1965 to 1984. GNP growth in 1988 was about 11 percent, with projections of 3-6 percent for annual growth into the 1990's.

The country is known as a regional financial, trade and transportation center. Its port is one of the busiest in the world; the country offers excellent port and air facilities for cargo handling and travel. Singapore's financial strength is based, in part, on a domestic savings rate of 36 percent of GDP, one of the highest in the world. (This rather high rate of savings is held by the Government through the Central Provident Fund, to which employees are required to contribute 24 percent of earnings, with the employer matching an additional 12 percent.)

Growth in GDP has primarily derived from the proliferation of export-oriented industries, especially manufactured goods and electronics. In 1987, Singapore experienced strong growth in manufacturing (15.4 percent) and in transportation and communications (7.1 percent). Earning its reputation as an "entrepot" economy, Singapore's total trade turnover is more than twice its GDP.

The country has welcomed foreign investment, and as a result, foreign companies in high technology sectors have long-established operations in Singapore. Of particular interest to foreign companies is the "Operational Base Incentive" program. This policy offers a tax incentive for the establishment of overseas headquarters in Singapore. For purposes of the law, overseas headquarters are defined as "any entity providing management services -- e.g. marketing/sales promotion, administration and planning, product/personnel, development and R&D, technical support services, etc. -- to subsidiaries and/or associates."

The Singapore government sponsors many programs for training and education of employees of small and medium sized companies. Areas presently being covered include CAD/CAM, printed circuit board manufacture, surface mounting, and automation.

Singapore's principal exports include office equipment, manufactured goods, machinery, transportation equipment and electronics. Its major imports include capital goods, manufactured goods, petroleum, and goods for re-export.

Total new investment in Singapore in 1987 was \$871.5 million, up 20.8 percent from 1986. Local investors provided 16.9 percent of this amount, while Japanese (34.5 percent) and American (31.1 percent) firms were the largest foreign direct investors. In the first half of 1988, new investments reached \$498.4 million, due in large part to investments in electronics (computers and peripherals), telecommunications equipment, and consumer electronics. Total investment 1988 was projected to reach \$800 million.

COUNTRY FACTS: REPUBLIC OF SINGAPORE

LAND
 Area: 239 square miles
 Cultivated: 9.5%, Forest: 4.6%, Pasture: 0
 Resources: None noted.

POPULATION
 1987 Estimate: 2,616,236
 Annual Population Growth: 1.1 %
 Life Expectancy: 71.5 years
 Infant Mortality: 9/1000
 Religions: Buddhist, Muslim, Christian, Hindu, Sikh

WORKFORCE
 Commerce and Services: 64.9%
 Manufacturing: 24.0%
 Construction: 8.2%
 Government: 16.0%
 Agriculture/Fishing: 0.8%

ECONOMY
 Economic System: free enterprise
 Currency: Singapore Dollar (100 cents), 1 US\$ = 2 S\$
 Major Industries: petroleum refining, rubber processing, electronics, food and beverage processing, ship repair, financial services.
 Major Imports: capital equipment, manufactured goods, petroleum, goods for re-export.
 Major Exports: machinery, manufactured goods, transportation.
 Per Capita GNP: US\$7,413 (1987)

Economic Statistics (US\$ Billions and percentages)
 Singapore is the 14th Largest U.S. Trading Partner

	1981	1982	1983	1984	1985	1986	1987
GNP	13.58	14.93	16.64	18.16	17.70	18.03	19.40
GNP Growth	9.9%	6.3%	7.9%	8.1%	-1.8	1.8%	8.8%
CPI Rise	8.3%	3.9%	1.2%	2.6%	0.5%	-1.0%	0.9%
Exports to US	20.97	20.79	21.83	24.07	22.82	22.49	28.62
Imports from US	27.57	28.18	28.16	28.67	26.24	25.51	32.49
US/Singapore Trade Balance (US\$ 3.87)	3.00	3.21	3.76	3.68	3.48	3.38	4.05
Investment/GDP Ratio	3.21	3.21	3.76	3.68	3.48	3.38	4.05

Source: U.S. Department of State, 1988
 The Heritage Foundation, Asian Studies Center, 1988.

OVERVIEW OF THE THAILAND ECONOMY

SECTOR IDENTIFICATION REPORT

KINGDOM OF THAILAND

The Kingdom of Thailand is a rapidly industrializing nation of some 54 million people. The country's present constitutional monarchy was established in 1932. The government is a parliamentary democracy, consisting of a popularly elected National Assembly and appointed Senate, a cabinet and an independent court system. The King appoints the Prime Minister from the leadership of the National Assembly.

The Thai economy has matched, and in some cases exceeded, the progress of its ASEAN neighbors, showing repeated annual growth. Over the past three decades, the Thai economy has averaged 6 percent annual growth.

GNP for 1987 was \$47.74 billion representing an annual growth rate of 6.6 percent. GNP is projected to increase by 11 percent in 1988. Growth has been fueled by conservative economic policies, a surge in tourism, heavy foreign direct investments and export diversification. 1987 U.S. direct investment in Thailand was \$1,282 million.

Thailand had a per capita income of \$875 in 1987. The Thai labor force is well educated and trained, yet offers one of the lowest wage rates in Asia. The Thai work force consists of over 27 million people, more than half under years of 30 age.

The ongoing expansion of the Thai economy can be traced to consistent efforts to diversify production. While agriculture is still the dominant economic sector, petroleum products have become increasingly important to Thailand's growth. Further diversification in food processing and packaging, light industry and manufacturing industries has been a keystone of continued growth in the face of declining commodities prices.

Foreign investment in Thailand has shifted during the past several years. In 1984, the United States direct foreign investment amounted to \$158 million (38.8 percent) of a total of \$407 million in direct foreign investment. Japan ranked second with \$109 million. In 1987, the U.S. foreign investment dropped to \$31 million, only 16.8 percent of the \$183 million total. Japan's investment, on the other hand, rose to \$127 million, far exceeding U.S. totals.

U.S. investment in Thailand is highest in the energy sector. Energy related products and services accounted for an estimated 49 percent of American investment. The banking industry ranks second at 25.5 percent. The manufacturing sector (18.4 percent) and trading activities (6.7 percent) are other areas in which U.S. companies have invested in Thailand.

The government agency responsible for investment promotion is the Board of Investment (BOI). BOI provides support for foreign investors in all stages of project planning and implementation. BOI has responded favorably to investment in projects involving technology transfer, export of finished products, and high labor utilization. Duty free imports of equipment and tax holidays of up to eight years are some of the most attractive incentives.

There are several areas of high growth potential for investors looking at Thailand. Planners can rely on an abundance of resources for food and beverage processing because cultivation has been successfully increased to keep pace with the growth of the sector. Seafood packaging also represents a good opportunity for investment.

In the area of communications, the development and expansion of the local infrastructure has produced great demand for investment and trade to support the expansion of ports, harbors, airports, and roads and highways. In line with the general upgrading of local infrastructure, the telecommunications sector has grown rapidly and presents good investment opportunities.

Other sectors with potential include power generation, exploration and development, petrochemicals technology and services, mining development, medical equipment and electronics component parts.

COUNTRY FACTS: KINGDOM OF THAILAND

LAND

Area: 198,500 square miles
 Cultivated: 38%, Forest: 29%, Pasture: 1%
 Resources: tin, rubber, natural gas, tungsten, tantalum,
 timber, fish

POPULATION

1987 Estimate: 53,645,823
 Annual Population Growth: 1.78%
 Projected Population in 2000: 65,600,000
 Life Expectancy: 62 years Literacy: 82%
 Infant Mortality: 57/1000
 Religions: Buddhist: 95.5%, Muslim: 4%, other: 0.5%

WORKFORCE

Commerce and Services: 19.25%
 Manufacturing: 8.31%
 Construction: 2.01%
 Agriculture and Fishing: 61.14%
 Government and Public Authorities: 5.25%

ECONOMY

Economic System: free enterprise
 Currency: Baht (100 satang), 1 US\$ = 24.85 Baht
 Major Industries: agricultural processing, textiles and
 garments, wood, cement, tin and tungsten ore mining,
 beverages, light industries
 Major Imports: machinery and transport equipment, fuels and
 lubricants, base metals, chemicals and fertilizers
 Major Exports: rice, sugar, corn, rubber, tin, gems, textiles
 and garments, integrated circuits, canned seafood, tapioca,
 fruit, gems
 Per Capita GNP: US\$875 (1987)

Economic Statistics (Billions \$US and percentages)
 Thailand is the 28th Largest U.S. Trading Partner

	1981	1982	1983	1984	1985	1986	1987
GNP	33.23	35.64	39.08	35.35	37.91	40.18	47.74
GNP Growth	5.8%	5.1%	5.0%	4.1%	4.1%	3.5%	6.6%
CPI Rise	12.7%	5.3%	3.7%	0.9%	2.42%	1.85%	2.5%
Exports	7.03	6.94	6.37	7.41	7.13	8.88	11.66
to US	1.01	0.96	1.04	1.43	1.54	1.87	2.39
Imports	9.95	8.53	10.28	10.37	9.26	9.19	13.03
from US	1.17	0.92	1.06	1.11	0.85	0.93	1.48
US/Thailand Trade Balance (US\$ M)					(804)	(1,019)	(1,144)
Investment/GDP Ratio					23.5%	20.5%	22.0%

Source: U.S. Department of State, 1988
 The Heritage Foundation, Backgrounder, 1988

**ENERGY ACTIVITIES
IN
COSTA RICA
AND
THE DOMINICAN REPUBLIC**

Costa Rica

On April 18, 1989, President Arias signed an Executive Decree establishing the basic procedures for obtaining permission for non-utility power projects with generating capacity of less than 10 MW to generate and sell electricity to the national grid. The decree also established prices for power from these private facilities. Larger projects will require a case-by-case review by ICE (Instituto Costarricense de Electricidad), the state-owned utility. The private sector is likely to propose only existing or rehabilitated sugarcane or hydroelectric projects for power sales to ICE until proposed legislation raises capacity limits for private power producers.

The decree was signed at the inauguration of a 300 kW hydroelectric facility located in Naranjo on the Colorado River, marking the first private plant to be connected to the ICE grid.

In addition, the Government plans to introduce an amendment to NORMA, the current power law, which would allow private hydropower projects of less than 20 MW and other private power installations of up to 30 MW to sell power to ICE. ICE is also drafting guidelines for cogeneration and private power with details on the technical and financial responsibilities of the utility and private power producer. The amendment is necessary for private power producers to generate and sell power over the long-run.

Dominican Republic

On March 7, 1989, the Government of the Dominican Republic (GODR) introduced legislation in the Senate that would permit and encourage private power. The legislation provides the institutional framework for large scale private investment in the power sector. As written, the legislation takes precedence over existing laws regarding power, specifically the law that established CDE (Corporacion Dominicana de Electricidad) as a monopoly and gave it power to expropriate private generating facilities.

The legislation enables the private sector to participate in the generation, transmission and distribution of electricity. It includes tax exemptions for both foreign and domestic investment, as well as government loan and foreign exchange guarantees. The electricity tariff will be set by the executive branch for the various regions of the country. Under the proposed legislation, a new regulatory agency, the Secretariat for National Electricity Development, would be formed to implement the private power law.

The GODR is considering setting up a private sector loan program for the power sector in the Dominican Republic. The USAID Mission in the Dominican Republic has committed \$12 million of its Economic Support Funds to finance U.S. sponsored projects, equipment and services. Discussions are underway with the World Bank to establish a funding mechanism, similar to the Private Sector Energy Development Fund recently established in Pakistan, which will be used to finance private power projects.

INDIA ENERGY CONSERVATION AND PRIVATE SECTOR POWER GENERATION

Energy Conservation

India's industrial sector is one of the most energy intensive in the world, particularly with regard to electricity consumption. Overall, the energy/GDP ratio was around 1.5 during the period from 1970-71 to 1983-84 when it was dropping below 1.0 in many countries.

Energy conservation opportunities are significant; high energy costs and power shortages persist. Potential for savings range from 8-25 percent in major industries. Conservation disincentives have begun to give way due to industrial licensing liberalization in 1985-86; competition is growing, attention turning to operational efficiency and cost reduction and a growing market for energy conservation equipment and services is emerging.

The Government of India is increasing attention to energy conservation. Preliminary indications on the eighth Five Year Plan drafting indicate conservation will be included as an energy supply option for the first time and a separate budget provided for conservation. An advisor on energy conservation with the rank of Secretary has been established supported by a Conservation Cell in the Department of Power.

The U.S. Agency for International Development supports the Indian Government's efforts to commercialize energy technologies, including conservation technologies, through a Program to Accelerate Commercial Energy Research (PACER).

Contact: David Jhirad, Agency for International Development, Office of Energy, Bureau for Science and Technology (202).

Private Sector Power Generation

The chronic shortfall in availability and reliability of power and the huge capital demands for future generation have focused attention on private sector options. Substantial debate and analysis indicates a likelihood the private sector role will expand in the future (with government approval). Potentially 5000MW of future expansion could be undertaken privately if the government finally approves. This could take the form of expansion of the three existing private utilities, new utility ventures, cogeneration and captive generation -- the traditional role of the private sector. Key issues are liberalization on the return of investment, utilities willingness to purchase power and gas pricing and availability for cogeneration. Some utilities, such as the Gujarat Electricity Board, have tried to initiate some guidelines on power purchases and done some small projects (wind and cogeneration).

Contact: Robert Archer, Agency for International Development, Bureau for Asia and Near East, Energy and Natural Resources, (202) 647-8274

India aims to boost private role in power sector

By David Housego in New Delhi

INDIAN government proposals to accelerate private investment in the power generating sector have been broadly welcomed by private industry.

The proposals aim to reduce the crippling power shortages in many states. They also reflect a move towards involving the private sector in infrastructure projects from road building to oil exploration which had previously been reserved to the state.

Senior government officials outlined the proposals to representatives of industry at meetings in New Delhi this week. The aim was to iron out differences before the plans are fully approved by the cabinet.

The proposals would permit licensed private companies to build gas, coal or lignite-based power stations to feed into the public grid.

Investors would have to find 20 per cent of the funds from their own resources. They would be allowed to seek a further 40 per cent in loans from state financial institutions and the rest from abroad.

The scheme is based on giving investors a 15 per cent return on capital after tax, equivalent to an estimated 32 per cent before tax. Electricity prices are state-administered, but the financial return is based on the generating plants operating at a 63 per cent load factor.

This is well above the operating efficiency of most state owned power stations, but well below that of the few private sector plants. Tata Electric achieves a 90 per cent load factor at its plant in Bombay.

Potentially large profits, as the private sector sees it, can thus be made by operating the plants above the proposed 63 per cent norm.

The private sector's main fear is that it has no guarantee of payment from state governments. In India state electricity boards often make large losses because they are unable to collect payments on electricity bills from customers.

PAKISTAN ENERGY CONSERVATION
AND PRIVATE SECTOR POWER GENERATION

Energy Conservation

The Government of Pakistan is implementing a National Energy Conservation Program that aims at saving 2.5mtoe per year by 1993 or 15.2 percent of 1984 energy consumption. A National Energy Conservation Center (ENERCON) was established in 1986 and is receiving support from the Agency for International Development. ENERCON has carried out approximately 50 detailed audits and eight feasibility studies in the industrial sector. A total of 265 energy conservation projects have been or are being implemented. The largest subsectors for potential projects were chemicals and textiles. Most of the projects identified have not required major investments. They have typically been in insulation and waste heat recovery. Six projects of over US\$1 million have been identified, including 3 in cogeneration.

Contact: Alain Streicher, RCG/Hagler, Bailly, Incorporated.

Private Sector Power Generation

Pakistan has been facing a critical shortage of electric power for the past seven years. Load shedding in May, 1989 was 1800MW or over 25 percent of total generating capacity. The situation and budget stringencies prompted the former government in late 1985 to promulgate a policy to induce private investors in the grid. Since then, proposals for oil, coal, and gas projects have been under discussion between potential investors and the GOP. Several letters of intent have been issued and the GOP is currently negotiating agreements for a 1200MW oil-fired plant with a consortium headed by Xenel Corporation of Saudi Arabia and Hawker-Siddley of the United Kingdom.

The new Bhutto Government and Minister of Water & Power Farooq Leghari have endorsed the private power direction and are especially emphasizing indigenous coal and low quality gas development for private investment and joint ventures. Several major donors including AID have joined in a multi-donor effort to support the GOP Private Power Program. Donors assistance is being provided to: (1) help establish the institutional framework and capacity to implement the program; (2) provide financing to investors through the National Development Finance Corporation; and (3) put in place a security package that will enable private power projects to proceed on a limited recourse financing basis.

For more information see the enclosed paper, or contact:
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Agency for International Development, (202)647-8274.

PRIVATE POWER DEVELOPMENT IN ASIA AND THE PACIFIC:

The Case of Pakistan

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Paper prepared for International Workshop on
Opportunities for private sector power generation in Indonesia
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The views expressed in this paper are those of the author
and do not necessarily represent those of the US Agency for
International Development or the US Government.

I. Climate for Private Power Investment

The developing countries of Asia are taking a serious look at the potential to open up power generation to the private sector. Local industrial leaders and foreign companies are talking to governments about the possibilities of investing in power plants that would be owned and operated by private companies at least for an initial period. Singapore and Malaysia are considering privatization of the overall power system, while Pakistan and the Philippines have issued letters of intent to companies for large thermal power projects. Indonesia has been pursuing BOT discussions with several consortia and even Thailand has raised the possibility seeking private capital for new power plant construction in the future. Interestingly, one of the most advanced projects is in China, where the government has agreed to permit a Hong Kong investment group to build, own and operate a large power plant.

Privatization of the power system and other public services has been a growing focus of bilateral and multi-lateral donors. AID has completed assessments of the potential for private power in Pakistan, India, Thailand, and Indonesia. The Asian Development Bank is currently engaged in a study of issues affecting the viability of private power in the region. The World Bank has led the effort discussed below in Pakistan to develop a multi-donor-supported private power project. Interest has grown as financial stringencies and inefficiencies in public systems push planners and policy makers to look for new ways of mobilizing and conserving capital.

This interest is reinforced by the rapid growth in electricity demand in the region. Asian economic growth rates have been generally higher than in other developing regions and electricity demand has increased by 5-10% per year in most countries. The capital requirements in energy and power to support continued economic growth are enormous. AID recently prepared a report to Congress on the Power Shortages in Developing Countries: Magnitude, Impacts, Solutions, and the Role of the Private Sector", which estimates that 1500 GW of new generation capacity will be needed by 2008 under current trends and with medium economic growth. This capacity would cost over \$2.6 trillion or an average of over \$125 billion per year (compared with the estimated \$50-60 billion currently being spent per year). The report concludes that private investment in power generation can play a role in ensuring adequate growth in capacity.

The United States has a predominant expertise and experience in private power production and sales to a central utility grid. Although U.S. electricity growth has been lower than

in the developing countries, a great deal of the new capacity added over the past several years has been by independent producers. Such utilities as Virginia Electric Power Company, they are looking to purchasing power from private producers for the majority of their futurerequirements. VEPCO's current generation ^{capacity} ~~capacity~~ of 10,000 MW will be augmented by nearly 6000MW of privately-owned power by the year 2000. Major changes are occurring in the U.S. market since we started looking at the applicability of PURPA (the Public Utilities Regulatory Policies Act) to developing countries several years ago. The evolution toward competitive bidding systems, such as in the New England and Virginia is one such change. AID is exposing leaders in these countries to U.S. approaches through training programs and seminars. For example we held a major workshop in India last year and sponsored the visit to the United States of an Indian delegation interested in cogeneration. Meetings will be held this year in the Philippines, Indonesia, and ASEAN that will involved U.S. industry, utility and financial experts. The flow of information on the U.S. experience will grow as countries begin to examine the issues in their own context.

The following discussion considers Pakistan and its pioneering effort to develop private power as a major portion of its future electric system.

II. Pakistan's Power System

Pakistan's power system is strongly influenced by the seasonal characteristics of the hydro facilities in the system, principally Tarbela and Manga. Current overall installed system capacity is about 6653MW, of which 2901MW is hydro and 3615MW is thermal and 137 MW is nuclear. The significant drop in hydro availability during the winter months and before the monsoon creates a need for substantial thermal capacity. Fuel oil and gas plants are the main thermal units. The country has experienced load-shedding over the past five years and this will get worse if new capacity is not added on schedule. AID is making a major contribution to thermal capacity by financing, along with the Asian Development Bank, a 1000MW gas-fired combined cycle plant at Guddu. Gas supplies are currently limited but promising. Many of the estimated reserves are of low btu content. High sulphur, low btu coal also exists and attention is being given to developing this resource. Industry has responded to the load shedding by purchasing small diesel generating sets. These are high-cost units using imported diesel.

The country is paying a substantial economic price for the delays in new large-scale capacity. The Water and Power

Development Authority(WAPDA) was only able to achieve 50% of its planned capacity expansion during the Sixth Five Year Plan(1982-87). In particular, decisions on new hydro capacity has been thwarted by political controversy over control over water and resettlement issues. The Seventh Five Year Plan calls for an increase of 6578MW during 1988-1992, comprised of 2258MW hydro and 4320MW of thermal. The government is under severe pressure to reduce the financial support to WAPDA. The energy budget currently consumes about 40% of the total development plan budget with power representing 70% of the energy amount. An allocation of Rs.17.3 billion (about \$1 billion) has been made for the power sector in the annual plan for 1988-89. The government is seeking to increase WAPDA's off-budget resource mobilization and last year authorized WAPDA to issue Rs. 2 billion in bonds to the public. After many years of declining real electricity tariffs, the GOP has moved to increase tariffs in FY86, FY87 and FY88. With an average increase of 16% this July, tariffs reached a level representing about 80% of the long-run marginal cost of 1.2 rupees. WAPDA is meeting about 40% of its investment program from internal funds.

III. Evolution of Pakistan's Private Power Policy

AID has worked closely with the GOP since the early 1980s in considering the role of the private sector in energy resource development and power. A major emphasis of this cooperation has been on the exploration and development of Pakistan's indigenous coal resources in the Lakhra area of Sind Province. In a move to stimulate private interest in investing in the Lakhra coal resources, WAPDA in 1983 issued a request for expressions of interest from the private sector. One of the options open to companies was an all privately owned and operated coal mine and power plant. Although this option was not pursued by WAPDA in later solicitations, it marked a significant step in the evolution of Pakistani willingness to consider private participation in this strategic sector.

As the load-shedding situation worsened and knowledge of the Lakhra coal reserves increased, Pakistani industry began pressuring the government to set up their own plants. In November 1985, the Ministry of Water and Power announced a new policy to induce the private sector into power generation. The policy limited involvement to plants fueled by domestic coal or imported oil. Companies would be guaranteed a 60% capacity factor on an annual basis and would be required to put up 25% equity from local and foreign exchange resources. These projects would be treated as industrial entities enjoying certain investment incentives. The GOP would not issue sovereign guarantees for the projects. Private investors would assume the risks and earn

a return that was not guaranteed (the informal guideline was 18% based on the 60% capacity factor). The debt service would therefore not add to the public debt burden. Shortly thereafter, the Karachi Electric Supply Company issued a request for proposals for a 120MW diesel unit at Hub Chowkinear Karachi. About thirteen proposals were received for this project, all involving local companies with some having foreign partners.

AID provided advisory services to the government in private power during this period, including an assessment team that found significant potential for gas-fired private generation and cogeneration in industry. Assistance was also provided in developing the basics of a power purchase agreement. In April 1987, the GOP asked the World Bank to take the lead in developing a program to support private power projects. With this growing evidence that the GOP was serious about moving ahead to implement the private power policy, a number of companies submitted more formal proposals to the Ministry of Water and Power. Proposals have been received from the following companies:

- Habibullah (with Siemens) for a 130MW FBC plant at Lakhra;
- Pakland (with Pyropower and Bechtel) for a 132MW FBC plant at Lakhra;
- Xenel/NIDC (Japanese/British) for a 1200MW oil unit on Hub River near Karachi;
- INTRAG with InterRedec Group and United Engineers for an 80MW FBC unit at the Salt Range in the Punjab;
- Hadson Corporation for a 120MW FBC unit at the Salt Range;

In addition, the GOP plans to issue a solicitation for a 100MW gas-fired private power plant at the low-quality Nandpur gas field.

The Government, following approval by the Economic Coordination Committee of the Cabinet, has issued letters of intent to the Habibullah and Xenel/NIDC projects. They have also issued a letter of intent to the Fecto Group for the Hub Chowki 120MW diesel project. The letter of intent is a rather detailed document that contains a specific price for power that the investor feels can be met if the cost assumptions are valid. The investor is required to place a performance bond upon receipt of a letter of intent to ensure the government that the project feasibility work and financing will be developed in a timely fashion, generally within six months.

Major emphasis has been placed on the role of private power in the new Seventh Five Year Plan (1988/89 to 1992/93). Due to the serious budget situation and to encourage potential investors in the light of the large Xenel/NIDC project, the Seventh Plan sets an ambitious target of 2300MW for the private sector (35% of total expected capacity additions for the Seventh Plan period).

IV. Multi-Donor Support Program

During the first-half of 1988, the World Bank with substantial assistance from USAID, developed the overall framework for a multi-donor program of support for the private power policy. The World Bank's umbrella project was approved in June 1988 and the agreement signed with the GOP in July 1988. The project has three main elements:

1. Institutional Strengthening
2. Private Sector Energy Development Fund
3. Security Package

Institutional Strengthening

Key GOP organizations will be strengthened under the project so they can effectively implement the program. Strengthening will be needed for the two key processes: Project Approval (including planning, project solicitation, review and approval) and Project Financing. The Ministry of Water and Power will be assisted in the establishment of a formalized process for the solicitation and review of proposals and in the preliminary assessment of the technical, economic and environmental feasibility of projects prior to the issuance of a letter of intent. WAPDA's capacity to negotiate agreements for the purchase of power from private producers and to operate an interconnected system will be increased. The National Development Finance Corporation will be supported in its role as appraiser of the final feasibility and financial package and financier of a portion of project debt. The Ministry of Petroleum and Natural Resources capability to review private sector proposals for coal, gas and other energy resource development will be improved. USAID will provide the funding, along with the World Bank and the British ODA for the technical assistance and training required by each agency. An investment guidelines brochure for the program is under development.

Private Sector Energy Development Fund

The program is estimated to cost about \$1.893 billion equivalent. Funding is estimated to breakdown as follows:

World Bank = \$150 million;
Cofinanciers = \$415 million;
PS Equity = \$470 million;
PS Loans = \$858 million.

A Private Sector Energy Development Fund is being created within the National Finance Development Corporation. The donors will provide loans and grants to the GOP with sovereign guarantees. These funds will be in turn lent to the Fund at an interest rate that allows the Fund to accumulate resources over time to support private energy projects. The Fund would lend to approved private energy projects, including energy resource development projects as well as power projects, for up to 30% of the cost of any project. The initial terms of the loans will be : 14%, up to 23 years, and up to 8 years grace. This rate will be reviewed each year. The 14 percent onlending rate is equal to the prevailing rate on foreign loans to industrial enterprises and GOP's loans to most energy sector entities. Since the investor must put up 25% equity, 45% of a project's cost must be raised from other sources if the full limit of the Fund is used.

Initial contributors to the Fund are expected to be the World Bank, USAID, the Japanese Export-Import Bank, British ODA, Italy, and W. Germany.

Security Package

While the broad participation of the donors in this program certainly provides a considerable measure of security for investors and the government, additional measures have been developed that seek to reduce risks for investors, the GOP and the donor agencies. Some of the key measures include:

A set of agreements would be concluded covering: Power Purchase; GOP obligations; construction; operation and maintenance; fuel supply. The Power Purchase Agreement would contain indices for adjustment of the purchase price. The GOP would guarantee the Power Purchase Agreement between WAPDA and the private producer.

Contractor performance guarantees and debt service reserve escrow account.

Subordination of Fund debt to commercial loans and/or exports credits.

Close monitoring and detailed review of proposals and projects by the World Bank.

The limited recourse financing approach being established seems to be acceptable to investors, as evident from the growing number of proposals. Since no agreements and financial packages have been concluded, it is still too early to determine the reaction of commercial banks to the program.

V. Potential Economic Impact of the Program

The new program clearly has significant economic implications for Pakistan. Of special importance in this regard would seem to be the following:

- (1) The program will mobilize additional investment resources and free up government resources for other sectors.
- (2) It will greatly expand oil imports if the Kenel/NIDC project proceeds and increase the vulnerability of the economy to future increases in international oil prices.
- (3) The local equity and debt financing requirements will put additional pressures on the financial system to reform reserve requirements and to move towards longer-term project financing.
- (4) An important new market for domestic coal will have been established (if the FBC projects go ahead), with important regional development impacts. Clean coal technologies will be transferred to Pakistan from the outset.
- (5) Unutilized low quality gas fields, uneconomic for pipeline development, may be economically exploited for power generation.

The program may also help to improve the overall efficiency of the system as well as reduce load-shedding. If the purchase price for the electricity produced by the investor is close to long-run marginal cost, it will encourage the government to increase tariffs to avoid subsidies and will help to create an environment in which renewable energy investments may be economically attractive.

VI. Implications for Other Asian Countries

The countries of the Asia region are still generally in the early stages of urban industrial development. Their need for electricity is likely to continue to grow rapidly. Due to the large capital requirements of these power systems and the high opportunity costs of capital in these economies, governments must seek to develop more efficient systems of generation, transmission, distribution and end-use consumption. The adoption of a private power development

policy, along with price reform and load management measures, can be an important component of an overall strategy to move towards a more efficient electricity system. With its abundant natural gas resources (e.g. Thailand, India, Bangladesh, Malaysia, Indonesia, China), the potential for efficient, low-cost cogeneration and combined cycle plants is significant. Nevertheless, such a policy should not be limited to large-scale units, but should provide an opportunity for private power investments in small local grids, rural towns and industrial parks. It is perhaps in these applications, depending on the quality and quantity of the local resource base, that renewables (e.g. wind, small hydro, and cane energy) can compete with more conventional options.

In the United States, a significant share of our capital markets are oriented toward electric utility financing. The institutionalization of a private power policy can serve to stimulate capital market development in developing countries and pave the way for a more dynamic and favorable investment climate for private industry. The Pakistan case has illustrated how a coalition of industrialists, financial and economic planners, and power system managers can push through a private power development policy. And, private investors have quickly moved to propose projects with significant equity commitments. If this has been true in the volatile political environment in Pakistan, it would seem that investors would be at least equally attracted to certain other Asia-Pacific countries that make clear commitments to private participation in power.

FOREIGN TRADE, INVESTMENT AND LICENSING CHECKLIST FOR U.S. FIRMS

The following is not an exhaustive guide to trade, investment and licensing agreements overseas. It is, however, a useful reference to U.S. companies negotiating or considering trade, investment and licensing projects in the developing world.

Although not all of the considerations will be specific to the energy industry, several will affect your ability to do business in the private power sector.¹

Foreign Investment Checklist

* Introduction

The first step in entering a foreign market, particularly in the developing world, is to make a commitment to a long term involvement. Few projects in developing countries, whether trade or investment transactions, provide immediate profit. Therefore, the firm must be willing to commit both capital and personnel to ensure its success in the immediate and long term.

* Market Prospects

Prior to detailed market research, the firm must identify those countries or regions that appear to fit within its global growth strategy. Of special concern here are the relative comparative advantages of the firm vis-a-vis other U.S. and non-U.S. competitors.

Selection of specific countries or markets will depend upon several factors:

- o Size, and cultural, economic and regulatory aspects of the target market;
- o Potential exports to third country markets from host country (if manufacturing there);
- o International market trends for the product or technology;

¹ Prepared by John D. Ferrera, U.S.-ASEAN Center for Technology Exchange, Washington, D.C., (202)289-1911. This paper has drawn extensively from one by Mssrs. A. Daza and R. Justis, United Nations Industrial Development Organization, Washington, D.C.

- o The ability of the host country to participate in the venture (if joint venture is sought or required).

* Specific Market Considerations

- o The nature, source, and extent of competition in terms of quantity, quality, value and source;
- o Gap between (energy) production and current and projected demand;
- o Sources of market information: government statistics and special reports; chambers of commerce, and trade and industry associations; banks, and accounting, legal and consulting firms; the experience of other firms in the market (contact with American business organizations in the host country has been found to be productive); private market research firms, and market surveys;
- o The system of distribution of domestic and import products (wholesaling, retailing, manufacturers representatives, exporters, forwarders, etc.);
- o Determine if there are limits to direct marketing by foreign companies;
- o Merchandising and sales practices or techniques and advertising media and methods, including peculiarities with respect to specified commodities or product lines.

* Government Laws and Regulations

The laws and regulations of the country in which you plan to establish a business will be an important factor in your decision. Firms should consider the general politico-economic situation of the country, the attitude of the government toward U.S. or other foreign private investment, and the types and forms of investment preferred. Are there restrictions on foreign ownership (in general and/or in specific industries)? Will government rules permit adequate controls of the company and protection of the technology? Does the host country or government:

- o Participate in International agreements, such as:
 - Treaty of Friendship, Commerce and Navigation with the United States;
 - International Agreements on Copyright Protection and Enforcement;
 - GATT, International Monetary Fund, World Bank, etc.;
 - Convention with the United States on the Avoidance of Double Taxation;
 - Investment Guarantee Agreement with the United States;
 - Most-favored-nation treatment with third countries;
 - Customs Union, Common Market, etc.
- o Give assurances as to remittance of profits, royalties, technical service fees, and repatriation of capital.

- o Have specific laws affecting:
 - Foreign investment, including licensing;
 - Specific industries - e.g. private power generation, energy industry technology transfer and/or systems manufacture, grid buy-back rates and procedures, the utilization energy conservation measures;
 - Percentage and form of foreign ownership;
 - Registration or incorporation of wholly or partly owned enterprises, permits, and time requirements, etc.;
 - Provinces, municipalities, special economic zones, or other localities;
 - Monopolies and restraints to trade;
 - Insurance.

- o Have regulatory or administrative practices affecting the prospective investor - e.g. is national treatment or most-favored-nation treatment accorded in respect to:
 - All foreign operations (or are types of investment excluded);
 - Tariffs, including any preferential treatment accorded third countries (i.e. the ASEAN Industrial Joint Venture program);
 - Imports or export quotas or permits;
 - Licensing;
 - Customs procedures, methods of evaluating duties, and time required in clearing goods;
 - Free ports (sea and air);
 - Price maintenance or discrimination;
 - Taxation;
 - Profits and use of funds generated in third countries;
 - Legal and judicial protection;
 - Availability of patent, copyright, trademark, or other protection;
 - Local branches with foreign equity and U.S. personnel, including residence requirements and limitations of stay;
 - Leasing or acquisition of land or other real property, or, for the purposes of this industry, use of existing property in energy related projects.

- o Impose tax rates affecting the proposed enterprise with respect to:
 - Initial plant and equipment, including spare parts for equipment;
 - Raw materials and components for manufacture in the country;
 - Environmental Benefits;
 - End products and sales (i.e. grid buy-back);
 - Import duties (raw materials and parts);
 - Exchange taxes;
 - Corporate taxes, income, and dividends;
 - Property/real estate taxes;
 - Personal income taxes -- national and foreign;

- Municipal and local taxes;
- Other taxes or charges (also ascertain the effect of U.S. taxes on the investment).

- o Offer tax concessions -- e.g. what types of exemptions or deferrals.

- o Offer other governmental, regional, or municipal incentives or inducements to private foreign investment.

* Financial Factors

To assist in determining whether or not financial conditions in the country are favorable for direct investment, you should consider the following:

- o Central Bank regulations regarding equity relationships, local financing, etc. Is the host country eligible for debt-equity transactions?

- o Convertibility of resources or the possibility of effectively using resources, such as the availability of foreign exchange and the financial stability or security of the banking and insurance system and the country in general.

- o Sources of local capital available for joint ventures, their financial capacity, the extent and nature of possible financial commitment, and other kinds of participation.

- o Domestic and foreign banking facilities available in the market and the nature of credit offered short, medium, and long term (conditions, terms, interest rates, etc.), including that available from governmental or other lending institutions.

- o Availability of loans from U.S. sources -- governmental and private.

- o Availability of funds or other resources from third-country operations.

- o Availability of local legal and accounting services.

- o Currency exchange rates and controls.

- o Capital repatriation and remittance of profits, licensing fees, royalties and other payments.

- o Third country transfers.

- o Availability of U.S. Government insurance covering nonbusiness risks, such as expropriation, convertibility, war risks, civil strife, and rebellion, in developing countries.

*** Materials**

Another factor in the decision should be the availability of production materials, spare parts, or facilities to provide them. Try to assess the:

- o Availability of domestic materials or components in terms of quantity, quality, continuity, and price; and identify the names, locations and general capacity of local suppliers.
- o Availability and prices of imported materials or components on the local market or those obtainable by direct import.
- o Availability of continuing supplies of spare parts for machinery and equipment, replacement tools, and materials for maintenance use.
- o Availability of local machine shops, tool and die shops, pattern shops, plant maintenance services, forging capacity and foundry capacity.
- o Subcontracting possibilities.

*** Communications and Transport**

The communications and transport facilities within the foreign market are essential to the efficient conduct of your business. Examine:

- o Telegraph, radio, telephone, telex, facsimile facilities.
- o Sea and river, truck and road, and rail and air transport.
- o Time and costs in moving goods and supplies between major cities and from raw material sources to production and consumption areas.
- o Any particular packaging and handling problems.

*** Labor and Management**

The following factors should be considered when examining the labor and management practices in a given country:

- o The supply of skilled, semiskilled (trainable) and unskilled labor; availability for single-, double-, and three-shift operations; availability of salespersons/agents, clerical and supervisory help; and the quality and supply of executive personnel.
- o Labor organizations and labor-management relations, including the existence of unions and federations, leadership and membership of organizations, the ratio and importance of organized and non-organized labor, and cultural factors affecting work habits.

- o The wage structure; minimum rates and estimated average rates for skilled and unskilled workers; and fringe benefits and traditional bonus payments, if any.

- o Labor laws, regulations, and policies affecting wages, hours, retirement, and termination; nationality requirements and hiring practices; health and worker's compensation insurance; sick leave; vacations and holidays (paid and unpaid); and other allowance and severance pay.

- o Labor stability.

- o Practices and availability of labor housing in terms of costs and other social overhead.

- o The mobility of the labor force and availability of worker transportation.

- o Worker efficiency and trainability. Include measurement of productivity; estimates of comparative working conditions and efficiency to levels in other countries (skilled and unskilled) in specific fields; and determination of the existence and quality of vocational, technical and administrative schools.

*** Plant and Physical Facilities**

When deciding to construct a physical plant for your operation, you'll need to investigate the following:

- o Costs and taxes on use of urban and suburban land (per square foot or square meter) and the availability of plant sites adjacent to strong infrastructure areas.

- o Costs for single- and multi-story buildings (per square foot or square meter) and time required for normal or specific types of construction and special problems associated with construction.

- o The adequacy, quality, pressure, and method of distribution of the water supply.

- o Waste disposal method.

*** Other Important Factors**

Once you have considered all of the above-mentioned factors, you should also take into account:

- o The cost of living.

- o Accounting, reporting, and auditing requirements.

- o Special local considerations or conditions in the country, such as housing, food, health problems, and medical facilities.

- o The employment of required U.S. personnel; their method of payment, allowances, taxation, etc.; and limitations on their number.
- o The assignment of direct responsibility for the project to a senior officer of the parent firm.
- o The arbitration clause for settlement of disputes in a joint venture agreement with a foreign private or government partner.
- o The capability of financing and staffing the operation and backstopping it effectively.

Licensing Abroad Checklist

When considering a licensing agreement abroad, you should be very specific about the territorial coverage; payments by the licensee to, or on behalf of, your company; trademark and patent questions; how your commercial operations will be conducted in the foreign market; and other factors listed in this section. It will also be helpful to read the "Government Laws and Regulations: and "Financial Factors" sections in the Investment Section of this article.

* Territorial Coverage

There are three main areas regarding territorial coverage of the licensing agreement which should be explicitly defined:

- o The field of agreement.
- o The territory within which the license is operative and the type of operation permitted; e.g. manufacture versus sale or lease rights.
- o The exclusivity of the license, the extent of which may be dictated by circumstances in a particular country. (In any case, you should provide for your right to convert the license from exclusive to nonexclusive or vice versa.)

* Payments By Licensee To, Or On Behalf Of, Licensor

The following factors should be studied with regard to payment:

- o Royalty percentage.
- o Advance payment over and above the royalties for goods and services, plans and engineering, promotional and sales programs, "good faith" guarantees, and an option regarding future improvements.

o After a specified period, future assistance with respect to the manufacturing technique.

o Taxes imposed by national or local authorities, other than income tax; e.g. stamp taxes, registration taxes, payroll taxes, property taxes, insurance, etc.

o The cost of obtaining and maintaining patents, trademarks, and copyrights.

o The currency in which royalties are to be paid. (Consider the effect of inflation, exchange rates, government restrictions, etc.)

o The right of the licensor to buy into the licensee on an anticipated basis. (It is sometimes desirable to have an option for the conversion of royalty obligations into equity interest.)

* Trademark and Patent Considerations

You should not assign trademarks to a licensee or even to your foreign licensing subsidiary or foreign based company. But you should consider the rights and privileges (or restrictions) of the licensee regarding the use of your trademark. Consider the nature and origin of trademarks to be used, the manner of their use, the conditions under which misuse may be penalized, and the country's enforcement history regarding infringements.

o When patents are involved, you should:

- Provide for "patent marking", as may be required under the law of the country in question;
- Protect the licensee against infringement by competitors (it is unwise to undertake the obligation to sue for infringement, but if such obligation is necessary, the licensor should always retain full control of such litigation);
- Include a specific statement that the licensor undertakes or assumes no obligation or warranty, and that the licensed operation is free of liability for potential infringement of third party-patent rights;
- Limit "future" licensor patent rights initially available to the licensee within the field of agreement;
- Give the licensee a conditional option to obtain future patent rights under the appropriate circumstances.

o When the license is not based upon patent rights and hence is a "know-how" and technical assistance agreement, you should:

- Limit the licensee's initial rights to "know-how" and existing technical information;

- Limit the license to improvements developed on a commercial basis within not more than one year in advance of the effective license date if "futures" are required at the outset;
- Establish the best possible basis for continuing assistance to the licensee as a means of retaining him as an effective operating representative;
- Provide the licensee with available, but always optional, marketing and promotional assistance;
- Provide for the control of timing and extent of "know-how" transfer and of general information that may be required by the licensee.

* Commercial Operations

Whether your licensing agreement is based upon patent rights or not, you should take into account the following regarding your commercial operations in the foreign market:

- o If more than one product is to be sold or manufactured, schedule orders and/or production to guard against the licensee overextending his initial commitments.
- o If processes are involved, spell out the areas of application and use by the licensee and establish control and periodic review of the licensee's operations (provision of maintenance and check-up service).
- o Reserve the right to require discontinuance of a particular product or process under designated conditions of the economy or if the licensee's operations are ineffective.
- o Provide for conditions under which the licensee may or may not manufacture or sell competitor products. (In this respect, you should reserve the right to screen the licensee's operation periodically.)
- o Establish your right to institute and enforce a standard of quality with particular relation to the use of your trademarks, where permitted.
- o Establish your right to inspect the licensee's operations, to receive and evaluate samples of products and promotional materials, to audit books, and to survey licensee sales and advertising efforts at stated periodic intervals. (Occasional waivers may result in the loss of these rights.)
- o Include a provision as to your right to export for parallel competition with a licensee under certain circumstances (Maintain the right to control and/or execute local sales of your product.)
- o Provide for control of changes in models or products produced or sold under the license.

* Other Important Factors

In order to make the licensing agreement as lucrative as possible for the licensor and licensee, you should also consider the following:

- o Training your licensee's personnel in advance of and during the licensed operations; e.g. where and when to train, how many trainees at a time, and for how long. (Establish a basis for payment of training costs and distinguish these costs from royalty obligations.)
- o Providing for special research and engineering on behalf of the licensee. (Clearly define the scope, time, and timing and assess the costs against the licensee on a cost-plus-percentage or other basis.)
- o Providing for confidential treatment by the licensee of your proprietary information and the available means of enforcing the confidentiality.
- o Including, when appropriate and possible, a provision for the reverse flow of "know-how" and patent rights. (Consider a "mutual assistance" concept in light of antitrust considerations.)
- o Providing for the handling of future disputes with your licensee. (Arbitration is normally not a very satisfactory recourse, and some countries bar this procedure.)
- o Spelling out the licensee's rights as to sublicensing and assignment of the original license. (Limit such rights and always require prior approval.)
- o Establishing circumstances and conditions under which the agreement may be terminated in advance of its natural life. (Consider the difference between termination and cancellation; also review the laws of the country in which the licensee is situated.)
- o Including an advance disclaimer as to your responsibility for the licensee's operations under the agreement as they may affect third parties or any foreign government. (Also disclaim any responsibility for damages or other liabilities resulting from faulty maintenance, installation, design, quality or production on the part of the licensee.)
- o Reserving the right to modify or terminate the license if unsatisfactory changes occur in the ownership or key personnel of the licensee.
- o Determining the source and quality of raw materials, components, repair parts and the like.

o Designating the jurisdictional law that governs the interpretation of the agreement. (Also designate the place of execution and be sure that the actual execution is effected at the location.)

o Granting the optional extension of the rights to adjoining territories for nonexclusive selling when the license is exclusive for selling or manufacturing in a certain territory.

o Assuring compliance with U.S. and foreign government regulations and restrictions.

o Defining the rights and obligations of both parties after termination, including the effect of waivers.

Foreign Trade Checklist

Although many of the considerations of the two prior segments are appropriate to this area of international business, the following are offered as specific trade issues:

* Market

o What is the current and projected demand/supply gap? Check existing sources of information on market demand. Where projections of future demand are involved, examine the historic success of the host country's projected demand (Have these projections reflected the reality of the market, or have there been serious discrepancies in market realities). Examining the current and projected growth of the manufacturing and construction industries should prove to be a helpful indication of future energy demand.

o What will the market support? Is this a one time sale, or are repeat sales possible? Future opportunities are often worth special considerations on initial sales. Further, many private power and conservation projects now available in the developing world are "quick-fix" measures intended to avert power crises. Will your product maintain its market applicability after these crises have been addressed?

o Can your company offer technologies that are compatible with current and future needs? The mode and level of production will affect the ability of a firm to make sales in a market. The ability to make modifications in available systems can be the difference between success and failure.

o It has been suggested that project bundling could be an effective method for increasing access by small- and medium-sized U.S. companies to foreign markets, especially in private power generation and conservation. Cooperation with U.S. or other foreign firms, vertically or horizontally, could increase U.S. companies ability to compete;

o What type of marketing strategies are acceptable and successful in the target market. Cultural and other factors are important to success in this area. A purely technical approach may hinder your ability to generate interest in developing countries, where familiarity with existing technologies and their benefits are often limited.

o Does shipping affect your ability to compete?

* Service

o The availability of service from U.S. companies in many high technology industries has often been a determining factor in the ability to sell high technology products overseas. The U.S. company should consider:

- Its ability to compete with other companies in the provision of installation, training, service and component parts to the buyer;
- The timing of that service (The ability to provide local service is important, especially in Asia, where the proximity of Japanese companies and other foreign representative offices allows for an almost immediate provision of service from the manufacturer);
- The prospect of training local technicians to handle service responsibilities.

o The cost of installation, maintenance, service and parts, as well as guarantee/warranty provisions of the purchasing agreement.

* Financial

o What type of payment do you require? Flexibility can be another determining factor in the ability to make a sale.

Alternatives to consider:

- Provision of financing by the manufacturer;
- Local availability of financing alternatives, such as host government and commercial loans;
- Ability of buyer to pay in foreign exchange, and the government regulations affecting these types of payments;
- U.S., host country and multilateral institutional guarantees of payment and performance;
- Do government environmental, energy conservation or other incentives relative to your industry affect the purchase price or the transfer of payment?

- What are the regulations regarding Build-Operate-Transfer (BOT), Build-Own-Operate (BOO) and other types of projects?

* Other Considerations

- o What type of patent/copyright legislation exists? Is enforcement adequate to protect your interests?
- o What are the unique needs/business practices that may affect your ability to do business in the host country? Contacting other companies or organizations having a familiarity with the host country could prove to be productive.
- o Other than industry-specific regulations, what other types of U.S. and host country regulations will affect your transaction?
- o What is the environmental impact, if any, of your product?

Concluding Considerations

In summary, you need to determine the best form of investment for your specific case, whether it is a licensing agreement, joint venture participation, associated branch operation, or subsidiary. You may also wish to consider the pros and cons of a joint venture with an agency of the foreign government itself. Whatever you decide, you should consider:

- o The method of operation or administration vis-a-vis your U.S. organization and the projected foreign facility.
- o The best form of financing the venture.
- o The long-term advantages and disadvantages of a specific foreign operation in your area or field and the effect it will have on the parent company.
- o Developing the clearest possible advance understanding with the foreign host government and with the foreign private participants or associates, if it is decided that an enterprise is to be established.

Foreign Aid Facts

U.S. Agency for International Development

Since 1961, the U.S. Agency for International Development (USAID) has provided financial assistance to help developing countries achieve sustainable economic growth and human progress.

USAID programs mean teaching a farmer in Africa to grow sorghum, giving a family in Asia the chance to start its own small business or showing a mother in Latin America how to use a simple formula to keep her child from dying from dehydration caused by diarrhea.

Since foreign aid programs were established in 1947 as part of the Marshall Plan to help rebuild war-torn Europe, more than \$210 billion has been made available through a variety of economic and disaster relief programs.

In 1989, U.S. foreign aid will provide approximately \$7 billion in economic assistance, which is about one-half of one percent of the federal budget.

It is important for Americans to understand that much of the money spent on foreign aid actually is spent here in the United States. In

fact, 70 cents of every foreign aid dollar goes to American businesses, creating thousands of jobs in the United States while providing needed assistance to developing countries.

Although the focus of foreign aid was shifted through President Truman's Point Four Program from Europe to developing countries, the reasons the foreign aid program was established remain valid today:

- In terms of **national security interest**, we want developing countries to emerge as stable democracies with strong ties to the United States and other Western countries.
- For **humanitarian** reasons, the people of the United States place a premium on seeing poverty and misery reduced in developing countries.
- For **commercial** purposes, our foreign policy helps establish strong and credit-worthy trading and investment partners. The nations of the developing world supply many strategic minerals vital to our national defense.

History has shown repeatedly

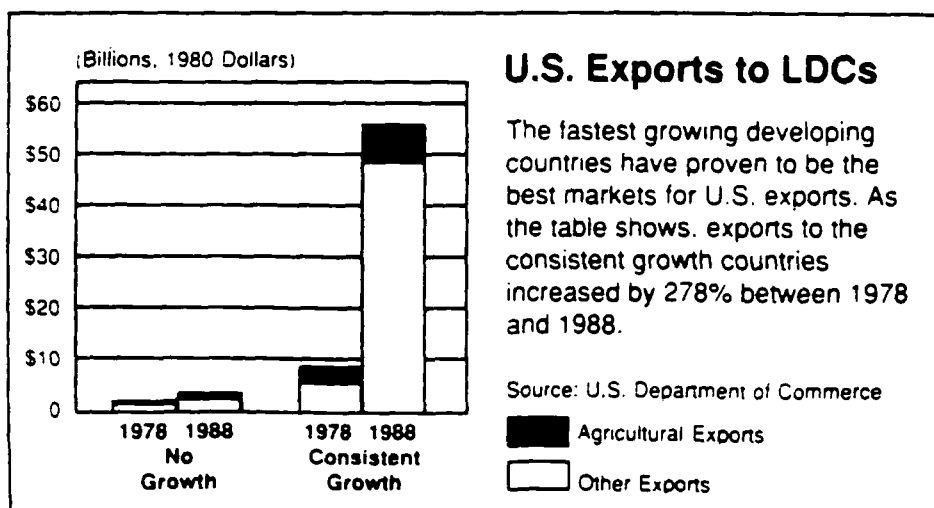


U.S. foreign aid programs are designed to stimulate economic growth in developing countries, thus making it possible for those countries to overcome long-term problems.

that countries we aid become healthy trading partners and strong allies once they can stand on their own. It is no accident that Japan, West Germany and other European nations we aided are among our strongest allies today.

Dramatic progress also has been made by early recipients of U.S. foreign aid. South Korea, Taiwan, Brazil and Greece are a few examples. Many countries that were underdeveloped are now newly industrialized. Today, they are able to help other less developed countries, and we benefit from their trade.

Developing and newly industrialized countries purchase more than 35% of all U.S. exports. In the first nine months of 1988, exports to these nations were worth more than \$76 billion, a 36% increase over 1987.



Of the 50 largest buyers of farm goods, 21 are countries that used to receive food aid from the United States. Korea, for example, now buys as much from U.S. farmers in one year as it received in its 25 years as a food aid recipient.

USAID MAKES A DIFFERENCE

In addition to helping countries like South Korea and Taiwan become valuable allies and trading partners, the foreign assistance program has brought about substantial improvements in the quality of life in less developed countries.

Our assistance is one of the most important means of promoting the humanitarian ideals and democratic values of the American people.

Without the food aid contributed by America in 1985, 20 million people would have died in sub-Saharan Africa in one of the worst droughts in history. Together with other international donors, USAID continues to supply food and economic support to famine-plagued areas in Africa such as the Sudan.

On the other hand, the U.S. foreign assistance program has worked with international donor organizations to help bring about breakthroughs in agriculture that have enabled many nations to become self-reliant in food.

One such country, India, has benefited from research sponsored by USAID that led to the development of hybrid crops capable of adapting to adverse weather conditions.

Foreign aid programs can make a difference. In health care, the Agency's efforts have led to the development and promotion of life-saving technologies, combating infectious diseases that kill millions of children in developing countries.

In the past 27 years, life expectancy in developing nations has



Access to schools has increased in developing countries. In the 1950s less than 40% of all school-age children were enrolled in primary school; the enrollment rate is now about 70%.

increased by 20%. Infant mortality rates declined by 4% annually in 1980-85 in USAID-assisted countries.

The results of U.S. foreign assistance programs are evident in many countries. Agency programs helped increase literacy rates in USAID-assisted developing countries by 33%. Primary school enrollment has tripled, and secondary school enrollment has expanded by an even larger amount.

In Egypt, USAID has built more than 500 schools since 1975, and total school enrollment there has increased more than 13%.

In Bangladesh, Agency programs have funded the electrification of 17 rural areas and the development of 17 privately owned electrical cooperatives. In Costa Rica, more than 3,000 loans for building or improving homes for low-income families were made available through a USAID program.

Agency-sponsored programs have worked to bring about democratic reforms by showing some countries how to revise their judicial systems and criminal codes to encourage due process and justice.

Nonetheless, it is not enough to vaccinate children against disease or give them food for a day. America's goal is to help developing countries learn how to maintain their own health care systems and provide food, clothing and jobs for their people.

FOREIGN AID: HOW IT WORKS

U.S. foreign aid programs are designed to stimulate economic growth in developing countries, thus making it possible for these countries to make permanent inroads against long-term problems such as hunger, health deficiencies, illiteracy and unmanageable population pressures.

With sustained economic growth as the goal, USAID programs are intended to assist foreign governments make the changes needed to create a climate in which their economies can expand.

When a nation requests economic assistance from the United States, help is provided to devise economic policies that enable long-term development to succeed.

USAID, therefore, works with governments to eliminate inappropriate subsidies, price and wage controls, trade restrictions, overvalued exchange rates and interest rate ceilings that curtail economic performance.

U.S. economic assistance also promotes open and competitive markets in developing countries and advocates policies in those countries that permit the expansion of the indigenous private sector.

The foreign aid program supports privately controlled cooperatives, credit unions and other insti-

tutions that give people the means to participate in choosing their leaders and working for needed changes.

TYPES OF PROGRAMS

The assistance provided by the U.S. Agency for International Development is divided into four major categories: Development Assistance, the Economic Support Fund, Food for Peace and Disaster Assistance.

An overview of each area follows:

DEVELOPMENT ASSISTANCE

Development assistance projects are designed to help recipient countries achieve economic progress on their own.

Aid is given in the form of grants and loans in areas such as agriculture, rural development, nutrition, voluntary family planning, health, education, human resource development, energy, science, technology and private sector training.

Programs are concentrated in countries where U.S. assistance is needed most and where there is a clear commitment to broadly based economic growth.

USAID supports more than 1,500 development assistance projects in more than 70 countries in the following areas:

Education and Human

Resource Development: A nation's human resources are a key to sustained economic and social development. In the developing world, about 600 million adults are illiterate. Professional and technical personnel are in short supply.

A major objective of U.S. foreign aid is to raise basic education levels, establish and maintain a skilled work force and ensure that people

have social and economic opportunities to use their talents and skills productively. Because women are an important part of the work force in developing countries, USAID programs emphasize the participation of women at all levels.

USAID's Office of International Training has provided opportunities for more than 260,000 people from developing countries to receive academic and technical training in the United States. The U.S.-based training also establishes important cultural links between developing countries and the United States.

Agriculture, Rural Development

and Nutrition: Another objective of the foreign assistance program is to increase the availability of food and improve nutrition to aid the more than 500 million malnourished people in the world today.

This is best accomplished by having countries change policies that limit agricultural production by improving agricultural technology and by providing training opportunities.

Research is a key factor in



Enabling developing countries to achieve self-reliance in food and helping them increase their citizens' income can expand U.S. export markets.

improving agricultural production. Development assistance for research support is furnished to a network of international agricultural research centers and U.S. land- and sea-grant colleges to enhance and expand food production.

Food aid can be an important contributor to income and human capital growth, especially among countries in the early stages of development. It also can relieve pressure on fragile natural resources while technology, institutions and policies are developed to increase agricultural production without destroying the land and the surrounding environment.

Enabling developing countries to achieve self-reliance in food and helping individuals increase their income also opens the door for expansion of U.S. export markets.

USAID support to agricultural research worldwide preserves genetic material and develops technology that can be helpful to U.S. farmers.

Health: Development assistance also goes to help expand basic health care through projects in areas with proven effectiveness in reducing morbidity and mortality from illnesses prevalent in the developing world.

Financial and technical support is given for the improvement of vaccines for measles, whooping cough, leprosy and rotovirus, the most common cause of infant diarrhea.

USAID was a sponsor of the research that developed oral rehydration therapy—a simple, inexpensive solution of salts, water and sugar that helps prevent death caused by dehydration from diarrhea—that can be administered by a mother. USAID works along with the United Nations Children's Fund (UNICEF) and the World Health Organization (WHO) as partners in the global effort to promote use of the solution.

Child survival projects are a major emphasis of USAID's health program. Half of all deaths in developing countries occur among children under the age of five.

Voluntary Family Planning: The goal of population assistance is to enhance the well-being of families by expanding the availability and use of voluntary family planning services such as allowing more time between the births of children to improve their chances of surviving.

Unrestrained population growth compounds serious development problems and increases the cost of national and international efforts to reduce disease, poverty and malnutrition.

USAID trains workers to take voluntary family planning services and information into rural areas and to coordinate voluntary family planning with education, health and nutrition programs.

Energy, Environment and Natural Resources: Incorporating environmental considerations into the development process only began in the last decade when USAID focused international attention on the relationship between sustained economic growth and natural resource management.

Environmental analysis has since become a requirement for all overseas development projects. Careful procedures for pesticide use in development activities also have been adopted.

Effective forest and land management is crucial to economic development. U.S. foreign aid supports more than 70 forestry projects in 37 countries to improve management and related soil, water, forest and range-vegetation conservation efforts.

USAID also provides technical training and research to help developing countries make the most efficient use of their energy resources and manage their natural resources.

THE ECONOMIC SUPPORT FUND

Other U.S. assistance is provided through the Economic Support Fund (ESF). It is part of the U.S. security assistance program and addresses economic, structural and developmental problems in countries of particular security and political interest to the United States. The economic support is sometimes linked to an agreement in which the developing country allows the United States to operate a military base or to have access rights to that country's bases.

These resources support development assistance goals and meet a variety of needs, including helping countries pay off their debts and finance capital projects such as roads, markets and schools.

FOOD FOR PEACE

Food aid is provided in close cooperation with the U.S. Department of Agriculture through the Food for Peace Program or Public Law 480.

Food used in the program comes from surplus American crops such as corn and wheat, thus providing a way for U.S. farmers to sell more of their products.

Since 1954, the Food for Peace program has delivered some 320 million metric tons of food to nearly 2 billion people in more than 100 countries.

DISASTER ASSISTANCE

USAID's Office of U.S. Foreign Disaster Assistance (OFDA) coordinates American government relief work to alleviate the effects of natural and man-made disasters as quickly as possible and to reduce human suffering.

During the last 27 years, relief was provided to victims of 998 foreign disasters in 135 countries in which 2.8 million people have died and 945 million others have been adversely affected.

In 1988, for example, USAID responded to 60 disasters, including providing aid to combat a severe locust outbreak in 11 African countries, delivering emergency supplies to Bangladesh and assisting relief efforts in hurricane-ravaged Jamaica.

OFDA also has established specialized disaster response teams, provided technical assistance and training to develop early warning systems and worked to improve preparedness in disaster-prone areas.

ECONOMIC GROWTH AND HUMAN PROGRESS

USAID works with other international donors and developing nations to stimulate broad-based economic growth and to ensure that important services reach the people who need them the most.

The Agency is convinced there is a dynamic relationship between economic democracy and political democracy. The more nations do to involve their citizens in the economic growth process, the greater the stake in freedom those citizens acquire.

The more the United States can do to help developing countries help themselves, the better off they will be. And the better off America will be.

Want to Know More?

For more information or additional copies, contact:

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(202) 647-1850

Export-Import Bank of the United States



**An Independent U.S. Government
Agency that Assists in the Financing of
U.S. Exports**

Eximbank's Mission

The Export-Import Bank is the independent U.S. Government agency that facilitates the export financing of U.S. goods and services. It supplements and encourages, and does not compete with, commercial financing. By neutralizing the effect of export credit subsidies from other governments and by absorbing risks that the private sector will not accept, Eximbank enables U.S. exporters to compete fairly in overseas markets on the basis of price, performance, delivery and services. To achieve its export finance mission, Eximbank has authority to provide loans, guarantees and insurance.

54-Year History

Eximbank was founded in 1934 to stimulate foreign trade during the Great Depression. During its 55-year history, Eximbank has supported nearly \$200 billion in U.S. exports, creating and sustaining literally millions of American jobs.

Eximbank's first loan in 1935 financed the Cuban government's purchase of silver from U.S. mines and its conversion into pesos by the Philadelphia mint. Eximbank financed construction of the Burma Road in the late 1930s and helped U.S. contractors build the Pan American Highway in the 1940s. It also helped U.S. companies participate in the post-World War II reconstruction of Europe and Asia.

Over the years, Eximbank has enabled U.S. companies to market new products, such as computerized axial tomography scanners, and new technologies, such as satellite communications, that commercial lenders could not finance on their own. Eximbank has helped new exporters to break into foreign markets for the first time and has helped established exporters to sustain their overseas markets in the midst of international financial uncertainties and intense foreign competition. Through international negotiations, it has reduced subsidies in official export financing.

Eximbank has redesigned and streamlined its loan, guarantee and insurance programs to make them more accessible, especially to the small and medium-sized businesses with the greatest potential for increasing U.S. exports and improving the balance of trade. The Bank also is working with cities and states on a program to educate local officials about trade assistance available from the U.S. Government.

Independent Agency

Eximbank is an independent, corporate agency of the U.S. Government, chartered by Congress. The principal legislation governing its operations is the Export-Import Bank Act of 1945, as amended through October 15, 1986, and the Government Corporation Control Act.

The Bank's policies are coordinated with overall U.S. Government foreign and economic policy objectives. Eximbank does not normally support sales of goods and services for military use, or sales to most Marxist-Leninist countries. To be eligible for Eximbank's support, goods or services exported must have at least 50 percent U.S. content.

Among the questions asked on each transaction are:

- Is there a U.S. export involved?
- What foreign competition exists, and is it officially subsidized?
- Is the transaction economically viable?
- Is there reasonable assurance of repayment?
- Would there be an adverse effect on the domestic U.S. economy from the transaction?

Financing Operations

Although it does not receive appropriations for its normal operations, Eximbank's annual authorization ceilings are set by Congress.

Eximbank has capital provided by the U.S. Treasury in 1945. It receives funds from repay-

ments of principal on outstanding loans, interest and fees charged for its services, and recoveries on previous claims payments. It also borrows funds, principally from the U.S. Treasury and the Federal Financing Bank.

Eximbank uses its funds for disbursements under loan agreements, the payment of principal and interest on its borrowings, payment of claims filed under guarantee and insurance programs, and for administrative expenses.

Flexible Programs

Eximbank has developed a full range of flexible programs to meet the varied financing needs of U.S. exporters and their customers. Some transactions qualify for assistance under more than one Eximbank program.

Export Credit Insurance

Eximbank's agent, the Foreign Credit Insurance Association (FCIA) offers several types of credit insurance policies to cover the risks of non-payment on export credit transactions such as sales of products and services, leasing of equipment, and consignments in foreign countries.

FCIA policies cover political and commercial risks of non-payment on short-term (up to 180 days) and medium-term (181 days to 5 years) export receivables. Political risks include war risks, cancellation of an existing export or import license, expropriation, confiscation of or intervention in the buyer's business, or transfer risk (failure of the appropriate foreign government authorities to transfer the foreign currency deposit into dollars). Commercial risks cover nonpayment for reasons other than specified political risk.

Working Capital Guarantees

Eximbank's Working Capital Guarantee Program helps small companies obtain critical pre-export financing from commercial lenders. Under this program, Eximbank looks to the exporter rather than the foreign customer for its reasonable assurance of repayment.

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Corporate Secretary

Joan P. Harris (202) 566-8871

Congressional Relations

Frank Record (202) 566-8967

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James R. Sharpe (202) 566-8187

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Stephen D. Proctor (202) 566-8822

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Vice President, Information Management

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Washington, D.C. 20571

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Los Angeles Liaison Officer

Arthur J. Obester (213) 485-6154

City Economic Development Office

Room 2008, City Hall

Los Angeles, CA 90012

Foreign Credit Insurance Association (FCIA)**New York:** (212) 227-7020

40 Rector Street

New York, NY 10006

Chicago: (312) 641-1915

20 North Clark Street, Suite 910

Chicago, IL 60602

Houston: (713) 227-0987

Texas Commerce Tower

600 Travis, Suite 2860

Houston, TX 77002

Los Angeles: (213) 687-3890

Wells Fargo Center, Suite 2580

333 South Grand Avenue

Los Angeles, CA 90071

Miami: (305) 372-8540

World Trade Center

80 Southwest 8th Street

Miami, FL 33130

March 1989

Medium and Long-Term Export Financing

Eximbank's loan and guarantee programs cover up to 85% of the U.S. export value, with repayment terms of one year or more.

Eximbank's loans provide competitive, fixed interest rate financing for U.S. export sales facing foreign competition backed with subsidized official financing. Evidence of foreign competition is not required for exports produced by small businesses where the loan amount is \$2.5 million or less.

Eximbank extends direct loans to foreign buyers of U.S. exports and intermediary loans to fund responsible parties that extend loans to the foreign buyer.

Eximbank's guarantees provide repayment protection for private sector loans to creditworthy buyers of U.S. goods and services exports. Eximbank will also guarantee payments on cross-border or international leases structured as either operating or finance leases. Notes covered by Eximbank's guarantee may be freely transferred. Eximbank's guarantee is available for fixed or floating rate export loans in dollars or convertible foreign currencies.

Eximbank's guarantees are available alone or may be combined with an intermediary loan (usually for medium-term transactions).

Organization and Responsibilities

Eximbank's Board of Directors is made up of five full-time members appointed for four-year terms by the President of the United States with the advice and consent of the U.S. Senate. In addition, the Secretary of Commerce and the U.S. Trade Representative serve as ex officio, non-voting members. The Board of Directors is responsible for the Bank's activities and policies, approving support for individual transactions, and designating the officers of the Bank and prescribing their duties.

Eximbank's organizational structure is designed to provide easy access to, and administration of, its programs. The Export Finance Group, under the Executive Vice President, in-

cludes all operating divisions that administer the Bank's loan, guarantee and insurance programs.

The four foreign geographic area divisions administer the Bank's medium and long-term lending and guarantee activities. Loan officers process requests for assistance, perform financial analysis and maintain contact with other participant countries in the OECD export credit arrangement.

The Engineering Division evaluates the technical feasibility of proposed projects and monitors projects in progress.

The United States Division is responsible for loans and guarantees to U.S. borrowers, specifically, the Working Capital Guarantee Program and transactions approved under Section 1912 of the Bank's 1983 legislation. Section 1912 allows Eximbank to help an American company compete for a domestic sale against a foreign firm backed by unfairly subsidized financing from a foreign export credit agency.

The Insurance Division is responsible for the Bank's export credit insurance programs that are administered by the Foreign Credit Insurance Association (FCIA).

The Claims and Recoveries Division processes claims filed under the Bank's guarantee and insurance programs and is responsible for collections and recoveries.

Board of Directors

Acting President and Chairman

William F. Ryan (202) 566-8988

Directors

Simon C. Fireman (202) 566-8292

Richard C. Houseworth (202) 566-8220

Rita M. Rodriguez (202) 566-8887

Directors, ex officio

Robert A. Mosbacher, Secretary of Commerce

Carla A. Hills, U.S. Trade Representative

MULTILATERAL INVESTMENT GUARANTEE AGENCY

The Multilateral Investment Guarantee Agency (MIGA), a member of the World Bank Group, is dedicated to helping developing countries attract foreign investment. This single purpose is served by two main facilities:

- provision of guarantees to foreign investors, in the form of political risk insurance, against currency transfer, expropriation, war, and breach of contract risks; and
- consultative and advisory services to member countries on means of improving their attractiveness to foreign investment.

Both programs complement the work of the World Bank, the International Finance Corporation, and other agencies in encouraging and facilitating investment in developing countries.

MIGA was inaugurated on June 8, 1988 by an initial group of 42 member countries that subscribed to 63 percent of the Agency's authorized capital of US\$1.082 billion. Since then, membership has continued to expand as other countries ratify the MIGA Convention.

MIGA is based in Washington, D.C.

For more information contact:

Mr. Christophe S. Bellinger
Guarantee Officer
Multilateral Investment Guarantee Agency
The World Bank
1818 H Street, N.W.
Washington, D.C. 20433
TEL: 202-473-6163
FAX: 202-334-0265
TLX: ITT 440098

Among the countries discussed at "Opportunities In Private Electric Power Generation & Energy Conservation in Asia and Central America" the United States and the following are currently members of MIGA:

Dominican Republic
Pakistan

Indonesia
Philippines

INTRODUCTION

The United States has long recognized that business investment overseas can assist in the economic development of foreign countries, as well as create jobs at home and new markets for American exports.

This is especially true of private investment in the world's developing countries, which absorb more than \$75 billion in U.S. exports annually and are among today's fastest growing markets.

Since 1971, the Overseas Private Investment Corporation (OPIC) has served as the key federal agency for encouraging mutually-beneficial American business investment in the world's developing nations.

To do this, OPIC provides qualified investors with insurance against certain political risks; loan guaranties; direct loans to small businesses and cooperatives; and a variety of pre-investment programs. All are designed to reduce the perceived stumbling blocks and risks associated with overseas investment.

OPIC's primary business is providing political risk insurance, a concept that dates back to 1948 when it was first

initiated under the Marshall Plan. At the time, insurance was offered against the risk of currency inconvertibility in order to generate capital formation for rebuilding war-torn Europe.

By the 1950s, when the European recovery was well under way, the political risk insurance aspect of the Marshall Plan was restructured to supplement direct aid programs to the world's developing countries. The programs' scope was also broadened to include coverage against the risk of expropriation and war.

In 1961, this insurance program was shifted to the newly-formed Agency for International Development (A.I.D.), and again broadened to include insurance coverage for revolution and insurrection, as well as a lending authority for loan guaranties. Because A.I.D.'s primary purpose was, and still remains, the administration of government-to-government assistance, Congress decided in 1969 that a separate, business-oriented agency should be established to provide more effective support for American investors entering the international marketplace.

The result was OPIC, which began operations in 1971. Organized as a cor-

poration and structured to be responsive to private business, the agency's mandate is to "mobilize and facilitate the participation of United States private capital and skills in the economic and social development of less developed, friendly countries and areas."

Currently OPIC programs are available for new business enterprises or expansions in approximately 100 developing countries or areas around the world. Assistance is not available for projects that adversely affect U.S. employment, are financially unsound, or do not promise significant benefits to the social and economic development of the host country or area.

As a self-sustaining agency, OPIC has received no public funds beyond its original start-up appropriations, which have been returned to the U.S. Treasury. Moreover, it has recorded a positive net income for every year of operation, with reserves currently standing in excess of \$1 billion.

This booklet provides a general overview of OPIC and the many programs and services it offers.

INSURANCE

While private investors generally have the capability to assess the commercial aspects of doing business overseas, they may be hesitant to undertake long-term investments abroad, given the political uncertainties of many developing nations. To alleviate these uncertainties, OPIC insures U.S. investments against three major types of political risks:

Inconvertibility

This coverage protects an investor against the inability to convert into U.S. dollars the local currency received as profits, earnings, or return of capital on an investment. OPIC's inconvertibility coverage also protects against adverse discriminatory exchange rates. Conversion of local currency into dollars is assured only to the extent that such currency could have been exchanged for dollars at the time the insurance was issued. The coverage does not protect against the devaluation of a country's currency.

Expropriation

This coverage protects an investor against confiscation or nationalization of an investment without fair compensation. Expropriation coverage also protects U.S. investors against losses due to a variety of situations described as "creeping expropriation," i.e., a set of actions whose cumulative effect is to deprive investors of their fundamental rights in the investment. Expropriatory actions provoked or instigated by the investor are not covered.

Political Violence

This coverage protects an investor against losses due to war (declared or not), revolution, insurrection, and civil strife (politically motivated violent acts including terrorism and sabotage). An investor may elect to cover loss of business income and/or loss of tangible assets resulting from damage caused by political violence.

Premiums for OPIC's insurance coverages are based on the nature of the investor's undertaking and the project's risk profile, not the country where the project is located. Although different base rates may apply to specialized coverages (see pages 6 and 7), the following base rates are typical for most manufacturing and service projects.

Coverage*	Annual Base Rate Per \$100 of Coverage
Inconvertibility	30¢
Expropriation	60¢
Political Violence**	
Business Income	45¢
Assets	60¢

*All OPIC insurance is backed by the full faith and credit of the United States of America.

**Investors may choose to delete civil strife from this coverage; the premium rate is typically lowered by 10¢ in this case.

Since its inception, OPIC has settled approximately 215 insurance claims totalling \$465 million; it has denied less than eight percent of the claims received.

American investors planning to share significantly in the equity and management of an overseas venture can often utilize OPIC's finance programs for medium- to long-term financing.

To obtain OPIC financing, the venture must be commercially and financially sound, within the demonstrated competence of the proposed management, and sponsored by an investor having a proven record of success in the same or closely-related business.

OPIC's financing commitment to a new venture may extend to, but not exceed, 50 percent of the total project cost. A larger participation (up to 75 percent of the project cost) may be considered for an expansion of a successful, existing enterprise. Investors must be willing to establish a sound debt/equity relationship—typically in a ratio of 60 percent debt to 40 percent equity. Currently, OPIC provides financing to investors through two major programs.

Direct Loans

These loans, which usually range from \$100,000 to \$6 million, are available only for ventures sponsored by, or significantly involving, U.S. small businesses or cooperatives. OPIC's definition of a "small business" is adjusted annually to reflect changes in the U.S. economy. In 1988, small businesses were defined as industrial companies with annual sales of less than \$130 million and non-industrial companies with stockholders' equity of less than \$47 million. Interest rates on OPIC direct loans vary according to a project's financial and political risk, but generally parallel commercial rates.

Loan Guarantees

Under this program, which is available to all businesses regardless of size, OPIC will issue a guaranty under which Repayment of direct and guaranteed loans is normally made in equal, semi-annual principal payments following a suitable grace period. Final maturity generally ranges from 5 to 12 years.

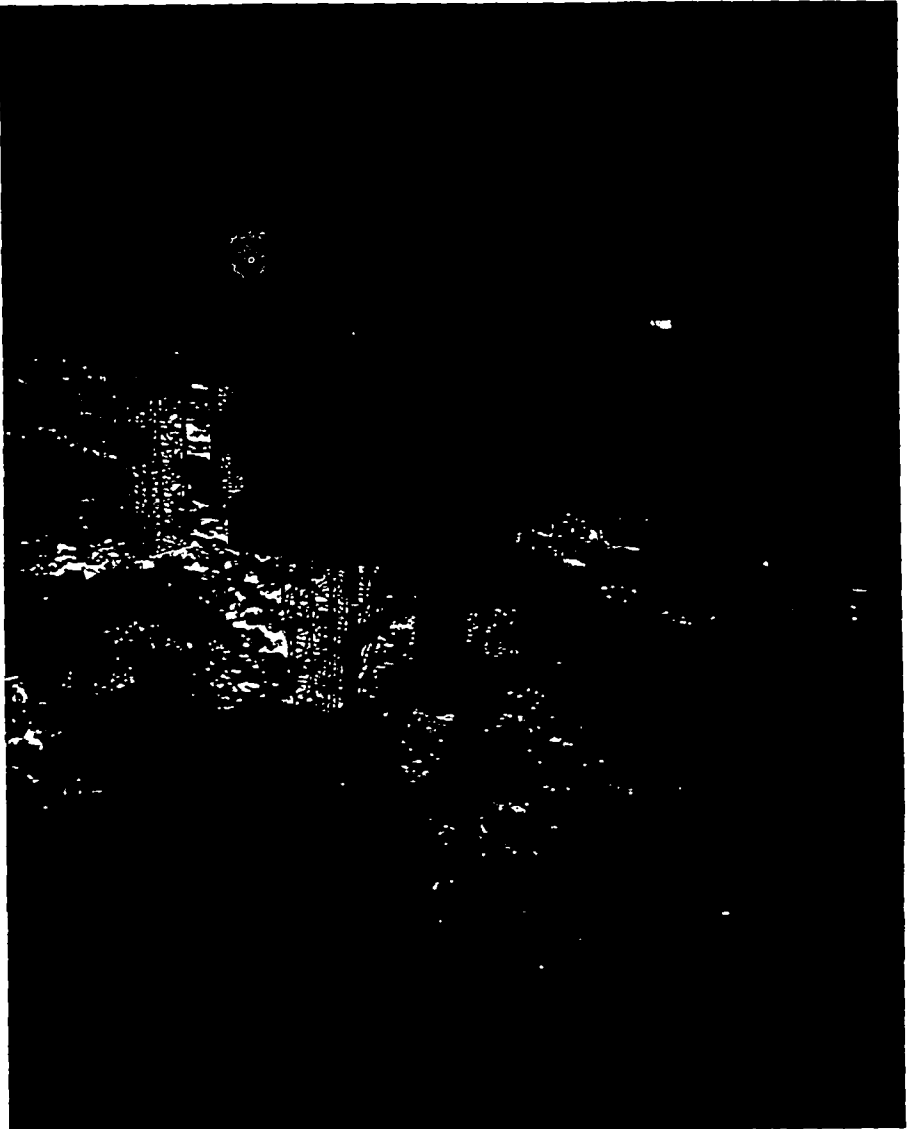
funding can be obtained from or through a variety of U.S. financial institutions. The guaranty covers both commercial and political risks.

Typical OPIC loan guarantees range from \$5 million to \$25 million, but can be as large as \$50 million. Interest rates on guaranteed loans are comparable to those of other U.S. Government-guaranteed issues for similar amounts and maturity. In addition, OPIC charges the borrower a guaranty fee averaging 2 percent, depending upon a project's commercial and political risk, as well as facility and commitment fees. All OPIC loan guarantees are backed by the full faith and credit of the United States of America.

SPECIAL PROGRAMS

In addition to its general insurance and finance programs, OPIC has developed special programs to meet the specific needs of investors involved in contracting and exporting, energy exploration and development, and leasing arrangements.

Contractors and Exporters Program
To improve the competitive position of American contractors and exporters seeking to do business in developing nations, OPIC offers specialized insurance and financing services.
When bidding on or performing over-



seas contracts, U.S. firms must often post on-demand and standby letters of credit as bid, customs, performance, advance payment or other types of guarantees. OPIC offers political risk insurance against the wrongful calling of such letters of credit.
OPIC also insures against losses sustained when a government owner fails to settle a dispute in accordance with the underlying contract.
Premium rates are assessed on a semi-annual basis, according to the risk profile of the particular project, based on the following guidelines:

Semi-Annual Costs Per \$100 of Coverage	
Bid, Performance and Other Guarantees (Wrongful Calling)	30¢
Contractual Disputes	40¢

Contractors and exporters may also obtain insurance against the risks of confiscation of tangible assets and bank accounts; damage to physical assets due to political violence; and, under certain conditions, currency inconvertibility. Costs and terms are comparable to those under OPIC's general insurance program (see page 2).

PRE-INVESTMENT ASSISTANCE

For most U.S. companies, especially those with little or no international investment experience, access to information on specific investment opportunities and the business environment in the developing nations is critical to making an investment decision. To aid American firms in this area, OPIC offers three special programs.

Investment Missions

Each year, dozens of American business executives participate in OPIC's investment missions to various developing

nations. On these missions, participants can obtain first-hand information about investment opportunities through personal meetings with business leaders and key government officials of the host country.

Countries are selected for investment missions after careful study of their needs, the investment climate, and the potential for profitable U.S. projects.

Participants are selected on the basis of their financial and management capability to undertake an overseas venture, as well as their experience in those industry sectors having priority in the host country. Investment mission participants pay all travel and accommodation costs.

Opportunity Bank

For investors seeking business opportunities in Third World countries, OPIC

offers a computer data system that can match an investor's interest with specific overseas opportunities.

This service, known as the Opportunity Bank, allows U.S. firms to submit a description of their business, the type of investment sought, and the developing country or countries of interest. Upon request, the information can be "matched" against similar information submitted by foreign businesses seeking American investors.

Any domestic firm or foreign entity can register itself with the Opportunity Bank at no charge; a modest fee is charged for "match" requests. The Opportunity Bank is designed to foster the exchange of investment information. No determination is made by OPIC as to the accuracy or reliability of information submitted.

Investor Information Service (IIS)

The Investor Information Service (IIS) provides interested companies and individuals with easy "one-stop shopping" for basic data and information needed by U.S. companies considering investment overseas. Country-specific information is available in kit form on more than 100 countries as well as 16 regions. Kits, available for a nominal fee, include materials covering the economies, trade laws, business regulations, political conditions and investment incentives of developing countries and regions.

OPIC also offers a special loan guaranty program for small business contractors to assist with their credit needs. This plan provides an OPIC guaranty of up to 75 percent of a standby letter of credit that is issued by a financial institution on behalf of a small-business contractor.

Leasing Program

For U.S. investors involved in international leasing, OPIC provides specialized insurance and finance services. Under this program, political risk insurance is available for cross-border operating and capital leases running for at least 36 months. Coverage is available for the lease transaction itself; equity investments in, and loans to, offshore leasing companies; and management/maintenance agreements involving leasing firms.

OPIC's investment guaranty and direct loan programs are also available to foreign leasing companies in which there is a significant U.S. private business interest.

Energy Programs

OPIC offers special insurance and finance programs for U.S. investors involved in oil and gas, oil shale, geothermal, mineral, solar and other energy projects, as well as for investors supplying support services or goods for such commercial projects.

Political risk insurance coverage is available to energy investors for currency inconvertibility, expropriation, and political violence. Coverage against "interference with operations" (cessation of operations due to political violence) is also available. Premium costs are determined by the risk profile of the particular project. However, the base rates listed below are typical for most projects.

Once a commercially feasible energy project is established, OPIC can provide a loan guaranty of up to \$50 million to finance as much as 50 percent of the cost of a new project, or 75 percent of an expansion of an existing project.

OPIC's insurance and financial services are not available for oil or gas projects in the member nations of the Organization of Petroleum Export Countries. OPIC services may be available, however, for other types of energy projects in those countries, and for investors providing goods and services to oil and gas projects.

Annual Base Rate Per \$100 of Coverage	
Coverage	30¢
Exploration	40¢
Political Violence*	75¢
Interference with Operations	40¢
Inconvertibility	30¢
Development/Production	\$1.50
	75¢
	40¢

*Civil strife can be deleted from coverage; the premium rate will typically be reduced by 15¢

OPIC COUNTRY & AREA LIST

In general, OPIC's insurance and finance programs are operable in the following countries and areas. Coverage may be limited in higher income areas, indicated by an asterisk. Investors are urged to contact OPIC directly for up-to-date information on OPIC services available in specific countries and areas, as well as information regarding program availability in countries not listed.

Anguilla	French Guiana	Nigeria
Antigua/Barbuda	Gabon	Niger
Argentina	Gambia, The	Netherlands Antilles*
Aruba*	Ghana	Nepal
Bahamas, The*	Guatemala	Mozambique
Bahrain*	Guinea	Morocco
Bangladesh	Guinea-Bissau	Mauritius
Barbados*	Guyana	Mauritania
Belize	Haiti	Malta*
Benin	Honduras	Mali
Bolivia	India	Malaysia
Botswana	Indonesia	Malawi
Brazil	Ireland	Madagascar
Burkina Faso	Israel*	Liberia
Burundi	Japan	Lesotho
Cameroon	Jamaica	Lebanon
Cape Verde	Jordan	Korea
Central African Rep.	Kenya	Kyrgyzstan
Chad	Kuwait	Laos
China (Taiwan)	Latvia	Libya
China	Lebanon	Lithuania
Colombia	Lesotho	Luxembourg
Congo	Madagascar	Moldova
Cook Islands	Malawi	Monaco
Costa Rica	Malaysia	Morocco
Cote d'Ivoire	Maldives	Mozambique
Cyprus	Malta*	Nepal
Djibouti	Mali	Netherlands Antilles*
Dominica	Malta*	Niger
Dominican Republic	Maldives	Nigeria
Ecuador	Mali	
Egypt	Malaysia	
El Salvador	Malawi	
Equatorial Guinea	Madagascar	
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OVERALL ELIGIBILITY

- OPIC programs are available only if:
 - The investor's project is a new venture or an expansion of an existing enterprise, and
 - The project is located in a developing country where OPIC operates, and
 - The project will assist in the social and economic development of the host country, and
 - The project is approved by the host government, and
 - The project is consistent with the economic interests of the United States and will not have a significant adverse effect on the U.S. economy or U.S. employment.
- OPIC will not support a "runaway plant" project, (i.e., the closing down of a U.S. facility to open a foreign facility where the same products or services will be produced for the same markets as before). OPIC cannot support certain other types of projects, including gambling facilities, distilleries, military projects, and projects posing serious environmental hazards.
- In addition, OPIC cannot support projects subject to host-government requirements that would substantially reduce the potential U.S. trade benefits of the investment. Of particular concern are "trade-related" performance requirements covering local content, maximum import and minimum export levels.

Specific Program Eligibility

- There is no fixed form which an investment must take in order to be eligible for OPIC insurance coverage. Conventional equity investments and loans; investment or exposure of funds; goods or services under contractual arrangements; and production-sharing agreements are among the investment forms commonly insured.
- Finance:**
 - Direct loans are issued only for investment projects sponsored by, or significantly involving, U.S. small businesses or cooperatives.
 - Loan guarantees are issued to:
 - U.S. financial institutions having over 50 percent U.S. beneficial ownership, or
 - Foreign lending institutions that are at least 95 percent U.S. owned.
- The following general restrictions and guidelines also should be kept in mind when considering specific OPIC-programs:
 - Insurance:**
 - OPIC can only issue insurance to "eligible investors," who are defined as:
 - citizens of the United States, or
 - U.S. corporations, partnerships or other business organizations with at least 50 percent U.S. ownership, or
 - foreign corporations, partnerships or other business organizations at least 95 percent owned by investors eligible under the above.
 - OPIC generally will cover no more than 90 percent of an investment plus attributable earnings. Therefore, the investor typically must bear the risk of loss of at least 10 percent of any investment insured by OPIC.
 - OPIC insurance is not available retroactively. Investors must obtain an OPIC insurance registration letter before the investment has been made or irrevocably committed. Investors are thus encouraged to contact OPIC in the early stages of investment planning.

For further information about OPIC, its
programs and services, write or phone:
Information Officer
Overseas Private Investment Corporation
1615 M Street, N.W.
Washington, D.C. 20527
Telephone 202-457-7010*

*Individuals residing outside of the Washington, D.C.
metropolitan area may phone toll-free 1-800-424-6742

For specific information on OPIC's insurance program,
phone Bob Marshak at (202) 457-7044.

For specific information on OPIC's finance program,
phone Joe Fisher at (202) 457-7073.

U.S. and Foreign Commercial Service

U.S. DEPARTMENT OF COMMERCE

The U.S. and Foreign Commercial Service (US&FCS) is a service corps of commercial specialists ready to promote and protect U.S. business interests in markets all over the globe.

With 1,300 employees in over 200 cities worldwide, the US&FCS is strategically located to assist U.S. companies in every phase of exporting and other commercial activities. Overseas, the US&FCS is present in 66 countries -- more than 95 percent of the world market for U.S. exports. Domestically, the US&FCS operates 48 district offices and 19 branch offices in industrial and commercial centers nationwide.

Since its creation in 1980, the US&FCS has grown and matured into a respected foreign affairs agency responsible for aggressively supporting U.S. commercial interests abroad. It is a service oriented agency, rather than administrative or regulatory, with its constituency being the U.S. business community.

The US&FCS, domestically and overseas, --

- o counsels U.S. companies on markets, regulations, and methods of doing business in foreign countries,
- o provides assistance in locating agents and distributors in overseas markets,
- o identifies major projects and supports U.S. companies bidding on projects in foreign countries,
- o does market research targetted to the needs of individual U.S. companies,
- o identifies and counsels U.S. companies on investment and licensing opportunities,
- o organizes trade missions, trade shows, and seminars to promote the sale of U.S. products and services, and
- o identifies and negotiates with foreign governments on market access issues and barriers to trade and investment.

The US&FCS has a strong corps of commercial officers who are specialists in international marketing and investment and have extensive private sector experience. Overseas officers have over 770 cumulative years of private sector experience, for an average of eight years each of experience in the private sector. Ninety-one percent of overseas officers have bachelor's degrees; 71½ have advanced degrees, mostly in business, international relations, or law.

The US&FCS officer corps is proficient in 20 different languages. Thirty percent (54 US&FCS officers) speak two or more foreign languages. Seventy-eight percent speak at least one foreign language, with 15 officers proficient in Chinese and 10 in Japanese.

In sum, the US&FCS is staffed with qualified, experienced professionals who are eager to assist U.S. companies in doing business in the East Asia and Pacific region and other overseas markets.



U.S. DEPARTMENT OF COMMERCE
INTERNATIONAL TRADE ADMINISTRATION
U.S. AND FOREIGN COMMERCIAL SERVICE
DISTRICT OFFICE DIRECTORY
SEPTEMBER 1987



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Director General

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THE U.S. TRADE AND DEVELOPMENT PROGRAM

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The Trade and Development Program (TDP), an independent U.S. Government agency of the International Development Cooperation Agency (IDCA), has two objectives:

- To assist in the economic development of friendly developing and middle-income countries and;
- To promote the export of U.S. goods and services to those countries.

TDP accomplishes these objectives by providing grants for feasibility studies, consultancies, training programs and other project planning services for public sector development projects. TDP assists U.S. firms by identifying major development projects which offer large export potential and by funding U.S. private sector involvement in project planning. TDP activities serve as a catalyst to encourage U.S. private sector involvement in LDC infrastructure projects. This approach helps position U.S. firms for follow-on contracts when these projects are implemented. TDP grants are untied to follow-on procurement yet TDP-funded feasibility studies have led to over \$2 billion in direct exports for the United States.

TDP activities cover a wide range of sectors of high priority to host governments and international development efforts. Additionally, TDP has statutory authority to facilitate access to natural resources of interest to the United States. U.S. technological expertise can help accelerate the development process in all these sectors. They include, but are not limited to the following:

- Telecommunications
- Energy Development
- Food Production
- Minerals Development
- Industry
- Transportation
- Educational Technology
- Waste Management

How to Apply for U.S. TDP Grants

Public Sector Projects

•*Foreign Governments*

TDP invites foreign governments to apply for grant assistance for planning studies of major public sector projects for which there are plans to allocate substantial resources for foreign goods and services. Any country classified as "friendly" by the Department of State, and which is eligible for U.S. bilateral assistance may apply for TDP planning assistance where non-U.S.A.I.D. financing is available for the project itself.

Official requests for TDP assistance may be made directly to TDP in Washington by the appropriate local government agency or ministry or through the in-country U.S. Embassy. All requests will ultimately require the endorsement of the U.S. Embassy. A Public Sector Planning Grant Questionnaire, while not mandatory, facilitates and expedites the TDP application review process. TDP normally conducts a preliminary internal review of the proposal to determine (1) that the project represents a development priority for the sponsoring country (2) that project financing has been identified and is likely if the study suggests project feasibility, (3) that the potential for U.S. exports during project implementation is significant and (4) that TDP has a facilitative role to play, without which the project would not move forward with U.S. exports.

•*Small U.S. Businesses*

In most cases, TDP sends a definitional mission of technical specialists to the country to investigate the project, work with local authorities to develop a scope of work for an appropriate feasibility study or consultancy, draw up a budget estimate and make a recommendation concerning TDP support of the study. TDP selects qualified consultants through the use of our *Consultants Database*. The consultant is selected on the basis of qualifications in conjunction with the cost. TDP's contracting operations are carried out in accordance with the Federal Acquisition Regulations Part 13. To participate in the bidding process, please write to TDP to request a *Consultant Database* form.

•*Large Business*

Once TDP determines that all funding criteria have been met, it may make an offer to the applicant government for support of the study. If the offer is accepted, TDP signs the grant agreement with the relevant host government agency or organization (the Grantee).

The Grantee (rather than TDP) selects the U.S. firm to conduct the study under approved competitive bidding procedures. Normally, this entails advertisement of the study or consultancy in the *Commerce Business Daily*, submission of qualification forms (available from TDP) to the Grantee, short-listing, submission of detailed proposals by short-listed firms, and selection of the top-rated firm, which then negotiates a contract with the Grantee.

Although the grant agreement is signed by TDP and the Grantee, no funds are ever transferred to the Grantee. Instead, the U.S. contractor submits its invoices to the Grantee, which approves and forwards them through the in-country U.S. Embassy to TDP in Washington. TDP then makes payment directly to the contractor.

U.S. Investor Projects

•Large and Small Businesses

In addition to the grants provided to Public Sector Grantees through the TDP project screening process, TDP also offers direct financing to U.S. companies for feasibility studies connected with potential investments in foreign countries. Such feasibility studies may be partially financed (up to 50%) by TDP to provide assistance to potential U.S. investors in investigating and developing prospective investment projects. Under current policy, TDP financing is in the form of a four-year interest-free loan, secured by the potential investor's promissory note.

The basic criteria for TDP financing of investor studies are the same as for projects identified under the TDP project screening process, i.e., the project must be a host country priority project, with the potential for substantial U.S. exports. Although the U.S. company applies directly to TDP for an investor project loan, approval by the host country government is required. Investor projects also must compete for TDP funding with projects identified through the TDP public sector project screening process. For further information contact the Regional Director in charge of the *Investor Assistance Program*.

Training and Other Activities

•Public and Private Organizations

In situations where neither a feasibility study nor a consultancy is appropriate, TDP may provide funding for technical seminars in either the U.S. or a foreign country for orientation visits to the U.S. of key government decision-makers. TDP also considers commercially-oriented training programs under the TDP public sector project screening process. For more specific information, contact the TDP Regional Director of the geographic area of interest.

Development Bank Trust Funds

•Large and Small Businesses

TDP has made grants to the World Bank, African Development Bank (ADB), and the International Monetary Fund (IMF) for U.S. consultant trust funds for feasibility studies. Under these programs, U.S. consultants may be recruited for bank studies which hold potential for significant U.S. exports. Interested U.S. consultants must be registered with the appropriate development bank and

should inquire with the bank desk officers of the country in question concerning consulting opportunities.

State Export Promotion Program

•Public and Private Organizations

TDP has undertaken a program to cooperate with the states in promoting exports. In response to the need expressed by many states for better information about export opportunities, TDP's state program concentrates primarily on activities which will enhance the ability of states to gather and distribute information important to their local export communities. In the same vein, opportunities which focus on major-project exports, assist small and medium sized businesses, demonstrate cooperation among states, and encourage the states to participate in export promotion to developing and middle income countries may be considered for funding as well. For further information contact the Regional Director in charge of the *State Initiative Program*.

JAPAN'S DEVELOPMENT ASSISTANCE OPPORTUNITIES FOR AMERICAN BUSINESS

In 1989, Japan will likely pass the U.S. to become the world's largest donor of economic assistance to developing countries. Japanese aid of about \$10 billion per year represents an important source of business potential for American companies.

Japan's foreign aid system is very different from that of the United States. U.S. firms will therefore have to employ different strategies in marketing goods and services for projects funded by Japanese Official Development Assistance (ODA). Success will require hard work and patience by U.S. firms. Japanese ODA agencies and companies active in ODA work, however, are increasingly inclined to tap the development expertise of foreign companies and include foreign equipment in projects.

The Scorecard on Tied Aid

Conventional wisdom holds that Japan's spending for foreign aid projects is so tightly tied to procurement from Japanese suppliers that attempts to crack this market are not worth the effort. Like most "conventional wisdom", this notion is increasingly obsolete.

- o Japan is gradually untying its aid program, largely at the urging of other aid donors.
- o Opportunities for U.S. firms are greatest in projects funded by Japan's concessional yen loan aid. In Japan's 1988 fiscal year, it committed to lend the equivalent of \$6.74 billion under completely untied terms.

Although engineering and consulting work is usually tied, increasingly procurement of equipment and construction services for aid projects is becoming untied, especially in East Asian and Latin American countries.

- o The share of contracts going to Japanese companies is declining and the share won by foreign firms is rising.
- o However, the share of contracts going to U.S. firms is dropping.
- o This strongly suggests that the competitive environment has become more favorable but that potential American bidders are not widely aware of it.

Preferred Sectors

Japanese development spending is highest in a number of sectors where American companies are competitive suppliers.

- o In the past decade, Japan has shifted its aid emphasis from agriculture to promotion of recipient nations' export industries and the infrastructure needed to serve them.
- o Preferred sectors now include power generation and transmission, road and railway construction, telecommunications, manufacturing industries, and water resource management.

Getting to Know the Players

Several Japanese Government agencies are involved in foreign aid policy and implementation; interested U.S. companies should get to know as many of the actors as possible.

- o Control over aid policy is shared by the Ministry of Foreign Affairs (MOFA), the Ministry of Finance and, to a lesser extent, the Ministry of International Trade and Industry.
- o Three agencies actually implement Japan's bilateral aid efforts:
 - The Overseas Economic Cooperation Fund (OECF) disburses almost 60 percent of Japan's bilateral aid via concessional yen loans for large-scale capital projects and non-project structural adjustment efforts.
 - The Japan International Cooperation Agency (JICA), headquartered in Shinjuku, Tokyo, oversees all Japan's technical assistance programs, sponsors a large project design effort, manages Japan's version of the Peace Corps and also runs grant aid projects.
 - MOFA directs a number of grant aid programs itself.

Joining the Process

Japanese law requires that requests for project loans, grants or technical assistance be initiated (formally, at least) by the prospective recipients themselves. Requests are reviewed by the Tokyo aid agencies. If approved and financing is offered, the recipient government bears responsibility for organizing competitive bidding on project contracts.

- o It is therefore essential to plug in to key officials in both Tokyo and the aid recipient country's capital. Both, ideally, should be made aware of your projects. Close coordination among firm's U.S. headquarters, its Tokyo office and regional offices in LDCs will be required here.

o Bear in mind also that:

- Japanese engineering and consulting firms often receive the initial design contracts and hence write the specifications for the construction phases of a project.
- Japanese trading companies often play a lead role in identifying potential aid projects and organizing consortia to equip them.

Other Tips

In countries where most projects are open only to Japanese firms or companies from LDCs (so-called LDC-untied projects), U.S. companies will need to form joint ventures with LDC or Japanese firms to secure access to project tenders. A number of Japanese firms, particularly in the architecture and engineering sector, are actively looking for American joint venture partners.

American embassies (economic and commercial sections) and especially missions of the U.S. Agency for International Development can be valuable sources of information on local Japanese aid plans, though USAID officials' main responsibility is of course to administer U.S. aid efforts. JICA and OECF also have offices in many LDC capitals; these are not always connected to Japanese embassies. Economic officers in Japanese embassies in developing countries can also be useful sources of information on specific aid projects. Japan's Foreign Ministry says that it and other Tokyo aid agencies welcome inquiries from American businesses seeking information on specific projects.

Conclusion

There is probably no substitute for a patient, multi-pronged approach to realizing business opportunities inherent in the expansion of Japanese foreign aid efforts. But challenges abound in doing any type of business overseas. The good news is that, with a new competitive environment, opportunities in the Japanese aid program deserve re-examination by American companies.

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US ASEAN

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BACKGROUND ON THE U.S.-ASEAN CENTER

The U.S.-ASEAN Center for Technology Exchange is a non-profit organization founded in 1984 to increase the economic and commercial ties between the United States and the countries of ASEAN. The Center is advised by the American and ASEAN private sectors, and designs and organizes industry specific, practical programs to facilitate business ties between U.S. and ASEAN private companies.

The Center's formation was recommended by the ASEAN-U.S. Business Council, with the strong endorsement of the U.S. Department of State and the ASEAN Governments.

Since its founding, the U.S.-ASEAN Center has conducted a variety of programs to assist U.S. and ASEAN companies explore potential trade, investment and technology transfer opportunities. The primary means for catalyzing contacts between business enterprises have been technical seminars held in the ASEAN region and missions for business executives to the United States.

The Center has conducted over 70 technical seminars in the ASEAN region, covering such topics as aquaculture, financial market development, insurance, packaging, food processing, quality control, plastics and process controls. More than 5,000 ASEAN business people and government officials have participated in these programs. U.S. corporations have provided the technical expertise, and more than 400 U.S. companies, large and small, have sent executives to these seminars.

Founded as a joint public-private sector initiative, the Center has been able to leverage U.S. government support with substantial cash and in-kind support from private industry.

The Center is headquartered in Washington, D.C. and maintains offices in Manila, Bangkok, and Jakarta.

American and ASEAN companies interested in finding out more about the Center and its activities, and how to use them, should call (202) 289-1911 or write to the address above.

PROSPECTUS

U.S.-ASEAN COUNCIL FOR BUSINESS AND TECHNOLOGY, INC.

BACKGROUND

The U.S.-ASEAN Council for Business and Technology, Inc. (U.S.-ASEAN COUNCIL) brings together the capabilities and resources of the U.S.-ASEAN Center for Technology Exchange, Inc., and the ASEAN-U.S. Business Council in a single Washington-based non-profit organization established to promote exchange of information, education, and policy analysis of issues relating to trade, investment and technology transfer between the U.S. and the nations of the Association of Southeast Asian Nations (ASEAN).

The U.S.-ASEAN Council's activities are both bilateral and regional in nature. Its purposes are to:

- o enhance the process of trade and investment between American and ASEAN-based companies;
- o study substantive policy issues and stimulate discussion of appropriate rules and regulations in the U.S. and in the nations of ASEAN that will promote economic development through the growth of private investment, technology transfer, and trade; and
- o serve as a clearinghouse for ideas and information which are consonant with private and public efforts to expand commercial and economic activity between the U.S. and the ASEAN region.

The U.S.-ASEAN COUNCIL is dedicated to enhancing the process of technology transfer and international business development between the U.S. and the ASEAN countries; it fills a void between commercially available services and governmental functions.

PROPOSED ACTIVITIES

Investment and Trade Clearinghouse

The U.S.-ASEAN COUNCIL assists U.S. and ASEAN-based companies and other organizations by acting as a clearinghouse for information. In this capacity the COUNCIL helps interested parties to identify the potential for joint ventures, technical assistance and technology transfer, trade and other transactions.

Using the resources, experience and networks of the U.S.-ASEAN Center for Technology Exchange, the ASEAN-U.S. Business Council and other non-profit organizations, the COUNCIL undertakes three types of programs:

US ASEAN

EXECUTIVE SUMMARY OF PROSPECTUS

U.S.-ASEAN COUNCIL FOR BUSINESS AND TECHNOLOGY, INC.

MISSION

The mission of the Council is to broaden and strengthen the commercial and economic ties between the United States and ASEAN private sectors and governments.

ACTIVITIES

Among the activities of the COUNCIL are the following.

Policy Analysis

1. Identification and analysis of economic and commercial policy issues that are of vital concern to companies engaged in U.S.-ASEAN trade, investment and technology transfer.
2. Communication of particular positions or viewpoints supported by analysis to individuals in the U.S. and ASEAN governments and other organizations.

Information on Business Activities

1. Up-to-date information about trade, investment and technology transfer between the U.S. and the ASEAN countries.
2. Special studies of business activities in particular industries (contingent on interest and funding);
3. Seminars and missions for U.S. executives in the U.S. and in the the ASEAN countries;
4. Missions for ASEAN government and private sector leaders to the United States;
5. Assistance in arranging meetings between individuals and representatives of U.S. and ASEAN companies to provide opportunities for discussions relating to trade, investment and technology transfer between the U.S. and the ASEAN countries.

1. Assessment of recent developments and opportunities by industry sector;
2. Workshops and missions in the U.S. and in the ASEAN region; and
3. Information dissemination.

It is envisioned that these activities will be supported by a combination of private and U.S. government funds.

Each of the three proposed activity areas is defined below.

1. Assessment of Recent Developments and Business Opportunities

To help U.S. companies and organizations better understand business activities and business cultures in the individual ASEAN countries, the U.S.-ASEAN COUNCIL will serve as a clearinghouse of information about trade, investment and technology transfer between the U.S. and the ASEAN countries.

Special studies of business activities in specific industry sectors may be undertaken if there is sufficient interest and funding. An example of such a study is one on energy conservation and private power completed by the U.S.-ASEAN Center for Technology Exchange in February 1989 with funding from AID.

The COUNCIL provides timely and relevant information to its members. Changes in the business climate in each of the ASEAN countries are carefully monitored by the COUNCIL, and members are provided regular reports.

2. Seminars and Missions in the U.S. and ASEAN

The U.S.-ASEAN Center for Technology Exchange has developed a widely respected track record of seminars and missions for business executives, government officials and other individuals. These programs are practical, and oriented to the day-to-day needs of the individual participants and their organizations. The U.S.-ASEAN COUNCIL will build on that record, and expand the program of seminars and missions.

The COUNCIL's programs will include:

- o Seminars in the United States for U.S. executives;
- o Seminars and missions in the ASEAN nations; and
- o Missions of ASEAN executives to the U.S.

Through the seminars and missions, the COUNCIL:

1. Provides information to ASEAN executives, firms, government organizations and research centers regarding new technologies and developments in their industry;
2. Establishes broader awareness of the comparative advantages of American technology, training and know-how in the ASEAN countries; and

3. Introduces U.S. executives and firms to their counterparts in the ASEAN nations.

The programs will be focused on specific industries and individual countries.

In conjunction with these programs, the U.S.-ASEAN COUNCIL will, upon request from program participants, organize meetings between individuals and representatives of U.S. and ASEAN companies to provide opportunities for discussions relating to trade, investment and technology transfer between the U.S. and the ASEAN countries. It should be noted, however, that the U.S.-ASEAN COUNCIL, as a non-profit organization, cannot and does not represent any individual or company in such meetings or promote individual business transactions.

3. Information Dissemination

Members and program participants are encouraged to maintain contact with the COUNCIL to obtain up-to-date information, including analyses and reports, on the ASEAN region. In addition, the COUNCIL will, when appropriate, arrange meetings with industry groups, government officials and other individuals.

Policy Analysis

The U.S.-ASEAN COUNCIL undertakes to identify and analyze economic and commercial policy issues that are of vital concern from the perspective of trade, investment, and technology transfer between the U.S. and the ASEAN countries. It is expected that these policy issues will include ASEAN policies relating to intellectual property protection, limitation on ownership of land and equity, limits on rights to conduct retail trade, and protection of specific industries, as well as U.S. policies relating to export and import controls, mixed credits, feasibility financing, among others.

Some of these policy issues are tied to concerns that are region-wide in ASEAN. But most are country specific. Therefore, the focus of the COUNCIL's policy analysis activities will be on bi-lateral policy issues.

The analytical approach of the U.S.-ASEAN COUNCIL focuses on real world business activities, the day-to-day problems facing corporations and their executives, the actual policy dilemmas facing government officials, and the range of practical solutions and options available to the trading partners.

After it has identified and analyzed the underlying facts and the key policy issues, the U.S.-ASEAN COUNCIL will communicate particular positions and policy options to interested parties in the U.S. and the ASEAN countries. For these purposes, the COUNCIL will participate in the ASEAN-U.S. Dialogue and will initiate appropriate programs.

The Council's program for policy analysis has three parts:

1. Identification of priority issues;
2. Preparation of reports and analyses presenting the concerns from the U.S. and ASEAN perspectives; and
3. Dialogue and educational programs with government officials and others in ASEAN and the U.S.

US ASEAN

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PROGRAM SCHEDULE JUNE THROUGH DECEMBER, 1989

JUNE

Meeting with senior officials of the State Department
in preparation for the ASEAN Post Ministerial Meetings
(date to be set)

- 29 Boston, Massachusetts
Seminar on "Opportunities in Private Electric Power
Generation and Energy Conservation in ASEAN"

JULY

- 12 Washington, D.C.
Seminar on "Opportunities in Private Electric Power
Generation and Energy Conservation in ASEAN"
- 14 Indianapolis, Indiana
Seminar on "Opportunities in Private Electric Power
Generation and Energy Conservation in ASEAN"
- 18 San Francisco, California
Seminar on "Opportunities in Private Electric Power
Generation and Energy Conservation in ASEAN"

AUGUST

- 18 Phoenix, Arizona
Seminar on "Opportunities in Private Electric Power
Generation and Energy Conservation in ASEAN"
- 21 New Orleans, Louisiana
Seminar on "Opportunities in Private Electric Power
Generation and Energy Conservation in ASEAN"

SEPTEMBER

Meeting with senior U.S. Government officials in
preparation for the ASEAN-U.S. Dialogue (date to be
set)

Bangkok, Thailand
ASEAN-U.S. Dialogue

OCTOBER

Washington, D.C.
ASEAN-U.S. Business Conference

Annual Meeting of the Board of Directors

Kuala Lumpur, Malaysia and Bangkok, Thailand
Mission for executives in private power and energy
conservation companies

NOVEMBER

Jakarta, Indonesia and Manila, Philippines
Mission for executives in private power and energy
conservation companies

DECEMBER

Report on the ASEAN Industrial Joint Venture and
opportunities for U.S. companies issued

OPPORTUNITIES IN PRIVATE ELECTRIC
POWER GENERATION & ENERGY CONSERVATION
IN DEVELOPING COUNTRIES

FINANCING PRIVATE POWER PROJECTS

PRESENTED BY

WILLIAM DYKES
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PRESENTATION: WASHINGTON 12 JULY 1989
INDIANAPOLIS 14 JULY 1989
SAN FRANCISCO 18 JULY 1989

CITIBANK  CITICORP 

WILLIAM DYKES, MANAGING DIRECTOR
CITICORP INTERNATIONAL LIMITED, HONG KONG

I am particularly pleased to be given the opportunity to speak at this series of conferences which will outline opportunities in the field of private electrical power generation in developing countries and in particular, the ASEAN region plus India and Pakistan. I have spent the past eight years of my long career with Citicorp/Citibank based in Hong Kong and I have been very active in the field of project finance which has included first-hand experience in arranging finance for privately owned power plants in the People's Republic of China and the Republic of Philippines. I realise that PRC is not a member of ASEAN, but the example I will describe later is becoming a model for future privately owned power plants which are currently the subject of much discussion in ASEAN countries. During the past two years, I have been very actively involved in supporting potential project owners and equipment suppliers for projects in China, Thailand, Malaysia, Indonesia, India, Pakistan and Philippines. To date, the only power plant project that I am aware of that has been completed on a private ownership basis is the Hopewell power plant located at Shajiao, Guangdong Province, People's Republic of China. The other project for which financing has just been finalised is a 200mw Gas Turbine Plant to be owned and operated by Hopewell Hong Kong in Republic of Philippines. In fact, I spent all of last week with Hopewell officials at the offices of Asian Development Bank in Manila finalising their portion of the financing. Committed financing should be in place by the end of July when construction work on that project is expected to commence.

Both of the projects I have mentioned have been handled on a BUILD-OPERATE-TRANSFER (BOT) basis. A more accurate acronym for such a structure should be BOOT which means BUILD, OWN, OPERATE and TRANSFER. Although projects have not yet come to fruition in other Asian countries, which is somewhat surprising, active discussion is taking place involving other forms of private ownership. I can envisage projects that are simply BOO - BUILD, OWN, OPERATE - with no eventual transfer. I can also envisage structures involving BOL - BUILD, OPERATE, LEASE. The private developer will be responsible for building and owning the power plant, but will lease the plant to an existing government utility for its on-going operation. As I say, many of these alternatives are being considered right now and we are actively pursuing some of them together with our Hong Kong customer, Hopewell.

.../2

Advantages of Private Sector Development & Ownership

- Brings private entrepreneurial energy and capital.
- Shifts debt from government sector to private sector.
- Private sector party assumes all responsibility for both equity and debt and are carried on balance sheet of private sector party rather than host government or government owned power company.
- Private developer will handle all supplier contracts and arrange all financing.
- Private sector party will be responsible for continuous operation and maintenance of the power plant.

Projects Developed & Owned by Private Sector Companies

- Minimum Security Structure Likely to be Required by Lenders

- Private sponsors must be well regarded by banking community. (NB: One of my original project financing maxims is: "If you do not trust the sponsor, do not make the project loan.")
- Ownership could be joint venture between private sponsor and domestic sponsor. This could have certain advantages, but will vary on a country by country basis.
- Privately owned power plant should have firm contract to supply minimum quantity of electricity to national utility or other suitable offtake party ideally on a "take or pay" basis.
- Offtake agreement should be on a pre-determined price basis.
- Feedstock fuel supply contract should be entered into with reliable supplier. This could include both domestic and imported fuel sources.
- Fuel supply should be assured and on an agreed price basis - ideally fixed.
- Fuel supply should be on a "supply or pay" basis.
- Normally take or pay contracts in respect of electricity and supply or pay contracts in respect of fuel will be subject to the power plant being capable of normal operation.
- Take or pay contracts and supply or pay contracts may need to be backed by a financial guarantee or alternative form of performance bond throughout the life of the project loans.
- There must be clear linkage between private power plant and power transmission distribution system with assurance of continuous operation.
- Contracts to supply power to national utility must be precise in terms of responsibility for providing infrastructure items such as land, water, access roads etc.

- All government consents and approvals should be in place prior to commencement of construction. This will normally involve a number of government departments such as Ministry of Finance, Central Bank, Board of Investment and other local and municipal authorities as appropriate.
- Approvals should be particularly precise in terms of permission to borrow foreign currencies and ideally permit payment for the electricity in foreign currency or at least provide on-going convertibility approval.
- Consideration should be given to holding the Foreign Currency payments in an "Offshore Account" possibly hypothecated in favour of Lenders or Lender's Agent.

Sources of Financing Available for
Development of Private Sector Power Plants

- Equity.
- Supplier credit/buyer credit - most major export credit agencies are willing to provide loans or otherwise insure credit for privately owned power stations in the Asian region. However, we have yet to see the export credit agencies be willing to take the project risk directly. As in the case of the Hopewell project in China, commercial banks will take project risk and give guarantee to export credit agencies. This will apply only where country has on-going access to commercial bank financing.
- Most Asian countries enjoy either intermediate rate or poor country rate, therefore enjoy credit from export credit agencies at a subsidised interest rate.
- International Finance Corporation - Washington and Asian Development Bank - Manila.
- As well as IFC and ADB direct loans, it is also possible to arrange complementary financing alongside IFC/ADB loans. This complementary financing provides an umbrella to commercial banks who may wish to be protected from sovereign risk of host country. This works because of an agreement between member countries with IFC/ADB that debt of such member country will not be rescheduled. Commercial banks will take project and sovereign risk but the latter is reduced by knowledge of agreement with IFC/ADB.
- Syndicated loan from commercial banks on project finance basis, ie limited recourse or non-recourse to shareholders.

For many potential project owners or sponsors, a first venture into the international field can be a frustrating experience. The rules of game will differ immensely from those applicable in

a domestic situation. We highly recommend using the services of an experienced financial advisor and we, at Citicorp, certainly have that experience. I have a great deal of experience in the field of financing, but I emphasise that our branches in most countries in Asia are even more familiar with the local requirements particularly in terms of governmental approvals, licences etc. Regulations will vary from country to country, but the services of a local expert are essential. This expertise will also extend to knowledge of local legal matters as well as taxation and accounting requirements.

Before turning to a detailed description of two specific privately owned power plants, let me outline some of the advantages I see for the introduction of private sector skills into the power industry in Asia. I firmly believe that the private sector, if given the right incentives, can add substantial value as well as being an economic alternative to the more traditional power station development by state-owned utilities. The energy situation in Asia is very simply this:

Everyone wants cheap electricity.
Everyone wants more electricity - now
no electricity = no growth.

Many of the countries in Asia require a massive increase in power development which can be restricted by the consequent increase in the host countries external debt. Allow me to quote Indonesia as an example. PLN - the state utility is planning to increase its installed capacity from the present 6200mw to over 13200mw by the year 2000. In addition, most of that power generation capacity will be shifted from oil to coal fired. At today's price, this proposed increase in power capacity will cost a minimum of US\$7 billion or 20% of Indonesian current foreign debt. By seeking private development of power plants in Indonesia, foreign equity will be imported which will be beneficial. The debt raised to finance the power plants will still be booked by lenders as Indonesian Sovereign Risk, but the loan will be booked in the name of the private power developer as opposed to the Indonesian government. It does not take away the sovereign risk but at least provides diversification of risk within the country.

We believe that the private sector can shoulder a greater share of the risks in power development and we see no reason why the development of power stations should be restricted to the public sector or national utilities. Privatisation of other infrastructure projects is becoming common place and we are

looking at privately owned roads, tunnels, bridges, telecommunications systems, mass transit railways etc. There is nothing unique about power stations. By shifting the development to the private sector, the host country will undoubtedly attract entrepreneurial energy as well capital. The private sector is normally much more cost efficient and accountability and responsibility for efficiency is more readily identified.

Hopewell Project - China

SLIDE 1

Having talked in general terms about private power development, let me now give you an example of a specific project that is fully operational. The plant at Shajiao is generally regarded by the PRC government as a model foreign investment project. Indeed, just prior to the recent turmoil in Beijing which unfortunately has put all new projects in China on hold, Hopewell was about to undertake an even larger power plant. They had just agreed to provide a 1320mw coal fired plant as an extension to Shajiao "B" station.

Let us concentrate on Shajiao "B" and look back into recent history. The origins of the project go back to 1980 when Hopewell built a 1200-room hotel in Canton called China Hotel. When the hotel was opened, Hopewell realised that it was to be a major consumer of electricity in Canton and indeed calculated that the hotel would use 2% of the entire electricity production of the local power company. Special terms were agreed for the hotel's electricity consumption, but at the same time Hopewell suggested that if the electricity shortage was so acute, they would be willing to build and operate a power plant that would sell electricity to Guangdong Province probably at a lower cost than their own cost of generation. This proposal was eventually taken seriously around 1984-85 when an agreement was entered into. Citicorp was appointed financial advisor and worked throughout 1985 developing a financing plan that was eventually implemented in 1986.

The Party A/Party B structure is typical of all joint venture projects in PRC. As additional information, I would mention that China Development Investment Hong Kong Limited - 40% shareholder - is a member of the Bank of China group and

B.O.T. (BUILD-OPERATE-TRANSFER) PROJECT
IN PEOPLE'S REPUBLIC OF CHINA

- HOPEWELL POWER (CHINA) LTD.
- CITICORP HONG KONG APPOINTED FINANCIAL ADVISOR AND LEAD MANAGER.
- 2 x 350MW COAL FIRED POWER STATION SHAJIAO "B" - LOCATED AT SHAJIAO, GUANGDONG PROVINCE APPROX 100KM WEST OF HONG KONG.
- LIKE ALL P.R.C. JOINT VENTURES, STRUCTURE IS:-

PARTY "A" - SHENZHEN SPECIAL ECONOMIC POWER DEVELOPMENT CO (SINGLE PURPOSE COMPANY FORMED TO BUY ALL POWER FROM PARTY "B").

PARTY "B" - HOPEWELL POWER (CHINA) LTD.

OWNERSHIP - HOPEWELL, HONG KONG	50	%
CHINA DEVELOPMENT INVESTMENT (HK) LTD	40	%
KANEMATSU-GOSHO LTD	5	%
YUE XIU ENTERPRISES LTD	2.5	%
SHUM YIP DEVELOPMENT CO LTD	2.5	%

similarly Yue Xim and Shum Yip represent the city of Guangzhou (Canton) and Shenzhen Special Economic Zone respectively.

SLIDE 2

This slide illustrates the key elements of the BOT structure in that the electricity offtake agreement and coal supply agreement are the major security elements offered to the lenders. Unfortunatley, the PRC party involved in the offtake agreement and coal supply agreement was a single purpose company formed solely for the services involving this power plant. It was necessary to seek additional credit support and therefore performance bonds were taken from a PRC financial institution in support of the offtake and coal supply agreements. A critical factor in Hopewell winning the contract was the agreement to take payment for electricity 50% in Renminbi and 50% in foreign exchange. PRC is always short of foreign exchange and therefore appreciated this flexibility. The calculation was surprisingly accurate in that 50% RMB is used to pay for domestic coal supply and local operating costs with foreign exchange payment being used to service debt and provide profit. Our two years of operating experience has shown that if anything there is a small shortage of RMB and we permit a swap of foreign exchange revenue into RMB from time to time to meet shortfalls in that currency. This RMB shortfall results from increased coal costs in that the coal quality is generally at the lower end of the specifications and therefore coal consumption is higher than originally anticipated. The greatest concern about the the efficient operation of the Shajiao "B" power plant relates to coal delivery. This is a very common problem in China. If the coal is mined efficiently, it is invariably held up in rail transportation between mine and power plant or in this case, port of shipment. All coal arrives by ship, but sometimes the plant is down to a few days of coal supply. We sometimes joke about the coal conveyor going directly from the ship to the furnace without entering the coal storage yard. If coal supply is severely interrupted, Hopewell has the right to purchase imported coal, but so far this has not been necessary.

SLIDE 3

My next slide shows the construction and supply details. The key elements were the Hopewell negotiation of a fixed price turnkey contract with the Japanese suppliers and in turn Hopewell was able to agree a fixed price turnkey contract to deliver the power plant. No completion guarantees were given

.../7

KEY ELEMENTS OF B.O.T. ARRANGEMENT

- HOPEWELL WILL OWN AND OPERATE PLANT FOR TEN YEARS THEN TRANSFER OWNERSHIP TO PARTY "A" AT NO COST.
- CHINESE PARTY "A" AGREED TO PURCHASE A MINIMUM QUANTITY OF ELECTRICITY AT FIXED PRICE OVER TEN YEAR PERIOD ON "TAKE OR PAY" BASIS (AS LONG AS PLANT IS CAPABLE OF DELIVERY).
- PARTY "A" AGREED TO SUPPLY COAL OVER TEN YEAR PERIOD AT FIXED PRICE (SUPPLY OR PAY).
- ELECTRICITY IS PAID FOR 50% IN RENMINBI AND 50% IN FOREIGN EXCHANGE (HK\$).
- RENMINBI IS USED TO PAY FOR COAL SUPPLIES AND LOCAL PLANT OPERATING COSTS.
- FX PAYMENT SERVICES DEBT AND PROVIDES PROFIT TO PARTY "B".
- COAL SUPPLY AND OFFTAKE AGREEMENTS ARE BACKED BY A PRC PERFORMANCE BOND.

CONSTRUCTION

- HOPEWELL NEGOTIATED FIXED PRICE TURNKEY CONTRACT (FIXED PRICE, FIXED COMPLETION, AGREED QUALITY).
- MITSUI & CO LTD LEAD CONSORTIUM INCLUDING ISHIKAWAJIMA HARIMA HEAVY INDUSTRIES (IHI) (BOILERS), TOSHIBA (TURBINES).
- SLIPFORM ENGINEERING (HOPEWELL SUB) WAS RESPONSIBLE FOR CIVIL WORKS.
- HOPEWELL IN TURN COMMITTED TO BUILD THE PROJECT ON A TURNKEY BASIS AT FIXED PRICE TAKING TIME AND COST OVERRUN RISKS.

but commercial banks were willing to take such risk given the knowledge that no new technology was involved and the equipment suppliers possessed a very sound reputation for on-time and quality delivery. Similarly, Slipform Engineering has an excellent record in the field of civil engineering in Hong Kong and even with the employment of relatively inexperienced PRC labour (90%), everyone was confident that Slipform would handle the civil engineering with their normal efficiency.

SLIDE 4

Let us now look at the project costs and the underlying financing structure. The bulk of the financing came in the form of a Japanese supplier credit of Yen 52 billion backed by Export Import Bank of Japan. Incidentally, the Yen exchange risk was taken against the advice of Citicorp, but the PRC parties were attracted by the long term fixed rate commitment from Japan. This has subsequently proved to be a very expensive mistake given the massive appreciation of the Yen since 1986. The PRC party took the exchange risk not Hopewell. A further difficulty was encountered in that the Japanese EXIM Bank would not take the project credit risk. This was overcome by Citicorp arranging a syndicate of banks to provide a guarantee to Japan EXIM as well as lending the non-EXIM covered portion of the project financing required. All of the financing was signed in April 1986. The Hopewell performance, ably assisted by the Japanese consortium and the PRC work force, motivated for the first time by a performance bonus(!), was quite phenomenal. The people of Guangdong Province are all capitalists at heart - after all they have followed the fortunes of Hong Kong long enough. Admittedly, a considerable amount of site clearance work had been undertaken prior to the signing of the financing contracts, but the following achievements should be recorded.

SLIDE 5

The first 350mw unit produced electricity into the local grid 22 months from start of construction with the second unit contributing 28 months following start of construction. The entire project was completed six months ahead of schedule with an average plant availability of 92% during the first year of operation - well above the industry average.

PROJECT COSTS/FINANCING

- PROJECT COST US\$512 MILLION.
- INCLUDES FIXED CONSTRUCTION COST (CIVILS, E & M, START-UP, FINANCING COST INCLUDING CAPITALISED INTEREST DURING CONSTRUCTION AND INSURANCE COSTS).
- COSTS FUNDED BY:-
 - SHAREHOLDER EQUITY
 - SUBORDINATED LOANS
 - DEFERRED RMB PAYMENT
 - DEBT FINANCING
- DEBT/EXPORT CREDITS/BANK LOANS
 - YEN 52 BILLION SUPPLIER CREDIT BACKED BY JAPAN EXIM.
- NON EXIM FINANCING PROVIDED IN HK\$, EUROYEN, RENMINBI.
- JAPAN EXIM WOULD NOT TAKE CREDIT RISK OF PROJECT.
- CITICORP ARRANGED ALL PROJECT FINANCING FROM SYNDICATE OF 46 BANKS INCLUDING GUARANTEE TO JAPAN EXIM.
- FINANCING ALL COMPLETED APRIL 1986.

PROJECT IMPLEMENTATION

- UNIT 1 SYNCHRONIZATION
22 MONTHS FROM START OF CONSTRUCTION.
- UNIT 2 SYNCHRONIZATION - 28 MONTHS.
- POWER STATION FULLY TESTED AND
COMMISSIONED AND IN FULL COMMERCIAL
OPERATION 33 MONTHS AFTER SITE FORMATION.
- COMPLETED SIX MONTHS EARLIER THAN
CONTRACT DATE WITH P.R.C.
- AVERAGE PLANT AVAILABILITY IN FIRST YEAR
OF OPERATION 92%.

SLIDE 6

Continuing its role of financial advisor to the project, Citicorp pointed out to Hopewell that since signing the Japanese supplier credit in April 1986 which included a 7.3% fixed interest rate, Yen domestic interest rates had fallen sharply. We considered financing with domestic Yen based on Japanese Long Term Prime Rate which was then 5.4% p.a. We then elected to use floating rate Euroyen as the basis for a refinancing and approached the 46 banks currently providing a syndicate guarantee for the Japanese supplier credit. We suggested that those banks become lenders of floating Euroyen instead of guarantors. The syndicate agreed and we raised a floating rate loan of Yen 49 billion to pre-pay the outstanding amount under the Japanese export credit. Some problems were encountered over the right to pre-pay the supplier credit, however, these were eventually overcome. The floating rate Yen loan 49 billion was swapped into fixed rate at around 5.4% p.a. This resulted in a cost saving to the project of approximately US\$40 million. Unfortunately I failed to negotiate a percentage of the savings!

In summary, the Shajiao "B" station has proved to be a very successful project for both Guangdong Province and Hopewell. Hopewell's complete inexperience in the field of power station development was not necessarily a disadvantage. They were able to question previous methods and able to design better ways of building the power station. Their first-hand experience in China was invaluable and they were able to adapt fast track methods to local capabilities. Their vast experience in the Slipform method of concrete construction meant a rapid completion of many critical structures in the civil works. For example, the 210 metre chimney was completed in 45 days and the turbine hall in six days. In negotiating the contract with PRC, Hopewell skillfully included something called "an early generation bonus". Hopewell was always very confident indeed of their ability to complete the project early even though the contractual date was considered very short indeed by many experienced hands. The early generation bonus which was earned by Hopewell amounted to US\$50 million. There were no contractor claims on the entire civil engineering. On the other hand, Guangdong Province received 3.1 billion KWHS from the project before the contracted completion date. The estimated economic value of that electricity to the province is close to US\$500 million.

Incidentally, I should mention that to overcome lenders fears about Hopewell inexperience, the lenders employed a major

REFINANCING 1987

- SUPPLIER CREDIT FROM JAPAN EXIM WAS YEN 52 BILLION 7.3% FIXED FOR TEN YEARS.
- BY MAY 1987, YEN DOMESTIC RATE DOWN TO 5.4%.
- CITICORP PROPOSED REFINANCING USING FLOATING RATE EUROYEN (4.8%) AND SWAP INTO FIXED RATE.
- REFINANCING COMPLETED AUGUST 1987 INCLUDING SWAP INTO FIXED YEN AT APPROX 5.4%.
- COST SAVING TO PROJECT APPROX US\$40 MILLION.

engineering company to review all aspects of the plant feasibility, construction and completion. This work was undertaken by Brown & Root who provided very acceptable reports throughout the project construction and completion. In addition, the lenders insisted upon the employment of an experienced power plant operator and a contract was entered into with a joint venture between Fluor Daniel and the UK Central Electricity Generating Board. That joint venture company continues to operate the plant.

Given the recent events in China, we are watching the progress at Shajiao "B" very carefully. The plant continues to operate at a very acceptable level and no problems have been encountered so far. In line with embassy directives, certain expatriates were removed from the plant to Hong Kong although some expatriates also remain on site. Key officials and operators are commuting daily from Hong Kong and we hope that the calm situation will remain. None of the violence experienced in Beijing and certain other cities has been encountered in Guangdong Province.

Hopewell Energy (Philippines) Corp

SLIDE 7

Let me now turn to a second power project being undertaken by the Hopewell Group which will be only the second BOT plant in Asia. This time in Philippines. There is a very serious shortage of electrical power in the Philippines and in particular in Metro Manila. Brown-outs are common place and the government utility, National Power Company (NPC), is resorting to the construction of several gas turbine facilities in addition to developing long term plans for base load power plants. During March 1988, Hopewell were invited to bid along with more traditional suppliers for provision of a 200mw gas turbine plant for NPC and Hopewell, given their experience in China, were able to submit a very attractive offer.

Most conventional suppliers submitting bids involving new equipment with a cost of around US\$85 million, but as far as I know none offered a BOT structure. Hopewell committed to a BOT structure with a 12-year life and offered fixed price of US\$41 million. Hopewell had identified sources of used gas turbines, but committed to deliver this equipment in a refurbished state to NPC. Obviously, considerable cost savings were advantageous and Hopewell also offered a very rapid completion time. Hopewell contracted to have the plant up and running in nine months from contract commencement. The original plan had been to underwrite the

HOPEWELL ENERGY (PHILIPPINES) CORP

- 200MW GAS TURBINE PLANT LOCATED AT NAVOTAS, METRO MANILA.
- B.O.T. BASIS (BUILD-OPERATE-TRANSFER).
- HOPEWELL WILL BUILD, OWN AND OPERATE FOR 12 YEARS AND THEN TRANSFER FREE OF CHARGE TO NATIONAL POWER CORPORATION (NPC).
- PROJECT AGREEMENT SIGNED 16 NOV 1988.
- CITICORP HONG KONG APPOINTED FINANCIAL ADVISORY BY HOPEWELL.

entire US\$41 million cost and commencing work immediately with conditions precedent being committed by NPC to permit refinancing of all cost except equity and in addition, Philippines government must guarantee all aspects of NPC offtake and payment commitments. Keep in mind that Philippines is a country whose debt has been rescheduled and commercial bank lenders are not generally available. The only financing source was likely to be multi-national or government agencies. Unfortunately, negotiation of certain matters became rather protracted and the project agreement between Hopewell and NPC was not signed until November 1988. Unfortunately, even more delays were encountered which I will touch on later.

Citicorp had been appointed financial advisor to Hopewell from the earliest discussions with NPC and played a major role in advising on local approval requirements as well developing a finance plan.

SLIDE 8

The plant will be used as a peak lopping facility with NPC paying a "capacity fee" for the available capacity. However, if the plant is called upon to run and electricity is produced, all electricity will be purchased by NPC. NPC will provide fuel for the gas turbines at no cost to Hopewell.

SLIDE 9

Given the special situation regarding the debt of the Philippines, it was necessary to look to IFC and ADB for debt financing. These banks agreed to provide US\$10 million each and together with ADB, we succeeded in obtaining US\$10 million on a complementary financing basis linked to ADB direct loan. This complementary financing is obtained from four commercial banks under the umbrella of ADB direct loan arrangements. The remaining funding comes from equity.

SLIDE 10

It is unusual to see Citicorp as an equity participant, but I think it makes sense in this case. Citicorp has arranged a debt to equity swap and frankly will receive a much better rate of return on the equity than it receives on the existing debt. Even without the debt/equity swap, I think it makes sense to take equity in many project situations. Frequently, commercial banks will take most or all project risks for a slender margin over Libor whereas equity investors invariably receive 15-20% p.a. I have said for many years that commercial project lenders have been taking equity risks without being paid correctly.

PROJECT DESCRIPTION

- 200MW GENERATING CAPACITY TO BE UTILIZED AS PEAK LOPPING PLANT.
- ALL ELECTRICITY WILL BE PURCHASED BY NPC.
- EQUIPMENT:
 - 3 WESTINGHOUSE W501/B TURBINE-GENERATOR UNITS PRESENTLY INSTALLED IN COLORADO. UNITS TO BE REFURBISHED AS NECESSARY AND INSTALLED WITH SWITCH-GEAR AND TRANSFORMERS. OTHER DEVELOPMENT TO INCLUDE BUILDINGS, ROADS, LANDSCAPING, DRAINAGE, FIRE PROTECTION, LIGHTING AND SECURITY SERVICES.
- SITE:
 - NPC WILL PROVIDE THE SITE AND ALL FUEL FOR GENERATION OF ELECTRICITY AT NO COST TO HOPEWELL.

COST ESTIMATE

TOTAL COST : US\$45.477 MILLION

COST TO HOPEWELL: US\$41 MILLION

COST TO NPC : US\$4.477 MILLION
(LAND LEASE + CERTAIN
INFRASTRUCTURE)

FINANCING PLAN
(HOPEWELL PORTION)

LOANS : IFC - US\$10 MILLION
ADB - US\$10 MILLION

COMPLEMENTARY : US\$10 MILLION
FINANCING
(ADB LINKED)

EQUITY : US\$11 MILLION

NO FINANCING IS BEING ARRANGED FOR NPC
PORTION.

EQUITY

SHAREHOLDERS ARE:

HOPEWELL (B.O.T. SPONSOR): US\$ 6.611 MILLION

CITICORP (ALSO FINANCIAL : US\$ 2.189 MILLION
ADVISOR)

ADB : US\$ 1.100 MILLION

IFC : US\$ 1.100 MILLION

TOTAL EQUITY : US\$11.000 MILLION

DEBT

- LOANS FROM ADB AND IFC HAVE BEEN ARRANGED WITH 10 YEAR MATURITY, IN US\$ ON FLOATING RATE BASIS.
- COMPLEMENTARY FINANCING (ADB LINKED) HAS BEEN ARRANGED WITH 7 YEAR MATURITY IN US\$ ON FLOATING RATE BASIS.
- THIS PORTION IS PROVIDED BY 4 COMMERCIAL BANKS WITH ADB AS LENDER OF RECORD BUT WITH COMMERCIAL BANKS TAKING FULL PROJECT RISK.

SLIDE 11

I mentioned that NPC will pay a capacity fee based on the committed availability. I compare this to a commitment fee paid by a borrower to committed lenders. In the cash flow projections, we have calculated that the capacity fee itself will cover debt service and operating costs, but leave little or no profit for the equity investors. The up-side for the project as far as equity investors are concerned is the likelihood of electricity generation and consumption. We hope this will provide a good profit and return on the investment. On the other hand, NPC will have a standby plant on stream very quickly and I have every reason to believe that Hopewell will again perform the construction task in the superhuman manner witnessed before in China on the Shajiao project.

SLIDE 12

My slide shows a brief description of the security structure for lenders and undertakings by shareholders.

Unfortunately, this project in Philippines has been dogged by delays. It is a great pity that the original commitment by Hopewell delivered in April 1988 could not be taken up rapidly by the Philippines authorities. Every approval required for commencement took months of negotiating and indeed the performance guarantee to be given by Philippines government was not delivered until February 1989. Much of the momentum was lost in bureaucratic delay and political argument. Everyone in varying degrees of office seemed to have a better way of doing things than the proposal in front of them. This may be typical of Philippines system and it certainly proved to be frustrating. In the meantime, the power situation in Manila worsens with brown-outs and complete failures increasing in frequency. The seemingly endless delays made Hopewell much more cautious about committing commencement of work and indeed they refused to purchase the major equipment until all aspects of the project approvals and financing were in place. At this point in time, we have just finalised all financing and the only remaining item is the board approval of the ADB loan. As soon as this is approved, Hopewell intends to purchase the equipment and commence work on site. Frankly, with more expeditious handling of many items within Manila, this project could have been undertaken one year earlier. Past events in Philippines are no doubt the cause for a very cautious approach to execution of contracts particularly with foreign suppliers. On the other hand, the delays encountered undoubtedly contributed to the lengthy delay in getting the project underway.

OPERATION OF PROJECT FACILITIES

- HOPEWELL WILL OPERATE AND MAINTAIN THE PLANT FOR 12 YEARS.
- NPC WILL PAY HOPEWELL A CAPACITY FEE (MONTHLY) FOR STANDBY CAPACITY COMMITTED TO BE AVAILABLE PLUS AN ENERGY FEE BASED ON ELECTRICITY ACTUALLY GENERATED.
- ALL PERFORMANCE OBLIGATIONS OF NPC (INCLUDING PAYMENTS) TO BE GUARANTEED BY GOVERNMENT OF PHILIPPINES.
- CAPACITY FEE AND ENERGY FEE TO BE PAID IN US\$ TO OFFSHORE BANK ACCOUNT TO BE MAINTAINED BY HOPEWELL.
- PROJECT AWARDED "PIONEER" STATUS BY GOVERNMENT. THIS PROVIDES CERTAIN PRIVILEGES INCLUDING "TAX HOLIDAY" OF 5 YEARS AND WAIVER OF IMPORT DUTIES ON EQUIPMENT.

SECURITY FOR LENDERS

- CHARGE OVER ALL HOPEWELL PHILIPPINES ASSETS.
- PLEDGE OF SHARES IN HOPEWELL PHILIPPINES.
- ASSIGNMENT OF HOPEWELL INTEREST IN PROJECT DOCUMENTS:-
 - PROJECT AGREEMENT
 - ACCESSION UNDERTAKING
 - PERFORMANCE UNDERTAKING
 - SUPPLY CONTRACT
 - INSTALLATION CONTRACT
- CHARGE OVER HOPEWELL'S DEBT SERVICE ACCOUNT.

ADDITIONAL UNDERTAKINGS

- RESTRICTIONS ON TRANSFER OF EQUITY SHARES.
- HOPEWELL PARENT COMPANY TO USE BEST EFFORTS TO ENSURE PROMPT COMPLETION AND MEETING ANY COST OVER-RUNS.

Nevertheless, the Hopewell Group are still sufficiently encouraged to bid on a pre-qualification basis for a 2 x 300mw coal fired plant to be built by NPC. Hopewell has again bid on a BOT basis and Citicorp will be financial advisor. Raising financing for a 2 x 300mw facility, ie approximately US\$500 million for a project in Philippines will be a monumental task compared to the financing requirements of the gas turbine facility. Preliminary sounding out with certain export credit agencies has been encouraging and some may even take B.O.T. risk! In addition, I was very pleased to see commercial banks being willing to take complementary financing with ADB.

In conclusion, I hope that I have been able to demonstrate first-hand experience in financing privately owned power plant facilities in Asia and I would welcome the opportunity to discuss this experience with each of you in the audience. If I can be of help to you at any time, please do not hesitate to contact me in Hong Kong.

Report No. 90-03

A Report of the
Office of Energy
Bureau for Science and Technology
United States Agency for International Development

PROGRAM PLAN
FISCAL YEARS 1990 AND 1991

July 1990

**OFFICE OF ENERGY
PROGRAM PLAN
FISCAL YEARS 1990 AND 1991**

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CHAPTER I

INTRODUCTION

The goal of the Agency for International Development (A.I.D.) is a world in which economic growth and development are self-sustaining and the extremes of poverty have been eliminated. Energy is a critical input to attaining those goals.

The Office of Energy, in A.I.D.'s Bureau for Science and Technology, shares with the Agency's Missions and Regional Bureaus the responsibility for helping assisted countries obtain appropriate energy services. This Program Plan explains the programs of the Office in pursuit of that end and how the Office is organized to implement those programs.

This introductory chapter briefly describes the importance of energy in development and how energy pertains to the overall emphases of A.I.D. The chapter also summarizes the chief problems that less developed countries (LDCs) encounter in obtaining sufficient energy, outlines the general role, goals, and programmatic themes of the Office of Energy, and then explains how the Office is staffed, budgeted, and organized.

A. ENERGY AS AN INPUT FOR DEVELOPMENT

Energy in its many forms provides services essential to development. Society needs energy to heat, cool, and move objects and materials, for production, communication, comfort and health, and needs a special form of energy--electricity--for lighting and power.

Primitive economies develop with human muscle; slightly more developed societies use animal muscle. *The average citizen in countries assisted by A.I.D. has access to only 50 watts of electric power.* In contrast, each citizen in the U.S. has access to approximately 3,000 watts, the equivalent power of forty human beings.

To lend focus to the ultimate goal of economic growth and development, A.I.D. aims its efforts at six chief problems in LDCs: inadequate income growth; hunger; health deficiencies, especially infant mortality; illiteracy and lack of education; unmanageable population pressures; and environmental and natural resource degradation.¹

Achievement of the goals for each of these six problem areas involves energy. Increased income growth means economic growth, which requires additional energy services.

¹ See *Blueprint for Development: The Strategic Plan of the Agency for International Development* (U.S. Agency for International Development, Washington, D.C.). Undated.

Allaying hunger requires energy for cooking as well as for greater agricultural productivity, and the agricultural sector requires several forms of energy input--for irrigation, for operation of on-farm equipment, for processing, and for transport, storage, and distribution. The third area--health--requires important energy input in order to deal with specific health problems (pumping of safe drinking water or refrigerated storage of vaccines, for instance) that are particular challenges when dealing with regions not connected to utility grids.

The fourth and fifth areas, education and family planning, require obvious energy services--electricity for lighting, communications, space heating at facilities, and transportation energy for moving staff and materials around. And the last area, maintaining the environment and natural resources, requires greater energy efficiency and increased use of renewable resources, cleaner liquid fuels, and environmentally more benign technologies for fossil fuel combustion.

Considerable amounts of energy are needed to meet income and food goals. A.I.D.'s quantitative goals for the assisted LDCs are a sustained 2 percent per capita growth in income and 3.7 percent annual growth in the agricultural sector. Based on past trends, meeting these development targets would require the increased availability of energy services in A.I.D.-assisted countries.

- Analyses of development experience indicate that each increase of 1 percent in Gross Domestic Product (GDP) has historically required an increase of 1.3 percent or more in energy inputs. At this ratio and given the expected population growth rates of 2.5 to 4 percent, attaining A.I.D.'s goal of a 2 percent real increase in per capita income would *require energy growth rates of 5.8 to 7.8 percent*. With highly efficient energy uses, this rate can be reduced to 4.1 to 5.4 percent.
- Similarly, the Agency's goal of increasing caloric intake would require agricultural growth of 3.7 percent per year, according to the Food and Agriculture Organization. Each increase of 1 percent in agriculture has required historically an additional energy input of more than 2 percent. Thus, if A.I.D. is to attain its goals for nutrition and agriculture, it must ensure that LDCs *increase their energy supply for agricultural development by at least 7 percent annually*.

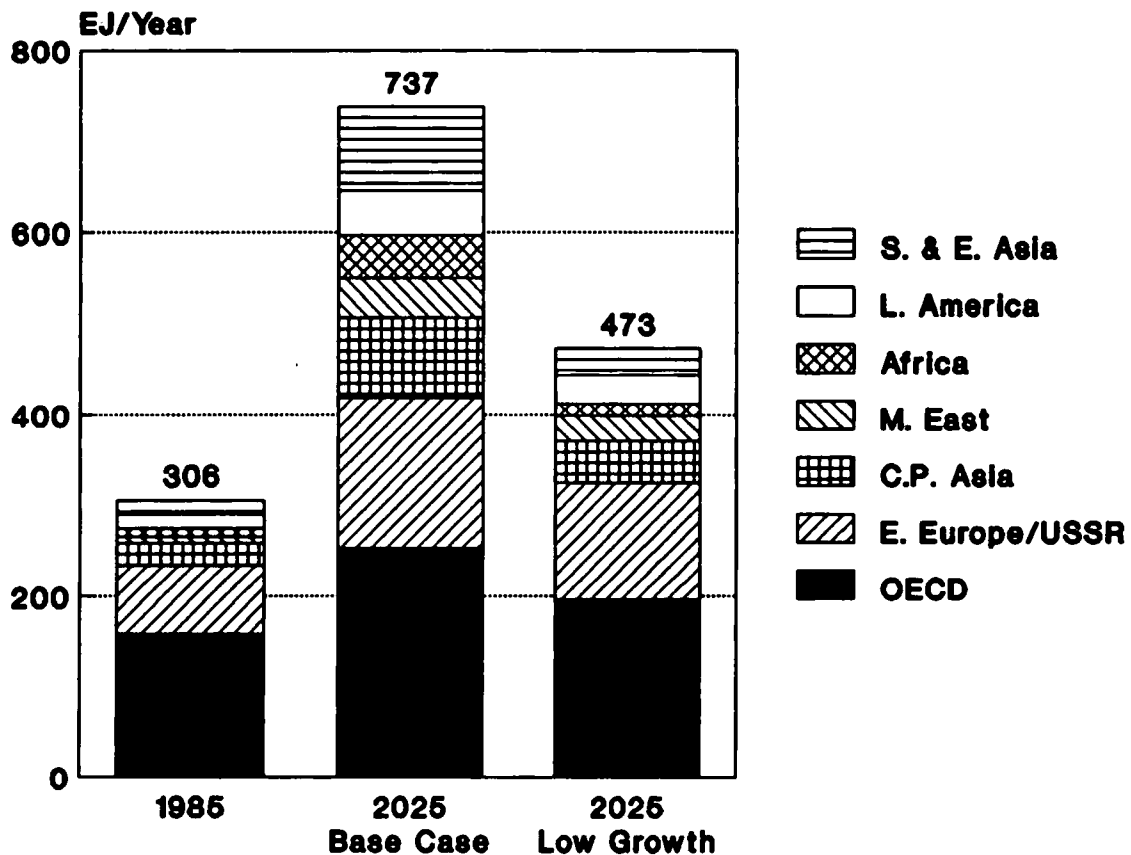
B. PROBLEMS OF ENERGY PRODUCTION AND USE

Energy resources and energy conversion are not free, and the costs--economic and environmental--present a myriad of problems.

Economic Effects

Most of the swelling demand for energy will be met in the mid-term by imported oil. Three-quarters of A.I.D.-assisted countries rely on oil for 50 percent or more of their commercial energy requirements. These imports create a serious foreign exchange problem. *Low-income countries use 20-30 percent of their export earnings for energy imports.* This drain, coupled with the serious debt crisis, leaves little for investment in agriculture, industrial development, and other critical development programs. Figure 1 compares projected increases in primary commercial energy consumption in the developing countries with those in Organization for Economic Cooperation and Development (OECD) countries between 1985 and 2025.

Figure 1
Primary Commercial Energy Consumption



Note: EJ = exajoule: 10^{18} joules = 0.95×10^{15} BTUs.

Source: U.S. Agency for International Development. *Greenhouse Gas Emissions and the Developing Countries: Strategic Options and the U.S.A.I.D. Response.* A Report to Congress, July 1990.

One of the fastest growing portions of the energy sector is electricity. *During the past couple of decades, electricity capacity in LDCs has been growing at a rate of greater than 7 percent.* Capacity in India, A.I.D.'s largest assisted country, has been expanding at greater than 9 percent per year. But these rates of growth are probably unsustainable for financial reasons. In many developing countries the largest single area of investment of national funds is the energy sector, with 70 - 85% of the investments going into the electric power subsector. *LDCs invest an average 25 percent of their total development investment budget in electricity infrastructure.* Because much of the equipment needs to be imported, and much of the money needs to be borrowed abroad, this represents another significant draw on foreign exchange.

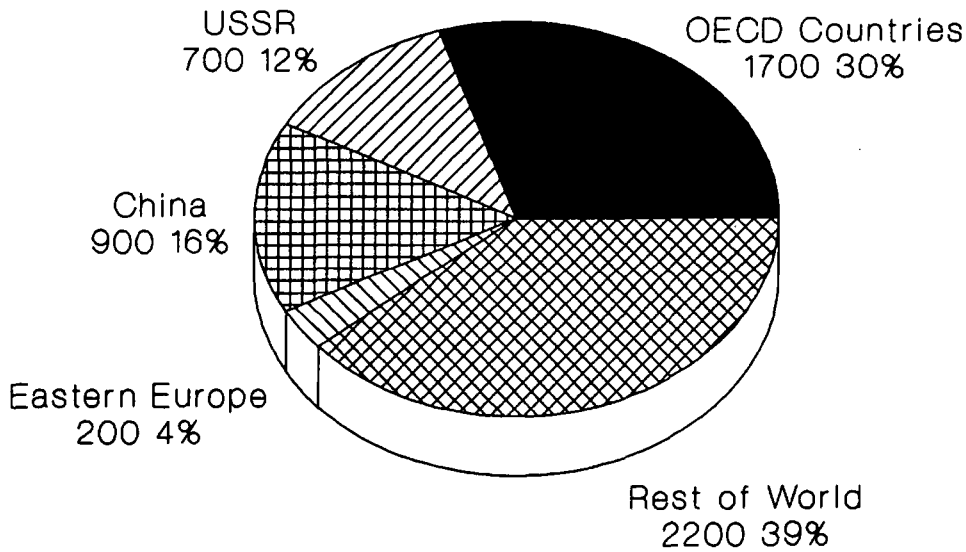
An overwhelming majority of electric utilities in LDCs are operating at a loss; not only because of subsidized electricity tariffs but also because of dramatically inefficient operations. This puts added strain on government budgets that are usually already severely strained.

The fact that developing countries need more electrical power for sustainable social and economic development than they are able to produce is demonstrated dramatically by frequent power shortages, which exist in over half of A.I.D.-assisted countries. In Pakistan, for example, power shortages have reached a level of 25 percent over demand at peak hours of usage. *Load shedding in Pakistan has led to a 1.8 percent decrease in gross domestic product and a 4.2 percent decrease in the country's foreign exchange earnings.* In India, the current 10 percent average cut in power to the industrial sector, accomplished by load shedding, is estimated to cause an average annual production loss of over \$6 billion--equivalent to 12 percent of the country's industrial output. Power shortages in the Philippines in 1990 are costing the economy an estimated \$1.1 million per day in lost production.

The Food and Agriculture Organization reports that nearly half the world's population today lives in areas where fuelwood is acutely scarce, and yet a majority of these people depend on fuelwood for the bulk of their energy needs. If current trends continue, up to 3 billion people (about half of the world's population) will be living in such areas by the year 2000. The past several years have seen dramatic rises in fuelwood and charcoal prices--a doubling in many places. These price rises place an intolerable burden on those least able to afford it.

In theory, more efficient cookstoves and industrial technologies could reduce wood requirements by 25-70 percent at very low cost. One study estimates that greenhouse gas emissions attributable to cookstoves could be halved. Another puts the reduction at 80 million tons of carbon per year, or 3 percent of greenhouse emissions from deforestation assuming that the stoves use 40 percent less fuelwood and that 175 million households used them. However, numerous past efforts to introduce improved stoves have not lived up to expectations, possibly because they did not save fuel or labor, or because wood could be gathered for free, and therefore was not highly valued, or because it was difficult to change

Figure 2
Regional Contributions to Global Increases in CO₂ Emissions
1985-2025 (teragrams/year)



Note: teragram = 10^{12} (one trillion) grams

Source: A.I.D. Office of Energy, 1990. *Assessment of the Global Energy Efficiency Initiative.*

Effectively counteracting all of the negative consequences outlined above requires that environmental considerations be included in energy development plans.

C. THE ROLE OF A.I.D. AND THE OFFICE OF ENERGY

The Agency's role in energy assistance is to help ensure an adequate energy supply to meet its goals in overall income growth and in agriculture, rural development, health, and other areas. Through its energy activities, A.I.D. can help to substitute indigenous energy sources for fuelwood and imported oil, introduce more efficient ways of using existing energy resources, and help countries make economically and environmentally wise energy-system choices and investment decisions.

present cooking practices. More efficient charcoal stoves have met with more success. The effect of their use is even greater when efficient charcoal production methods are used. Mass production and marketing of improved stoves to lower unit costs would also be useful.

For women and children the use of traditional cooking fuels -- primarily firewood and animal dung -- results in severe indoor air pollution that causes serious respiratory and eye disease.

Environmental Impacts

All forms of energy conversion extract an environmental cost. In economic terms, these costs are often difficult to track, but they affect the health of numerous ecosystems that in one way or another are critical to human welfare.

Particular environmental effects depend on the energy source and the technology used. For example, the construction and operation of hydropower facilities can contribute to deforestation, saltwater intrusion, and increased human diseases. The inundation caused by large dams can require significant human resettlement. Fossil fuels can pollute land and water during the extraction stage and their conversion can cause atmospheric degradation--air pollution, acid deposition, and global CO₂ buildup--and thermal water pollution.

The harvesting of fuelwood sometimes accelerates deforestation, which creates a host of additional environmental problems, including soil erosion, flooding, and the loss of species' habitats, biological diversity, and agricultural productivity. And the combustion of fuelwood and dung in enclosed spaces can pose a serious threat to human health from indoor air contamination.

Taken together, fossil fuel conversion and the depletion of forests are prime culprits in the increased atmospheric CO₂ associated with potential global climate change. The possible implications of this trend are many and dramatic. Currently, LDCs contribute a much larger portion (perhaps 90 percent) of deforestation-related CO₂ emissions than of energy-related emissions (about 15 percent); industrialized countries contribute the overwhelming majority of energy sector emissions now. But the energy demand growth that will accompany economic development and population growth in LDCs in future decades will change the relationship significantly. By 2025, LDCs will contribute a larger portion of the energy-related emissions than OECD countries. Figure 2 shows the relative contribution to overall increases in CO₂ emissions between 1985 and 2025.

The design and implementation of A.I.D. projects to help meet the development goals of assisted countries are primarily the responsibility of the A.I.D. Missions in the individual assisted countries. Numerous energy-related issues are considered and acted upon, then, at the Mission level.

Mission staffs confront a broad array of problems and face inevitable constraints on gaining access in the many relevant disciplines to the latest ideas and technologies, and lessons learned in other countries. The Office of Energy, as the other specialized offices in the Bureau for Science and Technology, plays a crucial role within the Agency. In support of Agency energy objectives, the Office develops new approaches to energy problems through research and adaptation; it applies these new approaches worldwide in collaboration with Missions. It helps formulate energy policy for the Agency and works with other donors to leverage their support of environmentally sound energy assistance.

These activities will become increasingly important because energy use in the developing countries is anticipated to grow by a factor of three to five over the next twenty years.

As pointed out in A.I.D.'s 1988 Report to Congress entitled *Power Shortages in Developing Countries: Magnitude, Impacts, Solutions, and the Role of the Private Sector*, under a "current trend" scenario, in which no energy efficiency measures are implemented, with a medium economic growth rate of 4.5 percent per year, 1,500 GW² (gigawatts) of additional generating capacity and related transmission and distribution facilities would be needed by the year 2008 in order to meet a projected annual electricity growth rate of 6-7 percent. By the year 2008, the annual cost of meeting power sector demand in developing countries will reach \$125 billion (compared with the estimated \$50-\$60 billion currently being spent per year).

The *Power Shortages* report downplays the likelihood that sufficient investment capital will be available in future years from traditional sources to support a continuation of the above-mentioned growth rates in electrical generation capacity.

The *Foreign Assistance Act*,³ which authorizes A.I.D. activities, also notes that the purpose of much of the assistance provided to the agricultural, industrial, social service, and other sectors in developing countries by A.I.D. is undermined by the inability of many of these countries to satisfy their energy requirements.

The high costs of energy could be reduced dramatically, according to the Report, by implementing an "efficiency" scenario that incorporates various efficiency measures and

² GW = gigawatt = 10⁹ (one billion) watts

³ *Foreign Assistance Act of 1961, as amended.*

assumes the same medium economic growth rate of 4.5 percent per year. Adoption of energy efficiency could enable developing countries to satisfy their demand for electricity and reduce the need for additional generating capacity to 700 GW. Figure 3 illustrates the differences in annual capital investments between the current trend and efficiency scenarios.

As a result of these findings, A.I.D. is promoting the crucial economic benefits of improved energy planning and efficiency and targets private sector investment in electricity systems. Equally as important, A.I.D. is targeting private sector investment to provide the necessary capital to overcome these shortfalls.

The substantial expenditures for and inadequate supplies of energy in developing countries are compounded by increasingly severe environmental impacts associated with energy production and use. In response to this situation, the *Foreign Assistance Appropriations Act of FY 1990*⁴ mandates the A.I.D. Administrator to implement a "Global Warming Initiative" that focuses the Agency's energy assistance on helping to mitigate the increasing contribution of "key" developing countries to greenhouse gas emissions resulting from deforestation and fossil fuel combustion. As part of this legislation, the Congress appropriated additional funds that are to be used by the Agency to augment its staff with energy and environmental expertise and to focus its assistance on "improved energy efficiency, increased use of renewable energy resources and national energy plans (such as least-cost energy plans) which include investment in end-use energy efficiency and renewable energy."⁵

The strategic focus of A.I.D.'s Office of Energy has anticipated and supports this recently enacted congressional legislation. This strategy includes expanding least-cost planning activities to incorporate environmental concerns, increasing support for feasibility studies in renewable energy (through creation of a Clean Energy Technology Feasibility Study Fund) and cleaner fossil energy technologies that focus on site-specific commercial applications, launching a multilateral Global Energy Efficiency Initiative, initiating an Energy Technology Innovation Project (see Chapter VI), 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. The Office of Energy is planning to place five or six senior energy professionals in the field to serve the energy needs of A.I.D. Regional Offices and national Missions.

In combatting such expected climate change, as well as the other related environmental insults described above, technology transfer, technical innovation, and commercialization in energy efficiency are crucial. However, even if the most ambitious goals for energy efficiency can be reached, developing countries will still need more energy

⁴ *FY 1990 Foreign Operations, Export Financing, and Related Programs Appropriations Act (Public Law 100-167)*.

⁵ *Ibid.*, Section 534(b)(1).

For several years the Office has placed special emphasis on biomass energy systems that use agricultural and forestry residues to generate electricity, sometimes in conjunction with process steam through cogeneration. The reasons for the emphasis are that successful energy conversion systems using agricultural residues usually provide a range of complementary benefits to agroprocessing industries, including marketable products, which enhances the self-sufficiency of the agricultural sector by increasing overall returns on investment in these systems; and the use of biomass residues, if they are truly coming from a renewable source (that is, a crop that is regrown), generates no net CO₂ to the atmosphere. CO₂ emitted during burning is re-absorbed during the growing season, (departures from this cycle are minor quantitatively). Current Office programs involve both

Source: U.S. Agency for International Development. *Power Shortages in Developing Countries: Magnitude, Impacts, Solutions, and the Role of the Private Sector*. A Report to Congress, March 1988.

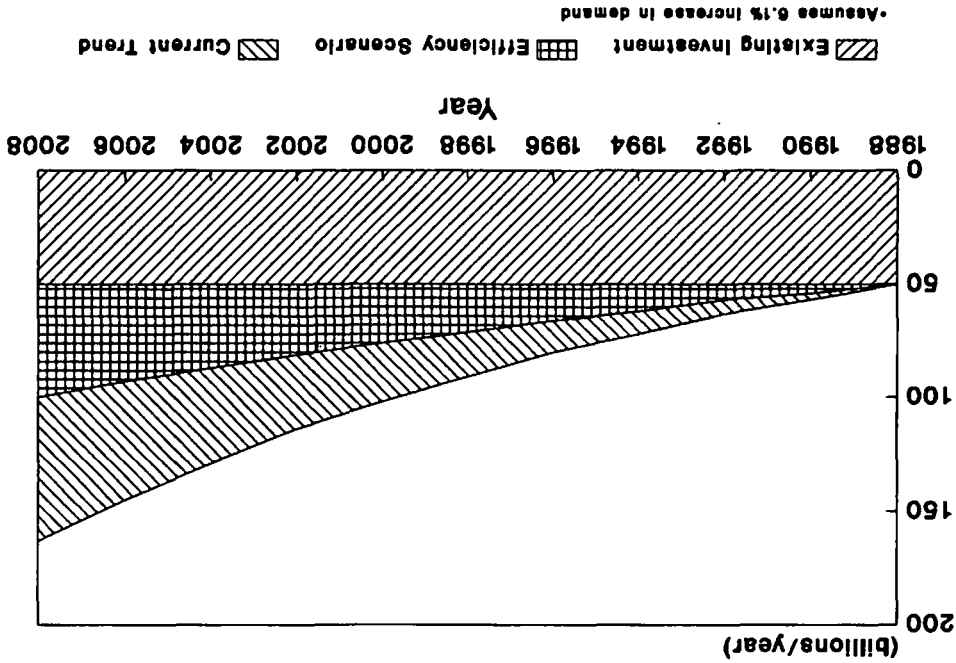


Figure 3
Annual Investment Requirement in the Power Sector
Medium Growth Scenario 1988-2008

Therefore, the Office supports urgently needed, economically attractive, and realistically implementable alternatives to coal and other high carbon-emitting fuels. Office initiatives include furthering the use of renewable energy resources such as solar, small hydro, wind, and geothermal and increased attention to natural gas and coalbed methane as fossil fuels emitting relatively lesser amounts of carbon.

research and active field projects and focus on sugar cane, rice, and wood wastes. (A full discussion of the Office's biomass and other renewable energy activities and projects is found in Chapter IV).

To carry out its responsibilities, the Office of Energy has set four goals and corresponding objectives:

1. Goal: Increase the efficiency of energy systems
 Objectives: Increase the efficiency of power generation, transmission and distribution, and end uses; improve energy efficiency in the industrial, buildings, and transportation sectors.

2. Goal: Ensure availability of energy for sustained rural development
 Objectives: Satisfy basic energy needs of rural populations for cooking and heating; agriculture; and for rural industries, especially agroprocessing.

3. Goal: Foster private enterprise energy development and management
 Objectives: Promote policy reform to improve functioning of energy markets; build local private sector capabilities; increase the efficient operation of energy systems, and increase the flow of technical and financial resources from the U.S. private sector.

4. Goal: Increase consideration of environmental criteria
 Objectives: Integrate environmental criteria into the energy planning process; encourage efficient energy conversion; promote the use of less environmentally damaging energy sources and conversion processes when cost-effective.

Each of these programmatic themes is addressed in the following chapters. In some cases, cross-cutting themes such as efficiency, private power, and environmental considerations are mentioned in more than one chapter. In addition to these programmatic themes, an important methodological approach to development assistance is training and institutional development. By cutting across all of these objectives, training represents a generic and integral component of the Office's individual themes and projects. Training programs help build the institutions of LDCs for the long haul and have always been a critical part of A.I.D.'s work. The Office's training efforts are described in Chapter VIII.

This Program Plan outlines and schedules the actions that the Office of Energy intends to take to help ensure that sufficient energy, produced with minimal environmental impacts, is available to meet the Agency's development targets. The Plan covers the current fiscal year, FY 90, and the following year, FY 91.

the Office. The organizational relationship of the Office and its projects to the Agency's overall framework for energy assistance is portrayed in Figure 4.

The organization of the Office provides a framework for assigning responsibilities to the staff to ensure that the objectives of the various themes, projects, and initiatives as described above are met. The Office consists of the following staff persons:

Director: James Sullivan

Deputy Director: Alberto Sabadell

Senior Physical Scientist: David Jhirad

Program Operations Specialist: Shirley Toth

Program Operations Specialist: Carolyn Kiser

Energy Systems Analyst: Ross Pumfrey

Energy Training Consultant: Jorge Perez Ponce

Energy Consultant: Ken Feldman

Energy Consultant: Nathaniel Brackett

The design and implementation of A.I.D. projects to help meet the development goals of assisted countries are primarily the responsibility of the A.I.D. Missions in the individual assisted countries. Numerous energy-related issues are considered and acted upon, therefore, at the Mission level.

Mission staffs confront a broad array of problems and face inevitable constraints on gaining access in the many relevant disciplines to the latest ideas and technologies, and lessons learned in other countries. The Office of Energy, as the other specialized offices in the Bureau for Science and Technology, plays a crucial role within the Agency. In support of Agency energy objectives, the Office develops new approaches to energy problems through research and adaptation; it applies these new approaches worldwide in collaboration with Missions. In addition, it helps formulate energy policy for the Agency. All the program themes or activities described in the following chapters comprise one or more of the FY 90-91 Office projects:

- Energy Policy Development and Conservation (EPDAC)
- Sub-projects: Energy Planning and Policy Development (EPPD)
- Energy Conservation Services Project (ECSPP);

- Biomass Energy Systems and Technology (BEST);

- Renewable Energy Applications and Training (REAT);

The programmatic themes discussed above are addressed in the Office of Energy's seven "active" projects, which correlate with the budgeting and organizational structure of

The Office of Energy's budget for FY 90 is \$15.4 million; the estimated budget for FY 91 is \$13.3 million. These budgets reflect basic program funding, as well as funding reserved for additional global climate change activities that is disbursed among several or all of the Office's projects. The FY 91 budget also includes \$600 thousand for starting up two new projects--the Energy Efficiency Project and the Energy and Environmental Planning and Policy Development project.

D. BUDGET, ORGANIZATION, AND STAFFING OF THE OFFICE

Much of this Program Plan is based on extensive analyses of energy needs in developing countries and on experience with various technologies and approaches to meet those needs. In part, however, the Plan charts new courses for developing novel approaches to old problems or adapting tested solutions to new problems. Considerable additional analysis is thus required to complete the design and planning of any program activity. This analysis will continue over the coming year in the detailed program plans for each initiative, and in some cases for major components of an initiative.

In a deliberate process that is partially the reverse of soliciting such input, the Office positions a number of its initiatives, especially pre-investment studies for power sector activities, so that they serve as input to investment decisions by those who provide significant financing--the utilities and banks. Carefully orchestrated initiatives, therefore, can leverage great influence.

The planning of Office activities incorporates input from within and outside the Office of Energy. The Agency Director for Energy and Natural Resources together with the Office's Director and various program managers solicit the views of other individuals in the Bureau for Science and Technology, specialists in A.I.D.'s Regional Bureaus and Missions, individuals from private companies, universities, the non-profit environmental and development communities, the National Laboratories, the World Bank, the Inter-American Development Bank, energy experts from LDCs, and other U.S. government agencies.

The Program Plan is a means rather than an end. It is a working document to be used by Agency energy officials to define the Office program in accord with the objectives of the Agency and the Bureau for Science and Technology. It specifies near-term achievements expected of the Office. It is a guide for resource allocation among Office projects. It sets priorities for the Office and describes where special emphasis will be placed. It provides an indication of the resources available from the Office to the Missions to support initiatives with host countries. It also serves to describe the Office program to interested persons outside the Agency.

This project funds feasibility studies for commercial applications of renewable energy technology (in addition to the biomass-fired power outlined above), with an emphasis on private sector participation, various rural and agricultural

Project Manager: David Jhirad

3. The Renewable Energy Applications and Training Project (936-5730)

Years of Project Life: FY 89 - FY 96

Proposed FY 91 Budget: \$ 2.0 million

FY 90 Budget: \$ 2.0 million

This project funds efforts to use biomass, especially the residues of common agricultural crops and woodwastes, for electricity generation. Project activities include applied R&D, commercial feasibility analysis, and solicitation of LDC private investment, as summarized in Chapter IV.

Project Manager: James Sullivan

2. The Biomass Energy Systems and Technology Project (536-5737)

Years of Project Life: FY 82 - FY 92

Proposed FY 91 Budget: \$ 1.7 million

FY 90 Budget: \$ 4.9 million

This project is divided into two sub-projects: the Energy Planning and Policy Development project, which funds several areas of planning and policy work, as summarized in Chapter II; and the Energy Conservation Services Project, which funds the Office's efforts in efficiency and conservation, as described in Chapter III. The planning portion of this project also contributes some of the funding for work in household fuels.

Conservation Project Manager: Alberto Sabadell

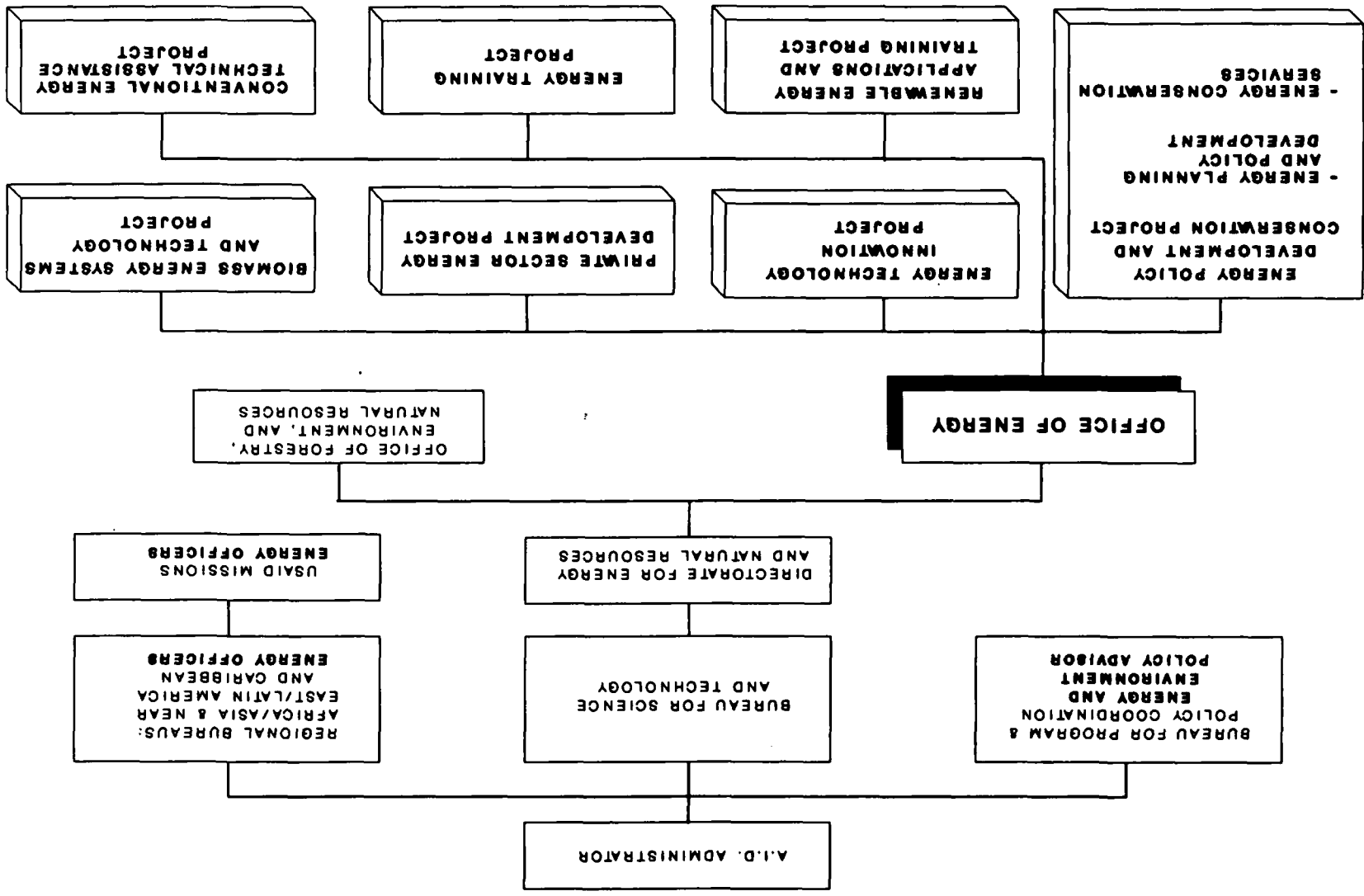
Planning and Policy Development Project Manager: David Jhirad

1. The Energy Policy Development and Conservation Project (936-5728)

These projects and their relatively discrete activities are described below:

- Private Sector Energy Development (PSED);
- Conventional Energy Technical Assistance (CETA);
- Energy Technology Innovation Project (ETIP); and
- Energy Training Project (ETP).

Figure 4
Organizational Chart of Energy Assistance
U.S. Agency for International Development



- To disseminate, systematically and in a timely fashion, program and energy sector information to A.I.D. senior staff, Regional Bureaus, Missions, other donor agencies, research institutions, and private sector organizations, both in the United States and A.I.D.-assisted countries; and
- The objectives of the outreach and information dissemination program are two-fold:

Outreach and Information Dissemination Program

The Office is moving in an incremental, participative manner towards a more comprehensive management information system in order to take account of the differing needs of the Office's project managers. The system will include publications and other relevant project items. Designed to be compatible with both Wang and IBM hardware, the system will facilitate the handling and communication of a wide range of program information.

The Office has prepared a manual that specifies in detail the procedures for this system and the computer hardware and software requirements. The Office uses a D-Base III + program format on the Office's Wang requests and buy-ins. The system uses a D-Base III + program format on the Office's Wang including tracking of deliverables and other milestones; and provides information on Mission obligations and expenditures; provides monthly, quarterly, and annual status reports, which tracks the status of contract control system, which tracks the status of contract

Project Control System

E. INFORMATION OUTREACH

The Office's own budget is leveraged by additional funding, particularly from Missions and some Regional Bureaus. Based on discussions with several Missions and Bureaus during this planning exercise and based on past experience, the Office estimates the level of "buy-ins" for all program activities will be approximately \$1.8 million in FY 90 and \$2.5 million in FY 91.

In similar fashion, staff responsibilities divide along geographical regions. Although usually focusing on one region, a project manager is frequently called on to advise on project activities in other regions. For instance, while the project officer for ECSP has special familiarity with Latin America and the EPPD Project Manager's balliwick is India, both lend their substantive expertise to issues in other regions as necessary. In addition, regional responsibilities are vested in other staff, especially in the case of Office activities in Eastern Europe.

Systematic Mission Briefings: Periodically, the Office notifies Missions and Regional Bureaus by cable about particular kinds of support that are available from the Office (such as assistance with policy dialogues related to energy price reform and with environmental analysis for energy investment proposals). In addition, Office staff traveling to assisted countries provide briefings for Mission staff on Office activities of interest to the Missions. The Office will participate in designing training courses for A.I.D. personnel in areas related to energy technology, economics, financing, and policy, and to the environmental implications of alternative energy development paths for developing countries.

In addition, the Office will publish in 1990 for the first time two high-quality brochures targeted at several internal and external audiences that explain the Office's activities, accomplishments, and major initiatives.

Publications Program: The second major element of the outreach/information strategy is the timely and systematic publication of reports resulting from contracts issued by the Office. To give these reports maximum distribution and impact, the Office employs a standard cover, irrespective of whether authorship rests with the Office, its contractors, or affiliated government organizations. A catalog of reports available from the Office is published once a year. (A list of available Office of Energy publications appears in the Appendix). As part of this activity, the Office has developed a microcomputer-based mailing list, updated as necessary, that allows it to target its publications to specific audiences in the international development community.

Program Planning Outreach Efforts: The Office periodically convenes small ad-hoc groups of experts from other international institutions (e.g., the World Bank, the United Nations, the Inter-American Development Bank), the private and non-profit sectors, and other U.S. agencies (such as the Department of Energy and the Environmental Protection Agency), and within the Agency to guide its program planning activities and assist in program implementation and outreach. An example is the Multi-Agency Group on Power Sector Innovation (MAGPI). During FY 90 this group will pursue better environmental management within LDC energy sectors.

To achieve these two objectives, the Office has defined a program organized around five key components:

- A program planning outreach effort;
- A publications program;
- Systematic Mission briefings;
- Private sector technology transfer teams; and
- Regional topical workshops.

- To involve outside public and private sector parties in program definition, review, and implementation.

Private Sector Technology Transfer Teams: In FY 89, the Office helped to lay the foundation for increasing the involvement of the U.S. energy sectors by tapping the extensive U.S. experience with private generation of power and interactions with utility systems. As described in Chapter V, several teams comprised of Agency officials and upper-level representatives of U.S. utilities, architecture and engineering firms, and technology manufacturers were assembled, under the aegis of the Administrator's Energy Industry Review Group, to conduct in-country visits to explore opportunities for privately financed and, in some cases, operated electric utilities in selected LDCs. The Review Group submitted a report containing its findings and recommendations to the Administrator in the Spring of 1989.

Topical Workshops and Study Tours: Under the fifth component of the outreach and dissemination program, the Office of Energy either co-sponsors or actively participates in a series of workshops in collaboration with A.I.D.'s Regional Bureaus, other lending or donor agencies, or industry. The workshops focus on topics that are relevant, and of interest, to a specific region and are open to both public and private sector participants. Workshops or conferences on the agenda for FY 90 and FY 91 are listed in Table 1.

In addition to the five central components of the outreach and information dissemination program just reviewed, the Office will also pursue a number of other activities. For instance, the Office will continue to encourage its staff to publish articles for A.I.D. and external publications, and will examine the possibility of holding joint energy briefings with A.I.D.'s Trade and Development Program for U.S. private companies. In addition, the Office will continue to foster the organization of in-country professional groups and associations and work on linking them on an international basis.

**TABLE I
WORKSHOPS, CONFERENCES, & SYMPOSIA**

Workshop	Location	Date
MAGPI symposium at the World Bank on "Utility-Scale Wind Power: The California Experience and Its International Significance"	Washington, D.C.	April 1990
International conference on "Innovation in the Electric Power Sector"	India	April 1990
Workshop on private sector power for representatives of the ASEAN nations	To be determined	Spring 1990
Workshop on private power opportunities	Egypt	Summer 1990
Workshop on the current status of various relevant technical developments in Cane Energy Systems	Hawaii	Summer 1990
Conference for LDC decision makers on environmental criteria in power sector investment decision-making	Helsinki	Summer 1990
Workshops on private power	Jamaica Bangladesh Abu Dhabi Latin America/Caribbean South Asia Eastern Europe	Fall 1990 To be determined To be determined To be determined To be determined To be determined To be determined

TABLE 1, continued
WORKSHOPS, CONFERENCES, & SYMPOSIA

Workshop	Location	Date
Workshop on "Energy Systems for the Forest Products Industry"	To be determined	Fall/Winter 1990
Workshop on energy conservation	Ivory Coast	September 1990
MAGPI symposium on energy investments and the environment	Washington, D.C.	October 1990
Sessions on price reform at regional workshops	India Ivory Coast	1990 1990
Study tours for officials from the Philippines, Poland, Hungary, other Eastern European countries, Egypt, Morocco, Latin American and South Asian countries	United States	1990-91
Regional conference for Africa on energy demand management in the power sector	Ivory Coast	Early 1991
Workshop on private power from geothermal resources	Kenya	To be determined
Workshop at the EximBank on private power generation using geothermal energy	Washington, D.C.	To be determined
Training program in energy efficiency that includes training for Mission staff.	To be determined	To be determined

Support Agreements and Contracts

The Office relies in part on outside support to implement its program activities. The objective of the Office's support agreements and contracts is to develop multidisciplinary teams of experts and continually enhance their capabilities through repeated experience in all key areas needed for program implementation and Mission support.

Other contractual mechanisms will include PASAs with the U.S. Environmental Protection Agency and Lawrence Berkeley Laboratory, and a Cooperative Agreement with the World Bank. The Office's major contracts are listed in Table 2.

In addition to these multi-year contracts, the Office also uses purchase orders, indefinite quantity contracts, and grants to carry out unforeseen and small jobs, when necessary. Based on past experience, approximately 5 purchase orders are likely to be needed in FY 90. The Office also facilitates Missions' financial participation, or "buy-ins", in Office contracts and PASA agreements.

TABLE 2
MAJOR CONTRACTS WITH THE OFFICE OF ENERGY

Project	Contractor	Description	Completion Date	Buy-in ^a Status
CETA	Bechtel National, Inc.	Contract for Service to the Conventional Energy Technical Assistance (CETA) Project (contract competitively selected in 1985)	03/31/91	yes
EPDAC	RCC/Hagler, Bailly & Company, Inc.	Contract for technical assistance to the Energy Conservation Services Program (ECSF) under the Energy Policy Development and Conservation (EPDACC) project (contract competitively selected in 1987).	07/19/92	yes
	Oak Ridge National Laboratory	Participating Agency Service Agreement (PASA) for management assistance to energy analysis and policy development activities under EPDACC (EPPD).	05/31/92	yes
	International Development & Energy Associates, Inc.	8(a) ^b contract for services to the Energy Planning and Policy Development (EPPD) project under EPDACC (contract selected in 1989).	09/15/90	yes
	Lawrence Berkeley Laboratory	PASA ^c to cooperate on assessing greenhouse gas emissions from developing countries and Eastern Europe.	01/31/92	yes
	Environmental Protection Agency	PASA for a joint program on initiatives to reduce greenhouse gas emissions.	07/30/92	no
	World Bank	Cooperative Agreement to establish a fund to assist in preparing energy projects involving increased efficiency and private sector development.	To be determined	no
	Princeton University	Cooperative Agreement to support and help expand activities in end-use energy efficiency and efficient gas turbine power generation.	To be determined	no
REAT	Oak Ridge National Laboratory	PASA to provide management assistance to the Renewable Energy Applications and Training (REAT) project.	9/30/90	yes

TABLE 2, Continued
 MAJOR CONTRACTS WITH THE OFFICE OF ENERGY

Project	Contractor	Description	Completion Date	Buy-In Status
	International Development & Energy Associates, Inc.	8(a) contract for services to the Renewable Energy Applications and Training (REAT) project (contract selected in 1989).	9/15/90	yes
	American Wind Energy Association	Grant to support a workshop on wind energy.	10/31/90	no
	Export Council on Renewable Energy	Cooperative Agreement to collaborate on developing and implementing renewable energy information, training, and reverse trade missions.	1/31/92	no
	Geothermal Resources Council	Grant to support a symposium on geothermal energy.	9/30/90	no
	Lawrence Berkeley Laboratory	PASA to collaborate on developing a least-cost planning analysis for LDC renewable energy power generation options and a long-range strategies program for the Renewable Energy Applications and Training (REAT) project.	To be determined	yes
	World Bank	Cooperative Agreement to work within MAGPI to identify opportunities for renewable energy options in multilateral bank power sector lending.	To be determined	no
	National Rural Electrification Cooperative Association	Cooperative Agreement to develop decentralized and private sector rural power systems in developing countries.	9/30/90	no
ETP	International Institute for Education	Contract to manage the Energy Training Project (ETP) (contract competitively selected in 1987).	8/24/92	yes
	T. Head, Inc.	8(a) contract to provide qualified energy and environmental staff and recruitment services.	To be determined	no

TABLE 2, Continued
 MAJOR CONTRACTS WITH THE OFFICE OF ENERGY

Project	Contractor	Description	Completion Date	Buy-In Status
BEST	Winrock International, Inc.	Cooperative Agreement to manage the Biomass Energy Systems and Technology (BEST) project.	08/30/94	yes
PSED	T. Head, Inc.	8(a) contract to provide qualified energy and environmental staff and recruitment services to manage the Private Sector Energy Development (PSED) project (contract selected in 1989).	9/29/91	yes
	K&M Engineering	Contract to provide assistance to the PSED project in evaluating and selecting feasibility study proposals and other energy/power project development activities.	To be determined	no
	National Geothermal Resources Association	Grant to help organize and conduct a conference on private power generation from geothermal resources in Kenya.	2/28/91	no
ETIP	To be determined	A new project designed to implement innovative technologies and methodologies to help meet expected energy/power sector demands in developing countries in an environmentally benign and cost effective manner. This project will include a feasibility study fund for clean energy technologies.	To be determined	yes

Notes: ^a Buy-in: The provision of funds authorized under one project for commitment to a contract authorized and funded under a different project. Buy-ins can come from Missions, Regional Bureaus, or Central Bureaus.

^b 8(a): 8(a) contracts are with firms given preference in government contracting because of "qualified" minority ownership.

^c PASA: Participating Agency Service Agreement.

With aggressive but technically and financially feasible implementation of new efficiency measures in generation, distribution, and end-use, the 20-year need for additional generating capacity could be reduced to approximately 700 GW. Even with the maximum feasible implementation of renewables and efficiency measures, major expansion of fossil and hydropower capacity will still be necessary. Moreover, significant indigenous innovation will be required to increase the technical performance and financial viability of LDC electric utilities, in part through increases in power plant efficiency and capacity factors, reduced transmission and distribution losses, and significantly increased end-use efficiency in all sectors. Such measures also deliver electricity services in a more environmentally benign manner by reducing fuel use and applying advanced (i.e., more efficient and less polluting) power generation technologies.

A.I.D.'s recent Report to Congress, *Power Shortages in Developing Countries*, which was cited in Chapter I, highlights the dilemma faced by many developing nations. These countries require continued growth in electric power supply to sustain economic development and modernization. Yet the traditional response to this need--that of concentrating on generation expansion--is likely to stall due to financial and capital constraints. As discussed in Chapter I, the Agency estimated that if developing countries were to meet a projected average annual electricity growth rate of 6 to 7 percent, 1,500 GW of new generating capacity would be required over the next 20 years. This implies a future annual investment on the order of \$125 billion, compared with the \$50-60 billion/year invested in the 1980s.

Most developing countries are struggling to overcome chronic power shortages and poor power quality while supporting continued industrialization and extension of electricity services to their burgeoning populations. Inadequacies in the quality, reliability, and quantity of electricity hamper development and seriously compromise economic productivity. Yet vigorous economic growth in the developing world will require rapid growth and substantial improvements in delivered electricity services. This cannot be accomplished simply by embedding new capacity in poorly operated and managed power systems.

Even though the scope of the Energy Planning and Policy Development project embraces all aspects of the energy sector in developing countries, the major focus in FY 90 will be least-cost investment planning in the power sector, environmental management, energy price reform, and the implementation of energy efficiency strategies related to these approaches.

A. RATIONALE

ENERGY PLANNING AND POLICY

CHAPTER II

- Strengthening and expanding the Multi-Agency Group on Power Sector Innovation (MAGPI);
- Promoting the concept of least-cost investment planning under capital constraints, taking into account risk and uncertainty;
- Improving the efficiency and performance of electric power systems in developing countries, and coordinating the new USAID/New Delhi \$15 million power efficiency program in India;

The program's strategy will embrace the following elements:

In addition, the program offers more general assistance to A.I.D. Missions and Offices in designing, maintaining, and evaluating energy projects and programs. For instance, the program provides assistance in designing the energy components of A.I.D.'s Country Development Strategy Statements.

The power sector strategy of the Office of Energy is designed to assist developing countries in escaping from the trap of escalating capital costs and deteriorating power system reliability, and to improve the efficiency and productivity of the electric power sector. The major emphasis will be on actual investment and policy decisions and attention to implementation, as opposed to analysis conducted in isolation.

Introducing least-cost, power sector investment planning, environmental management, energy price reform, and related energy efficiency components into the LDC power sector will be the major strategic focus of this program. Innovative approaches to these aspects of energy policy and planning are currently underway and will continue during FY 1990. These initiatives are responsive to the Congressional mandate to A.I.D. to help reduce the emissions of greenhouse gases in key countries.

B. STRATEGY

Inadequacies in the institutional and management structure and operation of developing country electric utilities have resulted in often poor technical and financial performance of these utilities. The Office is supporting efforts in collaboration with the World Bank and with several bilateral assistance agencies to assess the institutional reasons for the poor performance of electric utilities in over 20 countries. Detailed assessments of the electric power sector of key A.I.D.-assisted countries are being planned in collaboration with several multilateral development banks (MDBs). The objective is to establish the basis for new initiatives to improve technical and financial operation and management of developing country electric utilities.

The MAGPI framework provides a mechanism for other Office projects to work with the multilateral development banks in identifying and conducting prefeasibility studies for

The Office of Energy works closely within the MAGPI framework to identify and develop practical projects designed to catalyze innovation in the LDC electric power sector. In many of these activities, a technical and financial partnership with research and development (R&D) institutions and commercial organizations in the industrialized countries will be required to facilitate bankable projects.

During the past year, A.I.D.'S Office of Energy has increasingly collaborated with other bilateral and multilateral donors and lenders in helping to address the need for innovative power sector approaches under growing capital and environmental constraints. To facilitate this collaboration, the Office of Energy initiated the Multi-Agency Group on Power Sector Innovation (MAGPI) with the World Bank, the Inter-American Development Bank, the Asian Development Bank, the African Development Bank, the International Finance Corporation, and the United Nations. MAGPI is made up of about 15 senior decision-makers with operational responsibilities. At present MAGPI is restricted to bilateral and multilateral donor assistance agencies, although informal ties are maintained to private sector technology institutions. To reinforce the operations of MAGPI, the Office of Energy is setting up a cooperative agreement with the World Bank to implement an energy efficiency and private sector project.

The Multi-Agency Group on Power Sector Innovation (MAGPI)

The Office of Energy's specific programs and planned accomplishments in these areas are described separately below.

C. PLANNED ACCOMPLISHMENTS: ENERGY PLANNING AND POLICY DEVELOPMENT (EPPD)

- Encouraging price reform policies, using successful case examples;
- Developing and strengthening institutions to promote technology innovation and commercialization programs, such as the Program for the Acceleration of Commercial Energy Research (PACER) in India. Promoting U.S./host country joint ventures in research, development, and manufacturing;
- Supporting technology assessment and prefeasibility studies, including options for rural power delivery; and
- Developing a program in environmental management.

Consequently, the notion of least-cost planning is being expanded to allow symmetrical treatment of all options, not just power generation. Conventional analytic tools for investment decision-making also require major modification. For example, the Wien Automated Systems Planning (WASP) model used throughout the world for capacity expansion planning assumes that power demand is a given. In reality, the pace and composition of electricity demand are constrained by capital and determined by national policies on electrification. Furthermore, WASP determines the optimal capacity expansion

The traditional approach of power planners in the developed and developing nations was to focus almost exclusively on finding the least-cost generation mix to meet growing power demands. Projects were deemed economically and financially sound based on traditional criteria such as the internal rate of return and the optimal power generation expansion plan. The growing reality of capital constraints, however, requires a fundamental restructuring of this approach. Projects meeting the traditional criteria of economic soundness now confront these new and severe constraints.

Investment Planning Under Capital Constraints

1. Conduct a one-week MAGPI conference for LDC decision makers on environmental criteria in power sector investment decision-making.
2. Complete an Environmental Manual on Power Development.
3. Conduct a major appraisal of India's power sector plans for the next decade with the World Bank and the Overseas Development Administration (ODA) of Britain.
4. Conduct case studies of least-cost strategies to reduce greenhouse gas emissions in two key countries.
5. Implement a \$15 million Power Efficiency Program with USAID/New Delhi, the World Bank, and the Asian Development Bank.

Planned Accomplishments:

Examples include the collaboration of A.I.D., the U.S. Trade and Development Program (TDP), and the World Bank in the development of 15 MW of mini-hydropower capacity in Madagascar, involving an investment of \$20 million, and collaboration with the Inter-American Development Bank involving both small hydro and bagasse-fired private power generation in Costa Rica (the first two are activities of the Office's REAT project and the third is an activity of the BEST project, as described in Chapter IV).

The Office of Energy is working closely with the World Bank and other bilateral donor agencies to gain a better understanding of organizational and institutional influences on utility performance. The findings of this collaborative study will allow A.I.D. and other

Improvement in performance will almost certainly require additional financial resources, but it is also likely to require changes in utility management practices and changes in attitudes by staff. Training courses sponsored by the Office, which are designed to facilitate such changes, are described in Chapter VIII.

The level of performance of many utilities in developing countries is lower than what utilities in OECD (Organization for Economic Cooperation and Development) countries expect and routinely achieve. Maintenance, operations, accounting, billing, and planning practices all limit the ability of utilities in LDCs to deliver electricity for development. Often, poor technical performance results in transmission and distribution losses of up to 25-30 percent in delivered electricity in LDCs, compared with 7-8 percent in the U.S. Similarly, financial losses in LDCs often result in a negative return on assets in contrast to the positive return experienced by OECD countries. Improving the practices mentioned above could allow utilities to improve service, reduce costs, and mitigate environmental impacts. Past efforts to improve performance have focused on training, and while better training is often necessary, it has not been sufficient.

Electric Utility Performance Improvement Initiative

1. Complete comprehensive, least-cost investment planning projects in the Indian states of Maharashtra and Gujarat and in Costa Rica.
2. Provide micro-computer based tools to LDC decision-makers for evaluating public and private financing options.
3. Develop "bankable" proposals for power sector efficiency in India and Costa Rica (the latter in conjunction with planned accomplishment # 1 on page 41).

Planned Accomplishments:

The Office of Energy is developing innovative approaches to meeting power demands in developing countries, including the use of microcomputer-based tools for comprehensive investment planning in India and Costa Rica, developed collaboratively with utilities in these countries. Yet in many countries, outages are largely caused by distribution system failures. plan for a given demand forecast and a specified "loss-of-load" probability in the generation

Tariff reform is also needed to reflect the real long-run marginal costs of electricity production (including economic pricing of fuels) and eventually may incorporate peak load and time-of-day pricing. Also required is a rational and explicit set of policies, regulations, and structures to determine the technical requirements for independent power generation, and structures to determine the contractual arrangements (including tariff structures) for the purchase of electricity and capacity from private power plants. (Chapter V expands on the Office's

The Office is therefore concentrating its resources on implementing price reform. Once a country agrees that energy price reform is needed, the major question becomes how to develop and implement a strategy for price reform without threatening unacceptable kinds of instability. The strategy being pursued aims at improving the operating efficiency of energy supply institutions, thus reducing the marginal cost of producing energy; improving the efficiency of energy end-use, thus reducing the cost of energy services; and effecting institutional changes in how prices are set, thereby reducing the need for external interference in energy markets.

The Office's energy price reform program is based on two perspectives about policy realities in the countries A.I.D. assists. The frequent lack of progress on energy price reform occurs not because the problem is not recognized; it arises mainly from a fear on the part of host-country policymakers that price reform will be economically and politically destabilizing. Focusing the policy dialogue concerning energy price reform almost exclusively on rational prices has not brought about much price reform. Moreover, as a donor agency with relatively small investment levels in most countries, A.I.D.'s leverage in urging energy price reform is limited.

A.I.D. Missions have been directed by the Administrator to conduct policy dialogues on energy pricing wherever prices are being kept artificially low by host-government policies. At the same time, the World Bank and other lending agencies are urging developing countries to rationalize energy prices, in some cases making progress with price reform a condition for further development assistance. Technical assistance for these policy dialogues is a key part of the energy policy development activities of the Office of Energy.

Energy Price Reform

1. Implement a multi-donor agency electric utility performance improvement initiative, and provide a report with operational recommendations to LDC governments, donor agencies, and development banks.

Planned Accomplishment:

donors to design effective strategies for improving organizational and management performance, including the encouragement of private sector approaches.

EPPD will "fast-track" this experiment in other rapidly modernizing Asian societies, developing analogous programs in the near future.

PACER seeks to develop a new institutional alliance between the Indian energy sector and Indian research and development. The project is predicated on the presence of a large pool of skilled human resources, an increasingly sophisticated enterprise community, and rapidly growing markets for technically advanced products.

PACER is a six-year, \$20 million India/U.S. collaborative program in science and technology. The purpose of the program is to foster innovation in the Indian electric power sector, in part through facilitating the establishment of R&D consortia that link the industrial, commercial, R&D, and government sectors. This work focuses on advanced coal combustion technologies, renewable energy systems, advanced electric power technologies, and improved transmission and distribution planning and technologies. Innovation and commercialization strategies of organizations like the Electric Power Research Institute (EPRI) are directly relevant to PACER's.

PACER -- The Program for the Acceleration of Commercial Energy Research

1. Publish a guide on successful price reform experiences in developing countries.
2. Provide technical assistance with policy dialogue in a selected country, including a cost-shared in-country workshop to serve as a catalyst.
3. Conduct sessions on price reform at regional workshops in India and the Ivory Coast.

Planned Accomplishments:

The Office of Energy will work closely with the World Bank and selected host-country institutions within the context of the MAGPI to develop effective case examples of successful pricing reform. The Office will work to create an on-call, quick response technical assistance capability to support field policy dialogues.

strategy for implementing such mechanisms in order to enhance the private sector role in power generation. Realistic tariffs are required to sustain successful commercialization of new technology, private power, and the successful long-term operation of existing and new generation capacity and transmission and distribution equipment.

Environmental management has emerged as a major issue for international development in the 1990s. There is already significant evidence, from deforestation to air pollution, that many developing countries are not progressing along environmentally sustainable pathways (similar to the previous experiences of industrialized countries). In light of this evidence, development assistance agencies need to focus their attention on strategies addressing the environmental management issue.

Environmental Management of Energy Conversion

1. Complete a report on lessons learned from World Bank and A.I.D. rural electrification projects and develop a new rural power lending strategy in collaboration with the World Bank.

Planned Accomplishment:

The Office of Energy and the World Bank have conducted collaborative assessments of their experiences with rural electrification projects. A joint report is being prepared that addresses this experience, reviews the technical, financial, and institutional lessons learned, and identifies specific actions that can be initiated by A.I.D., the MDBs, and other bilateral development assistance agencies in improving the performance and sustainability of rural electrification programs.

Most developing countries have policies to expand electricity services and the use of electricity in rural areas. Implementation of these policies, especially by extending the grid into unserved areas, has contributed to the poor financial performance of some national utility systems because revenues from isolated rural loads have not covered costs. Rural minigrids, therefore, can be attractive alternatives to grid extension. They allow opportunities for cooperatives or domestic private sector firms to extend service in a more timely and responsive fashion and to support irrigation and other productive energy uses in rural areas.

Rural Power Delivery

1. Hold a major international conference in India on "Innovation in the Electric Power Sector."
2. Explore extension of the PACER concept to one other country.
3. Review selected PACER proposals for USAID/New Delhi.

Planned Accomplishments:

1. Through MAGPI, develop strategies and a handbook for incorporating environmental management objectives into power plant investment decision-making and encourage lending agency attention to the alternatives.
2. Complete a report assessing A.I.D. programs related to global climate change.

Planned Accomplishments:

The three principal goals of the Office of Energy's environmental initiative are providing leadership for the evolution of A.I.D. and United States policy on issues regarding international energy development and the environment; improving the state of the art for incorporating environmental management objectives into energy facility investment decision-making; and developing environmental competencies in LDCs to support siting, construction, operation, maintenance, and decommissioning of energy conversion facilities, as well as development of policies, standards and regulations, as appropriate.

Energy strategies may also affect the sustainability of economic development in more general ways. For instance, the growing concern about global climate change will likely lead to global strategies to limit the buildup of greenhouse gases, such as CO₂, from the use of fossil fuels. Similarly, concerns about deforestation and the conservation of biological diversity may lead to reduction in the use of fuelwood for development projects. Such possibilities suggest that developing countries should try to maintain a diversified portfolio of energy options in order to achieve continued socio-economic growth.

As a result, making decisions regarding technologies and policies for energy production in developing countries requires careful assessment of environmental impacts. For example, environmental analyses and mitigation technologies need to be considered before making an investment decision on a proposed new energy production facility. Also, proposals for new facilities often trigger discussions on environmental standards and regulations. Consequently, knowledge of technology characteristics, alternatives for achieving developmental objectives, and the potential of environmental impacts has become critical to energy sector planning and decision-making.

In developing countries, energy production is a significant piece of the environmental management issue. Fuel and energy conversion processes using coal, wood, and petroleum-derived fuels, for example, are major sources of air and water pollutants. In virtually every developing country, energy production contributes a large proportion of the pollutants emitted through modern economic activities. In addition to pollution, fuelwood use in developing countries often contributes to deforestation. Over the next twenty years, energy needs are anticipated to grow by a factor of three to six. The potential environmental consequences of such growth are great, ranging from population displacement to hazardous air and water pollution problems.

⁶ Note: In this chapter, "Energy Conservation" is used to refer to efforts to reduce energy use and "Energy Efficiency" is used to refer to efforts that seek to improve the efficiency of energy use. The two terms are often interchangeable.

Third, today's energy systems impose stresses on the environment, creating potential changes in the earth's climate through emissions of greenhouse gases and causing respiratory and other human illnesses by deteriorating local air quality. This situation will be exacerbated as many developing countries turn to coal and lignite to meet increasing shares of their energy needs.

Second, subsidized pricing often promotes the use of energy-inefficient systems or technologies. The cheap gasoline prices in the U.S. during the late 1960s, which encouraged Americans to buy large, "gas guzzling" automobiles, amply illustrate this phenomenon. When prices rose dramatically during the 1973 oil embargo, legislation was quickly introduced on fuel efficiency standards for automobiles, while consumers sought cars with improved gas efficiency or voluntarily adopted conservation practices.

First, capacity expansion in the electricity sector is expensive. The investment capital required for infrastructure additions can account for the dominant portion of many countries' development budgets (averaging 25 percent, but often reaching as high as 40 percent). Compounding this situation is the observation in A.I.D.'s Report to Congress on *Power Shortages in Developing Countries* that sufficient investment capital is unlikely to be available from traditional sources to support a continuation of growth rates in electrical generation capacity. Moreover, the need to import fuels in both the transportation and electricity sectors can create a serious strain on foreign exchange for most of these countries.

The rapidly increasing demand for energy in developing countries has placed a premium on increasing the supplies of energy. Electrical generating capacity in developing countries, for example, has been growing at an average annual rate of about 6 to 7 percent over the past two decades, and the demand for transportation fuels has also been increasing rapidly in these nations. While increased energy supplies are vital to the economic growth of developing countries, focusing strictly on supply side expansion, combined with the relatively low real or subsidized prices for energy, can produce a number of undesirable effects.

A. RATIONALE

ENERGY EFFICIENCY AND CONSERVATION⁶

CHAPTER III

3. Identify energy efficiency investment opportunities in Eastern Europe.
4. Initiate a joint program with the Environmental Protection Agency on initiatives to reduce greenhouse gas emissions.
5. Initiate a joint program with the World Bank to implement energy efficiency and private sector projects.
6. Complete IGCC feasibility study for India (performed in conjunction with planned accomplishment #3 on page 72).

Fuel and electricity pricing based on economic opportunity cost are the most effective policy tools available. However, economic pricing generally needs to be complemented with other types of assistance, such as training, institution building, technical assistance, information dissemination, and often some form of financial assistance. This chapter traces the Office of Energy's past efforts to provide this assistance, and outlines its planned technical and management support to promote energy conservation and demand management in the power, industry, buildings, and transportation sectors.

The proper policy, energy pricing, and investment climate is important to the success of energy efficiency and conservation programs. Many energy conservation projects will not succeed if energy users do not receive the correct policy signals, such as those given by energy pricing.

Energy conservation focuses on influencing energy use habits by creating energy saving alternatives for consumers, such as reliable and convenient public transportation. Energy conservation can be a useful vehicle for promoting private sector development by increasing the demand for energy management equipment, insulation, and more efficient energy conversion technologies, among other things, from local private manufacturers. Also, an expansion of energy conservation activities will increase or create a demand for private energy conservation consulting engineers who are capable of identifying energy conversion measures and installing energy conservation equipment. Finally, energy conservation investments, and their related management and operational changes, can improve the financial well-being of industrial enterprises by increasing their overall efficiency, leading to a stronger industrial sector.

Approaches to energy efficiency include loss reduction, fuel switching, the use of better technology or management, and the cogeneration of heat and power. By producing more output with the same energy cost input, energy efficiency promotes economic efficiency and improves the productivity and competitiveness of energy-consuming enterprises. In addition, there is consensus in the scientific community, reflected in the FY 1990 Foreign Assistance Appropriations Act, that *energy efficiency improvements represent the most important near-term response to the potential threat of global warming.*

Energy efficiency improvements and conservation represent cheap, quick, and relatively painless ways for most developing countries to stretch energy supplies, slash energy costs, and save foreign exchange.

Increasing energy efficiency helps in reducing the impact of these undesirable effects by conserving valuable resources, controlling external debt, and protecting the environment. While numerous opportunities remain for all nations to implement cost-effective improvements in efficiency, the developing energy sectors in A.I.D.-assisted countries could benefit from implementation of these policies before they develop.

B. STRATEGY

Until very recently, A.I.D.'s efforts in energy efficiency and conservation were shaped primarily by the urgent need of A.I.D.-assisted countries to save foreign exchange. Assistance was targeted toward industrial facilities that used large quantities of imported petroleum products. However, in light of the growing concerns surrounding rapidly increasing power demand, power shortages, poor system reliability, inefficient management, the tremendous capital requirements of new capacity, the shortfall in available capital, and growing environmental concerns, A.I.D. has begun to target a large share of its energy conservation assistance toward improving efficiency in the power sector.

The goals of this assistance are to address global and regional environmental degradation from energy use and delay the increase in capital expenditures for power sector expansion.

As part of A.I.D.'s increased work in energy-related environmental and health issues, the Office of Energy has begun to link its efforts in energy conservation in industrial facilities to efforts in pollution control and waste minimization through a program of comprehensive technical audits. Through these and other programs, the Office serves as an innovator in identifying suitable projects that can be funded by other donors and developing countries to help reduce the environmental and health impacts of energy development.

Most energy efficiency and conservation measures are dramatically less expensive than capacity expansion, and can delay or reduce the need for utilities to increase their debt load. The Office of Energy is implementing a number of activities to assist developing country utilities in implementing energy efficiency and conservation programs, including training, information dissemination, and least-cost-planning.

While these efforts do result in improvements in energy efficiency, the Office recognizes that in order to institute lasting technical and management capabilities in the host countries, one needs to identify and implement energy conservation programs and an institutional and policy framework that results in continued use of energy efficiency and conservation after the technical assistance has ended.

The Office of Energy has a two-pronged strategy--a micro approach and a macro approach--to achieve these goals. The micro approach focuses on assisting countries to design and implement specific energy conservation and efficiency projects. The macro approach focuses on the development of a policy and institutional framework for energy conservation, particularly least-cost power sector planning.

To implement this strategy, the Office continues to use the private sector to the greatest extent possible, and will concentrate its assistance primarily on the power sector, followed by (in decreasing order of priority) the industry, buildings, transport, and agriculture sectors. The strategy is divided into specific subject areas:

1. Participate in the design and implementation of the Global Energy Efficiency Initiative (GEEI).
2. Develop a tracking system and database to monitor the status and progress of energy efficiency activities in A.I.D.-assisted countries and other countries of interest to A.I.D.

Planned Accomplishments:

The Office of Energy plans to expand its promotional and planning activities to foster greater awareness of energy efficiency as the major strategy to reducing the threat of global warming. In this regard, the Office will take the lead in educating personnel in A.I.D. Missions, particularly in countries which are, or will be, the significant contributors of greenhouse gases. Further, the Office is participating in the Global Energy Efficiency Initiative, a broad-based, world-wide program to be defined and launched jointly by several U.S. government agencies--including A.I.D., DOE, EPA, and OTA--and a number of non-governmental organizations and private voluntary organizations. The Initiative will be led by a high-level steering committee whose role will be to provide concrete ideas on policy and project interventions to assist in controlling the emissions of greenhouse gases in developing countries and Eastern Europe.

Energy Efficiency as a Response to Global Warming

The Office of Energy's specific program and planned accomplishments in those areas are described below.

C. PLANNED ACCOMPLISHMENTS: ENERGY CONSERVATION SERVICES PROJECT (ECSP)

- Fostering greater awareness of energy efficiency as a response to global warming;
- Assisting energy conservation and demand management in electric power systems;
- Aiding energy conservation and demand management in industry; and
- Assisting energy conservation and demand management in the building and transportation sectors.

To increase the efficiency of the electricity sector in developing countries, the Office of Energy uses three approaches: (1) increasing the efficiency of power generation, transmission, and distribution; (2) improving power load management; and (3) improving end-use efficiency. The Office of Energy's program prepares generic analytical and practical tools useful to a broad range of countries, offers country-specific planning and technical assistance and training courses, and engages in country-specific studies of efficiency improvement opportunities.

Developing nations must improve the effectiveness of their large investment in current and new capacity by reducing system loss, and increasing end-use efficiency. In many of these countries, the availability factor of power plants is below 50 percent, compared to over 85 percent in the industrialized countries, resulting in reduced generation efficiency. Transmission and distribution losses consume over 20 percent of total electricity generation, compared to 8 percent in the U.S. Clearly, there is room for significant improvement.

Electricity demand usually increases at a greater rate than overall energy demand in a developing economy. Developing countries generally place the burden of providing increased electric generation capacity on the public sector, typically putting 20-40 percent of their annual government budget into this sector. In most of these countries, the necessary generation technology needs to be imported, thus exacerbating foreign exchange shortages and increasing external debt.

Energy Efficiency in Electric Power Systems

3. Design and implement a worldwide energy conservation outreach and information dissemination plan.
4. Design and develop a comprehensive training program in energy efficiency. The first phase will include training for Mission staff to promote energy efficiency as a response to the threat of global warming.
5. Conduct a feasibility study of natural gas and LNG to meet the needs of developing countries and assist in carrying out a natural gas utilization study in Egypt as a means to reduce oil consumption.
6. Design new, large-scale energy efficiency programs, focusing on the demand side. To be implemented in coordination with GBEI.
7. Establish a clearinghouse on energy use, including its contribution to global warming. Develop a database to track energy use by sector, expansion plans, and emissions.

Planned Accomplishments:

1. Provide assistance for the implementation of the Central America Power Efficiency Initiative (starting with Costa Rica), which will include power plant rehabilitation, line loss reduction, load management, and end-use efficiency improvements (in Costa Rica, pursued in conjunction with planned accomplishment #3 on page 30).

2. Hold the Africa regional conference on energy demand management in the power sector and design the Africa Power Efficiency Initiative as a follow-up to the conference.

3. Implement a major load management program in Pakistan.
4. Prepare an action plan to carry out feasibility studies to rehabilitate selected power plants in eight countries.

5. Review the actual performance of efficient power generation technologies with low global warming impacts, such as combined cycle using natural gas, in cooperation with the World Bank (Pakistan, Egypt).

6. Carry out preliminary electricity tariff studies designed to develop energy-efficient electricity pricing (Indonesia, Poland, Thailand).

Energy Efficiency in Industry

Industry has been an important target of A.I.D. energy efficiency programs because the industrial sector typically accounts for 20 to 35 percent of total commercial energy consumption in developing countries. Technically-proven and cost-effective energy conservation measures can save developing countries an estimated 10 to 30 percent of industrial sector energy consumption. In most developing countries, as much as 75 percent of industrial energy use is concentrated in few large industrial enterprises. Significant reductions in industrial energy use can be made by focusing assistance activities on these enterprises.

The trend toward privatization of industry in these countries gives their industrial enterprises a clear motivation for cost cutting.

The goal of this program, therefore, is to improve the energy management capabilities of the largest industrial energy users and facilitate private sector energy conservation activities. The emphasis of these activities focuses on leveraging private investments and developing local private sector capabilities to design, finance, and implement programs aimed primarily at reducing fossil fuel and electricity consumption.

Experience in the United States and other OECD countries indicates the need for legally-mandated energy efficiency performance standards in non-residential buildings and the establishment of government plan checking and approval agencies with the capability of evaluating proposed building designs on the basis of projected energy and peak load requirements. The development of a trained cadre of engineering and architectural design professionals to design, build, operate, and maintain energy efficient buildings in turn will require large, sustained training programs. The same programs can be used to train the staff of the government agencies required for building plan approval.

The most serious obstacles to improved energy efficiency in the buildings sector are the lack of data on energy use in buildings, awareness of the need and potential for energy conservation, knowledge about energy-efficient building design, and absence of building codes and standards that ensure energy efficiency.

Much of the growth in demand for electricity in the large cities of developing countries is driven by the demand for air conditioning and lighting in large commercial buildings. The buildings sector is the fastest growing consumer of electricity in developing countries, with demand increasing by up to 20 percent per year. In most of these cities, there is a shortage of available electricity and investment capital for additional capacity.

Energy Efficiency in the Buildings and Transportation Sectors

1. Continue to provide interim management and technical assistance to USAID/Cairo for implementing the Energy Conservation and Efficiency Project.
2. Provide technical assistance to USAID/Amman for implementing an energy conservation program in small and medium-sized industries in Jordan.
3. Carry out combined energy, environment, and productivity audits in industries in selected countries.
4. Identify 2 cogeneration opportunities and begin a feasibility study in one country in FY 90 (Indonesia, Poland, Costa Rica, Thailand).

Planned Accomplishments:

Increasing private industry participation is a primary element of the Office of Energy's conservation program. The Office of Energy continues to build upon on-going private sector activities and launch new initiatives. Following an analysis of decision making for energy conservation investments completed in FY 89, the Office of Energy will investigate private sector responses in new countries in FY 90.

1. Identify and implement one country-specific project to analyze energy consumption in the urban buildings sector and identify priority programs to reduce electricity demand in a selected country.
2. Implement a project on energy efficiency in buildings in conjunction with the PACER program in India.
3. Assist in designing an energy-efficient building as a case study in a selected country.
4. Prepare an action plan for conservation activities in the transportation sector in coordination with the GEBI. Select a country and begin planning for implementation of the action plan.

Planned Accomplishments:

The objective of the Office of Energy's program is to address the lack of basic energy use data. By developing a better understanding of energy use patterns in urban buildings, the needs and opportunities for conservation can be better identified and pursued.

Energy use in the transportation sector represents over 40 percent of total petroleum consumption in many developing countries. Even small improvements in efficiency can produce large savings on petroleum import bills and free up resources for more productive uses, as well as improving local air quality. Scant information exists on the effectiveness of various approaches to conservation in the transportation sector of developing countries.

With a small budget, this program must concentrate on low-cost/high payback measures. The focus of FY 90 activities will be on identifying and implementing small, country-specific projects to test and demonstrate specific energy conservation activities in the buildings and transportation sectors.

⁷ Proof of commercial maturity is provided by the diversified mix of renewable energy resources that are tapped by electric utilities in the State of California. Connected to the grid as of the end of 1988 were 2,290 MW of installed capacity from geothermal resources, 1,520 MW from wind, 644 MW from biomass, and 275 MW from solar thermal and photovoltaics (mostly solar thermal, which has become commercial; photovoltaics are not yet competitive within grids).

Renewable energy technologies can address some of the problems of both urban and rural regions. As part of an overall least-cost, environmentally sensitive approach to improving the technical, financial, and managerial performance of LDC electric utilities, renewable energy technologies can provide high-quality, grid-connected electric power. Under suitable circumstances, many renewable energy technologies can be economically competitive on a life-cycle basis with conventional mid- to large-scale fossil fuel options.⁷ In these cases, they are serving the needs of urban areas as well as those rural areas connected to grids.

The Office of Energy has two projects--Renewable Energy Applications and Training (REAT) and Biomass Energy Systems and Technology (BEST)--that support the development of economically and financially sustainable mechanisms to address the energy needs of development with renewable energy and hybrid (renewable/conventional) energy systems. This work is conducted in collaboration with the private sector and policy activities of the Office.

Several renewable energy technologies fueled by the resources listed above can compete with more conventional technologies for supplying electricity to central grids; all of them can be economical for off-grid applications under certain conditions. Being indigenous, they can reduce the strain on foreign exchange caused by imported fuels. And in almost all cases, they cause significantly less environmental impact than the more conventional alternatives.

Renewable energy resources--agricultural residues, solar thermal and solar electric (photovoltaic), geothermal, wind, and hydro--are playing an increasingly important role in improving the quality and reliability of electric power in both urban and rural settings, and especially in delivering urgently needed energy services to rural areas for agricultural and small industry development, village social services, and household needs.

A. RATIONALE

RENEWABLE ENERGY FOR DEVELOPMENT

CHAPTER IV

In addition to economic factors, environmental considerations argue for a strong effort to help LDCs identify available renewable sources of energy and the appropriate technologies and policies. Use of renewables results in significantly less degradation to the environment than fossil sources. This means much lower toxic emissions to the air, land,

Environmental Considerations

Renewable energy technologies can have a significant effect, of course, only if their cumulative use is widespread. One-of-a-kind technical experiments and demonstrations often lead nowhere, as the experience of A.I.D. and other donors has shown over the past two decades. There must be a coherent effort, from identification of the needs and associated markets (either commercial or donor-supported) through the development of the appropriate institutional mechanisms and sources of financing, for the introduction and diffusion of the technology to succeed.

LDC decision makers are often unaware of the economic potential of many renewable energy options. In part this is because the means for financing renewable energy projects, whether grid-connected wind farms or large numbers of small, decentralized renewable energy applications, are not well-developed. But it is also due to the lack of adequate cost and performance data on renewable energy technologies and their applications available to these decision makers.

Power generation from selected biomass fuels offers a unique set of opportunities for developing countries, and the Office of Energy has established a separate project (BEST) for that category (see Section D of this chapter). Significant quantities of residues are generated at agricultural or wood-processing facilities, thus providing accumulations of available fuel. On-site demands exist for both electricity and steam, and the amount of available fuel allows production of surplus electricity for sale to local or centralized grids. The latter creates a new source of revenue for an existing business, and experience shows that once the more entrepreneurial private companies undertake electricity production for profit, replication within the industry quickly follows.

Decentralized applications of renewable energy technologies are especially relevant to the needs of rural populations. Even small quantities of electricity can substantially improve and even transform the conditions of human health, sanitation, and economic development in these regions, and may help to slow urban migration. The technologies are reliable, inherently modular, and can grow in response to local needs and resources.

For a large number of rural areas not currently served by utilities, grid extension in the near future is too expensive and, even when competitive, must compete with other uses of scarce financial and technical resources. Many regions that will eventually be served by the grid must do without electricity for several decades.

and water. The potential of climate change resulting from CO₂ emissions and other greenhouse gases from fossil fuel combustion is reduced by the use of renewable energy.

Biomass resources, of course, must be used in a sustainable fashion. When crop residues are used, for instance, this criterion is met. The quantity of CO₂ emitted when the biomass is burned to produce energy is re-absorbed by the new plants grown the subsequent season, resulting in no net change in atmospheric CO₂. And controlled combustion also reduces the other emissions in addition to CO₂ that result when crop residues otherwise are disposed of through open burning.

On a global scale, a dramatic increase in the penetration of renewable-based technologies in the energy sector will require many decades. The impact of renewables on atmospheric CO₂ concentrations, therefore, will occur only in the long term. But the impact on local and regional air quality, through reduction of SO₂, NO_x, hydrocarbons, and particulates, will be immediate in those areas where site-specific conditions allow for greater relative penetration.

B. STRATEGY

The Office's renewable energy strategy for FY 90 has been broadened substantially. This reflects both the recent Congressional mandate to the Agency and the growing international commitment to the use of environmentally sound energy technologies to address developmental issues. The expanded program includes ambitious new initiatives for establishing multilateral programs that can lead to the economic use of modern renewable energy technologies on a scale unprecedented in the developing world.

Many renewable energy projects have been funded over the past two decades by A.I.D. and other donors. Few of these projects have resulted in any subsequent commercial diffusion. There were virtually no attempts by donor agencies or host government institutions to establish appropriate mechanisms for financing (including provision of hard currency), for technical assistance, for local business development, system maintenance and servicing, or for consumer credit. Donor agencies failed to establish funds of any significance to support the start up of renewable energy projects aimed at eventually achieving sustainable, widespread diffusion, and in general there remains a notable lack of donor coordination and cooperation in this field.

In 1988 the Office completed a review⁸ of A.I.D.'s renewable energy activities over the last decade. The study concluded that an important reason for disappointment was un-

⁸ Office of Energy, U.S. Agency for International Development. *New Directions for A.I.D. Renewable Energy Activities*. Report No. 88-01, March 1988.

Whenever appropriate, these efforts promote technology transfer from the U.S. Many of these activities, therefore, are being coordinated with the work of the inter-agency

systems. It will also prepare a series of papers focusing on the particular benefits of biomass energy renewable energy. Through MAGPI, the Office will play a major role in the renewable energy components of an environmental guidebook for electric power development projects. The Office will make a special effort to highlight the environmental benefits of

private renewable energy projects. For the design of a business plan for a non-profit venture fund to channel resources into projects. An additional attempt to develop financing mechanisms involves active support financing mechanisms for renewables and to implement "bankable" renewable energy Group on Power Sector Innovation (MAGPI, see Chapter II) to develop innovative available to the Office, a number of project activities work with the Multi-Agency Working To catalyze larger activities and leverage the investment of greater funds than those

extension services to incorporate energy extension services as well. projects--REAT and BEST--that seeks to expand the traditional role of agricultural The Office is developing a collaborative program between its two renewable energy

commercial transactions. not fund the actual purchase of hardware but rather plays a catalytic role in actual mechanisms that can make such dissemination affordable and sustainable. The Office does the goal of the Office is to identify and encourage institutional, financing and servicing technology and skills. With regard to the dissemination of small-scale systems in rural areas, pre-investment stage in order to reduce perceived risk, and to help transfer relevant need to make decisions, to bring those actors together when appropriate, to assist at the end-uses and available technologies offers the greatest hope for near- or mid-term commercial success. The objectives are to assure that important actors have the information they The Office's program attempts to identify those circumstances in which matching

The Office wishes to expand the use of renewables for both grid- and non-grid-connected sources of high-quality electricity. The approach concentrates on cost-effective uses of commercially proven renewable energy technologies and focuses on economically sustainable and replicable projects using these technologies. Research is supported only in carefully selected cases (see the discussion of "Working Labs" in Section D).

1981 United Nations Conference on New and Renewable Sources of Energy held in Nairobi. following 1981 further dampened interest in renewables following the brief euphoria of the economic and institutional issues. The unexpected, dramatic reduction in oil prices sprouted up without consistent attention being paid to real end-use needs or to long-term oil price shocks of the 1970s, donor-funded demonstrations of renewable technologies realistic project planning and expectations. In a well-intentioned desire to respond to the

⁹ CORECT's lead agency is the U.S. Department of Energy. CORECT includes the Department of Commerce, the EximBank, the Overseas Private Investment Corporation, the U.S. Trade and Development Program, and other federal agencies.

Through the MAGPI mechanism REAT works with the multilateral development banks, the International Finance Corporation (IFC), the United Nations, and other bilateral donors to catalyze bankable projects and effective commercialization strategies to support the introduction and diffusion of renewable energy technologies. The Office works with the

Targeted Project-Level Support for Commercialization

- Targeted project-level support for commercialization;
- Education, training, and reverse trade missions;
- Policy guidelines and institutional framework;
- Technical assistance to A.I.D. field Missions; and
- REAT project planning and implementation.

The goal of the REAT project is to catalyze replicable and sustainable investments in renewable energy technology that in turn can meet important rural and urban needs for reliable, high-quality electricity on a significant scale. Working with both industry and government, the REAT project tracks developments in solar, wind, small hydro, and geothermal technologies and applications in the U.S. and abroad. The REAT goals are addressed by the following project elements:

C. PLANNED ACCOMPLISHMENTS: RENEWABLE ENERGY APPLICATIONS AND TRAINING (REAT)

The balance of this chapter describes the REAT and BEST projects in detail.

Much of the site-specific project development work is conducted with private sector firms, and thus there is significant interaction with the Office's private sector power efforts (see Chapter V).

Committee on Renewable Energy Commerce and Trade (CORECT)? In the past, the Office has supported CORECT by providing information on renewable energy experience, assisting in the preparation of brochures, and working with industry associations to bring senior LDC decision makers and managers to educational and promotional events.

1. Identify five site-specific, bankable renewable energy applications (other than small hydro) for pre-investment analysis, and pursue at least two to completion.
2. Support pre-investment studies for PV joint-venture projects in India (joint venture manufacturing) and at least one other location.
3. Evaluate investment opportunities for decentralized power systems incorporating applications of wind, PV, diesel, and renewable/diesel hybrid systems in Indonesia, the Philippines, and at least one other country.
4. Conduct pre-investment assessments for small hydro project development in Costa Rica, Indonesia, and Tanzania.
5. Provide follow-up review of a pre-feasibility study for a small geothermal application in Kenya and assist in supporting the feasibility study.

Planned Accomplishments:

Activities in FY 90 will be a continuation of these efforts and a screening of additional candidate projects. The Office expects this ongoing process to result in two or three formal pre-investment studies being prepared each year. In some cases, specified policy actions by the host government will need to be encouraged by the Office simultaneously with these studies.

During 1989 several candidate projects were identified for possible assistance. These include joint ventures in small-hydro installations and in photovoltaic manufacture in India, biomass combustion for heat applications in the Philippines, PV/diesel hybrid systems in Indonesia, wind/diesel power plants in Egypt, grid-connected wind farms in Egypt, India, and Costa Rica and small wind systems in Morocco, PV systems in the Dominican Republic, and small geothermal power applications in Kenya, and multi-technology applications in rural Guatemala.

U.S. renewable energy industry to identify site-specific applications where interested users, sellers, and investors all exist, but where funds for pre-investment analysis are needed to catalyze the project development process. The Office is working with the U.S. Export Council for Renewable Energy (US/ECRE) to develop training materials, to conduct reverse trade missions, and to conduct seminars and workshops for developing country government and industrial decision makers and for A.I.D. staff.

Education, Training, and Reverse Trade Missions

Appropriate information and useful skills are necessary at all levels of technology development, transfer, and application. Technical and economic information on renewable energy technologies that are available to meet user needs in the developing world is needed by A.I.D. staff in Washington and in the field, and by public and private sector actors in the host countries.

Information on LDC needs and on the important characteristics of international trade and project development in LDCs is needed by many U.S. industrial concerns. To make certain that the renewable energy projects supported by A.I.D. or others can be sustained, LDC nationals must have the necessary skills in planning, operations, and maintenance.

Each year the Office selects ways to meet those needs for information and training. Some of these activities are pursued in concert with CORRECT. Meetings of CORRECT and its subcommittees are regularly attended by representatives of U.S. technology manufacturers.

Office publications provide LDC decision makers, development specialists, and A.I.D. Mission personnel with information on the applications and conditions in which renewable energy technologies can be cost-effective, the lessons that have been learned about disseminating these technologies, and the products and services available from U.S. manufacturers.

The various U.S. industry associations periodically sponsor workshops and site visits which provide an opportunity for LDC nationals to observe and discuss the extensive U.S. experience with these technologies. The Office funds the participation of several A.I.D. host-country nationals to one or two of these events each year.

The Office's training activities facilitate sustainable commercialization of renewables technologies in LDCs and increase the opportunity for U.S. and LDC joint ventures and technology transfer. Targeted participants are LDC public or private sector individuals who could be significant players in commercial implementation of technology, local personnel involved in promotion, assessment, or applied research in support of applications, and public sector officials whose understanding and support is needed. In addition, special education and training materials will be prepared to provide A.I.D. program, Regional Bureau, and Mission staff with up to date authoritative information on the status of commercially available renewable energy products and services that can be used in support of Agency programs in such areas as health, education, agricultural development, and environmental management.

Planned Accomplishments:

1. In collaboration with the U.S. Export Council for Renewable Energy (US/ECRE), develop and implement a renewable energy information, training, and reverse trade mission program.

2. Assist US/ECRE in developing a uniform application form and streamlined process for applications from the U.S. renewable industry for Federal assistance.

3. Support the participation of nationals from A.I.D.-assisted countries in reverse trade missions and attendance at U.S. industry-sponsored symposia (including those sponsored by the American Wind Energy Association and the Geothermal Resources Council).

4. Sponsor a MAGPI symposium on "Utility-Scale Wind Energy Experience in California and its International Significance" at the World Bank in April 1990, and will sponsor at least two other symposia on renewable energy applications for the LDC power sector.

5. Sponsor the presentation at A.I.D. of two professional seminars on the technical, economic, financial, and institutional aspects of renewable energy applications.

6. Reprint and distribute the brochure *Renewable Energy for Agriculture and Health* in cooperation with the U.S. Export Council on Renewable Energy.

7. Develop videotapes on wind and PV technology options that address the questions typically asked by A.I.D. Mission personnel and LDC decision makers.

8. Participate in the design of A.I.D.'s new training program for A.I.D. staff, incorporating information on renewable energy systems.

Policy Guidelines and Institutional Framework

The Office provides support to host-country governments, U.S. institutions, international donor community, and others in the development of policies and institutional mechanisms to support least-cost implementation of environmentally sound energy options.

On the policy side, it is important that decision makers in the utility sector be aware of the lower environmental costs of renewable energy systems. The Office will take selected

1. Develop the section on renewable energy in the Environmental Manual for Power Development (a MAGPI activity).
2. Develop a least-cost power system planning analysis of the role of renewable energy power generation options in one or more specific developing country power sectors.
3. Conduct a joint U.S./Costa Rica study to establish the institutional and financial framework for public and private power investments in environmentally attractive renewable energy technologies for power generation.
4. Work within MAGPI to identify opportunities for renewable energy options, including "bundling" of small projects.
5. Pursue opportunities for replication of a commercially successful private sector venture that sells small PV systems to rural households in the Dominican Republic.
6. Participate in the FINESSE project, providing both technical and financial support for development and implementation of small-scale renewable energy project financing mechanisms, and for project identification and pre-investment analysis and assessment.

Planned Accomplishments:

Especially constraining to the dissemination of small-scale renewable energy systems in rural areas has been the lack of institutional frameworks required to appraise, finance, manage, operate, and maintain such systems. Financing and servicing are particularly crucial. The REAT project will continue its efforts to replicate a successful dissemination project in the Dominican Republic and will join in a specific new multi-agency initiative--the FINESSE Project (Financing of Energy Services for Small-Scale Energy Users). FINESSE will identify and establish innovative financing mechanisms to access multilateral development bank power sector loans and other sources to support widespread use of small-scale renewable energy systems. Other sponsors of this effort include the World Bank, CORRECT, and the Dutch Government.

steps during 1990 to encourage the integration of environmental considerations into investment planning.

To adapt its renewables program to changing conditions, technology advances, and expanding requests for assistance, and to interact with the professional renewable energy community, the Office of Energy supports several project planning and professional outreach activities.

REAT Internal Project Planning and Professional Outreach

1. Assist USAID/Rabat in completing a wind-powered water pumping project.
2. Assist USAID/Rabat in assessing renewable energy applications in rural health delivery.
3. Assist USAID/Cairo with development of a micro-computer based renewable energy information facility for the New and Renewable Energy Authority (NREA) of Egypt.
4. Assist USAID/Cairo in designing a new renewable energy project focused on bankable project development and implementation.
5. Prepare a joint A.I.D./U.S. Windpower paper on the commercialization experience with wind electric technology in the United States and present at the 1990 PACER Conference in New Delhi (see Chapter II).
6. Produce professional quality 35mm slides and black and white prints for PACER conference presentations by U.S. participants.
7. Establish a pilot training program in renewable energy applications with one or more Missions.

Planned Accomplishments:

The Office of Energy regularly responds to requests for advice on renewable energy from A.I.D.'s field Missions. Most of these exchanges are routine, but each year the Office is asked by a few Missions for more extensive help in order to fulfill their objectives. This may involve assistance in establishing a new program, in formally reviewing an existing project, or in providing short-term consulting for a component of an existing project. Assistance will also include development of training materials and seminars for A.I.D. Mission personnel to provide them with current information on the technical and economic status of various U.S. renewable energy products and services.

Technical Assistance to USAID Field Missions

Planned Accomplishments:

1. Design a new long-range strategic program for the REAT project with the assistance of outside expert consultants, which will entail establishing an informal renewable energy advisory committee including representatives of the U.S. renewable energy industry, USDOE, USEPA, national laboratories, and academia.

2. Develop new in-house resources including (1) computer systems, (2) specific programs and tools (e.g., project financial analysis), (3) a library, and (4) on-line renewable energy database, plus graphics, videotapes, etc.

3. Prepare professional papers for publication in peer review journals and participate in domestic and international conferences on renewable energy.

D. PLANNED ACCOMPLISHMENTS: BIOMASS ENERGY SYSTEMS AND TECHNOLOGY (BEST)

In the rural sector of most developing nations, biomass residues abound, primarily from agricultural and forestry activities. At present, most of these residues are burned openly or left to rot. Some are burned to meet process energy requirements but the combustion technologies used are almost always inefficient.

Many of these residues could be used on a sustainable basis to produce energy products. Revenues from the sale of these products could have a significant impact on the health of the agricultural sector and enable better management of natural resources. The use of biomass residues for energy production provides several benefits:

- Revenues to farmers, agricultural processors, owners of forest land, and/or wood-products companies from the sale of electricity, steam, or liquid fuels produced from residues;
- Electricity and/or liquid fuels for the local community or national grid;
- Incentives to attract new investment to the production and processing of traditional commodities;
- Additional employment, income, and value-added in rural areas;
- Potential for displacement of petroleum imports and concomitant savings in foreign exchange; and

- Project development and implementation;
- Working labs;
- Venture Investment Program; and
- Program support.

The Office has categorized its biomass efforts into the following four components:

The major new initiative to be undertaken by the BEST project in the coming year is the development of a "venture fund" to be supported with monies from private sources that will be able to directly support promising projects and companies with investments, loans, and/or technical assistance. Once created, this new mechanism will make it easier to finance projects.

The new BEST project continues the Office of Energy focus on implementing specific projects in conjunction with the private sector and aims to identify and reduce technical, economic, financial, and institutional risks. Through the implementation of specific projects, the Office of Energy expects to introduce innovative technology and continue to demonstrate the commercial viability of biomass energy systems.

Another important milestone was the first private investment in the production of electricity based on biomass residues made as a direct result of Office of Energy support. The El Viejo sugar factory has invested in equipment for its factory in Costa Rica that will enable it to sell approximately 5 MW of power to the national utility beginning in the fall of 1990. The Office of Energy provided technical assistance to help the Government of Costa Rica (GOCR), the regulatory authority, and the national utility change the regulations governing private production and sale of electricity. It also recommended the technical configuration implemented by the El Viejo factory.

The past year marked several milestones in the Office of Energy's bioenergy activities. First, the completion of the Bioenergy Systems and Technology (BST) project was followed by the design of the new Biomass Energy Systems and Technology (BEST) project. The Office of Energy used the opportunity afforded by the new project to strengthen mechanisms for working with the private sector and to clarify the avenues for transferring commercial technologies to developing countries.

- Net reduction in CO₂ and other greenhouse gas emissions.

Project Development and Implementation

The new BEST project has restructured the approach to development and implementation of projects. Because economic, financial, and institutional risks tend to differ significantly from country to country, the Office of Energy's BEST project staff will develop project opportunities by country. The project will continue to concentrate on the sugarcane, rice, and forest products sectors.

Planned Accomplishments:

1. Costa Rica: Fund project assessments for biomass-fueled private power projects, provide policy support to GOCR institutions, and conduct research on baling of cane field residues, efficiency at sugar factories, and new biomass fuel sources.

2. Guatemala: Conduct a cogeneration pricing study to facilitate private electric generation and sale to public utilities through development of mechanisms for determining fair prices. Work with sugar industry to develop projects.

3. India: Prepare a multi-sector biomass fuel assessment for the Indian state of Tamil Nadu and a summary of the investment climate and current regulations concerning private power. Support a meeting of the Tamil Nadu "enterprise sector" to generate a flow of bioenergy deals.

4. Indonesia: Prepare a bioenergy survey of the sugarcane and palm oil industries in collaboration with Perkebunan (a parastatal organization that owns sugar and palm oil estates throughout Indonesia) and collect information on forest management policies and the forest products industry.

5. Pakistan: Assess economic and investment potential for electricity development by the private sugar industry in collaboration with ENERCON (Pakistan's Energy Conservation Program) and prepare a review of fuel ethanol economics and gasoline blending requirements for Pakistan.

6. Philippines: Support site-specific private power project assessments and provide technical assistance to the national Office of Energy Affairs in its preparation of a National Indigenous Energy Development Plan.

7. Thailand: Monitor continuation of the program to bale, store, and burn sugarcane field residues at private sugar factories in Thailand and support private power project development by sugar companies.

1. Advanced Conversion Lab: Refine assessments of BIG/STTG (Biomass-Injected Gas turbine/Steam-Injected Gas turbine) technology for the forest products and sugar industries with focus on Brazil and Indonesia (Cooperator: Princeton University).
2. Cane Lab: Launch a five-year program to assess agronomic impacts of cane residue removal. Also, support further baling trials and develop options to prepare bales for feeding to bagasse boilers. The Cane Lab will focus on Costa Rica, Brazil, Thailand, and the Philippines.
3. Forest Wastes Lab: Prepare a baseline energy analysis for the pulp and paper industry and identify candidate sites for research on sustainable tropical forest management activities linked with the forest products industry.

Planned Accomplishments:

The creation of the Cane, Rice and Advanced Combustion Labs formalizes research that has been supported for several years by the Office of Energy. The creation of the Forest Wastes Lab is a result of last year's program initiative to address tropical forestry issues.

BEST's Working Labs provide an excellent mechanism for transferring commercial technologies to developing countries. Not only do they adapt technologies, but they help create a base of technical skills and information in participating countries that can support market expansion.

Working Labs are programs of applied research carried on at multiple sites around the world in which the goal is to create knowledge that will help resolve critical problems in the deployment of biomass energy technologies. The Office of Energy will collaborate with existing centers of expertise in the U.S. and internationally to help resolve these problems.

Many commercially proven technologies in the U.S. require adaptation before they can be applied in developing countries. Adaptation is often critical to whether a market develops for a particular technology.

Working Labs

8. Other: Respond to private biomass power opportunities as they arise and follow up on preliminary contacts have been made with Jamaica, Honduras, Kenya, Gambia, Malawi, Panama, Nicaragua, and the Pacific Islands.

1. In support of entrepreneurial networking, sponsor development of case studies of private bioenergy opportunities through the Biomass Users Network.

Planned Accomplishments:

The Program Support component also provides state-of-the-art computer equipment for the new BEST management team and continued information dissemination in the biomass energy area.

The Program Support component will continue to support networking, both directly and indirectly. Direct support will be provided to an existing developing country network, and one major workshop will be held at which the results of cane energy research can be shared.

Program Support

1. Prepare a business plan for a non-profit Venture Fund to invest in renewable energy projects and companies.

Planned Accomplishment:

The goal of the Venture Investment Program is to harness the talent and energy of private enterprise to promote international development. During the next year, the Office of Energy will develop a business plan for creating a Venture Fund that will support projects using technical assistance, bridge loans, equity investment, and loan guarantees. The Fund will rely where possible on discounted debt as a source of local currency and will seek to share risk by attracting partners.

Venture Investment Program

4. Rice Lab: Identify collaborating institutions and coordinate with the International Rice Research Institute.
5. Competitive Grants Program: Prepare scopes of work for target grants, subject to the availability of funds.
6. General Research: Analyze desirable site characteristics for establishing tropical biomass plantations (grasses, trees) and analyze the California experience with biomass power, giving attention to the structure and evolution of biomass markets.

2. Procure microcomputer systems for staff, laptops for use during travel, and special purpose items (scanner, modems, networking hardware, and software).
3. Prepare, translate, produce and disseminate technical reports, prepare and distribute three additional "Bioenergy Systems Reports", and prepare and disseminate a series of "occasional papers".
4. Sponsor a global sugarcane symposium to present the state of power generation and associated issues. Sponsor a forest industries workshop to define research targets for the Forest Wastes Lab.
5. Other program support: Refine the energy strategy for wood wastes, investigate agri-waste management opportunities, and provide overall management support.

- Shortage of public investment capital;
- Inefficient parastatal institutions;
- Policy barriers;

address the following problems:

The Office of Energy's efforts in promoting private participation in the energy sector

energy.

The goal of the Office of Energy is to stimulate and accelerate the development of private energy projects in developing countries. This entails identifying the potential for, and the impediments to, private energy development in selected countries, providing technical support in developing and implementing private energy policies and projects, cost-sharing feasibility studies, and collecting and disseminating information pertinent to private

Since private participation in the power sector is new in developing countries and requires major initiatives on the part of governments, electric utilities, and the private sector, the progress in taking advantage of this opportunity has been slow.

In the 1988 *Power Shortages* report, A.I.D. recognized that energy production by the private sector was frequently more efficient than state-owned utilities in developing countries. The report urged developing countries to allow the private sector a greater role in providing new sources of efficient power generation.

Electric generation facilities are highly capital-intensive and compete for scarce public investment monies--consuming 5-30 percent of developing country public investment funds. Therefore, a growing number of developing countries are exploring new avenues to involve the private sector in helping solve the power shortage situation.

As explained in Chapter I and elsewhere in this Program Plan, power shortages continue to plague the economies of developing countries and symptomize a serious and growing problem with expanding the generation capacity base to support sustainable economic growth.

A. RATIONALE

PRIVATE SECTOR PARTICIPATION IN THE ENERGY SECTOR

CHAPTER V

Governments and their public utilities in developing countries have little recent experience with private participation in the energy sector. As a result, they do not clearly

Many developing countries have public policies, regulations, and practices that act as barriers to private sector involvement. In many countries, only the state-owned utility can generate, distribute, and sell electric power. Before private investment can take place, policy issues must be resolved. Additional barriers to investment by private foreign and domestic sources are created by other public policies such as restrictive tax policies, high import duties, restrictions on repatriation of profits, prohibitions on foreign ownership of companies, unavailability of adequate guarantees of payment on contracts and inadequate mechanisms for dispute resolution.

In short, state-owned utilities often lack the financial, managerial, and technical resources required to develop and implement capacity expansion plans to keep pace with growing demand. For these reasons, private investment in the energy sector of developing countries could have a significant, beneficial impact, provided that several policy and institutional impediments can be overcome.

Inefficiency within the parastatal utilities also has often abetted the power shortage problem. Resource allocations and prices tend to be administratively determined rather than respond to market forces. As entrenched government bureaucracies, many utilities have become over-staffed with poorly paid employees and are unable to attract qualified personnel. Such organizations find it hard to adopt modern management techniques or modern power technologies. The result is the inefficient operation of generating plants, transmission and distribution systems, and revenue collection systems.

Developing countries are experiencing a shortage of public investment funding to meet these capital expansion needs. These utilities traditionally have depended on the government for supplementary funds, especially for expensive new generating facilities. However, their governments cannot provide the needed resources from elsewhere within the public sector. Hence, almost all A.I.D.-assisted countries have been unable to fund the capital requirements of their power systems without extensive foreign aid.

The 1988 *Power Shortages* report estimated that in order to sustain a 4.5 percent per year real economic growth rate at current levels of energy system efficiency, developing countries would need to add 1,500 gigawatts of new generating capacity over the next 20 years. That would mean an investment of \$125 billion each year, compared to the \$50-60 billion a year that developing countries are currently investing in electricity supply.

- Lack of experience with private sector involvement;
- High risk and expense of developing private energy projects; and
- Global climate change.

To encourage private participation in the power sector, the Office of Energy organizes its activities around the following three broad objectives:

The Office of Energy has adopted a strategic approach to enhancing private sector participation in LDC energy sectors that focuses on overcoming these attitudinal and practical barriers. The focus of this strategy is to create a favorable environment that encourages private financing, ownership, and operation of energy facilities in selected developing countries--one that concentrates initially on electric power.

B. STRATEGY

In addition, many U.S. companies avoid marketing their goods and services in developing countries. Some lack experience with overseas markets, while others lack the resources and the contacts to market overseas. Some are unaware of U.S. government assistance and financing programs that are available to assist them.

The process of developing privately owned energy projects in developing countries involves high risk and expense for private companies. Since the political and financial risks especially are perceived as very high, the result is extensive front-end project development costs and difficulty in raising and servicing project equity and debt.

For developing countries, the re-entrance of private companies into the energy sector, particularly the power sector, is nothing short of institutional revolution. Limited participation of privately owned or -operated electric utility systems or facilities is still the exception rather than the rule. Prior to World War II, the development of electric power systems in these countries had been accomplished primarily through privately owned and financed power companies that were later taken over by state-owned public utilities.

Increased private sector participation in the energy sector should also have some benefits with regard to reducing the emissions of greenhouse gases. Private sector generators of electricity selling to a national grid for a contracted price will have an incentive to make their generation facilities as efficient as possible. In addition, an overwhelming majority of the private sector proposals reviewed thus far by the Office of Energy have been based on renewable energy resources.

Understand what the private sector needs to successfully design, finance, build, and operate privately owned electric power facilities. Appropriate laws, regulations, and guidelines for private power are not in place. How to solicit and evaluate project proposals and how to set a fair purchase price for power are inadequately understood. How to arrange equitable contracts, secure project loans from foreign lenders, and integrate private facilities into public power systems are additional issues that developing countries have not had to face in recent years.

Technical assistance is offered in drafting private power legislation and in developing regulatory frameworks and financing mechanisms. The Office also sponsors study tours for host country officials to visit the U.S. to meet private power experts and tour private power facilities.

The Office conducts conferences and workshops in assisted countries and in the United States that involve developing country ministers and utility officials, private power experts from banking and utility institutions, and project developers. These meetings act as catalysts to promote interest in policy changes that will permit private sector entry into the power sector.

As explained in the "Rationale" section, the energy sector, particularly its electric power component, traditionally has been a monopoly of the state. Therefore, an important first step in accommodating private power is to help developing country governments and utilities assess the constraints of the current system and to judge the appropriate roles for the private sector. The United States, of course, has significant experience with private power generation and distribution and with the regulation of such activities, especially in light of the innovations allowed by the Public Utilities Regulatory Policies Act (PURPA), which Congress passed in 1978.

Policy Reform and Institutional Development

The Office has planned a number of activities for 1990 and 1991 in pursuit of the three categories of objectives enumerated above.

C. PLANNED ACCOMPLISHMENTS: PRIVATE SECTOR ENERGY DEVELOPMENT (PSED)

To implement these objectives and the broader strategic vision described above, the Office has launched a five-year, \$10 million Private Sector Energy Development (PSED) project. The project's specific initiatives and planned accomplishments are listed below.

- Inducing policy reform and institutional development supportive of private participation in the power sector of developing countries;
- Assisting private power project development, especially in the electric power sector; and
- Improving coordination and use of U.S. government resources by private firms seeking involvement with the power systems of developing countries.

1. Organize and conduct with the World Bank a workshop on private power in Jamaica.
2. Organize and conduct with the World Bank a workshop on private power in Bangladesh.
3. Organize and conduct with the World Bank in Abu Dhabi, United Arab Emirates, a workshop on private power project investment opportunities in developing countries.
4. Organize and conduct a workshop on private power in Latin America and the Caribbean (Guatemala, the Dominican Republic, or Brazil).
5. Organize and conduct a workshop on private power in South Asia (India, the Philippines, or Thailand).
6. Organize and conduct a workshop on private power in Eastern Europe (Czechoslovakia, Hungary, or Poland).
7. Organize and conduct a workshop on private power from geothermal resources in Kenya.

Planned Accomplishments for Workshops, Study Tours, and Training:

The PSED program assists utilities in developing countries to identify options for captive power (used solely by the company that produces it) and cogeneration (the simultaneous generation of heat or steam and electricity) options. The program will also develop informational profiles on each of the potential captive and cogeneration opportunities in key developing countries with an eye toward efficiency improvements and global climate change mitigation measures. The contribution of captive and cogeneration power facilities to state-owned utility generation, especially during peak demand hours, must become an integral part of the power planning process. A significant advantage of captive power is that it reduces investment costs for electricity capacity expansion because less new capacity is required, regardless of the whether captive power is considered as a reduction in load or as part of existing capacity.

Private Power Reporter.

The Office has established a database on private power initiatives in A.I.D.-assisted countries. The database includes project opportunities, U.S. vendors of private power and cogeneration technology, and country-specific laws and regulations. Information from the database is periodically disseminated to interested persons through the Office of Energy

The Office has established a Private Sector Energy Development Feasibility Study Fund that generally shares with private companies up to 50 percent of the cost of

To cooperate effectively with the private sector, the Office works in a project-oriented manner, within the context of A.I.D.'s development goals and within the broader policy and institutional environment in which the private sector can operate.

Feasibility Study Fund for Project Development

1. Provide technical assistance in private power policy development and institution building in Latin America and the Caribbean (Guatemala, Dominican Republic, or Brazil).
2. Provide technical assistance in private power policy development and institution building in Eastern Europe (Czechoslovakia, Hungary, or Poland).
3. Provide technical assistance in the assessment of private power from geothermal resources in Kenya.
4. Provide technical assistance to Indonesia in the development of rules and regulations for the implementation of Law No. 15, assessment of captive power opportunities, and assessment of private power options on Batam Island.
5. Provide technical assistance to the Philippines for the transfer of a production costing model (ELFIN) and a project financial evaluation model (PROJEV).
6. Provide technical assistance in the assessment of private power opportunities in selected countries in the Caribbean.
7. Identify environmentally sound cogeneration and captive power generation opportunities.

Planned Accomplishments for Technical Assistance and Special Studies:

8. Develop a video-based training course for A.I.D. Missions on private power issues, rules and regulations, pricing issues, power purchase contracts, and institution building.
9. Conduct study tours for officials from the Philippines, Poland, Hungary, Egypt, Morocco, Latin American countries, South Asia, and other Eastern European countries.

The PSED project seeks to improve coordination between A.I.D., other U.S. government agencies (such as OPIC, EximBank, the Departments of Energy and Commerce, and the Trade and Development Program), other bilateral donors, multilateral development banks, and the private sector.

Program Coordination

1. Administer PSED Feasibility Study Fund and cost share feasibility studies in Costa Rica, Dominican Republic, India, the Philippines, Turkey, and Eastern Europe.
2. Fund a feasibility study for a cogeneration/environmental upgrade project in Poland.
3. Fund a feasibility study of a hydroelectric project in Costa Rica.
4. Fund a feasibility study for an efficient combined cycle project in the Dominican Republic.

Planned Accomplishments:

Also, the PSED project provides technical support to project sponsors and can assist with advice on project development, political risk, and project financing. To provide the private sector with information on project opportunities and private power activities, the PSED project maintains a Private Power Database and publishes the *Private Power Reporter* newsletter.

The Office works closely with private sector energy associations, industry and utility representatives, and project developers to enhance their understanding of private sector power opportunities and in developing specific electric power generation and distribution facilities. Project activities will be conducted in Asia/Near East, Latin America/Caribbean, and Africa regions.

Recognizing the importance of reducing threats of global climate change, the PSED project will attempt to select project proposals incorporating efficiency improvements and pollution mitigation measures.

Planned Accomplishments:

1. Consult with technical advisors from the power industry and government representatives to advise the Office of Energy on projects and other matters pertaining to private power.
2. Disseminate information on private power including preparation and publication of a paper.
3. Expand data-gathering activities, maintain the Office of Energy Private Power Database, and publish the Office of Energy Private Power Reporter.
4. Disseminate information to multilateral lending institutions and non-governmental organizations on the role of private sector participation in electric power supply, on private power opportunities, and on innovative technological options and financing strategies.

INDIGENOUS FOSSIL FUELS AND ADVANCED TECHNOLOGY

CHAPTER VI

A. RATIONALE

The oil price hikes of the 1970s persuaded many countries, including LDCs, that the development of indigenous energy resources, both fossil and renewable, was important for energy security. Developing these resources can provide needed energy and generate domestic employment and income, while reducing foreign exchange expenditures for imported oil.

The Office of Energy's efforts in exploiting renewable energy were described in Chapter IV. A number of LDCs are also endowed with significant fossil resources and wish to use those resources for economic development. For both economic and environmental reasons, the Office can play an important role in assisting with this development. Keeping costs down through proper assessment, wise management, and efficient conversion technologies is in the economic interest of the country, and both efficiency and proper control technologies are important for the environment. Some of the resources are low-grade fossil fuels (e.g., lignite, peat, and oil shale).

In the U.S., combined private sector and government efforts have harnessed scientific and technological ingenuity for developing more efficient, cleaner, and less expensive ways of transforming various energy resources into useful forms of energy. In particular, great strides have been made in exploiting low-grade fossil fuels and solid wastes. A new menu of innovative technologies and tools, including fluidized-bed combustion, integrated coal gasification combined cycle (IGCC), and management information systems, has evolved from scientific concepts through pilot experiments and demonstrations into commercial reality. Particularly significant are improvements in meeting stringent environmental requirements. Dramatic advances in computer science have also produced new tools to help decision-makers manage and operate energy facilities more efficiently and plan future energy investments more effectively. The wealth of U.S. experience with these technologies can be adapted to exploit various indigenous energy resources and improve energy self-sufficiency in A.I.D.-assisted countries.

B. STRATEGY

The Office of Energy has designed and is implementing the Conventional Energy Technical Assistance (CETA) project to apply these U.S. advances in energy technology and utilization to the developing world. Through this project the Office taps into the wellspring of U.S. industry know-how and provides technical services to: (1) assist countries to identify, evaluate, and develop their conventional energy resources; (2) utilize these resources more efficiently; and (3) reduce dependence on imported oil while improving efficiency and environmentally clean performance. Drawing on the U.S. leadership position in many energy fields, the project serves as a vehicle to provide appropriate U.S. energy and environmental expertise. Marshalling private sector interest, experience, and financing is a vital element of this approach.

As part of its strategy, the Office of Energy reviews the energy resource base and generating capacity expansion plans of key A.I.D.-assisted countries and identifies opportunities for indigenous energy resource development and private sector participation. These opportunities are then evaluated through definitional missions or preliminary technical assessments that consider overall technical and economic parameters of each opportunity. Favorable initial assessments lead to more definitive studies of project viability, the results of which are then shared with potential project financing agencies such as the World Bank, the International Finance Corporation, commercial banks, private corporations, and within A.I.D.

The Office of Energy's strategy consists of the following elements:

- Strengthening efforts to assess and develop indigenous energy resources;
- Promoting technology innovation to harness indigenous energy resources;
- Transferring commercially proven and environmentally more benign U.S. energy technologies;
- Applying U.S. operating know-how and financing strategies; and
- Creating avenues of cooperation between governments and the private sector.

FY 90 is the last year in the life of the CETA project. Some of the activities identified under CETA will be continued under the Energy Technology Innovation Project (ETIP) described in Chapter VII.

C. PLANNED ACCOMPLISHMENTS: CONVENTIONAL ENERGY TECHNICAL ASSISTANCE (CETA)

The Office's specific programs and planned accomplishments under the CETA project are divided into two categories: resource assessment and development; and technology innovation.

Resource Assessment and Development

In the area of resource assessment and development, the Office of Energy expanded its involvement significantly during FY 89, and the planned accomplishments described below reflect continued support to accelerate the momentum of this program thrust.

In FY 89, the Office completed a prefeasibility study of oil-shale utilization for power production in Jordan. In addition, a successful test burn of Jordanian oil shale was conducted in a circulating fluidized-bed combustor. As a direct result of these pioneering efforts, the confidence level associated with use of this low grade indigenous energy resource was raised significantly. A workshop to be conducted in FY 90 will disseminate the results of this work. Results of the workshop could lead the Governments of Morocco and Egypt to develop their indigenous oil shale using this innovative technological approach of directly burning the shale.

The Office of Energy's strategy is to capitalize on this growing interest among countries endowed with oil shale and to assist them in exploiting this resource in an environmentally acceptable manner.

To date, the resource assessment and development of natural gas in developing countries has received scant attention. During FY 90, the Office of Energy will explore selected cases where such an effort appears to be warranted. For example, in Egypt natural gas associated with petroleum production is currently flared, thereby wasting an important energy resource that otherwise could be used productively. Acting on a request by the Egyptian Government, the Office of Energy has begun to develop a strategy for improving the use of this associated gas. Technological options that would allow economical storage and utilization of this gas from production wells are being investigated.

The Philippines is beginning a significant effort to expand its exploration and development of indigenous petroleum and other fossil resources. The first major gas deposit was discovered in late 1989. Geological data suggest that this natural gas resource, if fully developed, could significantly affect the overall energy situation of this country.

Discussions are under way to provide technical assistance to the Government of the Philippines (GOP) to rationalize the country's natural gas planning and utilization. This will

The development of the energy sector in many LDCs is frequently hampered by the lack of an efficient data-management system. The Office of Energy possesses relevant data-

In the area of IGCC, the Office of Energy initiated a study in FY 89 under a cooperative arrangement among USAID/New Delhi, the U.S. Trade and Development Program, and the Council for Scientific and Industrial Research of the Indian Government to review candidate gasification technologies for application to a commercial-size IGCC power plant that will be capable of using indigenous, low-grade, high-ash coal.

Two recent advances in coal combustion technology--atmospheric fluidized-bed combustion (AFBC) and integrated coal gasification combined cycle (IGCC)--achieve high energy conversion system efficiency and minimize undesirable emissions to the environment.

Project activities in the areas of technology innovation will have several thrusts. Due to growing international environmental concern over the increasing use of coal, the Office of Energy will identify innovative clean coal technologies for application in several coal-producing and -using LDCs. Other innovative technologies that will receive special attention include a computerized energy technology screening tool for LDC energy planners and decision makers, and the tailoring of advanced management information systems for improving energy facility planning and operation.

The past decade witnessed the emergence of several innovative technologies for fuel treatment, combustion, and electric power generation--many with the potential to meet developing country needs in economically and environmentally advantageous ways. The Office hopes to help disseminate these technologies in the 1990s.

Technology Innovation

1. Perform fuel assessment and initiate project development efforts based on activities generated by the FY 89-90 oil-shale prefeasibility study and private power workshop in Jordan; assess oil-shale development in Morocco and Sinai, Egypt.
2. Coordinate Office of Energy, TDP, trade association, and contractor initiatives in the Philippines.
3. Perform gas utilization planning studies in Egypt and the Philippines.

Planned Accomplishments:

allow the GOP to identify and implement proper incentives to increase private sector investment, thereby accelerating development of this resource.

1. Assess opportunities for indigenous fuel and innovative technology energy projects and provide technical and financial services to facilitate private investment in the Philippines.
2. Identify potential applications of clean coal technologies in Indonesia, the Philippines, and Thailand.
3. Perform an IGCC prefeasibility study for India (performed in conjunction with planned accomplishment #6 on page 35).
4. Apply management information system technology to the management of indigenous energy resource data in Pakistan and the Philippines.
5. Perform analysis of Japan's OECF (Overseas Economic Cooperation Fund)/Japanese Export-Import Bank energy sector loan programs in A.I.D.-assisted countries to identify areas for increased cooperation and conduct seminars and site visits to U.S. private power projects to focus on U.S. experience and project financing (performed jointly with the Energy Planning and Policy Development project).
6. Provide technical assistance to Pakistan, Egypt, and the Philippines in the areas of power sector rehabilitation, operation and maintenance and inventory control needs, oil and gas optimization studies, and hydrocarbon exploration.

Planned Accomplishments:

management expertise and is currently cooperating with USAID/Cairo in assisting the Government of Egypt in developing an energy data-management system for its national petroleum company. In response to a request by the Office of Energy Affairs (OEA) in the Philippines, the Office of Energy conducted a two day seminar in Manila in October 1989 for senior OEA personnel, and jointly developed an approach to designing an information system tailored to OEA's needs. This approach will allow OEA to systematically plan for integration of an energy data-management system with compatible software and hardware, enable OEA to issue timely information needed for investment decisions, and permit data sharing with other GOP agencies and donors, as well as with the private sector. The system will also be designed to allow better coordination with the ongoing technical assistance efforts of the World Bank and the Canadian Government.

The Office of Energy has designed its Energy Technology Innovation Project (ETIP) to assist developing countries in the use of advanced commercial energy conversion technologies, power system control and management techniques, and conventional and alternative indigenous energy resources. As part of its activities, ETIP will help to reduce the discrepancy between energy demand and power sector growth in an environmentally acceptable and cost-effective manner. ETIP will support prefeasibility studies, develop and implement innovative approaches to technology transfer, conduct management/operational assistance workshops, and catalyze economic/financial project components for private sector involvement within an acceptable institutional framework. These activities are the natural

B. STRATEGY

The current growth in demand for electricity in developing countries, the inability of those countries to fund and sustain the necessary capacity expansion, and the specter of environmental degradation--all justify support for a new initiative to guide the development of innovative and clean energy harvesting, conversion, transmission, and distribution, as well as improved power system management and technology evaluation and commercialization.

A longer-term view is necessary to ensure sustainable technological development of the power sector in developing countries. Support for diversified energy sources to reduce sensitivity to fuel price fluctuations, the use of more secure indigenous resources, and the transfer of advanced, innovative, clean energy technologies to limit environmental impacts are all necessary.

An important element of power sector development is continued research in new and innovative technologies, which has led to economic expansion and improved social welfare. However, most developing countries are plagued with centralized state-owned utilities that find it difficult to implement modern power system management techniques or technologies. As discussed in previous chapters, many developing countries also have public policies, regulations, and practices that prohibit or discourage energy conservation or private power development. Other public policies often create barriers to foreign investment in energy technologies.

A. RATIONALE

ENERGY TECHNOLOGY INNOVATION PROJECT

CHAPTER VII

The CETFSF could finance studies to evaluate the feasibility of an indigenous natural gas resource used for the generation of electricity. The fund could also support prefeasibility studies in clean coal technologies, such as integrated combined cycle (IGCC) and fluidized-bed combustion systems for power generation.

The 1980s have seen the emergence of a number of innovative technologies for production, transmission, and distribution--many of them with the potential to meet LDC needs in an environmentally acceptable and cost-effective manner. A focus of EITP is to make these technologies available so that A.I.D.-assisted countries can develop conventional and alternative indigenous energy resources in an environmentally sound way and perform prefeasibility studies for adapting various power generation systems with these technologies. A Clean Energy Technology Feasibility Study Fund (CETFSF) will be established under EITP for this purpose.

Clean Energy Technologies

Anticipated accomplishments under each project component are given below.

C. PLANNED ACCOMPLISHMENTS: ENERGY TECHNOLOGY INNOVATION PROJECT (EITP)

- Clean energy technologies;
- Innovation in energy efficiency and power generation, transmission and distribution;
- Technology transfer to rehabilitate current systems; and
- Improvement of power-sector institutional structures.

Specific technologies and methodologies will be chosen for their applicability to indigenous energy resources, relevance to improving existing systems throughout the power sector, minimum impact on the environment, and economic suitability to specific conditions in developing countries. Implementation of these technologies and related activities will occur under four project components:

extension of activities completed under the Conventional Energy Technical Assistance (CETA) project. EITP will build upon the results of CETA to accomplish its goals.

Planned Accomplishments:

1. Establish the Clean Energy Technology Feasibility Study Fund and finance various conventional and alternative indigenous energy prefeasibility studies such as a wellhead geothermal development including exploration and assessment for geothermal projects in the Philippines.

2. Perform a municipal waste-to-energy project assessment in India and/or the Philippines.

3. Conduct a definitional mission to assess the application of fluidized-bed combustion in selected developing countries.

4. Perform an integrated gasification combined cycle power plant prefeasibility study for India.

5. Perform clean coal technologies project verification studies for Indonesia, the Philippines, and Thailand.

Innovation in Energy Efficiency and Power Generation, Transmission and Distribution

EITP will focus on energy efficiency improvements in the supply and distribution stages of the power sector, to complement activities conducted under ECSP (see Chapter III), which focuses on the demand side.

EITP will also apply innovative, commercially proven technologies, such as computer-based tools, to improve energy conversion efficiency, to measure and monitor environmental effects, and to update power system management and rehabilitation in developing countries. Cogeneration will be promoted to take advantage of its potential to cut energy requirements and carbon emissions by 25-40 percent.

Planned Accomplishment:

1. Develop computer-based energy technology screening tool for the Asia and Near East Region.

Technology Transfer to Rehabilitate Current Systems

The U.S. energy sector has a competitive advantage over foreign competition in at least five areas:¹⁰

- Advanced clean coal and certain other energy resource and conversion technologies, such as wind, solar, and various advanced fuel preparation and combustion methods;
- Computer hardware and software for management information systems, and process control systems;
- Financial engineering;
- Management services for complex energy infrastructure projects; and
- Power plant rehabilitation and extension of system lifetimes.

Slow demand growth for electricity and energy conservation efforts in the U.S. has caused the U.S. power industry to look to foreign markets for continuing sales growth. However, foreign competition is keen and as a result, U.S. exports currently represent less than 10 percent of total power generation exports to developing countries, while they accounted for over 17 percent five years ago and over 20 percent in the late 1970s. If the current declining trend continues, the U.S. share of the developing country power market will be limited to about 5 percent of the estimated export potential during the next twenty years.¹¹

Although these technologies and services are very appropriate for LDCs, sales will be governed by the issue of cost-competitiveness, including the cost of equipment and services and attractive financing. Financing is a major impediment to successful U.S. sales, because so-called "mixed credits"--grants combined with concessional loans--are offered by foreign loans are offered by foreign businesses and their government sponsors in their commercial proposals. EITP will provide an excellent opportunity for U.S. energy equipment manufacturers, engineering firms, utilities, and other firms with knowledge and experience in the technologies of the energy sector to work directly with LDC governments and the private sector on financing issues and hopefully encourage the application of the latest U.S. hardware and methodologies in these areas to power sector problems. EITP will assist in promoting U.S. energy sector trade in areas such as advanced energy resource and conversion technologies (including clean coal technologies), computer hardware/software

¹⁰ Bechtel National, Inc., 1989. *A Potential Role for Selected U.S. Technologies in India*, prepared for A.I.D. Office of Energy.

¹¹ Op. cit., *Power Shortages*.

management information systems and process control systems, financial engineering, management services for complex energy infrastructure projects, and power plant rehabilitation and extension of system lifetimes.

Planned Accomplishments:

1. Co-sponsor trade missions to selected developing countries for interested U.S. participants to explore financing of business ventures and collaboration.

2. Co-sponsor reverse trade missions for key governmental decision makers and industrialists from selected developing countries to visit relevant U.S. manufacturing and power generation facilities and hold discussions with U.S. financial institutions.

Improvement of Power Sector Institutional Structures

The U.S. has one of the most efficient power sectors in the world. U.S. utility companies have gained unique experience in dispersed power systems and the integration of private power generation with existing grid distribution systems from operation under the 1978 Public Utilities Regulatory Policy Act (PURPA). Funding under EITP will support efforts to increase the efficiency of operation in the energy/power sector of LDCs through workshops for management personnel and through the streamlining and rehabilitation of institutional organizations. EITP components will work with U.S. companies that have been or are interested in "down-stream" involvement with developing countries to design power projects and assist in their implementation with the private sector.

Planned Accomplishment:

1. Design a management information system (MIS) and demonstrate the ability to streamline organizational infrastructure and develop more efficient managerial approaches for a Pakistani petroleum company.

In terms of enhancing energy efficiency and of minimizing environmental damage, a pressing need of the developing nations is for technically skilled personnel in all phases of energy exploration, exploitation, production, operations, maintenance, distribution, and management. This need extends to A.I.D. field staff in Regional Offices and host country

With respect to environmental concerns, the U.S. has much to offer developing countries in assisting them to make these decisions. A substantial knowledge base has been developed by U.S. ecologists, engineers, planners, economists, and managers. Pathfinding results of research and development on such man-created phenomena as local air pollution, acid rain, and the potential for global warming and climate change--and the new technologies deriving from them--can be readily transferred to the developing world through technical training.

These tools must be made readily available to policymakers and managers who face the complex tasks of setting priorities for the allocation and utilization of energy resources. In setting priorities, decision-makers must take into account the most pressing social and economic needs of their nations, the political system within which they must work, the extent and capabilities of their human resources, the availability of non-energy resources required to carry out energy operations, the amount of capital available for various lines of action, and the varying environmental impacts of alternative energy technologies.

Techniques and technologies for energy production, conversion, and utilization have reached high levels of sophistication in the industrialized world. On the demand side, they include end-use analysis, operations auditing, systematic maintenance, and efficiency-conscious management. On the supply side, they include resource-assessment methods and technologies for mining, harvesting, and conversion that accommodate environmental concerns.

Training--the development of human resources--has always been an important part of A.I.D.'s work in all sectors. The U.S. has a broad range of experience, expertise, and educational fora that can be made available to the citizens of developing countries.

True development in A.I.D.-assisted countries requires that they gain those skills and build those institutions that will make the development process sustainable and predominantly indigenous.

A. RATIONALE

ENERGY AND ENVIRONMENTAL TRAINING

CHAPTER VIII

Missions. Few A.I.D. Missions have any professional staff in the energy and electric power fields. The Office's training programs in energy, especially related to energy efficiency, renewables, and environmental management of electric power systems, will be extended to selected Regional Offices and Mission staff.

B. STRATEGY

Recognizing the need for training as long ago as 1980, the A.I.D. Office of Energy began a systematic, diversified program of training as an efficient and cost-effective way of transferring human-resource and technical skills to cooperating countries. Since then, the program has steadily expanded and improved, in response to needs identified by cooperating nations and to recommendations of program alumni, their employers, and professional evaluators.

Elements of the overall program include formal training for practicing professionals in energy management, exploration, engineering, production, utilization, policy and planning, conservation, and related topics.

Complementing the major components of all other Office of Energy programs, these courses are offered by U.S. training cooperators selected for their demonstrated competence. They include electric utilities, academic institutions, government agencies, national laboratories, proprietary training organizations, oil refineries, and exploration companies.

An important subsidiary benefit of these training programs is the establishment of close working relationships between the developing-nation professionals thus trained and their training institutions. These ties have often led to business opportunities for the U.S. organizations providing the training, as alumni have successfully advocated the purchase of their trainer's equipment or services upon returning to their home countries.

One major training effort of the Office of Energy was the Conventional Energy Training Project (CETP), which trained 721 developing-nation professionals from 1980 until its conclusion in 1987. It was succeeded at that time by the Energy Training Program (ETP), bolstered by a broader mandate.

The ETP, just as the CETP before it, designs energy-related training programs to meet the specific needs of governmental, parastatal, and private employers in developing nations. Nearly all of the training is short-term--typically from two to seven months. A small percentage of the trainees pursue Master of Science programs at U.S. universities.

Whether short- or long-term, the training is intensive, demanding, practical, and full-time. To the maximum extent, it emphasizes the "hands on" approach in actual work settings. Participants in these courses are required to return home immediately following

- I. Energy Policy and Analysis
 1. National Energy Policy and Planning (7 months) - for mid- to senior-level energy managers and planners. Prepares participants to solve national and institutional energy-planning problems in efficient and cost-effective ways. (January 16 - July 27, 1990)
 2. Economic and Financial Analysis of Energy Projects (10 weeks) - for mid- to upper-level management personnel who develop, evaluate, recommend, or approve energy investments. Provides participants with relevant, practical experience concerning modern-day industrial and governmental procedures for analyzing the economic and financial viability of energy investment projects. This is an applications-oriented program with emphasis on case studies to illustrate concepts throughout the training. (February 5 - April 16, 1991)

The following energy activities provide the framework for ETP courses planned as training accomplishments for FY 90:

C. PLANNED ACCOMPLISHMENTS: ENERGY TRAINING PROGRAM (ETP)

In response to Congressional concerns regarding the potential dangers of global climate change stimulated by human energy use, ETP is now designing courses that both characterize the problem and identify ways to address it, to be offered to developing-nation managers, policy-makers, and technicians who are in a position to implement what they learn.

In 1988, ETP programs trained 109 participants in energy-related fields. In 1989, the number increased to 143.

The expectation is that the new skills will be incorporated into long-term institutional capability. In the best of worlds, alumni transfer their skills to colleagues, who then apply them throughout their organization.

To increase the likelihood that newly acquired skills will actually be put to use, ETP requires each employer who nominates a candidate for training to provide round-trip international air transportation, pay full salary while the participant is in training, and guarantee employment upon return.

graduation, in order to put their newly gained knowledge and skills to work in service to the energy needs of their nations.

1. **Electric-Utility Engineering** (14 weeks) - for electric-utility engineers. Covers engineering practices and technologies for generation, transmission, and distribution of electricity by fossil-fuel and hydro-power systems, with attention to long-term planning. (July 31 - November 2, 1990)

III. Power-Industry Development

6. **Petroleum Management** (9 weeks) - for new and mid-level managers, providing an overview of the petroleum industry, from geology and exploration to production and refining, followed by an examination of key managerial functions such as principles of management, economics, accounting, finance, computer applications, decision-making, organization, and supervision. (Dates TBA)

5. **Management of a National Petroleum Enterprise** (10 weeks) - for senior-level officials. Covers how to promote cooperative oil and gas ventures with international oil companies and financial institutions and to negotiate productive and equitable contracts. (September 25 - December 7, 1990)

4. **Fluidized-Bed Coal Combustion** (8 weeks) - designed to provide engineers with the fundamentals of fluidized-bed combustion, the information needed to evaluate technologies currently available, and methods for determining the technology that best fits a particular application. (May 15 - July 13, 1990)

3. **Structure and Management of the Natural Gas Industry** (12 weeks) - for mid-level managers, providing practical information necessary for intelligent decision-making in exploration and development, production, processing, transportation to markets, utilization, and computer applications. (Dates TBA)

2. **Lignite-Coal Utilization** (10 weeks) - for mid- to upper-level managers, supervisors, and engineers working on the development and utilization of lignite and sub-bituminous coal for power or steam generation. Covers the complete coal cycle and combines classroom work with practical internships. (July 5 - September 14, 1990)

1. **Applied Petroleum Exploration and Production Technology** (12 weeks) - for junior to mid-level oil and gas technical professionals. Applies the principles and techniques of geology, geophysics, and engineering to petroleum exploration and production. (Dates TBA)

II. Indigenous Fossil Fuel Development

2. **Power-Systems Protection** (9 weeks) - for electric-power design and maintenance engineers. Provides hands-on training in all effective techniques of power-systems protection, including microcomputer-based protective relay systems. (June 5 - August 10, 1990)
 3. **Mechanical Maintenance of Electric-Power Plants** (12 weeks) - for mechanical engineers engaged in the maintenance and operation of power plants. State-of-the-art procedures and practices for optimizing mechanical efficiency and reliability of electric-power plants. (April 3 - June 29, 1990)
 4. **Diesel-Based Electric-Power Generation** (8 weeks) - trains engineers in skills and techniques required to maximize the availability, reliability, and performance of diesel-powered generators. (July 17 - September 15, 1990)
 5. **General Management of Electric Utilities** (12 weeks) - for mid- to senior-level technical managers from utilities and other companies which produce or utilize energy as a primary commodity. Demonstrates how to manage a company as a total enterprise, by combining technical capabilities with general managerial skills in order to optimize performance of men and machines. (September 11 - December 7, 1990)
 6. **ASEAN Private Power Workshop** - Designed for senior executives in the electric-power industry in Southeast Asia, the ASEAN Private Power Workshop will provide training in technical, financial, policy, and institutional aspects of cogeneration and Independent Private Power (IPP) projects. Participants will learn how to plan for cogeneration, analyze projects, and develop power purchase agreements for independent cogeneration and IPP facilities. The Workshop is a cooperative enterprise of the Office of Energy and the Bureau for Asia, the Near East, and Europe, with funds provided by the latter. (April 22 - May 12, 1990)
- IV. Energy Conservation and Efficiency**
1. **Utility and Industrial Energy Conservation** (8 weeks) - for utility and industrial plant engineers and supervisors. Covers implementation of in-house energy conservation programs. (June 19 - August 17, 1990)
 2. **Refinery Energy Conservation** (10 weeks) - for refinery engineers. Provides comprehensive, hands-on training in pinch technology and other techniques to reduce energy consumption and improve operational efficiency of refinery and petrochemical plants. (August 21 - October 26, 1990)

1. Egypt Energy Manpower Development Project (EMD) - The EMD's goal is to improve the technical and managerial capabilities of the country's petroleum and electricity sectors by assisting three agencies--the Egyptian General Petroleum Corporation, the Egyptian Electrical Authority, and the Electrical Distribution Authority--in the design, use, and adaptation of human resource and career development systems for human resource planning.

VII. Other Accomplishments

2. The ETP Newsletter - Published semiannually, keeps alumni up-to-date on colleagues who have recently graduated from ETP courses, on the content and critical dates of upcoming courses, on alumni activities, and on any other developments which will encourage their ongoing involvement in the program. The next edition is scheduled for publication in June 1990.

1. Workshop - A Regional Workshop in Costa Rica, originally planned for April 1990, has been postponed at USAID recommendation because of national elections being held. It is currently being planned for September 1990. The workshop will focus on practical, readily available means of promoting energy efficiency and energy conservation within their organizations. Invitees will include all alumni residing in Central America, Caribbean nations, and northern nations of South America. (September 1990)

ETP has been actively developing an Alumni Network for International Training, to promote long-term professional relationships among course graduates and to provide opportunities for periodic updating of their knowledge and skills.

VI. Alumni Network

2. Geothermal Exploration (12 weeks) - for exploration geologists. Covers the development and utilization of geothermal energy resources, with focus on locating, assessing, and exploiting geothermal sites. (Dates TBA)

1. Solar Electricity (Photovoltaic) Technologies (4 weeks) - for engineers. Comprehensive, hands-on training in all aspects of designing and utilizing photovoltaic (PV)-powered equipment, as well as technical, economic, and practical information necessary to design a PV-based project or to set up a PV-based commercial enterprise. (July 17 - August 15, 1990)

V. Alternative Energy Systems

1. Environmental Policy and Regulation (12 weeks) - training in alternative approaches and methodologies for pollution control and enforcement. Examination of economic and physical (mass balance) aspects of pollution externalities; goals of regulation; alternative pollution-control instruments, including statutory regulation, command-and-control strategies (performance and technology-based standards), and revenue-based programs (fees, taxes, and subsidies); and the role of risk assessment in standard-setting. The use of interim standards based on other-country standards and research will also be evaluated. (Dates TBA)

I. Manpower Development

The two themes mentioned above--developing the human resource base and interagency cooperation--underlie all projected efforts under the Environment Activities.

The beneficial impact of the resources thus invested can be multiplied in two practical ways: (1) by improving cooperation among domestic and international agencies, both public and private, with shared environmental concerns; and (2) by stressing the development of human resources. Enhanced cooperation with colleague agencies is particularly necessary because they contribute a large share of development funds, and the lion's share of facilities and equipment.

The potentially life-threatening magnitude of global environmental problems makes it imperative that the limited resources available to deal with them be marshalled quickly and managed judiciously.

D. PLANNED ACCOMPLISHMENTS: ETP ACTIVITIES IN ENVIRONMENTAL TRAINING

3. Internships - Approximately half of the 149 energy professionals from Pakistan who are expected to come to the U.S. for training during 1990 will be slated for individual "hands-on" internships in highly-specialized fields. Each intern will be matched with a carefully selected U.S. company in order to meet the training requirements of specified by his or her employee.

2. Academic Training - During 1990 nine engineers (all from Pakistan) are expected to complete their Master of Science programs at various U.S. universities. An additional engineer (from Uruguay) and a geologist (from Pakistan) will continue in M.S. programs, and eleven new M.S. candidates (from Pakistan) are expected to begin studies.

Given the time constraints imposed on managers and policymakers, the Office of Energy further proposes to design courses as brief as feasible without compromise of the integrity and utility of the material presented.

The Office of Energy will assist in the development of training programs for USAID personnel to upgrade their qualifications on environmental topics and enable them to identify needs, evaluate programs, and design projects with an environmental focus. From an energy perspective, much of the training will address the relevance of least-cost planning, efficiency, and renewable resources. Training will be made available to personnel in Washington and in the overseas Missions.

II. Training of USAID Staff

- Waste Disposal.
- Resource Allocation for Environmental Management; and
- Institution-Building for Environmental Management;

Of course, the list of environmental courses above is not exhaustive and represents only an initial effort. The Office of Energy has also begun development of three additional courses that will be offered in the future as funds become available:

3. **Data Collection and Analysis (6 weeks)** - training in all aspects of empirical-data management for environmental regulation. Emphasis on designing data-survey instruments; data-collection and sampling techniques; statistical processing of data; and choosing, maintaining and upgrading databases. Data-collection costs, training of technicians for basic data collection and maintenance, and remote-sensing applications. Program is applicable to both single-medium and multi-media pollution control. (Dates TBA)
2. **Pollution-Control Systems (12 weeks)** - training in media-specific pollution control technologies. Air-pollution control, targeted at particulates and gaseous stationary-source emissions from fossil-fuel energy conversion; combustion chemistry; physical and chemical removal processes; fan equations; in-stream sampling; cyclone, precipitator, scrubber and baghouse design; regenerative systems; sizing pollution-control equipment; retrofitting of existing boilers; energy penalties for pollution-control systems; and disposal of pollutants. (Dates TBA)

III. Environmental Training-Needs Assessments

Prerequisite to a concerted training effort in any institution is the systematic assessment of the human resources required to meet stated goals.

The assessment process entails definition of the total body of knowledge and skills required to meet stated goals, measurement of the extent to which employees possess such knowledge and skills, and design of a strategy of training and recruitment to fill any gaps.

Within the developing nations--and in the Eastern European nations only now opening their doors to the world community--there is a critical shortage of professional personnel attuned to the environmental "downside" of economic development and technically competent to deal with it.

To help alleviate that shortage within national energy sectors, the Office of Energy now proposes to conduct training-needs assessments (TNAs) within key industries and institutions of those nations responsive to the twin notions that environmental protection is an important, even indispensable component of economic development, and that other nations can contribute toward that end without compromising host-nation or indigenous-institution integrity.

The first step is to win agreement, through representations of USAID Missions in developing nations and U.S. embassies in Eastern European nations, on the utility and desirability of TNAs within key energy organizations, followed by invitations to conduct such assessments.

The objective would be to measure institutional strengths, weaknesses, and training needs of agencies and companies engaged in the production and use of energy derived from petroleum, natural gas, coal, and renewable resources such as sunlight, water, wind, and biomass.

The electric-power industry will be a prime target, in its unintended role as polluter of water, soil, and air, and as major generator of carbon dioxide contributing to potential climate change.

Within each organization mutually agreed upon, a joint team of ETP and host-nation energy/environmental specialists will conduct a preliminary institutional-capability and training-needs assessment, identifying those production goals whose attainment will generate adverse environmental impacts and estimating the extent to which the organization is equipped to take remedial actions.

These preliminary assessments will enable ETP and host-country managers to identify and designate a few pilot companies in which to demonstrate the techniques and practical benefits of TNAs. Company personnel trained by ETP will conduct rigorous

This networking process can be further enhanced through seminars, conferences, and workshops designed to encourage and facilitate exchanges among U.S. citizens and group members.

To the extent feasible, each program will serve energy/environment officials from more than one nation. ETP has found in the conduct of its training courses that opportunities to establish personal relationships and to engage in substantive dialogue with counterparts from other nations are perceived by participants as major bonuses to their training experience.

These carefully crafted programs will provide opportunities for frank and open discussion and exchange of information with professional counterparts across the United States: policymakers, planners, managers, and other professionals charged with addressing environmental problems.

The Office of Energy, through the ETP, will develop and conduct observation-and-consultation programs in the United States for energy/environment professionals from Third World and Eastern European nations, to acquaint them with available technologies, processes, and successful institutional policies and programs for dealing with environmental problems.

IV. Study Tours

The Office of Energy has developed with the U.S. Department of Energy a cooperative initiative to implement TNA/manpower-development activities in Poland. The Office of Energy will conduct similar activities in other nations considered critical, at a later date.

energy/environment TNAs, with guidance from ETP upon request. All data thus collected will be analyzed by the same personnel, again with ETP guidance, and reported for use by managers in formulating manpower-development programs characterized by annual training and recruitment plans.

APPENDIX

Selected Reports of
the Office of Energy
Bureau for Science and Technology
United States Agency for International Development

Office of Energy Report No.	Title of Report	Prepared By	Date	Document No.
88-01	New Directions for A.I.D. Renewable Energy Activities	Office of Energy and Oak Ridge Nat'l Laboratory	February 1988	PN-ABB-532
88-02	Rice Residue Utilization Technology, International Market Prospects for U.S. Industry	Louisiana State University Agricultural Center	January 1988	PN-ABB-533
88-03	Cane Energy Utilization Symposium, A Report from the 2nd Pacific Basin Biofuels Workshop, Volume I: Summary	Tennessee Valley Authority	April 1987	PN-AAZ-721
88-04	Cane Energy Utilization Symposium, A Report from the 2nd Pacific Basin Biofuels Workshop, Volume II: Presented Papers	Tennessee Valley Authority	April 1987	PN-AAZ-721
88-05	Potential for Private Investment in Rice Residue Power Generation, Indonesia 1987, Preliminary Analysis	Tennessee Valley Authority	May 1988	PN-AAZ-728
88-06	Assessment of Integrated Coal Gasification Combined Cycle Technology for India	Office of Energy	May 1988	PN-AAZ-893
88-07	Project Evaluation and Implementation	RCG/Hagler, Bally, Inc.	April 1988	PN-AAZ-769
88-08	Energy Standards Directory for the Process Industry	RCG/Hagler, Bally, Inc.	March 1988	PN-AAZ-740
88-09	The Hashemite Kingdom of Jordan, Recommendations for an Industrial Energy Efficiency Program	RCG/Hagler, Bally, Inc.	May 1988	PN-ABB-534
88-10	Program Plan, Fiscal Years 1988 and 1989	Office of Energy	May 1988	PD-AA4-768

Report No.	Title of Report	Prepared By	Date	Document No.
88-11	Trial Year Program Proposal, Nong Yai Sugar Mill, Thailand	Tennessee Valley Authority	August 1987	PN-ABA-332
88-12	Energy in West and Central Africa: Issues, Problems and Donor Activities	RCG/Hagler, Bally, Inc.	July 1988	PN-ABA-256
88-13	Power Shortages in Developing Countries: Magnitude, Impacts, Solutions, and the Role of the Private Sector	A.I.D.	March 1988	PN-AAZ-552
88-14	The A.I.D. Experience with Independent Power Generation	Office of Energy	August 1988	PN-ABB-535
88-15	Options to Increase Private Participation in Electric Power Development in A.I.D.-Assisted Countries	Office of Energy	December 1987	PN-ABB-536
88-16	A Financial Model for Evaluating Proposed Private Power Projects in Developing Countries	RCG/Hagler, Bally, Inc.	April 1988	PN-ABB-537
88-17	A Prefeasibility Assessment of the Potential of Wood Waste Power Systems for the Indonesian Wood Products Industry, Phase I Report	Tennessee Valley Authority	November 1988	PN-ABB-341
88-18	Electric Power from Sugarcane in Costa Rica, A Technical and Economic Analysis	Tennessee Valley Authority	July 1988	PN-ABB-444
88-19	Summary of the Central American and Caribbean Workshop on Electric Power	RCG/Hagler, Bally, Inc.	December 1988	PN-ABB-538
88-20	Report on Roundtable for Private Participation in the Electrical Sector of the Dominican Republic	K & M Engineering and Consulting Corp.	August 1988	PN-ABB-539
88-21	Electricity and Ethanol Options in Southern Africa	Tennessee Valley Authority	September 1988	PN-ABB-540

Report No.	Title of Report	Prepared By	Date	Document No.
89-01	Energy Efficient Stoves In East Africa: An Assessment of the Kenya Ceramic Jiko (Stove) Program	Oak Ridge National Laboratory and Kenya Energy and Environmental Organization	January 1989	PN-ABD-072
89-02	Prefeasibility Study Oil Shale Utilization for Power Production in the Hashemite Kingdom of Jordan, Volumes I - VI	Bechtel National, Inc.	May 1989	PN-ABD-619 PN-ABD-620 PN-ABD-621 PN-ABD-622 PN-ABD-623 PN-ABD-624
89-03	Electric Power from Cane Residues, A Technical and Economic Analysis	RONCO Consulting Corp.	September 1986	PN-ABA-930
89-04	Summary Report of the Philippine Seminar and Roundtable on Private Power Generation Through Build-Operate- Transfer (BOT)	Bechtel National, Inc.	May 1989	PN-ABD-617
89-05	The Sugar Industry in the Philippines: An Analysis of Crop Substitution and Market Diversification Opportunities	RONCO Consulting Corp.	December 1986	PN-ABA-959
89-06	Fuel Alcohol Production in Honduras: A Technical and Economic Analysis	RONCO Consulting Corp.	April 1986	PN-AAW-502
89-07	Energy Inefficiency in the Asia/Near East Region and its Environmental Implications	RCG/Hagler, Bally, Inc.	June 1989	PN-ABF-134
89-08	Program Plan, Fiscal Years 1989 and 1990	Office of Energy	June 1989	PN-ABA-910
89-09	Costa Rica Load Control Demonstration Project	RCG/Hagler, Bally, Inc.	July 1989	PN-ABD-618

Report No.	Title of Report	Prepared By	Date	Document No.
89-10	Jamaica Cane/Energy Project, Feasibility Study, Volume I	RONCO Consulting Corp.	September 1986	PD-AAV-308
89-11	Technical, Economic, Financial and Commercial Considerations of the San Miguel Corporation Private Power Program	Bechtel National, Inc.	August 1989	PD-ABE-113
89-12	Steam-Injected Gas-Turbine Cogeneration for the Cane Sugar Industry, Optimization Through Improvements in Sugar-Processing Efficiencies	Princeton University	September 1987	PN-ABC-988
89-13	Electroplan: A New Spreadsheet Model for Comprehensive Power Systems Planning in Developing Countries	IDEA, Inc.	July 1989	PN-ABD-616
89-14	Handbook for Comparative Evaluation of Technical and Economic Performance of Water Pumping Systems	Oak Ridge National Laboratory	November 1988	PN-ABF-135
89-15	Screening Study to Determine the Feasibility of Small Non-Centralized Electric Generating Stations Using Indigenous Fossil Fuel to Supply Energy Needs in Rural Areas in Developing Countries	Energy and Environmental Engineering, Inc.	November 1989	PN-ABE-114
89-16	Energy Conservation Investment Decision-Making in Developing Countries	RCG/Hagler, Bally, Inc.	December 1989	PN-ABD-858

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**GUIDE TO THE
INTERNATIONAL DEVELOPMENT
AND
FUNDING INSTITUTIONS
FOR THE
U.S. RENEWABLE ENERGY INDUSTRY**

September 30, 1986

**Prepared for:
Technical Competitiveness Subcommittee
Committee on Renewable Energy Commerce and Trade
U.S. Department of Energy**

**Prepared by:
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EXECUTIVE SUMMARY

The less developed countries (LDCs) of Asia, Africa, and Latin America constitute the most promising market for applications of renewable energy technologies and products. Millions of people in these countries lack access to a central electricity grid, and renewable energy can provide them with power for basic human needs such as drinking water and irrigation, refrigeration, lighting, and general electrical power. The LDCs, however, lack the capital resources to independently purchase renewable energy systems. Thus, the assistance of the multilateral development and funding institutions, such as the United Nations and its component agencies, the World Bank and its component agencies, and the regional development banks, is essential in bringing together renewable energy technology firms with potential end-users in the Third World.

This Guide to the International Development and Funding Institutions has been developed to provide the U.S. renewable energy firms with a "road map" to the multilateral lending institutions that provide financial assistance to programs and projects, funding sources in geographic areas, and end-use applications pertinent to renewable energy firms.

Some of the major highlights in this report are:

- The United Nations Development Programme (UNDP) is the world's largest channel for multilateral technical and pre-investment activities. UNDP in-country personnel, known as Resident Representatives, can make autonomous project and procurement decisions, without prior approval from UNDP headquarters in New York, for amounts up to \$400,000.

- The World Health Organization (WHO) issues technical specifications for photovoltaic-powered medical refrigerators. A product listed in WHO's information sheets carries the agency's endorsement that it is suitable for vaccine storage.

- The United Nations Capital Development Fund (UNCDF) has a special mandate to assist the very poorest countries, and only finances projects in the \$200,000 to \$5,000,000 range. UNCDF has financed the installation of solar-powered pumps and mini-hydroelectric power schemes.

- The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) established a regional network on biomass, solar, and wind (BSW) energy. Last year, this BSW network convened an expert panel on photovoltaic technology.

- The Inter-American Development Bank (IDB) has financed numerous renewable energy initiatives, including a solar technology testing center in the Dominican Republic, a regional training program in geothermal energy, a study on the design of small-scale hydropower projects, and a project loan for the installation of biogas digesters.

The examples cited above indicate the multitude of project opportunities for renewables that exist within the development finance institutions. The chapters that follow provide in-depth discussions of each agency's renewable energy experience and identify the institutions where project opportunities can be found.

1.0 Introduction

1.1 Purpose

The purpose of this report is to provide the U.S. renewable energy industry with a "road map" of the international development and funding institutions in order to facilitate effective contacts with key decision-makers in each institution. This report serves as an international companion document to the Federal Export Assistance Programs Applicable to the U.S. Renewable Energy Industry, which was updated in June 1986.

1.2 Background

Developing countries currently provide the major market for U.S. renewable energy product sales for a number of reasons.

- Current and proposed reductions in tax credits for renewable energy equipment have reduced the potential market for these technologies within the U.S.
- The export market provides the economies of scale needed to bring system prices to the level where they are cost competitive in U.S. bulk power markets. It also provides experience which allows manufacturers to refine their products for domestic consumption.
- Approximately 50 percent of the rural areas in developing countries lack access to the electricity grid for supplying power for agricultural, health, residential, education, and other general electrical needs. Renewable energy systems can supply this power on a cheaper basis than conventional alternatives which have high operation and maintenance costs.

Although the developing country marketplace holds tremendous potential for U.S. renewable energy firms, a number of barriers exist that have deterred export growth:

- Government-Subsidized Foreign Competition - Foreign renewable energy firms receive government-supported export credit assistance that has not traditionally been matched by the U.S. Government, thus reducing the competitive position of U.S. firms.
- Education - Foreign buyers and intermediary institutions are unfamiliar with the range of applications appropriate for today's renewable energy products.
- Trade Barriers - Foreign countries frequently erect trade barriers to the importation of foreign products, which restrict the ability of U.S. firms to compete.

J. Hogan-Siegel, Federal Export Assistance Programs Applicable to the U.S. Renewable Energy Industry, Department of Energy Photovoltaic Energy Technology Division, Washington, D.C., June 1986.

Exhibit 1-1 depicts the locations of the headquarters for each of the multilateral organizations addressed in this study. Exhibit 1-2 summarizes

- Historical background on the organization
- A brief description of the organization's mission and primary activities
- The sectoral and regional emphases of the organization's efforts
- Renewable energy experience (if any) and renewable energy project opportunities
- Project evaluation and procurement procedures
- A listing of key contacts, including names, addresses, telephone and telex numbers, and additional references (reports and newsletters).

Individual chapters are provided for each of these organizations, with the following information presented, as available:

Twenty-two organizations are addressed in this report. They include: the United Nations (UN) and its component agencies -- the UN Development Programme, the UN Department of Technical Cooperation for Development, the UN Children's Fund, the World Health Organization, the Food and Agriculture Organization, the International Fund for Agricultural Development, the UN Capital Development Fund, the UN Institute for Training and Research, the Economic and Social Commission for Asia and the Pacific, the Economic Commission for Latin America and the Caribbean, the Economic and Social Commission for Western Asia, and the Economic Commission for Africa; the World Bank and its component agencies -- the International Bank for Reconstruction and Development, the International Development Association, and the International Finance Corporation; the regional development banks -- the African Development Bank, the Asian Development Bank, the Caribbean Development Bank, the Inter-American Development Bank, the Islamic Development Bank; and the Organization of American States.

1.3 Report Organization

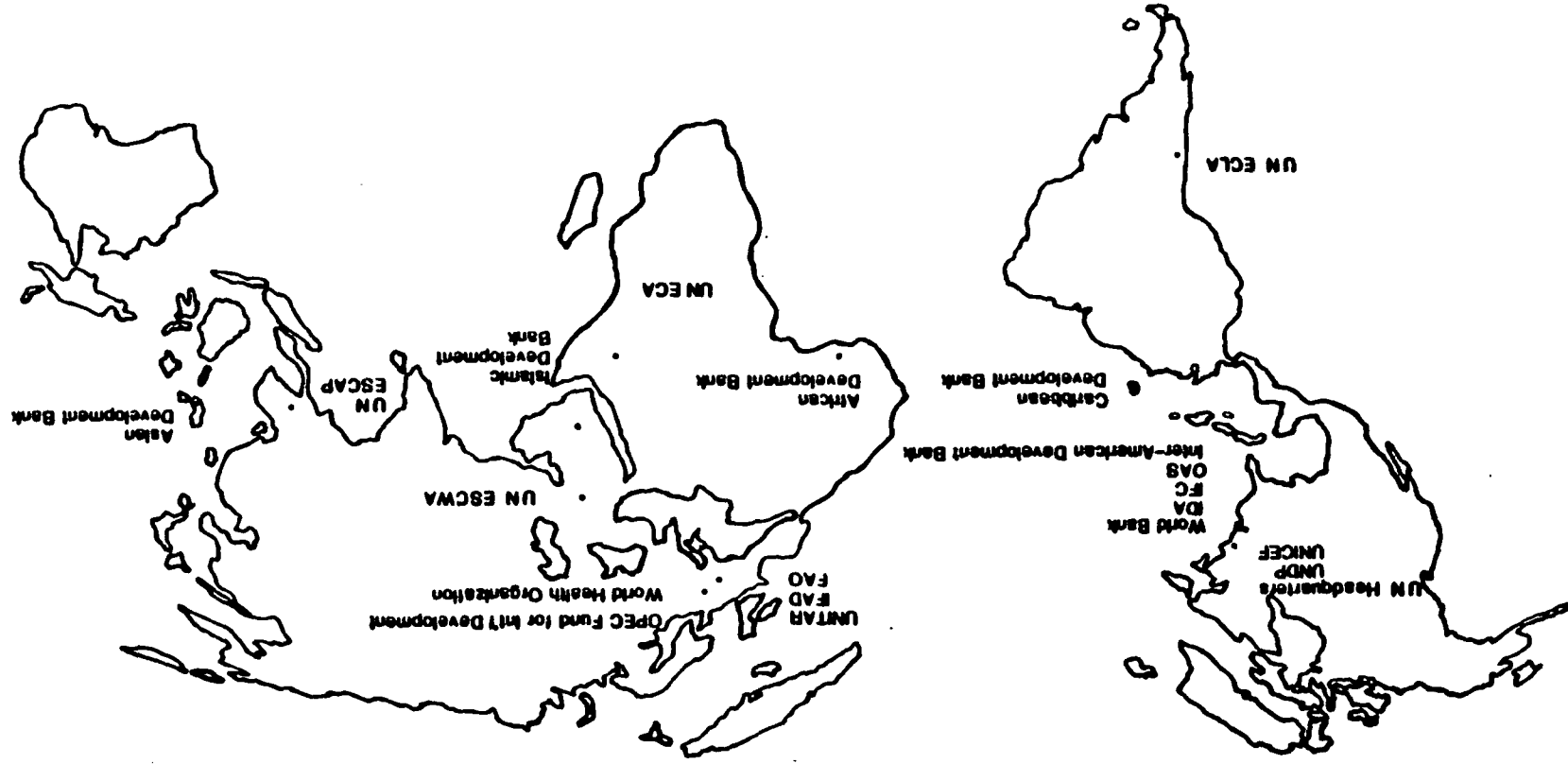
Thus, the report will assist U.S. renewable energy firms in targeting multilateral organizations and projects relevant to their individual marketing needs, and in identifying appropriate contacts within these agencies.

This report, which is one of several initiatives sponsored by the CORECT, seeks to address the last major barrier identified above -- financing. It presents information on the key international organizations that annually provide billions of dollars in development, financial, and technical assistance services to developing countries for end-use projects applicable to renewables.

To respond to these barriers, the Committee on Renewable Energy Commerce and Trade (CORECT) was established by the Renewable Energy Industries Development Act of 1983 (P.L. 98-370). The CORECT is comprised of 13 federal agencies whose mission is to enhance commerce in U.S. renewable energy products and services by mitigating export barriers.

- Financing - Developing country end-users most in need of renewable energy systems often lack the capital to purchase these products.

**EXHIBIT 1-1: INTERNATIONAL DEVELOPMENT AND FUNDING INSTITUTIONS-
HEADQUARTERS LOCATIONS**



the organizations' activities according to end-use application sectors, and geographic regions. The institutions are further divided between those which provide project financing (to host governments, not to U.S. exporters), and others that provide only technical assistance or project formulation services.

The information used to prepare this report was obtained through personal interviews with officials of development institutions, library searches, and reviews of organizations' annual reports and other publications.

2.0 The United Nations Overview

2.1 History

The United Nations (UN) was established on June 26, 1945, with the signing of its charter in San Francisco, California. The major objectives of the UN are to maintain international peace and security; to promote friendly relations among nations based on respect for equal rights and self-determination; to cooperate in solving international social, economic, and humanitarian problems; and to harmonize the actions of nations to attain these goals.

The original members of the UN were the 51 nations that participated in the San Francisco Conference and ratified the UN Charter. As of October 1983, 158 member countries comprise the UN. Exhibit 2-1 provides a listing of UN member countries. In addition, the following non-member states are permanent observers to the UN: People's Democratic Republic of Korea, the Holy See, Monaco, Republic of Korea, and Switzerland.

2.2 Organization

The UN Charter established six principal organs: the General Assembly; the Security Council; the Economic and Social Council; the Trusteeship Council; the International Court of Justice; and the Secretariat. Exhibit 2-2 illustrates the organization of the UN system, with a brief description of the six UN components provided below.

- General Assembly. All members of the UN are members of the General Assembly and each has one vote. The Assembly receives and considers reports from the other UN organs and approves the budgets of the UN and its specialized agencies.

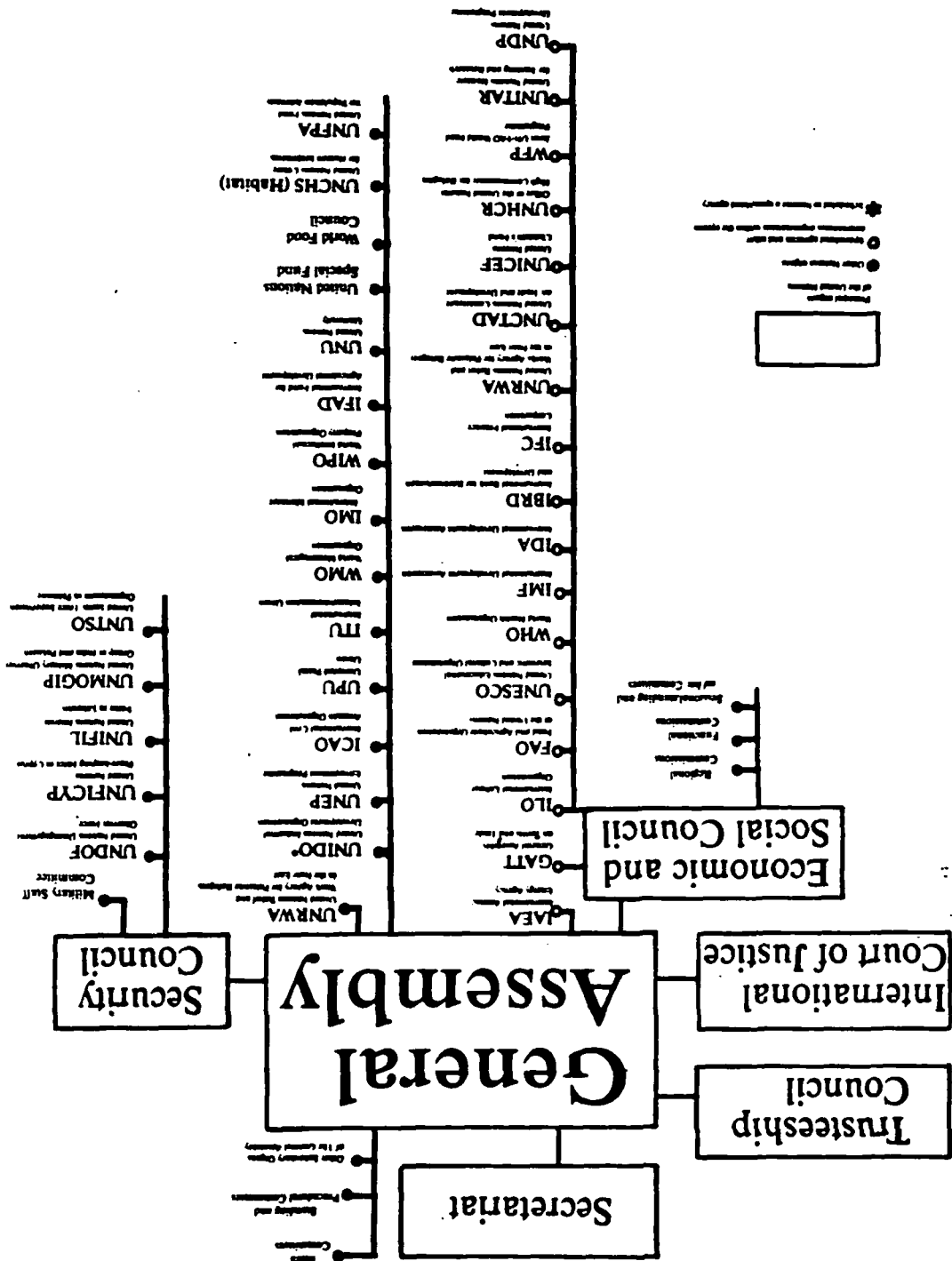
- Security Council. The Council has primary responsibility for the preservation of international peace and security. The 5 permanent members -- China, France, the United Kingdom, and the United States -- are joined by 10 nonpermanent members who are elected by the General Assembly to 2-year terms. The Council may investigate and determine the existence of any threat to peace and may make recommendations to maintain or restore international peace and security.

- Economic and Social Council. This organ, under the authority of the General Assembly, coordinates the economic and social work of the UN and of the specialized agencies and institutions known as the "UN family." The subsidiary organizations of the Economic and Social Council include six functional commissions (the Statistical Commission, Population Commission, Commission for Social Development; and Commissions on Human Rights, the Status of Women, and Narcotic Drugs); six standing committees (the Committee for Programme and Coordination and the Committees on Natural Resources, Transnational Corporations, Human Settlements, Non-Governmental Agencies, and Negotiations with International Agencies); and five regional commissions (the Economic Commission for Africa, and headquartered in Addis Ababa; the Economic and Social Commission for

Exhibit 2-1: MEMBER COUNTRIES OF THE UNITED NATIONS

Panama	German Democratic Republic of	Afghanistan
Papua New Guinea	Germany, Federal Republic of	Albania
Paraguay	Ghana	Algeria
Peru	Greece	Angola
Philippines	Grenada	Antigua and Barbuda
Poland	Guatemala	Argentina
Portugal	Guinea	Australia
Qatar	Guinea-Bissau	Austria
Romania	Guyana	Bahamas
Rwanda	Haiti	Bahrain
Saint Christopher and Nevis	Honduras	Bangladesh
Saint Lucia	Hungary	Barbados
Saint Vincent and the Grenadines	Iceland	Belgium
Samoa	India	Belize
Sao Tome and Principe	Indonesia	Benin
Saudi Arabia	Iran (Islamic Republic of)	Bhutan
Senegal	Iraq	Bolivia
Seychelles	Ireland	Botswana
Sierra Leone	Israel	Brazil
Singapore	Italy	Bulgaria
Solomon Islands	Ivory Coast	Burkina Faso
Somalia	Japan	Burma
South Africa	Jamaica	Burundi
Spain	Jordan	Byelorussian Soviet Socialist Republic
Sri Lanka	Kuwait	Cameroon
Sudan	Kenya	Canada
Suriname	Laos People's Democratic Republic (Laos)	Cape Verde
Swaziland	Lebanon	Central African Republic
Sweden	Lesotho	Chad
Syrian Arab Republic	Libya Arab Jamahiriya	Chile
Thailand	Luxembourg	China
Togo	Madagascar	China
Trinidad and Tobago	Malawi	Colombia
Tunisia	Malaysia	Comoros
Turkey	Maldives	Congo
Uganda	Mali	Costa Rica
Ukrainian Soviet Socialist Republic	Mauritania	Cuba
United Arab Emirates	Mexico	Czechoslovakia
United Kingdom of Great Britain and Northern Ireland	Morocco	Cyprus
United Republic of Tanzania	Mozambique	Democratic Kampuchea
United States of America	Nepal	Democratic Yemen
Uruguay	Netherlands	Denmark
Vanuatu	New Zealand	Djibouti
Venezuela	Nicaragua	Dominican Republic
Viet Nam	Niger	Dominica
Yugoslavia	Nigeria	Ecuador
Zaire	Norway	Egypt
Zambia	Oman	El Salvador
Zimbabwe	Pakistan	Equatorial Guinea

ORGANIZATIONAL STRUCTURE OF THE UNITED NATIONS SYSTEM
 Exhibit 2-2



In 1960, the General Assembly determined that the advanced countries should transfer 1 percent of their national income to the UN. The Second United Nations Development Decade was declared in October 1970, and with it the General Assembly adopted the International Development Strategy for the Decade. This strategy included measures to increase financial resources for development. Equally important, the Member States also resolved at that time that the developing countries must bear the major responsibility for financing their development.

As part of its overall objective to promote economic growth in the developing world, the United Nations places great emphasis on stimulating and mobilizing resources within the developing countries. The UN also seeks to ensure the flow of external financial assistance from developed countries, multilateral agencies, and special funds.

2.3 Funding Policies

- Secretariat. The Secretariat services the other components of the UN and administers the programs and policies that they enact. It is comprised of the Secretary-General, who is the chief administrator of the UN, and related staff. The staff of the Secretariat includes 16,000 men and women from more than 140 countries who execute the day-to-day operations of the UN both at headquarters in New York City and at offices around the world. Their responsibilities include administering peace-keeping operations, organizing conferences on issues of global concern, translating documents, and providing the media with information about the UN.
- International Court of Justice. The Court, located at the Hague, serves as the principal judicial organ of the UN. In resolving international disputes, the Court applies international conventions, international customs, generally recognized principles of law, and judicial decisions of the most highly qualified legalists. The Court is composed of 15 independent judges of different nationalities who are elected by the General Assembly and the Security Council.
- Trusteeship Council. The UN Charter assigns this body primary responsibility for supervising the administration of territories placed under the trusteeship system.
- Economic and Social Commission for Asia and the Pacific, headquartered in Bangkok; the Economic Commission for Latin America, headquartered in Santiago; and the Economic and Social Commission for Western Asia, headquartered in Baghdad). The regional commissions study the problems of their respective areas and recommend courses of action to member countries and UN specialized agencies. The work of the regional commissions has expanded in recent years to include increased involvement in executing development projects. The related intergovernmental agencies are separate, autonomous entities that are linked to the UN by special agreements. These organizations have their own membership, budgets, and executive bodies, but work with the UN through the coordination of the Economic and Social Council. The 15 "specialized agencies" that report to the Economic and Social Council are listed in Exhibit 2-3.

Exhibit 2-3: "SPECIALIZED AGENCIES" OF THE UNITED NATIONS

International Labour Organization (ILO)
Food and Agriculture Organization of the UN (FAO)
UN Educational, Scientific, and Cultural Organization (UNESCO)
World Health Organization (WHO)
International Bank for Reconstruction and Development (IBRD)*
International Finance Corporation (IFC)*
International Development Association (IDA)*
International Monetary Fund (IMF)*
International Civil Aviation Organization (ICAO)
Universal Postal Union (UPU)
International Telecommunication Union (ITU)
World Meteorological Organization (WMO)
Inter-Governmental Maritime Consultative Organization (IMCO)
World Intellectual Property Organization (WIPO)
International Fund for Agricultural Development (IFAD)
*Comprise the World Bank

Developing countries were also urged to make effective use of their financial resources through sound fiscal and monetary policies, reform of taxation systems, and mobilization of private savings into investment projects.

2.4 Specialized Agencies

Crucial financial assistance is provided through the facilities of the World Bank, which is comprised of the International Bank for Reconstruction and Development, the International Association, and the International Finance Corporation. Chapters 15.0 to 18.0 contain additional information on the World Bank Group.

2.5 Special UN Funds

The General Assembly established several funds to address special sectoral issues, which include the following:

- The Revolving Fund for Natural Resources Exploration was established in 1973 to provide risk capital for natural resources exploration (predominantly mining) in developing countries.
- The UN Capital Development Fund was established in 1966 to concentrate on community development projects that directly benefit the lowest income groups in the least developed countries. Chapter 9.0 provides further information on the UN Capital Development Fund.

2.6 Technical Cooperation

The United Nations provides technical assistance to developing countries through the following vehicles:

- The regular UN budget (financed by assessed contributions of member states)
- Components of the United Nations Development Programme (see Chapter 3.0)
- Special funds-in-trust
- The regional economic commissions (see Chapters 11.0 - 14.0).

Concerning the last item above, five regional commissions, serving Asia and the Pacific, Africa, Latin America, Western Asia, and Europe, were established by the Economic and Social Council to more effectively address economic problems at a regional level. As a group, these commissions work to increase economic activity, strengthen economic relations among countries, and promote social progress in their respective regions. They are empowered to make recommendations directly to member governments and to the UN specialized agencies. However, no action may be taken regarding a country without the consent of the host government concerned. The Secretariats of the commissions, each of which is headed by an Executive Secretary, are integral components of the United Nations Secretariat, and their budgets are part of the regular UN budget.

As part of the restructuring of the economic and social sectors of the UN, the Department of Technical Cooperation for Development (DTCO) was formed in 1978 to carry out technical cooperation initiatives in areas of UN specialization. Chapter 4.0 contains more background information on DTCO.

Chapters 3.0 to 14.0 that follow provide an in-depth discussion of those UN components with development mandates and/or funding capacity to implement renewable energy projects.

UNITED NATIONS DEVELOPMENT PROGRAMME HIGHLIGHTS

- UNDP assistance is provided only at the request of host governments, in the form of project grants.
- At the country level, UNDP is represented in more than 150 states and territories by Resident Representatives, who oversee projects in every sector.
- UNDP is the world's largest channel for multilateral technical assistance, and directs 80% of its aid to the world's 60 poorest countries.
- The UNDP Energy Account, established in 1980, provides resources to two programs which are jointly executed with the World Bank: (1) the Energy Sector Assessment Program (ESAP) consists of missions by World Bank energy economists to individual developing countries; (2) the Energy Sector Management Program (ESMAP) follows up on ESAP reports and helps countries implement priority investments.
- A joint UNDP/World Bank study was conducted to determine financing requirements for new and renewable sources of energy.

3.0 United Nations Development Programme

One United Nations Plaza
New York, New York 10017
Telephone: (212) 906-5000
Telex: 125 980 or 236 286

Administrator: Mr. Morris Draper

3.1 Agency Background

3.1.1 History

The United Nations Development Programme (UNDP) is the focal point of the UN development system. Established in 1965, the UNDP is the world's largest channel for multilateral technical and pre-investment activities.

3.1.2 Mission

The UNDP aims to help developing countries make better use of their assets, improve living standards, and expand productivity. It works to achieve these aims by conducting surveys of the country's natural resources, expanding educational systems, upgrading economic and development planning capabilities, and helping to mobilize capital investments to achieve these objectives. The UNDP is represented at the country level, in more than 150 countries and territories, by a Resident Representative who oversees projects in virtually every economic and social sector. These project areas include farming, fishing, manufacturing, power, transport, communications, health and environmental sanitation, education, economic planning, and public administration.

3.1.3 Activities

UNDP assistance is provided only at the request of host governments, in the form of project grants. Requests for UNDP assistance are made by the host country through the UNDP Resident Representative. The government itself establishes how it wishes to spend the UNDP funds. Nearly all projects are implemented by the UN Department of Technical Cooperation for Development (DTCD) or one of the other UN-related agencies. Exhibit 3-1 lists the executing agencies and participating organizations of the UNDP.

3.1.4 Organization

The UNDP Administrator is responsible to a 48-nation Governing Council representing all major regions, and donor and recipient countries. The Governing Council reports to the UN General Assembly through the Economic and Social Council. It sets policy guidelines and approves the volume of assistance allocated to each recipient country.

The UNDP maintains country offices in 114 developing nations. These offices are headed by Resident Representatives who are responsible for performing the bulk of program operations and for assisting governments in coordinating UN and developing country inputs. The Resident Representative can make autonomous program or procurement decisions for sums up to \$400,000 without prior approval

Exhibit 3-1: EXECUTING AGENCIES AND PARTICIPATING ORGANIZATIONS
OF THE UNDP

African Development Bank (ADB)
Arab Fund for Economic and Social Development (AFESD)
Asian Development Bank (AsDB)
Economic and Social Commission for Asia and the Pacific (ESCAP)
Economic Commission for Africa (ECA)
Economic Commission for Europe (ECE)
Economic Commission for Latin America (ECLA)
Economic and Social Commission for Western Asia (ESCWA)
Food and Agriculture Organization of the United Nations (FAO)
Inter-American Development Bank (IDB)
International Atomic Energy Agency (IAEA)
International Civil Aviation Organization (ICAO)
International Fund for Agricultural Development (IFAD)
International Labour Organization (ILO)
International Maritime Organization (IMO)
International Telecommunication Union (ITU)
International Trade Centre (ITC)
Office of the United Nations Disaster Relief Coordinator (UNDRC)
United Nations Centre for Human Settlements (HABITAT)
United Nations Centre on Transnational Corporations (UNCTC)
United Nations Children's Fund (UNICEF)
United Nations Conference on Trade and Development (UNCTAD)
United Nations Department of Technical Cooperation for Development (DTCO)
United Nations Educational, Scientific, and Cultural Organization (UNESCO)
United Nations Environment Programme (UNEP)
United Nations Fund for Drug Abuse Control (UNFDAC)
United Nations Fund for Population Activities (UNFPA)
United Nations High Commissioner for Refugees (UNHCR)
United Nations Industrial Development Organization (UNIDO)
Universal Postal Union (UPU)
World Bank
World Food Programme (WFP)
World Health Organization (WHO)
World Intellectual Property Organization (WIPO)
World Meteorological Organization (WMO)
World Tourism Organization (WTO)

from UNDP headquarters. Exhibit 3-2, at the end of this chapter, lists UNDP Country Offices, the name of the Resident Representative, the office address, telephone, and telex numbers.

3.2 Program Emphasis

3.2.1 Sectoral Focus

According to the 1984 UNDP Compendium of Approved Projects, there were 4,705 operational projects as of September 30, 1984. The five largest sectoral groupings of projects were as follows: Agriculture, Forestry, and Fisheries (906 projects or 19.3 percent of all projects); Industry (772 projects or 16.4 percent of all projects); Development Strategies and Planning (490 projects or 10.4 percent of all projects); Transportation and Communications (418 projects or 8.9 percent of all projects); and Natural Resources (477 projects or 10.1 percent of all projects).

In the energy sector, the UNDP Energy Account was established in 1980 in response to the severe strain placed on developing countries by high-priced energy imports. By November 1983, \$10.4 million had been contributed to the account, and the OPEC Fund for International Development pledged an additional \$6 million over a 3-year period. The Energy Account's financial resources have been applied to two major programs. The first program, the Energy Sector Assessment Program (ESAP), was initiated in 1980 to help developing countries formulate strategies for increasing energy production and for using energy more efficiently. This program, which is conducted in cooperation with the World Bank, consists of missions by World Bank energy economists to individual countries, followed by written assessments of the countries' energy sectors. ESAP has produced assessments of more than 70 countries thus far. The second program, the Energy Sector Management Assistance Program (ESMAP), was inaugurated in 1983 and follows up on ESAP reports by assisting countries, as well as donor agencies and the private sector, to implement priority investments and technical assistance activities. In addition to these two programs, a joint UNDP/World Bank study was performed to evaluate financing requirements for pre-investment and to identify support activities for new and renewable energy sources. These joint efforts are designed to help developing countries choose appropriate energy strategies and related investments.

3.2.2 Regional Emphasis

The geographical distribution of UNDP projects for 1984 was as follows:

Region	Percent
Africa	33
Asia and the Pacific	33
Latin America	16
Arab States	11
Europe	5
Global and Interregional	2
Total	100

The DMS provides procurement services for UNDP headquarters and country offices. DMS purchases include office equipment, furniture, and utility vehicles. Procurement in 1982 totaled \$5.1 million (\$2.5 million of equipment and supplies, and \$2.6 million in services).

The DMS provides procurement services for UNDP headquarters and country offices. DMS purchases include office equipment, furniture, and utility vehicles. Procurement in 1982 totaled \$5.1 million (\$2.5 million of equipment and supplies, and \$2.6 million in services).

The OPE handles those projects that do not fall directly into the specialized field of a particular UN agency (e.g., health and WHO, agriculture and FAO), that are interdisciplinary and involve two or more agencies, or that receive expressed host government requests for direct implementation by UNDP.

UNDP aid is integrated into overall national or regional development efforts and nearly all UNDP projects are implemented by one of the executing agencies within the UN system of organizations. However, the UNDP does implement a limited number of projects directly. The UNDP's New York City headquarters houses two components directly involved in procurement: the Office for Projects Execution (OPE) and the Division for Administrative and Management Services (DAMS).

3.4.2 Procurement

As noted above, UNDP assistance is provided only at the request of the host government. If requested, staff members of a country office will provide technical assistance in formulating projects and identifying problem sectors.

3.4.1 Project Evaluation

3.4 Lending and Procurement Procedures

In May 1986, the UNDP, in conjunction with photovoltaic industry representatives, sponsored two information briefings on PV for developing country applications. The briefings, which were held in Thailand and Kenya, addressed the technical, economic, and institutional factors of photovoltaic technologies. In attendance were decision-makers from UN member agencies and host countries.

As a result of ESAP and ESMAF activities, projects have already been executed in the areas of hydropower site selection, geothermal exploration, and wind, tidal, and solar power. Follow-up activities to ESMAF efforts include rural and renewable energy planning, institutional and manpower development, and support for host country energy planning and management.

3.3 Renewable Energy Project Opportunities

As noted above, UNDP-funded projects are normally executed by the Department of Technical Cooperation for Development or by one or more of the 25 UN-related agencies. Exhibit 3-1 provides a list of executing agencies and participating organizations of the UNDP.

3.2.3 Interagency Cooperation

The Inter-Agency Procurement Services Unit (IAPSU) is a central business information point for the UN system. Its main objective is to assist UN executing agencies in procuring equipment at the lowest possible cost. Other IAPSU objectives include increasing procurement from developing countries, increasing utilization of non-convertible currencies, and achieving a broader geographical range of procurement sources. Goods are procured through international competitive bidding; IAPSU's aim is to obtain a representative assortment of tenders from qualified sources, at the lowest prices, from an equitable geographical distribution of bidders.

IAPSU is also charged with providing potential suppliers of equipment and services with advance information on business opportunities arising from UNDP-assisted projects. Information provided by the 114 UNDP country offices is transmitted to the Development Business magazine for publication (see 3.6 "Additional References" below).

3.5 Key Contacts

Further information on renewable energy projects is available from:

Mr. A. Bruce Harland
Director
UNDP Energy Office
One United Nations Plaza
New York, New York 10017
Telephone: (212) 906-6090

or

Mr. Ram S. Ragde
UNDP Energy Office
One United Nations Plaza
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Additional information on UNDP procurement procedures can be obtained from:

Director, Office for Projects Execution
United Nations Development Programme
One United Nations Plaza
New York, New York 10017
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and

Chief, Division for Administrative and Management Services
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New York, New York 10017
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3.6 Additional References

UNDP produces a number of publications that provide detailed information on programs and policies, including:

- Development In Action - the UNDP newsletter
- General Business Guide - a handbook describing the procurement needs and procedures of UNDP and its participating UN member agencies.

In addition, announcements of upcoming UNDP projects and related procurements are published in Development Business, the business edition of the UN's Development Forum newspaper. Development Business is published 24 times a year and carries an annual subscription fee of \$250.00. For subscription information, contact:

Development Business
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Exhibit 3-2: UNDP FIELD OFFICES (Continued)

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Exhibit 3-2: UNDP FIELD OFFICES (Continued)

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Exhibit 3-2: UNDP FIELD OFFICES (Continued)

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Exhibit 3-2: UNDP FIELD OFFICES (Continued)

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Exhibit 3-2: UNDP FIELD OFFICES (Continued)

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Exhibit 3-2: UNDP FIELD OFFICES (Continued)

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Telex: 41123 SY DEVAM
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THAILAND

UNDP Field Office
G.P.O. Box 618
Bangkok, Thailand
Resident Representative: Mr. Yoon Yul Kim
Telex: TH 82392
Telephone: 66-2-2829613

TOGO

UNDP Field Office
Boite Postale 911
Lome, Togo
Resident Representative: Mr. Dramane Ouattara
Telex: 5261 TOGO
Telephone: 21-20-22

TRINIDAD AND TOBAGO

UNDP Field Office
P.O. Box 812
Port-of-Spain, Trinidad and Tobago
Resident Representative: Mr. Hugh Greenidge
Telex: 22257 UNDP WG
Telephone: 809-62-37056

Exhibit 3-2: UNDP FIELD OFFICES (Continued)

TUNISIA

UNDP Field Office
Boite Postale 863
Tunis, Tunisia
Resident Representative: Mr. Riad Tabbarah
Tel: 13777
Telephone: 216-1-264-011-
662 855

TURKEY

UNDP Field Office
P.K. 407
Ankara, Turkey
Resident Representative: Mr. Sarfraz Khan Malik
Tel: 44584 UNDP TR
Telephone: 90-41-26 81 13

UGANDA

UNDP Field Office
P.O. Box 7184
Kampala, Republic of Uganda
Resident Representative: Mr. Friedrich Mumm von Mallinckrodt
Tel: 61255
Telephone: 256-41-233440

UNITED ARAB EMIRATES

UNDP Field Office
P.O. Box 3490
Abu Dhabi, United Arab Emirates
Resident Representative: Mr. Akram Qursha
Tel: 22727 UNDP EM
Telephone: 971-2-324987

UNITED REPUBLIC OF TANZANIA

UNDP Field Office
P.O. Box 9182
Dar-es-Salaam, United Republic of Tanzania
Resident Representative: Ms. Mary Chinery-Hesse
Tel: 975-41284
Telephone: 255-51-27411

URUGUAY

UNDP Field Office
Castilla de Correo 1207
Montevideo, Uruguay
Resident Representative: Mr. Pedro Mercader
Tel: UNDEVPR UY 23020
Telephone: 598-2-90-01-77

Exhibit 3-2: UNDP FIELD OFFICES (Continued)

VENEZUELA

UNDP Field Office
Apartado 69005
Caracas 1062 A, Venezuela
Resident Representative: Ms. Elena Martinez
Tellex: 23181 UNDPVC
Telephone: 58-2-284-6823

VIET NAM

c/o UNDP Field Office
GPO Box 618
Bangkok, Thailand
Resident Representative: Mr. Anders Roelkjaer
Tellex: 4417 UNDP VT
Telephone: 5-7495

YEMEN ARAB REPUBLIC

UNDP Field Office
P.O. Box 551
San'aa, Yemen Arab Republic.
Resident Representative: Mr. Ayoub Batarseh
Tellex: 2234 UNDP YE
Telephone: 967-2-205596

YUGOSLAVIA

UNDP Field Office
P.O. Box 644
11001 Belgrade, Yugoslavia
Resident Representative: Mr. Roland Riefenrath
Tellex: 11393
Telephone: 38-11-644-463

ZAIRE

UNDP Field Office
Boite Postale 7248
Kinshasa, Republic of Zaire
Resident Representative: Mr. Robert Kinloch
Tellex: UNDP KIN ZR 21164
Telephone: 30-601

ZAMBIA

UNDP Field Office
P.O. Box 31966
Lusaka, Republic of Zambia
Resident Representative: Mr. Dusan Dragic
Tellex: 42730
Telephone: 260-1-212637

ZIMBABWE

UNDP Field Office
P.O. Box 4775
Harare, Zimbabwe

Resident Representative: Mr. Abebe Ambatchew

Telex: 4668 ZM
Telephone: 263-0-79-26-81

Exhibit 3-2: UNDP FIELD OFFICES (Continued)

**UNITED NATIONS DEPARTMENT OF TECHNICAL COOPERATION
FOR DEVELOPMENT HIGHLIGHTS**

- DTCD is the principal executing agency for the UNDP, and has primary responsibility for exploration, development, and utilization of new and renewable sources of energy.
- A special unit, the Conference on New and Renewable Sources of Energy (NRSE), was initiated at an energy development conference in Nairobi, Kenya in 1981.
- The special unit on NRSE is executing pilot projects and feasibility studies in geothermal, biomass, solar, wind, mini-hydro, and ocean energy.
- DTCD publishes a Natural Resources and Energy Newsletter that is available free-of-charge.

4.0 United Nations Department of Technical
Cooperation for Development

One United Nations Plaza
New York, New York 10017
Telephone: (212) 754-8362

Under-Secretary-General: Mr. Xie Qimei



4.1 Agency Background

4.1.1 History

The Department of Technical Cooperation for Development (DTCO) was created in March 1978 as part of the United Nations' overall initiative to reorganize its economic and social structures.

4.1.2 Mission

DTCO is the principal implementing entity of the UN Secretariat for Technical Cooperation Projects and serves as an executing agency for the United Nations Development Programme (UNDP). More specifically, DTCO is responsible for the exploration, development, and utilization of non-nuclear energy sources. In recognition of the need to identify and use indigenous energy supplies in developing countries, DTCO created the Special Unit on New and Renewable Sources of Energy (NRSE).

4.1.3 Activities

The Special Unit on NRSE commenced operations with an energy development conference in Nairobi, Kenya, in August 1981. The findings and recommendations of this conference, known as the Nairobi Programme, included expanding international cooperation to help developing countries to adapt, develop, and utilize their NRSE; developing NRSE as a means of facilitating decentralized and diversified growth in recipient countries; and mobilizing additional financial resources from developed countries to aid developing nations in identifying and using NRSE.

4.2 Program Emphases

4.2.1 Sectoral Focus

DTCO's Special Unit on NRSE is executing projects in a variety of renewable energy technology areas -- geothermal, biomass, solar, wind, mini-hydropower, ocean, multi-source, and general conservation -- for a wide range of end-use applications. DTCO-sponsored projects include solar heating and cooling of homes in the People's Republic of China; biogas digesters in India; a pre-feasibility evaluation of wind power for connection to the electricity grid in Mauritius; and a feasibility study for a 15-MW geothermal power plant in Chile.

The role of DTCD is primarily one of technical advisor rather than financing organization. DTCD's technical cooperation activities are funded primarily by the UNDP and, therefore, conform to procurement procedures for UNDP-assisted projects. Section 3.4 discusses the lending and procurement procedures for UNDP.

4.4.2 Procurement

At the request of the local government, DTCD will dispatch an advisory mission to the developing country to provide guidance on energy policy, project design, resource evaluation, and feasibility studies. As part of its special mandate to help develop NRSE, DTCD will also provide developing countries with assessments of financing needs for energy exploration, including geothermal, and surveys for small hydropower (around 1 MW) station projects.

4.4.1 Project Evaluation

4.4 Lending and Procurement Procedures

In accordance with their mandate to assist developing countries in choosing the most appropriate renewable energy technologies, DTCD's Special Unit on NRSE is executing pilot projects and feasibility studies in each of the renewable energy technologies listed above.

4.3 Renewable Energy Project Opportunities

Region	\$(U.S. Millions)	Percent
Africa	\$ 253.2	18
Asia and the Pacific	\$ 774.0	56
Europe	\$ 79.9	6
Latin America and the Caribbean	\$ 274.5	19
Interregional	\$ 1.1	1
Total	<u>\$1,382.7</u>	<u>100</u>

The regional distribution of funding commitments for the development of NRSE during the period 1981-1983 was as follows:

4.2.2 Regional Emphasis

4.5 Key Contacts

For further information on DICD's activities in the renewable energy area, contact:

Mr. Edmund K. Leo
Chief
Energy Resources Branch
Department of Technical Cooperation for
Development
One United Nations Plaza
New York, New York 10017
Telephone: (212) 754-8773

or

Mr. Suresh Hurry
Energy Resources Branch
Department of Technical Cooperation for
Development
One United Nations Plaza
New York, New York 10017
Telephone: (212) 754-8594

or

Mr. Joseph V. Acakpo-Satchivi
Secretary
Committee on the Development and Utilization
of New and Renewable Sources of Energy
Room S-2977D
United Nations
New York, New York 10017
Telephone: (212) 754-5737

4.6 Additional References

In September 1985, DICD produced a summary report of its activities in the energy sector. This 15-page overview is available from:

Energy Branch
Department of Technical Cooperation
for Development
One United Nations Plaza
New York, New York 10017

In addition, DICD issues a National Resources and Energy Newsletter that is available, free-of-charge, from the address listed above.

UNITED NATIONS CHILDREN'S FUND HIGHLIGHTS

- UNICEF works with developing countries to plan and implement programs for maternal and child health, nutrition, potable water supply and sanitation, education, and family planning.
- The Extended Programme on Immunization accounts for more than 50% of UNICEF's expenditures. UNICEF officials in New York are familiar with photovoltaic-powered refrigerators, but lack the funds to purchase such capital-intensive systems.
- UNICEF maintains field offices in more than 90 countries, through which assistance is funded and implemented. The key decision-maker for any particular project is the head of the UNICEF office in the individual country.
- The UNICEF Packing and Assembly Center in Copenhagen, Denmark stockpiles supply items, such as medical equipment, to facilitate direct distribution to project sites.



Executive Director: Mr. James P. Grant

866 United Nations Plaza
New York, New York 10017
Switchboard: (212) 415-8000

5.1 Agency Background

5.1.1 History

The United Nations International Children's Emergency Fund (UNICEF) was established by the General Assembly in 1946 to meet the needs of children in post-war Europe and China. In 1950, the Fund's emphasis shifted to more long-range programs to benefit children in developing countries. The General Assembly determined in 1953 that UNICEF should continue its work indefinitely. At this time, its name was changed to the United Nations Children's Fund, but the acronym "UNICEF" remained.

5.1.2 Mission

UNICEF cooperates with developing countries to protect children and enable them to develop their full potential. According to UNICEF's Basic Strategy, which was adopted in 1976, the Fund assists governments, at the government's request, to plan, develop, and implement low-cost programs for maternal and child health, nutrition, clean water and sanitation, education, and family planning.

5.1.3 Activities

UNICEF assists programs for children in more than 100 countries; these countries are divided into 3 categories:

- Group I - countries that require "special assistance" and are designated as least developed.
 - Group II - countries that receive UNICEF's "normal" level of assistance and are in the middle range of development. The child population of these countries represents about two-thirds of all children in UNICEF-assisted countries.
 - Group III - countries that have reached a more advanced stage of development, yet still require outside assistance due to a lack of trained personnel.
- There are three major types of UNICEF assistance: planning and design of services for children, delivery of supplies and equipment, and provision of funds for the training of personnel (e.g., nutritionists, teachers, health and sanitation workers, social workers, midwives, and birth attendants) to work with and for children.

UNICEF assistance is provided at the request of the developing country, and programs are formulated in consultation with government officials. For this reason, UNICEF has acquired a highly decentralized system of evaluating projects and selecting project inputs. Therefore, the key decision-maker for any particular project is the head of the UNICEF field office in that country.

5.4.1 Project Evaluation

5.4 Lending and Procurement Procedures

The major areas of UNICEF activity -- primary health care and immunization, potable water supply and sanitation, education, and shelter -- provide numerous opportunities for use of renewable energy technologies.

5.3 Renewable Energy Project Opportunities

As noted above, UNICEF provides development aid to mothers and children in more than 100 countries in Africa, Asia, Latin America, and the Eastern Mediterranean.

5.2.2 Regional Emphasis

UNICEF programs are directed at five major areas of child welfare. Maternal and child health is UNICEF's major field of activity, particularly the Extended Programme of Immunization (EPI), which accounts for more than 50 percent of total expenditures. In addition, health, sanitation, and clean water supply programs have been implemented in more than 100 countries. Aid to child malnutrition programs has more than doubled since 1966. Education programs include teacher training, provision of books and equipment, and curriculum reform. Emergency aid is provided to mothers and children in times of natural disasters or epidemics in the form of vaccines, food, medicines, clothing, and blankets.

5.2.1 Sectoral Focus

5.2 Program Emphasis

UNICEF maintains field offices in more than 90 countries. These field offices fund and implement assistance programs. Exhibit 5-1, at the end of this chapter, lists the UNICEF field offices.

UNICEF has semi-autonomous status within the United Nations and reports to the Economic and Social Council and the General Assembly. An Executive Board, comprised of representatives from 30 states chosen by the Economic and Social Council, formulates UNICEF's policies and meets annually to review the Fund's programs. UNICEF relies entirely on voluntary contributions to finance its activities. Nearly three-quarters of its income is provided by governments; the remainder comes from the general public, fund-raising campaigns, and greeting card sales. In addition, National Committees for UNICEF in 31 countries help increase awareness about the needs of children in the developing world and explain how UNICEF works to meet those needs.

5.1.4 Organization

5.4.2 Procurement

Specifications for equipment are developed by UNICEF field office staff in conjunction with local government authorities, and purchases are made on a competitive bid basis.

The UNICEF Packing and Assembly Center (UNIPAC) in Copenhagen, Denmark, was established in 1963 to facilitate bulk procurement and distribution of supplies for UNICEF-assisted projects. UNIPAC stockpiles supply items such as medical equipment, pharmaceuticals, school equipment, and emergency supplies, and can custom-pack these goods to facilitate direct distribution to project sites.

UNICEF's Supply Division, located in New York City and Geneva, Switzerland, procures project inputs on behalf of governments, non-governmental organizations, and UN agencies providing assistance similar to that offered by UNICEF.

5.5 Key Contacts

As previously noted, the local UNICEF field offices generally make autonomous decisions regarding project inputs. Exhibit 5-1 provides a list of addresses and telex and telephone numbers of the UNICEF field offices.

Additional information on UNIPAC can be obtained from:

General Manager
UNIPAC

129 Aarhusgade
Freepost

2100 Copenhagen, Denmark
Telephone: 29 34 56

Telex: 19813 UNICEF DK

Information on UNICEF procurement policies is available from:

Mr. Jean Wasselein

Head of Procurement

UNICEF Supply Division

866 United Nations Plaza

New York, New York 10017

Telephone: (212) 415-8390

5.6 Additional References

More detailed descriptions of UNICEF programs and objectives are provided in the State of the World's Children 1986, the annual report of UNICEF. Copies of this 88-page report are available from:

UNICEF

Division of Communication and Information

866 United Nations Plaza

New York, New York 10017

Telephone: (212) 415-8211

Exhibit 5-1: UNICEF FIELD OFFICES

AFGHANISTAN

UNICEF
P.O. Box 54
Kabul, Republic of Afghanistan
Tel: 206
Telephone: 61865

ALGERIA

UNICEF
Boite Postale 660
Alger-Gare, Algeria
Tel: 52824
Telephone: 231-590646

ANGOLA

UNICEF
Caixa Postal 2707
Luanda, Angola
Tel: 3227
Telephone: 71748

BAHRAIN

UNICEF
P.O. Box 6755
Manama, Bahrain
Tel: 9665 BN
Telephone: 728 696

BANGLADESH

UNICEF
P.O. Box 58
Dhaka, Bangladesh
Tel: 642471 CEF BJ
Telephone: 500 180

BARBADOS

UNICEF
Es Sueno, Worthing
Christ Church, Barbados
Tel: 2344 UNDEVPRO
Telephone: 809-436-2119

BENIN

UNICEF
Boite Postale 2289
Cotonou, Benin
Tel: 5083 WORLD BANK CTNOU
Telephone: 31.57.77

BHUTAN

UNICEF
P.O. Box 162
Thimpu, Bhutan
Cable: UNICEF THIMPU BHUTAN
Telephone: 2959

BOLIVIA

UNICEF
Casilla de Correo No. 20527
La Paz, Bolivia
Tel: 3243 UNICEF BV
Telephone: 321699

Exhibit 5-1: UNICEF FILED OFFICES (Continued)

BOTSWANA

UNICEF
P.O. Box 20678
Gaborone, Botswana
Cable: UNDEVPRO GABORONE
Telephone: 52752

BRAZIL

UNICEF
Caixa Postal 040-084
70072 Brasilia, DF, Brazil
Telephone: 224 7145
Telex: 61181

BURKINA FASO

UNICEF
Boite Postale 3420
Ouagadougou, Burkina Faso
Telephone: 336487
Telex: 5357 BF

BURUNDI

UNICEF
c/o UNDP
Boite Postale 1490
Bujumbura, Burundi
Telephone: 26888
Telex: 5078 UNDEVPRO

CAMEROON

UNICEF
c/o UNDP Yaounde
P.O. Box 836
United Republic of Cameroon
Telephone: 22-31-82
Telex: 8322

CAPE VERDE

UNICEF
c/o PNUD
Caixa Postal 62
Praia, Cape Verde
Telephone: 548599
Telex: 61 PNUD CV/UNICEF

CENTRAL AFRICAN REPUBLIC

UNICEF
Boite Postale 907
Bangui, Central African Republic
Telephone: 61.28.50
Telex: 5235 RC

CHAD

UNICEF
c/o UNDP
Ndjamne P.O. Box 1141
Chad Republic
Telephone: 39.99
Telex: 5323 KD

Exhibit 5-1: UNICEF FIELD OFFICES (Continued)

CHILE

UNICEF
Casilla 196 Correo 10
Santiago, Chile
Tel: 340338 UNICEF CK
Telephone: 231-4210

CHINA

UNICEF
12 San Litun Lu
Beijing, People's Republic of China
Tel: 22695 CFCB CN
Telephone: 52-3131

COLOMBIA

UNICEF
Apartado Aereo 7550
Carrera 13 No. 75-74
Bogota, Colombia
Tel: 45472 TACRO
Telephone: 217-2200

COMOROS ISLANDS

UNICEF
Boite Postale 497
Moroni, Comoros Islands
Cable: UNICEF MORONI
Telephone: 24-93

CONGO

This office serves Congo, Gabon, and Sao Tome and Principe.
UNICEF
Boite Postale 2110
Brazzaville, Republic of Congo
Tel: 5260
Telephone: 81-4319

DJIBOUTI

UNICEF
P.O. Box 583
Djibouti, Republic of Djibouti
Tel: 5940 DJ
Telephone: 35.12.74

DOMINICAN REPUBLIC

UNICEF
Apartado 1649
Santo Domingo, Dominican Republic
Tel: 3460291
Telephone: 809-532-8900

Exhibit 5-1: UNICEF FIELD OFFICES (Continued)

ECUADOR

UNICEF
Avenida 10 de Agosto 5470 y
Villalengua
Oficina 55, Sucursal 11C1
Apartado Postal 4731
Quito, Ecuador

EGYPT

UNICEF
8 Adnan Omar Sidky St.
Dokki, Cairo
Arab Republic of Egypt

ETHIOPIA

UNICEF
P.O. Box 1169
Africa Hall
Addis Ababa, Ethiopia

FIJI

UNICEF Programme Consultant
c/o UNDP
Private Mail Bag
Suva, Fiji

GHANA

UNICEF
c/o UNDP
Ring Road East
P.O. Box 1423
Accra, Ghana

GUATEMALA

UNICEF
Apartado 525
Guatemala City, Guatemala

GUINEA

UNICEF
P.O. Box 222
Conakry, Guinea

Exhibit 5-1: UNICEF FIELD OFFICES (Continued)

GUINEA-BISSAU

UNICEF
c/o UNDP
Boite Postale 179
Bissau, Guinea-Bissau
UNICEF
Telex: UNDEVPRO BIS 261 UNICEF
Telephone: 21 25 06

GUYANA

UNICEF
c/o UNDP
P.O. Box 726
Georgetown, Guyana
UNICEF
Telex: 2201
Telephone: 64040

HAITI

UNICEF
P.O. Box 1363
Port-au-Prince, Haiti
UNICEF
Telex: (203)0346
Telephone: 5-3532

INDIA

This office serves Bhutan, India, and Mongolia.
UNICEF House
73 Lodi Estate
New Delhi 110003, India
UNICEF Representative
P.O. Box 202/JKT
Jakarta 10002, Indonesia
UNICEF
Telex: 3161464 UNCF IN
Telephone: 690401

INDONESIA

UNICEF Representative
P.O. Box 202/JKT
Jakarta 10002, Indonesia
UNICEF
Telex: 46103 UNICEF IA
Telephone: 321308

IRAN

UNICEF
c/o UNDP
P.O. Box 1555
Teheran, Islamic Republic of Iran
UNICEF
Telex: 212397
Telephone: 684102

IRAQ

UNICEF
P.O. Box 10036
Karradah, Baghdad
Iraq
UNICEF
Telex: 213838
Telephone: 964-1-97921

EXHIBIT 6-1: UNICEF FIELD OFFICES (Continued)

IVORY COAST

UNICEF
Office of the Director
Boite Postale 443
Abidjan 04, Ivory Coast

JAMAICA

This office serves Antigua, Barbados, British Virgin Islands, Dominica, Grenada, Jamaica, Montserrat, Saint Christopher-Nevis-Anguilla, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, and the Turks and Caicos Islands.

UNICEF
P.O. Box 305
Kingston, Jamaica

JORDAN

UNICEF
P.O. Box 811721
Amman, Hashemite Kingdom of Jordan

KENYA

This office serves Burundi, Djibouti, Kenya, and Rwanda.

UNICEF
P.O. Box 4145
Nairobi, Kenya

KOREA

UNICEF Representative in Korea
c/o UNDP
UN House
Seoul, Republic of Korea

LAOS

UNICEF
P.O. Box 1080
Vientiane, Lao People's Democratic
Republic

LEBANON

UNICEF
P.O. Box 5902
Beirut, Lebanon

Exhibit 6-1: UNICEF FIELD OFFICES (Continued)

LESOTHO

UNICEF
c/o UNDP
P.O. Box 301
Maseru, Lesotho
Telex: 4288 UNICEF LO
Telephone: 315801

LIBERIA

UNICEF
P.O. Box 460
Monrovia, Liberia
Telex: 44593 UNICEF
Telephone: 231-262118

MADAGASCAR

UNICEF
c/o UNDP
P.O. Box 1348
Antananarivo - 101, Madagascar
Telex: 22345 UNDEVPRO
Telephone: 280.83

MALAWI

UNICEF
P.O. Box 30375
Lilongwe 3, Malawi
Telephone:

MALAYSIA

UNICEF
P.O. Box 12401
Kuala Lumpur, Malaysia
Telephone: 60-3-930830

MALDIVES

UNICEF
Nitrohu, Fadyaaruu Magu
Male 20-02 Republic of Maldives
Telex: 77052 UNICEF MF
Telephone: 2017

MALI

UNICEF
Boite Postale 96
Bamako, Republic of Mali
Telex: 536 UNICEF MALI
Telephone: 22440

MAURITANIA

UNICEF
Boite Postale 620
Nouakchott, Mauritania
Telex: UNICEF 503 MTN
Telephone: 53784

Exhibit 5-1: UNICEF FIELD OFFICES (Continued)

MAURITIUS

UNICEF
c/o UNDP
P.O. Box 253
Port Louis, Mauritius
Telex: 1M 4259 UNDEVPRO
Telephone: 2-0257

MEXICO

UNICEF
Ave. Presidente Masaryk No. 29
80 Piso
Mexico 5, DF Mexico
Telex: 177 1055 UNICEF
Telephone: 250-1434

MOROCCO

UNICEF
Caster ONU
Rabat/Cheilah, Morocco
Telex: 327 73 M
Telephone: 600.83

MOZAMBIQUE

UNICEF Representative
Caixa Postal 4713
Maputo, Mozambique
Telex: 6-515 ICEF MO
Telephone: 74.10.23

NEPAL

UNICEF
P.O. Box 1187
Gatridhara Road
Katmandu, Nepal
Telex: 02202 UNDP NP
Telephone: 977-5-21991

NICARAGUA

UNICEF
Politicinica Nicaraguense
2 Cuadras Al Oeste
Managua, Nicaragua
Telex: 1204 UNDEVPRO
Telephone: 96-933

NIGER

UNICEF
Boite Postale 12.481
Niamey, Niger
Telex: 982-5453 UNICEF
Telephone: 72 3 724

NIGERIA

UNICEF
P.O. Box 1282
Lagos, Nigeria
Telex: 603.540
Telephone: 22477

Exhibit B-1: UNICEF FIELD OFFICES (Continued)

NORTH YEMEM (YAR)

UNICEF
P.O. Box 725
San'aa, Yemen Arab Republic
Tellex: 2461
Telephone: 967-2-231 256

OMAN

UNICEF
P.O. Box 67 87 Ruwi
Muscat, Sultanate of Oman
Tellex: 5719 UNICEF ON
Telephone: 602624

PAKISTAN

UNICEF
P.O. Box 1063
Islamabad, Pakistan
Tellex: 5585 UNICEF PK
Telephone: 821 643

PARAGUAY

UNICEF
c/o UNDP
Castilla de Correo 1107
Asuncion, Paraguay
Cable: UNDEVPRO ASUNCION
Telephone: 595-21-93025

PERU

UNICEF
P.O. Box 5317
Lima 18, Peru
Tellex: 25309 PE UNICEF
Telephone: 47 7608

PHILIPPINES

This office serves Cook Island, Fiji, Kiribati, Niue, Papua New Guinea, Philippines, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu.
UNICEF
P.O. Box 7429 ADC
Pasay City, Philippines
Tellex: 22251 UNICEF
Telephone: 86 42 45

RWANDA

UNICEF
c/o UNDP
P.O. Box 445
Kigali, Rwanda
Cable: UNDEVPRO KIGALI
Telephone: 53-63

SAUDI ARABIA

UNICEF
P.O. Box 18009
Riyadh 11415, Kingdom of Saudi Arabia
Telephone: 966-1-4415346

SENEGAL

UNICEF
Boite Postale 429
43, Avenue Albert Sarraut
Dakar, Senegal
Tel: 250
Telephone: 21 47 80

SIERRE LEONE

UNICEF
c/o UNDP
P.O. Box 1011
Freetown, Sierre Leone
Tel: 3299 UNDEVPRO FREETOWN
Telephone: 26825

SINGAPORE

UNICEF
360 Orchard Street
International Building 07-02
Singapore 0923
Tel: RS 39089
Telephone: 7376079

SOMALIA

UNICEF
P.O. Box 1768
Mogadiscio, Somali
Democratic Republic
Tel: 762 UNICEF MOG
Telephone: 21089

SOUTH YEMEN (PDRY)

UNICEF
P.O. Box 5208
Maala, Aden
People's Democratic Republic of Yemen
Tel: 2304
Telephone: 42835

SRI LANKA

UNICEF
P.O. Box 143
Colombo, Sri Lanka
Tel: 22505 AB UNICEF
Telephone: 586168

SUDAN

UNICEF
P.O. Box 1358
Khartoum, Sudan
Tel: 24105 SCO SD
Telephone: 46381

SWAZILAND

UNICEF
P.O. Box 1859
Mbabane, Swaziland
Tel: 2159 MD UNICEF
Telephone: 43725

Exhibit 5-1: UNICEF FIELD OFFICES (Continued)

SYRIA

UNICEF
c/o UNDP
P.O. Box 2317
Damascus, Syrian Arab Republic
Telex: 41123
Telephone: 332440

TANZANIA

UNICEF
P.O. Box 4076
Dar-es-Salaam,
United Republic of Tanzania
Telex: 41103
Telephone: 28539

THAILAND

UNICEF
P.O. Box 2-154
Bangkok 10200, Thailand
Telex: TH 82304
Telephone: 2823121

TOGO

UNICEF
c/o UNDP
P.O. Box 911
Lome, Togo
Telex: 5094 UNICEF
Telephone: 21 04 03

TUNISIA

UNICEF
c/o PNUD
Boite Postale 863
Tunis, Tunisia
Telex: 14267
Telephone: 236678

TURKEY

UNICEF
Ataturk Bulvarı 197
P.K. 407
Ankara, Turkey
Cable: UNICEF ANKARA
Telephone: 27 34 91

UGANDA

UNICEF
P.O. Box 7047
Kampala, Uganda
Telex: 61199
Telephone: 234591

Exhibit 5-1: UNICEF FIELD OFFICES (Continued)

UNITED ARAB EMIRATES

UNICEF
P.O. Box 4013
Abu Dhabi, United Arab Emirates
Tel: 22651 EM
Telephone: 342292

ZAIRE

UNICEF
Boite Postale 7248
Kinshasa, Republic of Zaire
Tel: UNDP 21164 UNICEF
Telephone: 30-257

ZAMBIA

UNICEF
P.O. Box 33610
Lusaka, Zambia
Tel: 44310
Telephone: 216332

ZIMBABWE

UNICEF
P.O. Box 1250
Harare, Zimbabwe
Tel: 2458 ZW
Telephone: 703941

WORLD HEALTH ORGANIZATION HIGHLIGHTS

- WHO provides worldwide services to help countries achieve the highest possible level of health. These services include world-wide immunization campaigns, providing safe drinking water, and training health workers.
- WHO's Expanded Programme on Immunization issues technical specifications for photovoltaic-powered medical refrigerators. Institutional purchasers often select equipment based on WHO's endorsements in product information sheets.
- For 1986-1987, WHO's working budget totals nearly \$1 billion to finance health programs in developing member countries.

20 Avenue Appia
1211 Geneva 27, Switzerland
Telephone: 91 21 11
Telex: UNISANTE GENEVA 27821



Director-General: Dr. Halfdan T. Mahler

6.1 Agency Background

6.1.1 History

The World Health Organization (WHO) was founded on April 7, 1948, when the 26th United Nations member ratified its constitution. For this reason, April 7th is celebrated each year, throughout the world, as World Health Day. As of 1985, WHO's membership numbered 166 states, of which 120 are developing countries.

6.1.2 Mission

As stated in its constitution, WHO's objective is the "attainment by all peoples of the highest possible level of health." In 1977, the World Health Assembly set "Health for all by the Year 2000" as WHO's key priority. In keeping with these objectives, WHO plays a major role in the UN International Drinking Water Supply and Sanitation Decade, which was initiated in 1981 to provide safe drinking water and adequate waste disposal for all people of the world. WHO is also leading a worldwide campaign to immunize all children by 1990 against the six major communicable diseases of childhood: diphtheria, measles, poliomyelitis, tetanus, tuberculosis, and whooping cough.

6.1.3 Activities

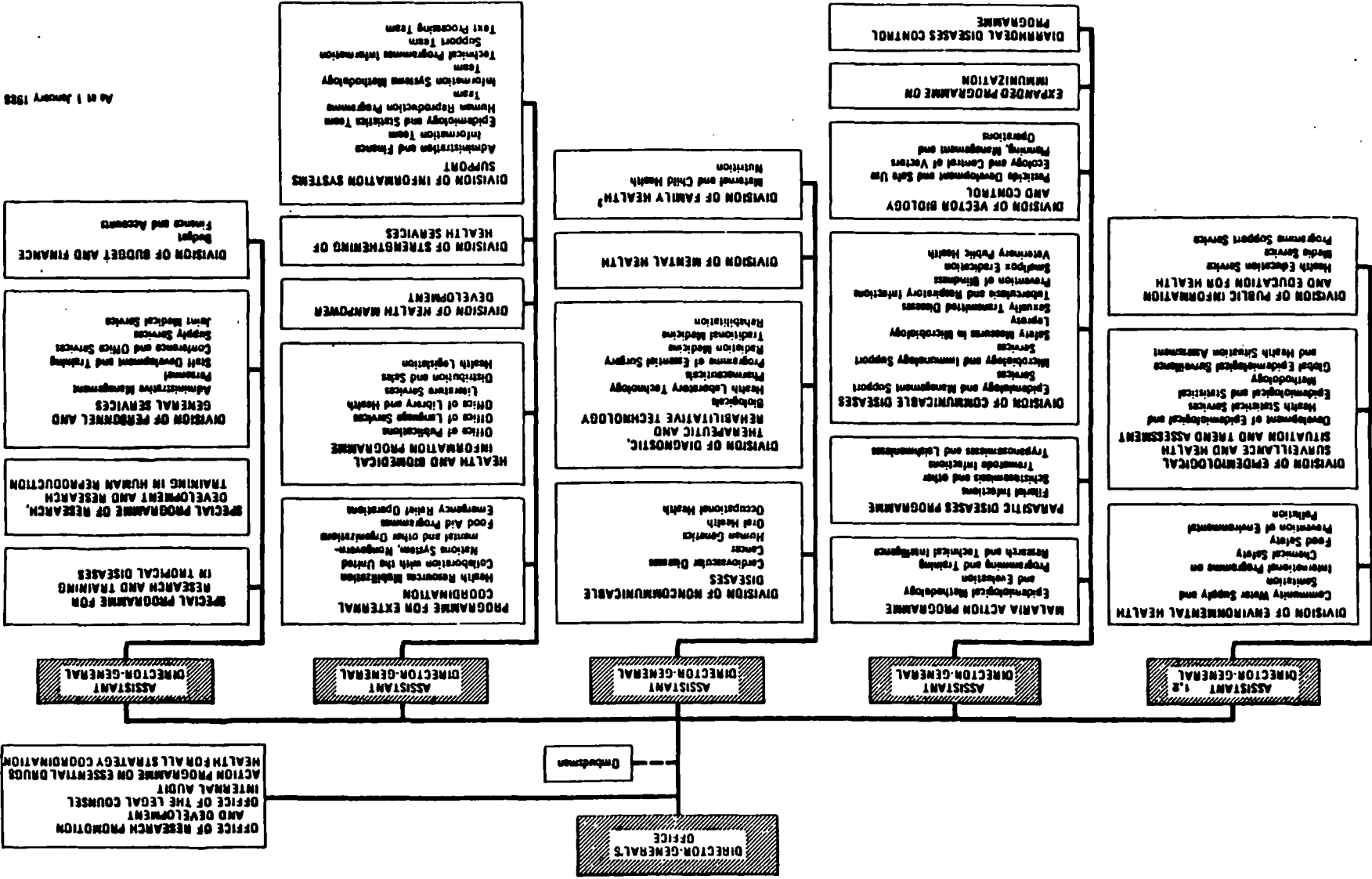
WHO provides worldwide services to promote health, assists member countries in their health efforts, and coordinates biomedical research. WHO's services include disseminating information regarding diseases, pollutants, and drugs, and training health workers to help strengthen national programs to fight diseases. The WHO research program focuses on coordinating the efforts of member countries and national institutions.

The 1986-87 working budget for WHO totals \$543.3 million. However, with the addition of extra budgetary funding from UNDP and other resources, WHO will have nearly \$1 billion with which to finance health programs in member countries.

6.1.4 Organization

The World Health Assembly is the governing body of WHO. All UN member countries are represented at this body. The other main organs of WHO are the Executive Board, six regional committees (Africa, the Americas, Eastern Mediterranean, Europe, Southeast Asia, and Western Pacific), and the Secretariat. Exhibit 6-1 provides an illustration of WHO's organizational structure.

EXHIBIT 6-1: ORGANIZATIONAL STRUCTURE OF THE WORLD HEALTH ORGANIZATION



As of 1 January 1988

The distribution of responsibility for divisions and programmes among assistant directors-general will be modified when the vacant post of assistant director-general is filled.
 The responsibilities of this Assistant Director-General include the chairmanship of the Headquarters Programme Committee.
 The Director of this Division is the focal point for Women, Health and Development.

6.2 Program Emphasis

6.2.1 Sectoral Focus

As part of its specific mandate to plan and coordinate global health activities, WHO promotes all aspects of primary health care, including education regarding health problems, food supply and nutrition, safe water supplies and sanitation, maternal and child health (including family planning), immunization against infectious diseases, prevention and treatment of common diseases, and provision of essential drugs. WHO helps developing countries reinforce their health care capabilities by building up infrastructure, especially manpower and family- and community-oriented health care services, and access to supplies and equipment.

6.2.2 Regional Emphasis

As mentioned above, WHO is divided into six regional offices. The relative size of the six offices is as follows: the Regional Office for Africa encompasses 44 states and 360 million people (8.1 percent of the world total); the Regional Office for the Americas includes 31 states and 610 million people (13.8 percent of the world total); the Regional Office for the Eastern Mediterranean comprises 23 states and 270 million people (6.1 percent of the world total); the Regional Office for Europe encompasses 35 states and 830 million people (18.7 percent of the world total); the Regional Office for Southeast Asia includes 10 states and 1.05 billion people (23.7 percent of the world total); and the Regional Office for the Western Pacific comprises 15 states and 1.31 billion people (29.6 percent of the world total).

6.2.3 Interagency Cooperation

As one of the specialized agencies of the UN, WHO is an autonomous organization that works with other components of the UN Economic and Social Council and with other multilateral development institutions and nongovernmental organizations. For example, the Special Programme for Research and Training in Tropical Diseases is jointly executed by WHO, the World Bank, and the UN Development Programme. Similarly, many of WHO's primary health care programs are administered in cooperation with UNICEF.

6.3 Renewable Energy Project Opportunities

In general, renewable energy technologies can be applied to the broad objectives of WHO -- vaccine refrigeration, potable water supply, and lighting and power for health training and extension services.

More specifically, WHO's Expanded Programme on Immunization (EPI) issues technical specifications for photovoltaic-powered refrigerators. These specifications include requirements to: maintain a temperature range of 2° to 8°C in the refrigerator section, sustain a maximum temperature of -10°C in the freezer; provide a capability for freezing 2 kilograms of warm water within 2 hours; and provide a capacity of 60 to 100 liters in the refrigerator section. All of these specifications must be met over an ambient temperature range of 21°C to 43°C.

WHO also tests equipment that is submitted for evaluation. Based on test results, EPI publishes product information sheets for refrigeration equipment. A product included in these sheets carries WHO's endorsement that it is suitable for vaccine storage. Most importantly, institutional purchasers generally select equipment from these product information sheets. Exhibit 6-2 provides a sample product information sheet.

For further information on WHO performance requirements for PV-powered refrigerators, contact:

Mr. Peter Ozorio
Information Officer
World Health Organization
Division of Public Information
1211 Geneva 27, Switzerland
Telephone: 91 21 11
Telex: 278 21

The WHO Regional Office for the Americas is located at:

Pan American Health Organization Sanitary Bureau
525 23rd Street, N.W.
Washington, D.C. 20037
Telephone: (202) 861-3200

At UN headquarters, further information on WHO programs can be obtained from:

Dr. Karen Edstrom
WHO Medical Liaison Officer
Room A-6528
United Nations
New York, New York 10017
Telephone: (212) 754-7970

or

Mrs. Vera Kalm
Director
WHO Liaison Office to the UN
Room DC2-0956
United Nations
New York, New York 10017
Telephone: (212) 754-6004

6.4 Key Contacts

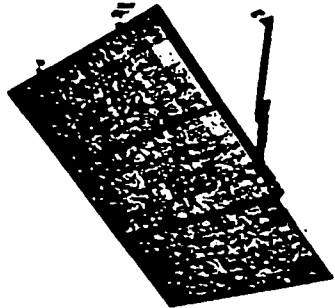
EXHIBIT 6-2: EXAMPLE OF A WHO EPI PRODUCT INFORMATION SHEET

P.I.S 83/08

DESCRIPTION
Photovoltaic solar system
Refrigerator & freezer solar system

COMPANY NAME & ADDRESS

SOLARIX
1335 Piccard Drive
Rockville
MD 20850
USA
Tel/Telx: 301 948 0202 / 248359 solix ur



UNIPAC/

SIZE Refrigerator: Freezer:

Manufacturers gross volume. 93 Lts Vaccine storage capacity. 80 Lts
18 Lts Manufacturers gross volume. 10 Lts
External dimensions of refrigerator/freezer. HxWxL. 91 x 82 x 67 cm

PERFORMANCE at... 32degC... 43degC

Iceback freezing, kg. per /No. hours. 2.1/24 kg/hr 2.1/24 kg/hr
Internal refrigerator temperatures, minimum. 5 degC 8 degC
Internal refrigerator temperatures, maximum. 8 degC 8 degC
Holdover time during power cut. 20 hours 16 hours
Power consumption per 24 hours. 0.93 kWh 0.93 kWh
(with iceback freezing) (with iceback freezing)
kerosene. NA litres NA litres
LP gas. NA lbs NA lbs
C recorded during day/night (43/15C) tests

SYSTEM COMMENTS A B MODEL

Refrigerator/freezer	1	1 Qty Marvel R1D 4
Photovoltaic panels	6	4 Qty Solarix model SX-42 @ 44W
Battery systems	8	6 Qty GNB Absolyte 1260 @ 60Ah
Power regulator	1	1 Qty included with 4 R1D
Array cable	20 m	20 m #6 AWG, 2 cond. type SBO
No. shipping packages	3	3
Overall volume	1.4 m ³	1.1 m ³
Overall weight	306 kg	236 kg
Accessories		

COMPLETE SYSTEM PRICES \$US Qty: 1-9 10-99 100+

System A : Areas receiving 3.5-4.7 kWh/m²/day
8 days no-sun security.....5507 4782 4292
System B : Areas receiving 5.8-7.0 kWh/m²/day
6 days no-sun security.....4781 4115 3674
Both systems normal operation with icebacking, no-sun period without icebacking
Note: 1 kWh/m²/day = 86 kWh/m²/day = 3.6 m.joules/m²/day

COMMENTS Revision date: 22/05/85

Report references: CCIS/85.4
Countries where this company has installed refrigerator/freezer systems:
United States, Australia, Guyana, Ecuador, Kenya, Zimbabwe, Zaire,
Nigeria and Sierra Leone.
Worldwide Solarix distributor, contact above address for further
information.

6.5 Additional References

WHO produces a number of publications on health and development issues, including:

- World Health -- a monthly illustrated magazine
- WHO Chronicle -- a report of WHO activities and publications
- World Health Forum -- a quarterly review of new approaches to health and development issues.

FOOD AND AGRICULTURE ORGANIZATION HIGHLIGHTS

- **FAO Programs are designed to improve levels of nutrition and standards of living; improve efficiency of food production and distribution; and improve rural living conditions.**
- **FAO provides technical assistance, not project funding, in areas such as nutrition, irrigation engineering, plant and animal diseases, and soil erosion control.**
- **In 1984, nearly 44% of FAO's funds for field programs and technical cooperation activities were directed to the needs of Africa.**
- **FAO helps developing member countries identify and formulate investment projects, and obtain funding from institutions such as the World Bank, UNDP, and the regional development banks.**

7.0 Food and Agriculture Organization of the United Nations

Viale delle Terme di Caracalla
00100 Rome, Italy
Telephone: 57971
Telex: 610181 FAO I

Director-General: Mr. Edward Saouma

7.1 Agency Background

7.1.1 History

The Food and Agriculture Organization of the United Nations (FAO) was proposed at the 1943 meeting of the UN Conference on Food and Agriculture and founded on October 16, 1945.

7.1.2 Mission

The primary objectives of FAO are to raise levels of nutrition and standards of living, to improve the efficiency of food production and distribution, and to improve rural living conditions and "ensure humanity's freedom from hunger."

7.1.3 Activities

FAO serves as the lead agency for rural development in the United Nations system. It provides expert technical assistance to member countries and helps them obtain financing for agricultural development projects.

FAO activities include: promoting the global exchange of new types of plants; disseminating information on advanced agricultural techniques; helping countries to combat epidemics of plant and animal diseases; and providing technical assistance in areas such as nutrition and food management, soil erosion control, reforestation, irrigation engineering, and fertilizer production. The organization also collects the latest information on agriculture, forestry, and fisheries and makes it available to member countries.

Field projects account for nearly two-thirds of the professional staff's activities and 80 percent of FAO funds. The bulk of this funding is provided by the United Nations Development Programme (UNDP). However, substantial sums are also provided by donor countries that request FAO to execute aid programs on their behalf.

Technical investment assistance activities, provided at the request of host governments, consist of two stages: identification and project preparation. FAO assists the developing member country in selecting viable agricultural development projects, and then provides the country with FAO staff to identify possible projects within the country.

7.1.4 Organization

FAO is governed by its Conference, which is composed of all 144 member nations. The Conference meets every 2 years to review the state of food and agriculture and to approve FAO's budget and program of work for the next 2 years. The Conference elects an interim governing body, a council of 49 member states, to serve three-year rotating terms. FAO's member countries are listed in Exhibit 7-1.

A number of committees and other bodies have been created by the FAO Conference and Council to encourage cooperative efforts in a specialized area. The Committee on Commodity Problems is an example of one such specialized committee.

7.2 Program Emphasis

7.2.1 Sectoral Focus

The sectoral distribution of FAO-assisted investment in agricultural development for the period 1966-1983 was as follows:

Sector	\$(U.S. Millions)	Percent
Irrigation	8,055	33
Food-Crop Production	6,157	25
Forestry	2,364	10
Credit	2,197	9
Cash-Crop Production	1,275	5
Livestock	1,151	5
Fisheries	954	4
Storage and Marketing	860	4
Research and Education	719	3
Agricultural Industries	505	2
Total	23,237	100

7.2.2 Regional Emphasis

The regional distribution of FAO field programs for 1984, including technical cooperation projects and UNDP-funded efforts, was as follows:

Region	\$(U.S. Millions)	Percent
Africa	105.1	44
Asia and Pacific	56.8	24
Latin America and Caribbean	21.1	8
Near East	55.4	23
Europe	2.5	1
Total	240.9	100

7.2.3 Interagency Cooperation

FAO helps developing member countries identify and formulate investment projects. To accomplish this, FAO works closely with UNDP, the World Bank, Asian Development Bank, African Development Bank, Inter-American Development Bank, and other financing institutions and aid agencies. The World Bank

Exhibit 7-1: FOOD AND AGRICULTURE ORGANIZATION - MEMBER COUNTRIES

- | | | |
|--|---|---|
| <p> Afghanistan
 Albania
 Algeria
 Angola
 Antigua and Barbuda
 Argentina
 Australia
 Austria
 Bahamas
 Bahrain
 Bangladesh
 Barbados
 Belgium
 Belize
 Benin
 Bhutan
 Bolivia
 Botswana
 Brazil
 Bulgaria
 Burkina Faso
 Burma
 Burundi
 Canada
 Cape Verde
 Central African Republic
 Chad
 Chile
 China
 Colombia
 Comoros
 Congo
 Costa Rica
 Cuba
 Cyprus
 Czechoslovakia
 Democratic Kampuchea
 Democratic People's
 Republic of Korea
 Democratic Yemen
 Denmark
 Djibouti
 Dominica
 Dominican Republic
 Ecuador
 Egypt
 El Salvador
 Equatorial Guinea
 Ethiopia
 Fiji
 Finland
 France
 Gabon </p> | <p> Gambia
 Germany, Federal Republic of
 Ghana
 Greece
 Grenada
 Guatemala
 Guinea-Bissau
 Guyana
 Haiti
 Honduras
 Hungary
 Iceland
 India
 Indonesia
 Iran
 Iraq
 Ireland
 Israel
 Italy
 Ivory Coast
 Jamaica
 Japan
 Jordan
 Kenya
 Kuwait
 Laos
 Lebanon
 Lesotho
 Liberia
 Libyan Arab Jamahiriya
 Luxembourg
 Madagascar
 Malawi
 Malaysia
 Maldives
 Mali
 Malta
 Mauritania
 Mauritius
 Mexico
 Mongolia
 Morocco
 Mozambique
 Namibia
 Nepal
 Netherlands
 New Zealand
 Nicaragua
 Niger
 Nigeria
 Norway
 Oman </p> | <p> Pakistan
 Panama
 Papua New Guinea
 Paraguay
 Peru
 Philippines
 Poland
 Portugal
 Qatar
 Republic of Cameroon
 Republic of Korea
 Romania
 Rwanda
 Saint Christopher and Nevis
 Saint Lucia
 Saint Vincent and the
 Grenadines
 Samoa
 Sao Tome and Principe
 Saudi Arabia, Kingdom of
 Senegal
 Seychelles
 Sierra Leone
 Somalia
 Spain
 Sri Lanka
 Sudan
 Suriname
 Swaziland
 Sweden
 Switzerland
 Syrian Arab Republic
 Thailand
 Togo
 Tonga
 Trinidad and Tobago
 Tunisia
 Turkey
 Uganda
 United Arab Emirates
 United Kingdom
 United Republic of Tanzania
 United States of America
 Uruguay
 Vanuatu
 Venezuela
 Vietnam
 Yemen
 Yugoslavia
 Zaire
 Zambia
 Zimbabwe </p> |
|--|---|---|

is the single most important financing institution for investment projects prepared by FAO. An increasingly prominent lender is the International Fund for Agricultural Development (IFAD), which lends money for food production and agricultural development on concessional terms. Since 1978, the year IFAD was created, 6 out of 10 projects prepared by FAO have been financed entirely by IFAD. For additional information on IFAD activities, see Chapter 8.0.

7.3 Renewable Energy Project Opportunities

The agricultural development objectives pursued by FAO are well-suited to applications of renewable energy technologies for end-uses such as irrigation, crop drying, and rural household power.

The United Nations Conference on New and Renewable Sources of Energy (NRSE) has asked FAO to help establish regional cooperative networks in Asia and the Pacific to develop and apply the area's renewable energy resources.

7.4 Lending and Procurement Procedures

FAO provides technical assistance, project formulation, and general information services to promote agricultural development. Projects prepared by FAO are subsequently financed by a regional development bank or other funding institutions. Procurements of project inputs are governed by the regulations of the particular executing agency.

7.5 Key Contacts

Information on FAO goals and programs is available from:

Mr. Gabriel S. Saab
 Representative at the United Nations
 Food and Agriculture Organization
 DCI-1125
 One United Nations Plaza
 New York, New York 10017
 Telephone: (212) 754-6036

7.6 Additional References

FAO publishes a number of documents on the organization's programs, as well as statistical information on agricultural production and trade. These publications include:

- World Food Report -- the annual review of FAO
- FAO Production Yearbook
- Commodity Review and Outlook.

INTERNATIONAL FUND FOR AGRICULTURAL DEVELOPMENT HIGHLIGHTS

- IFAD mobilizes resources in order to help developing countries improve their food production and nutrition. Efforts are focused exclusively on the agricultural sector -- livestock, fisheries, food processing and storage, and irrigation.
- IFAD lends funds, mainly on concessional or low-interest terms, to projects that will significantly improve food production in developing countries, particularly to benefit the poorest sectors of the rural population.
- Since 1976, IFAD has provided 160 loans to 84 low-income, food-deficit countries, for a total of \$1.97 billion. Nearly two-thirds of these loans have been extended on highly concessional terms -- a service charge of 1% per annum with a repayment term of 50 years, including a ten-year grace period.
- IFAD emphasizes generation of additional resources through co-financing arrangements with other external development and donor institutions.

8.0 United Nations International Fund for
Agricultural Development

Via del Serafico 107

00142 Rome Italy

Telephone: 54591

Telex: 616160, 614162

President: Mr. Idriss Jazairy

8.1 Agency Background

8.1.1 History

The International Fund for Agricultural Development (IFAD) was established by a United Nations agreement adopted on June 13, 1976. After obtaining preliminary pledges of \$1 billion, this agreement became effective on November 30, 1977.

8.1.2 Mission

The main objective of IFAD is to mobilize resources in order to help developing countries improve their food production and nutrition. IFAD works exclusively with the agricultural sector (including livestock, fisheries, and food processing and storage) and focuses its efforts on rural areas where the bulk of developing country populations live and work.

8.1.3 Activities

IFAD lends funds, mainly on concessional or low-interest terms, for projects that will significantly improve food production in developing countries, especially in the poorest sectors of the rural population. IFAD resources are also used to bring small-scale farmers and the landless into the development process. The aim of these programs is to improve employment, nutrition, and income distribution. IFAD projects include irrigation and water control, integrated rural development, agricultural settlement, agricultural credit to small-scale farmers, livestock development, and fertilizer supply and distribution.

There are two categories of IFAD loans: projects initiated by the Fund, and projects co-financed with other financial and development institutions such as the World Bank and the regional development banks. Project costs are only partially covered by IFAD loans; host governments also contribute a share. At the end of 1984, 51 percent of IFAD's projects were IFAD-initiated and 49 percent were initiated by IFAD's cooperating institutions.

Technical Assistance

Between 1978 and 1984, IFAD provided technical assistance grants totaling \$90.4 million or 5 percent of total operations. A major portion of IFAD's technical assistance is provided to support agricultural research in areas such as roots and tubers, cereals, soil fertility, livestock, and pest control. IFAD has also extended technical assistance grants for training activities in farm management and agricultural development programs.

Special Programming Missions

To supplement normal project activities to identify investment and technical assistance projects, IFAD organizes Specialized Programming Missions (SPMs). As of year-end 1984, SPMs had been organized for 24 member countries.

SPMs focus on developing countries suffering from special problems that cannot be addressed adequately by the conventional project approach. The SPM evaluates the country's overall socio-economic environment, giving special attention to the rural poor and the government policies for agricultural pricing and marketing. The aim of the SPM is to develop a comprehensive strategy for rural development in order to increase food production and alleviate rural poverty. Many IFAD projects are identified in the course of SPMs.

8.1.4 Organization

IFAD's operations are directed by the Governing Council. All 139 member states* are represented on the Council and have the same number of votes. Current IFAD operations are overseen by the Executive Board, which is comprised of 18 Executive Directors and chaired by the President of the Fund. Exhibit 8-1 illustrates the organizational structure of IFAD.

8.2 Program Emphases

8.2.1 Sectoral Focus

IFAD concentrates its loan operations in the poorest food-deficit countries; these countries are defined as those with a gross national product (GNP) per capita below \$470 in 1982 prices. Thus far, IFAD has provided 160 loans to 84 countries in this low-income, food-deficit group. To date, IFAD's loans total \$1.968 billion. Nearly two-thirds of its loans have been granted on highly concessional terms; these loans carry a service charge of 1 percent per annum with a repayment period of 50 years, including a 10-year grace period. Ordinary loan terms consist of an 8 percent annual interest rate with a repayment period of 20 years, including a 3-year grace period. Intermediate terms carry a 4 percent annual interest rate with a repayment period of 20 years, including a 5-year grace period.

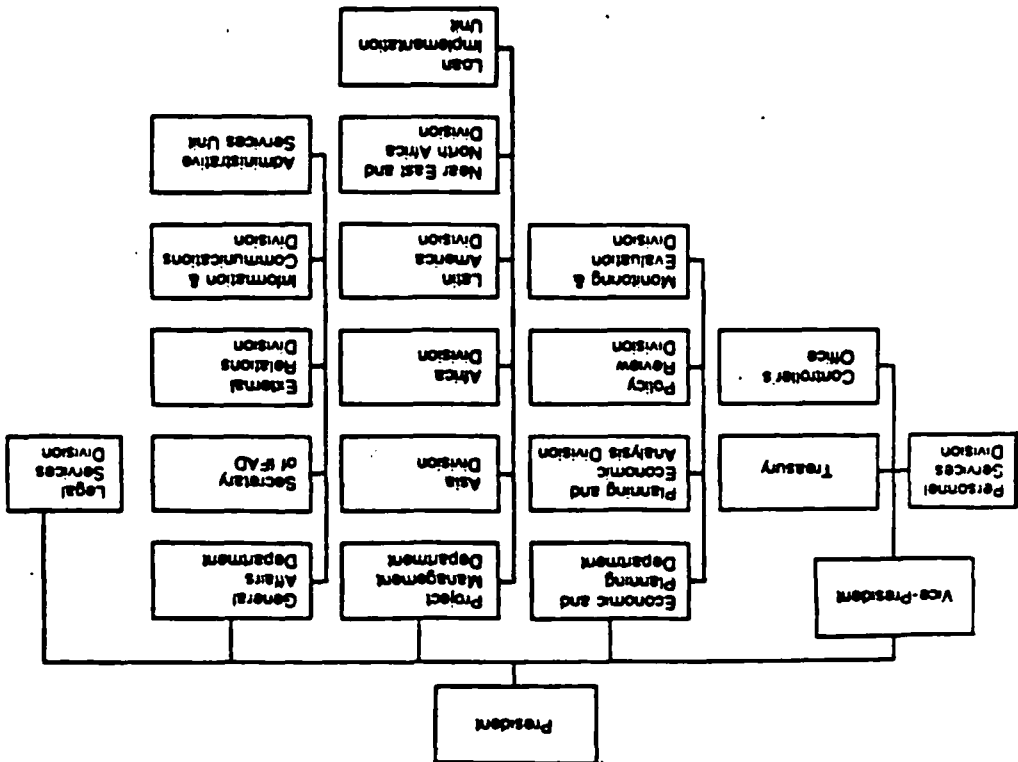
Resource mobilization is a cornerstone of the IFAD lending policy. The Fund places great emphasis on generating additional resources through co-financing arrangements with other external donors such as the World Bank, International Development Agency, and the regional development banks.

8.2.2 Regional Emphases

In 1984, IFAD approved 25 projects for a total of \$175 million: 11 loans for Africa totaling \$71.5 million (42 percent); 4 loans for Asia totaling \$67.7 million (37 percent); 4 loans to Latin America and the Caribbean totaling \$31.4 million (18 percent); and 6 loans for the Near East and North Africa totaling \$4.6 million (3 percent). The sectoral distribution of the 1984 loans

* As of December 31, 1984, there were 20 members in "Category I" (developed countries), 12 in "Category II" (oil-exporting developing countries), and 107 in "Category III" (other developing countries).

EXHIBIT 8-1: ORGANIZATION OF IFAD



Senior Staff

President
Ibnas Jazairy

Vice-President
Donald S. Brown

Economic and Planning Department

Assistant President

Director, Planning and Economic Analysis Division
Abdel-Aziz El-Sherbini

Director, Policy Review Division
Sayy Shindo

Director, Monitoring and Evaluation Division
Raim Maitouza

Assistant President
Mouss Mensah

Director, Asia Division
MacDonald Benjamin

Director, Africa Division
Barman Mansuri

Director, Latin America Division
Domingos Donada

Director, Near East and North Africa Division
Sami Asmar

Chief, Loan Implementation Unit
Sam Naim Saqal

Financial Services Division⁽¹⁾

Comptroller
Desmond Sedartha

Treasurer
My Myrth Cong

Internal Auditor
Tor Myrangs

Personnel Services Division⁽¹⁾

Chief
Alan Prian

Director
Mohammed Nawal

Legal Services Division

Secretary of IFAD
Thomas Harms

Director, External Relations Division
Nanna Al-Shayji

Director, Information and Communications Division
Sergio Apokomo

Chief, Administrative Services Unit
Gordon Munson

⁽¹⁾ As of 31 December 1984.
⁽²⁾ These Divisions are under the supervision of the Vice-President.

Mr. Abbas Kesseba
Senior Technical Advisor
Program Management Department
IFAD Liaison Office
Room S-2955
United Nations
New York, New York 10017
Telephone: (212) 754-4245

Further information on IFAD can be obtained from:

There is also an IFAD Liaison Office at UN Headquarters in New York City.

IFAD
Via del Serafico 107
00142 Rome, Italy

These division directors can be contacted at IFAD headquarters:

Asia Division	Macdonald Benjamin
<u>Africa Division</u>	Bahman Mansuri
<u>Latin America Division</u>	Domingos Donida
<u>Near East and North Africa Division</u>	Samir Asmar

The directors of IFAD's regional divisions are:

8.4 Key Contacts

As the organizational chart in Exhibit 8-1 indicates, there is no energy-specific entity within IFAD. Instead, the Fund is divided into regional divisions of the Project Management Department and policy review and evaluation divisions of the Economic and Planning Department. However, IFAD's agricultural development objectives are well-suited to a variety of renewable energy technology applications.

8.3 Renewable Energy Project Opportunities

As a member of the United Nations family, IFAD maintains relations with other UN agencies. Given its special mandate, IFAD focuses its interagency efforts on those institutions that deal directly with agricultural and rural development, particularly the well-being of the rural poor. IFAD's interagency activities have included work with the Food and Agriculture Organization (FAO), UN Children's Fund (UNICEF), World Health Organization (WHO), and UN Development Programme (UNDP). Assistance has also been provided by the World Bank and the regional development banks. IFAD has also cooperated with those non-governmental organizations (NGOs) that have common developmental objectives, such as Save the Children, Bread for the World, and the Interreligious Task Force on Hunger.

8.2.3 Interagency Cooperation

was as follows: 10 for agricultural development; 4 for rural development; 4 for agricultural credit; 2 for fisheries; 2 for livestock; and 3 for research, extension, and training services.

UNITED NATIONS CAPITAL DEVELOPMENT FUND HIGHLIGHTS

- UNCDF is a special fund of UNDP and provides capital on concessional terms for the economic needs of the very poorest countries.
- UNCDF has assisted in the construction of mini-hydroelectric schemes, installation of solar-powered water pumps, and production of fuel from forestry by-products.
- Between 1966 and 1985, UNCDF funded 283 projects with a total of \$361.4 million. Nearly 60% of this funding was directed to the agriculture, water supply, irrigation, and health sectors.
- UNCDF focuses on small-scale project investments -- projects in the range of \$200,000 to \$5,000,000 -- smaller than those normally considered by multilateral financing institutions.

9.0 United Nations Capital Development Fund

United Nations Development Programme
1 United Nations Plaza
New York, New York 10017
Telephone: (212) 906-5000 (UNDP Switchboard)
Executive Secretary: Mr. Orlando Olcese

9.1 Agency Background

9.1.1 History

The United Nations Capital Development Fund (UNCDF) was established by the UN General Assembly in 1966 and became fully operational in 1974.

9.1.2 Mission

The UNCDF was created as a special fund of the UN Development Programme (UNDP) to provide capital on concessional terms and to direct its assistance toward the economic needs of the LDCs.

9.1.3 Activities

The UNCDF has the unique mandate to focus its assistance on the very poorest countries (90 percent of its aid is directed to the 36 least developed countries). This mandate enables the UNCDF to develop productive sectors such as agriculture and small-scale industry; to strengthen infrastructure sectors such as rural transportation and communications, water resources, and energy development; and to help meet basic needs for food, safe drinking water and sanitation, primary health care, education, and low-cost housing. The fund is functionally located within the UNDP, allowing it to draw on the central services, worldwide network of Resident Representatives, and policy guidance of this agency. Exhibit 9-1 lists UNCDF recipient and donor countries.

9.1.4 Organization

As a special fund of UNDP, UNCDF is headed by an Executive Secretary and supported by a small staff.

9.2 Program Emphases

9.2.1 Sectoral Focus

According to its 1985 Annual Report, the sectoral allocation of UNCDF assistance for the period 1966-1985 was as follows:

Education. UNCDF assistance includes constructing and equipping primary schools and establishing vocational training facilities. In the Central African Republic, UNCDF helped the government to construct 55 primary schools.

Energy. Development of renewable energy resources was mandated by the sharp rise in petroleum prices in the 1970s and the increased energy consumption of LDCs. UNCDF has assisted in constructing minihydroelectric schemes, producing fuel from forestry by-products, and installing solar-powered water pumps. In Ethiopia, UNCDF co-financed the replacement of three diesel-powered generating facilities with hydroelectric plants.

Small-Scale Industry. UNCDF funded projects to promote agro-industries, manufacturing facilities, and financing for small-scale enterprises are designed to develop the industrial sectors of the least developed countries and to contribute to economic growth by creating employment opportunities. In Lesotho, UNCDF financed a vegetable canner in cooperation with the UN Food and Agriculture Organization.

Transportation and Communications. Developing productive sectors and providing basic social services depend on rural transportation and communications systems. UNCDF projects include constructing secondary roads and providing transportation and communications equipment for rural areas. In Senegal, UNCDF assisted national public works officials with the construction of feeder roads to link villages to main commercial centers.

Water Supply, Sanitation, and Health. Safe drinking water is available to less than one-third of the rural population of the LDCs. This problem is compounded by inadequate primary health care facilities. UNCDF-funded projects include building and equipping primary health care centers, providing equipment to combat communicable diseases, and installing sanitation facilities. A UNCDF-assisted project in Gambia includes constructing 174 health care units.

Agriculture. UNCDF assistance is aimed at improving crop yields, installing irrigation schemes, establishing and equipping fish processing facilities, and providing credit to small-scale farmers. In rural Bolivia, UNCDF funded a project in 1984 to rehabilitate irrigation systems and control soil erosion.

In total, UNCDF approved financing of \$361.4 million for 283 projects in this 20-year period. Examples of UNCDF-assisted projects include the following:

Sector	Percent
Agriculture	34
Water Supply, Sanitation, and Health	25
Transportation and Communications	15
Small-Scale Industries	9
Energy	8
Education	5
Housing	4
Total	100

Each candidate project is evaluated according to five criteria: relevance to UNCDF's mandate and the host government's development objectives; socio-economic impact on low-income groups; the host country's capacity to implement, maintain, and manage the project; financial viability and replicability; and internal consistency of project design.

Projects are selected for UNCDF assistance during project formulation missions. These missions, which are comprised of a UNCDF officer, a technical advisor (UNCDF-hired consultant) and UN field office personnel (such as the UNDP Resident Representative), include consultations with host government officials to determine the country's specific needs and objectives.

9.4.1 Project Evaluation

9.4 Lending and Procurement Procedures

UNCDF's focus on small-scale project investments also bodes well for renewables. The Fund finances projects in the range of \$200,000 to \$5,000,000 -- smaller than those normally considered by multilateral financing institutions.

As mentioned above, the UNCDF directs its assistance to the least developed countries, with more than half of its project funding (59 percent) allocated to agriculture, water supply, sanitation, and health. These end-use applications constitute the greatest opportunities for employing renewable energy equipment.

9.3 Renewable Energy Project Opportunities

As a special division of UNDP, the UNCDF complements the efforts of UNDP and other UN agencies. Technical assistance is often provided to the UNCDF by such UN components as the Department of Technical Cooperation for Development (DTC), Food and Agriculture Organization (FAO), the World Health Organization (WHO), the UN Children's Fund (UNICEF), and the World Food Programme (WFP). In addition, many UNCDF-assisted projects are implemented in cooperation with the World Bank, African Development Bank, Asian Development Bank, Inter-American Development Bank, European Development Fund, and International Fund for Agricultural Development. The UNCDF also works closely with nongovernmental organizations (NGOs) through project co-financing and supporting technical assistance. Specifically, the Fund works with NGOs such as the Oxford Committee for Famine Relief (OXFAM), Cooperative for American Relief Everywhere (CARE), Catholic Relief Services, and Africare.

9.2.3 Interagency Cooperation

There is no specific regional orientation to UNCDF assistance. Rather, as mentioned above, the Fund's efforts are focused on the 36 very poorest countries.

9.2.2 Regional Emphases

● Housing. UNCDF funding is directed at alleviating slum conditions, promoting local production of building materials, and improving urban services and living conditions. In Burundi, UNCDF financed the upgrading of a slum area; this effort included supplying water, constructing a road, providing street lighting, and building a community center and school.

The recipient country government has primary responsibility for executing the project. If necessary, a specialized UN agency may be designated to assist in procurement or project management.

9.4.2 Procurement

Procurement of equipment for UNCDF-assisted projects is carried out according to UNDP standard procedures for international competitive bidding. Chapter 3.0 contains a more detailed discussion of UNDP procurement regulations.

9.5 Key Contacts

For further information on UNCDF programs and policies, contact:

Mr. Normand Lauzon
Chief
Office of Policy Planning and Evaluation
United Nations Capital Development Fund
FF-1002
United Nations Development Programme
New York, New York 10017
Telephone: (212) 906-6167

UNITED NATIONS INSTITUTE FOR TRAINING AND RESEARCH HIGHLIGHTS

- UNITAR's Centre on Small Energy Resources promotes the development of small energy resources, especially to benefit the rural poor in developing countries, by facilitating information exchange on energy resources and technologies.
- The Centre organizes training courses to encourage the application of small energy resources in developing countries.
- The UNITAR Centre on Small Energy Resources is not a funding institution, nor does it implement technical assistance projects. It serves as a clearinghouse of information concerning small energy resources.

10.0 United Nations Institute for Training and Research

801 United Nations Plaza
New York, New York 10017
Telephone: (212) 754-7631



Executive Director: Mr. Michel Doo Kingue

10.1 Agency Background

10.1.1 History

The United Nations Institute for Training and Research (UNITAR) was established at UN headquarters in New York City in 1965 to enhance the major objectives of the UN, particularly maintenance of peace and security and the promotion of economic and social development. In 1984, the UNITAR Centre on Small Energy Resources was established in Rome, Italy.

10.1.2 Mission

The aim of the UNITAR Centre on Small Energy Resources is to promote the development of small energy resources, especially for the benefit of the rural poor in developing countries. UNITAR works toward this goal by coordinating and facilitating information exchange on small energy resources and related technologies.

10.1.3 Activities

The Centre serves as a clearinghouse for information concerning small energy resources and organizes training courses and other promotional activities to encourage application of these resources in developing countries. Other functions of the Centre include collecting data on small energy resources all over the world; publicizing information concerning technology developments through a Centre newsletter; providing information, contacts, and advice to members of the Centre; and organizing training seminars and meetings to exchange information of interest to developed and developing countries.

10.1.4 Organization

The Centre is headquartered in Rome, Italy, and is headed by a Director appointed by the UNITAR Executive Director in consultation with the UNDP Administrator. UNDP became co-sponsor and co-manager of the Centre in 1985. A Governing Board, chaired by the Executive Director of UNITAR, is responsible for overall management of the Centre. Private companies, engineering consultants, equipment manufacturers, and institutions in developed countries can become members of the Centre by paying an annual membership fee.

10.2 Program Emphases

10.2.1 Sectoral Focus

The Centre is designed to promote the exchange of information on all types of small energy resources for various end-use applications in the developing world.

10.2.2 Regional Emphases

The focus of the Centre's activities is global. It strives to bring together technical experts from private and public sector institutions in order to share their knowledge of small energy resources with those in need of such information.

10.3 Renewable Energy Project Opportunities

The UNITAR Centre for Small Energy Resources is not a funding institution; its role is solely advisory. The Centre does not implement technical assistance programs or procure small energy systems. As such, there are no project opportunities available through the Centre. However, the Centre's information exchange between developing country decision-makers and technical experts from the developed countries may provide potential marketing opportunities for U.S. renewable energy firms.

10.4 Key Contacts

Further information on the Centre is available from:

Mr. John H. Gray

Director

UNITAR Centre on Small Energy Resources

5 Via Catalana

00186 Rome, Italy

Telephone: 654-2200

Telex: 610181 FAO I UNITAR

For additional information on the energy activities of UNITAR, contact:

Mr. Joseph Barnea

Senior Special Fellow

Programme on Energy and Natural Resources

UNITAR

801 United Nations Plaza

New York, New York 10017

Telephone: (212) 754-8618

10.5 Additional References

In January 1986, the Centre began publishing a newsletter about its objectives and activities. To receive the newsletter, contact the Centre at:

UNITAR Centre on Small Energy Resources
5 Via Catalana
00186 Rome, Italy

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC HIGHLIGHTS

- ESCAP's general objectives include promoting regional cooperation in economic and social development; helping member countries attract and mobilize external sources of development assistance; and serving as a clearinghouse of information.
- In 1983, ESCAP established the Regional Network on Biomass, Solar and Wind Energy (BSW), to promote the development and application of renewable energy technologies.
- The BSW Network has convened regional expert panels on photovoltaic (PV) technology. The June 1985 session addressed system design, developmental applications for PV, and the potential for local manufacture of PV cells.
- Biomass conversion for rural energy supply in developing member countries is another priority initiative of the BSW Network.

11.0 United Nations Economic and Social Commission
for Asia and the Pacific

United Nations Building

Rajdamnern Avenue

Bangkok 10200, Thailand

Telephone: 2829161 or 2829617

Telex: 82392 ESCAP TH

Executive Secretary: Mr. Shah A.M.S. Kibria

11.1 Agency Background

11.1.1 History

The Economic and Social Commission for Asia and the Pacific (ESCAP), formerly known as the Economic Commission for Asia and the Far East (ECAFE), was established in March 1947 to promote the reconstruction and economic development of the region. ESCAP is comprised of 34 countries and 7 associate members. Exhibit 11-1 lists the ESCAP member countries.

11.1.2 Mission

ESCAP's primary objective is to identify common regional problems and facilitate cooperation in economic and social development in order to increase economic activity and raise living standards.

11.1.3 Activities

ESCAP provides technical assistance and advisory services at the request of member governments, helps member countries to attract and mobilize external sources of development assistance, and serves as a clearinghouse for information.

11.1.4 Organization

ESCAP is divided into nine legislative committees with the following areas of responsibility:

- Agricultural development
- Development planning
- Industry, housing, and technology
- Natural resources
- Population
- Social development
- Statistics
- Trade
- Shipping, transport, and communications.



Exhibit 11-1: ESCAP MEMBER COUNTRIES

Members

Afghanistan
Australia
Bangladesh
Bhutan
Burma
China
Democratic Kampuchea
Fiji
France
India
Indonesia
Iran
Japan
Lao People's Democratic
Republic (Laos)
Malaysia
Maldives
Mongolia
Nauru
Nepal
Netherlands
New Zealand
Pakistan
Papua New Guinea
Philippines
Republic of Korea
Samoa
Singapore
Sri Lanka
Thailand
Tonga
United Kingdom
Union of Soviet Socialist
Republics
United States
Vietnam

Associate Members

Brunei
Cook Islands
Gilbert Islands
Hong Kong
Solomon Islands
Trust Territory of the
Pacific Islands
Tuvalu

11.2 Program Emphases

11.2.1 Sectoral Focus

Since 1974, ESCAP has concentrated its efforts in six priority areas: food and agriculture, energy, raw materials, technology transfer, external financial resources, and integrated rural development. Specific ESCAP work in these areas is discussed below.

Agriculture. Task forces were created in 1974 to identify specific projects in priority areas such as regional cooperation in grain cultivation; cooperative chemical fertilizer production, distribution, and use; and development of selected nonconventional energy sources, including workshops on the use of biogas technology.

Energy. The Natural Resources Division was established in 1972 to help member countries develop and manage their energy, mineral, and water resources. In 1974, ESCAP convened an intergovernmental meeting to consider the impact of the energy crisis on the region's economies, and recommended that all forms of energy be evaluated and developed to reduce dependence on oil. A Regional Mineral Resources Development Centre was founded in 1973 to provide technical assistance, regional exploration and development facilities, and training services for member government agencies.

More specifically, as part of the Nairobi Programme of Action for the Development and Utilization of New and Renewable Sources of Energy (see Chapter 4.0 "UN Department of Technical Cooperation for Development"), the Regional Network on Biomass, Solar, and Wind Energy (BSW) was established in October 1983. The Network's activities are being financed by contributions from the governments of Japan and Australia.

Population. The ESCAP Population Division was created in 1969 to address the impact of population growth on economic and social development in the region. The Division works in the areas of general demography, fertility and family planning, and information services.

Transport and Communications. The Asian Telecommunication Network, completed in 1980, links the countries of the region and spans from Iran to Indonesia. The Asia-Pacific Telecommunity, comprising 14 countries, serves as a forum for governments to cooperate on issues such as technical compatibility and training.

11.2.2 Regional Emphases

ESCAP has initiated special projects to stimulate regional and subregional approaches to common problems. Particular emphasis is on aid to the least developed countries, including island nations and land-locked countries, to lessen the income disparities between income groups within member countries. Further focus is placed on the rural poor, who constitute the majority of the region's population.

11.2.3 Interagency Cooperation

As a component of the United Nations system, ESCAP works closely with the specialized agencies to benefit from their technical expertise, and with funding

Mr. L.N. Fan
 Chief
 Natural Resources Division
 ESCAP
 United Nations Building
 Rajdamern Avenue
 Bangkok 10200, Thailand
 Telex: 82392 ESCAP TH
 Telephone: 2829161-200, ext. 1510

Additional information on specific energy activities is available from:

11.5 Key Contacts

ESCAP does not provide capital resources. Rather, it has helped establish institutions to attract funding for regional projects, which in turn supply development aid. For example, the Asian Development Bank (AsDB) was created as an independent institution under the auspices of ECAF in 1966 (Chapter 20.0 contains a more detailed discussion of AsDB). ESCAP also attempts to mobilize capital resources from affiliate UN agencies and funds. Transfer of funds and procurement of project inputs are governed by the regulations of the executing agency.

11.4 Lending and Procurement Procedures

- The BSW Network has convened regional expert panels on photovoltaic (PV) technology. The most recent session, held in Bangkok in June 1985, addressed systems design, applications for PV (particularly PV water pumping), and the potential for local manufacture of PV cells.
- ESCAP initiated a 3-year project to accelerate the use of renewable energy sources for rural development schemes, particularly small-scale hydropower generation for rural electrification.
- Biomass conversion for rural energy supply in developing member countries is another priority initiative of the BSW Network. A guidebook on Biomass Development was published by the ESCAP Secretariat.
- Training courses, demonstration projects, and workshops are an integral part of ESCAP's attempts to develop and utilize renewables in member countries.

ESCAP has been particularly active in the development and application of renewable energy technologies. Examples of ESCAP activities in this area include:

11.3 Renewable Energy Project Opportunities

institutions to obtain capital for executing development projects. For example, several BSW projects are being implemented in cooperation with such organizations as the International Labor Organization, the United Nations Industrial Development Organization, the Asian Development Bank, and the Food and Agriculture Organization.

11.6 Additional References

ESCAP's BSM Network publishes a quarterly newsletter, ESCAP Energy News, that is available free-of-charge by contacting:

Mr. S. Koide
Coordinator
Regional Network on Biomass, Solar,
and Wind Energy
Natural Resources Division
ESCAP
United Nations Building
Rajdamern Avenue
Bangkok 10200, Thailand
Telex: 82392 ESCAP TH
Telephone: 2829161-200

Three recent ESCAP publications provide further background information on the Commission's plans to apply renewable energy technologies in the region:

Local Manufacture of Energy Equipment, Regional Energy Development Programme: RAS/80/001 (May 1985)

Proceedings of the High-Level Regional Consultative Meeting for the Mobilization of Financial Resources for New and Renewable Sources of Energy and of the Meeting of Focal Points on New and Renewable Sources of Energy, Regional New and Renewable Sources of Energy Programme for Asia and the Pacific: ST/ESCAP/345 (November 1985)

Energy Resources Development Series No. 28: UN Publication Sales No. E.86.II.F.3 (1985).

These three documents are available from the Natural Resources Division of ESCAP at the address listed above. As noted earlier, the BSM Network recently published an updated guidebook on Biogas Development (Energy Resources Development Series No. 27). The guidebook is available for \$17.50 from:

United Nations Sales Section
New York, New York 10017

Specify UN Publication Number ST/ESCAP/275 and UN Sales Number E.84.II.F.14 when ordering.

ECONOMIC COMMISSION FOR LATIN AMERICA AND THE CARIBBEAN HIGHLIGHTS

- ECLAC's general objectives include strengthening economic relations among Latin American countries and between Latin America and the rest of the world; analyzing social and economic conditions in the region; and reviewing member countries' development plans and progress.
- Special emphasis is placed on promoting regional economic integration and expanding the availability of social services.
- Agricultural issues -- irrigation, productivity, rural development, and crop yields -- are central to ECLAC's activities, and are well-suited to applications of renewable energy technologies.

12.0 United Nations Economic Commission for Latin America and the Caribbean

Edificio Naciones Unidas

Castilla 179-D

Santiago, Chile

Telephone: 56-2-48-50-51

Telex: 240862

Executive Secretary: Mr. Norberto Gonzalez

12.1 Agency Background

12.1.1 History

The Economic Commission for Latin America and the Caribbean (ECLAC) was established in February 1948 to help Latin American governments further the economic growth and improve living standards of their peoples. ECLAC is comprised of 32 members and 7 associate members (see Exhibit 12-1).

12.1.2 Mission

ECLAC's goal is to strengthen economic relations among Latin American countries and between Latin America and the rest of the world. Toward achieving this goal, ECLAC conducts research on the various sectors of the Latin American economy, analyzes economic and social conditions in the region, and reviews the progress of member countries' development plans and programs.

12.1.3 Activities

Early in its existence, ECLAC emphasized the need to train government officials to conduct economic planning. Simultaneously, the Commission researched problems surrounding multilateral trade and regional integration. Since 1970, ECLAC has expanded its facilities and scope to include: assessing the regional and international socio-economic situation to help member countries define their development strategies; and conducting operational activities such as technical assistance projects, training courses, and other advisory services.

In 1977, ECLAC began to focus on the potential of the Latin American economy within the global setting. A strategy proposed at the 1977 Commission meeting placed special emphases on promoting integrated development of member country economies, working toward improved income distribution, and expanding social services to include education, training, and health care.

12.1.4 Organization

The ECLAC Secretariat is organized into the following divisions:

- Economic development
- Social development
- Natural resources and environment
- Transport and communications
- International trade and development

Exhibit 12-1:
ECONOMIC COMMISSION FOR LATIN AMERICA AND THE CARIBBEAN -
MEMBER COUNTRIES

Argentina	Guatemala
Bahamas	Grenada
Barbados	France
Bolivia	El Salvador
Brazil	Ecuador
Canada	Dominican Republic
Chile	Cuba
Colombia	Costa Rica
Cuba	
Dominican Republic	
Ecuador	
El Salvador	
France	
Grenada	
Guatemala	

Associate Members

Belize
Antigua
Dominica
Saint Kitts-Nevis-Anguilla
Saint Lucia
Saint Vincent
Montserrat

Guyana	Venezuela
Haiti	Uruguay
Honduras	United States
Jamaica	United Kingdom
Mexico	Trinidad and Tobago
Netherlands	Suriname
Nicaragua	Peru
Panama	Paraguay
Paraguay	

Since April 1984, ECLAC has sponsored several technical missions to investigate new and renewable sources of energy (NRSE) in Central America, the Dominican Republic, and Haiti. A study of the economics of solar energy in the ECLAC region was also initiated. These and other projects will be documented in an ECLAC report, scheduled for late 1988, which will evaluate past findings and future prospects for NRSE in terms of useful power. Special emphasis will be placed on firewood because of its prominence as an energy source in the region.

12.3 Renewable Energy Project Opportunities

ECLAC works closely with a number of the UN specialized agencies, including the International Labor Organization, FAO, UNIDO, the Organization of American States, and Inter-American Development Bank, the Latin American Energy Organization (OLADE), and the Caribbean Economic Community (CARICOM).

12.2.3 Interagency Cooperation

By definition, ECLAC's activities focus on the social, industrial, environmental, and technological concerns of the Latin America/Caribbean region. However, priority has also been placed on cooperation with other areas of the Third World, particularly Africa.

12.2.2 Regional Emphasis

Because agriculture dominates the Latin American economy, questions of productivity, crop yields, rural living conditions, and foreign trade are central to ECLAC activities. The dependence of the region's economy on commodity exports such as beef, bananas, coffee, sugar, and cotton has made Latin American economic integration a critical issue as well. ECLAC has promoted regional integration efforts by collaborating with the Caribbean Development and Cooperation Committee and the Central American Common Market.

12.2.1 Sectoral Focus

12.2 Program Emphasis

In addition to these divisions, the ECLAC system contains three other major bodies: the Latin American Institute for Social and Economic Planning (ILPES), which conducts research and provides training in development and planning techniques; the Latin American Demographic Centre (CELADE), which offers training and technical advisory services on population matters; and ECLAC's Latin American Centre for Economic and Social Documentation, which provides information support for regional development activities.

Two additional divisions are joint efforts with other UN agencies. They are the ECLAC/UN Industrial Development Organization (UNIDO) Industrial Development Division and the ECLAC/Food and Agriculture Organization (FAO) Agriculture Division.

- Statistics and quantitative analysis
- Operations
- Economic projects.

12.4 Lending and Procurement Procedures

ECLAC does not provide capital resources; however, it collaborates with other development agencies to mobilize funds for Latin American needs. Transfer of funds and procurement of project inputs are governed by the regulations of the individual executing agency.

12.5 Key Contacts

For additional information on ECLAC programs, contact:

Mr. Fabio Arango
 Information Officer
 ECLAC Washington Office
 1735 Eye Street, N.W., Suite 809
 Washington, D.C. 20006
 Telephone: (202) 955-5613

12.6 Additional References

ECLAC publishes two major annual reviews of regional conditions:

- Economic Survey of Latin America
- Statistical Yearbook for Latin America

These publications are available from the Washington, D.C. Liaison office listed above.

ECONOMIC AND SOCIAL COMMISSION FOR WESTERN ASIA HIGHLIGHTS

- o ESCWA's main objectives are to improve the standard of living and level of economic activity of member countries, and to strengthen economic relations among themselves and with other regions.
- o A recent ESCWA study identified solar, wind, biomass, and geothermal energy as the most promising future energy sources for the Arab World.
- o ESCWA sponsors assessments of the region's economic and technological problems and provides technical assistance.
- o Activities in the natural resources, science, and technology area include a comprehensive study of water resources development in the ESCWA region.

13.0 United Nations Economic and Social Commission for

Western Asia

P.O. Box 27

Baghdad, Iraq

Executive Secretary: Mr. Amir al-Khishali



13.1 Agency Background

13.1.1 History

The Economic and Social Commission for Western Asia (ESCSA) was established by the Economic and Social Council in August 1973. The new organization absorbed the United Nations Economic and Social Office in Beirut (UNESOB), which had been established in 1963 as the Middle East outpost of the UN Department of Economic and Social Affairs and the UN Industrial Development Organization (UNIDO). UNESOB had served the governments of the region in accordance with resolutions of the UN General Assembly.

13.1.2 Mission

ESCSA's objectives are to help member countries improve their level of economic activity and living standards, and to strengthen economic relations among themselves and with other regions.

13.1.3 Activities

ESCSA sponsors assessments of the region's economic and technological problems, performs advisory services at the request of member governments, and offers technical assistance at the request of the Economic and Social Council.

13.1.4 Organization

The original membership of ESCSA included those UN members that formerly belonged to UNESOB, with new applications for membership determined by the Economic and Social Council. In July 1977, the Council amended ESCSA's charter to provide for the membership of the Palestine Liberation Organization. A list of ESCSA member countries is provided in Exhibit 13-1.

13.2 Program Emphases

13.2.1 Sectoral Focus

In the agriculture area, a cooperative program between ESCSA and the Food and Agriculture Organization (FAO) concentrates on improving agricultural planning, enhancing food security, promoting agricultural integration within the region, and identifying investment opportunities.

Activities in natural resources, science, and technology include a basic study of water resource development in the ESCWA region and a preliminary evaluation of port facilities in nine member countries.

Exhibit 13-1: ESCWA - MEMBER COUNTRIES

Bahrain	Democratic Yemen
Egypt	Iraq
Jordan	Kuwait
Saudi Arabia	Syria
United Arab Emirates	Yemen Arab Republic
Oman	Palestine Liberation Organization
Qatar	

- In 1977, the Scientific Research Institution established a solar energy unit.
- The Physics Department of the University of Mustansiriyah (Baghdad) initiated solar energy work in 1972.

Iraq

- The Solar Energy Laboratory at Cairo's National Research Center (NRC) was established in the early 1970s. The NRC Solid State Laboratory is working on cadmium sulfide and cadmium telluride solar cells in cooperation with the Laboratory of Bellevue (France).
- In 1976, the Ministry of Electricity and Energy formed a Solar Energy Commission, which in 1978 became the Supreme Council of Renewable Energy Sources.

Egypt

- In 1977, the Ministry of Development and Industry commissioned the Bahrain National Oil Company (BANOCO) to initiate a solar energy program in conjunction with the Kuwait Institute for Scientific Research (KISR). This program is currently collecting data on the performance of flat-plate solar collectors.

Bahrain

- L'Organisme National de la Recherche Scientifique in Algiers has established a model solar village with assistance from UNDP.

Algeria

In a recent study, ESCWA identified wind, solar, biomass, and geothermal energy as the most promising future energy sources for the Arab World. Examples of solar energy activities by individual Arab countries are described below.

13.3 Renewable Energy Project Opportunities

ESCWA cooperates with many of the specialized UN agencies, including UNIDO and FAO. In addition, ESCWA maintains liaison relationships with intergovernmental organizations in the region, such as the League of Arab States and the Arab Fund for Economic and Social Development.

13.2.3 Interagency Cooperation

In addition to its goals and programs to promote economic development in Western Asia, ESCWA has initiated cooperative efforts with the Economic Commission for Africa.

13.2.2 Regional Emphasis

- The University of San'aa Faculty of Science has sought assistance from the Georgia Institute of Technology to develop a solar energy program.

Yemen Arab Republic

- In cooperation with France's Centre Nationale de Recherche Scientifique, a PV study is currently underway to consider the production of copper photo cells and thin-film heterojunctions.

Tunisia

- In 1977, the Solar Energy Committee was established by the Ministry of Electricity.
- Solar energy work began in 1976 at the Faculty of Mechanical and Electrical Engineering of the University of Damascus.

Syria

- The Saudi-U.S. Program for Cooperation in Solar Energy (SOLERAS) is centered at the Saudi Arabia National Center of Science and Technology in Riyadh.
- Solar energy activities began at the University of Petroleum and Minerals with an international conference on Solar Energy held in 1975.

Saudi Arabia

- The Qatar General Petroleum Corporation is considering using solar energy in heating and cooling, desalination, and thermal conversion applications.

Qatar

- In 1977, the Princeton Energy Group (US) visited Oman to study the feasibility of solar energy applications in two remote villages.

Oman

- The Ministry of Energy and Mines created an ad hoc committee to study the possibilities for utilizing solar energy. This committee led to the creation of the Solar Energy Research Centre at Marrakesh.

Morocco

- The Kuwait Institute for Scientific Research (KISR) is responsible for solar energy research, development, and demonstration (RD&D). It has an annual budget of over \$2 million and employs more than 22 scientists.

Kuwait

- The Jordanian Telecommunications Corporation (Amman) has developed a PV telecommunications system to serve rural villages and initiated a project with the Jordanian Army to install 100 PV-powered emergency telephones along highways.

Jordan

In response to the recommendations of the 1981 UN Conference on New and Renewable Sources of Energy (NRSE), held in Nairobi, Kenya, ESCWA created a primary task of the NRSE Network is to provide education, training, and transfer of technology for the benefit of ESCWA member countries. This is to be accomplished through training courses and workshops and the development of an NRSE data base. The data base will be designed to draw upon, and contribute to, the information activities of other UN agencies such as the World Health Organization, UN Development Programme, Food and Agriculture Organization, and the Economic and Social Commission for Asia and the Pacific (ESCAP) (see Chapter 11.0 for a description of ESCAP's renewable energy activities).

13.4 Lending and Procurement Procedures

ESCWA does not provide capital resources; however, it collaborates with other development agencies to mobilize funds for regional needs. Transfer of funds and procurement of project inputs are governed by the regulations of the executing agencies.

13.5 Key Contacts

Additional information on ESCWA's programs and policies is available from:

Mr. Abdelaziz Soliman Hegelian
Liaison Officer
Economic and Social Commission for Western Asia
Room S-3127E
The United Nations
New York, New York 10017
Telephone: (212) 754-5566

ECONOMIC COMMISSION FOR AFRICA HIGHLIGHTS

- ECA's primary objectives center on the modernization of Africa, including rural development, industrialization, and regional economic integration.
- Agriculture, which involves 75 percent of Africa's population, is the focal point of ECA activities, such as increased food production, integrated rural development, and promotion of agro-industries.
- ECA provides technical advisory services, at the request of member countries, to help these states formulate development programs and policies.

Africa Hall

P.O. Box 3001

Addis Ababa, Ethiopia

Telephone: 251-1-40-8075

Telex: 976 21029 ECA

Executive Secretary: Mr. Adebayo Adedeji

14.1 Agency Background

14.1.1 History

The Economic Commission for Africa (ECA) was established by the Economic and Social Council in April 1958 to promote cooperative action for the continent's economic and social development. The ECA is comprised of 50 regional member states and 3 associate members (see Exhibit 14-1).

14.1.2 Mission

The ECA's chief objective, as stated in its charter, is the modernization of Africa, with equal emphasis on rural development and industrialization.

14.1.3 Activities

ECA works to strengthen economic relations among African states and between Africa and the rest of the world. The Commission provides technical advisory services at the request of member country governments and helps these states formulate development policies and programs.

14.2 Program Emphases

14.2.1 Sectoral Focus

Because agriculture involves nearly 75 percent of Africa's population, ECA's programs place substantial emphasis on this area. Specifically, ECA works to promote integrated rural development, expand food production, and improve agricultural marketing capabilities. These efforts are being conducted in cooperation with the Food and Agriculture Organization (FAO).

Industrial development is another priority area for ECA assistance. ECA efforts focus on regional cooperation; development of the chemical, food, and agro-industries; and general institution building and promotion of rural industries.

14.2.2 Regional Emphases

In pursuit of economic cooperation and integration, ECA created Multinational Programming and Operational Centres (MULPOCS) to implement ECA programs in the field. Since 1977, five Centres have been established in Yaounde, Cameroon;

Members

- | | |
|-----------------------------|--|
| Algeria | |
| Angola | |
| Benin | |
| Botswana | |
| Burkina Faso | |
| Burundi | |
| Cape Verde | |
| Central African Republic | |
| Chad | |
| Comoros | |
| Congo | |
| Djibouti | |
| Egypt | |
| Equatorial Guinea | |
| Ethiopia | |
| Gabon | |
| Gambia | |
| Ghana | |
| Guinea | |
| Guinea-Bissau | |
| Ivory Coast | |
| Kenya | |
| Lesotho | |
| Liberia | |
| Libyan Arab Jamahiriya | |
| Madagascar | |
| Malawi | |
| Mali | |
| Mauritania | |
| Mauritius | |
| Morocco | |
| Mozambique | |
| Niger | |
| Nigeria | |
| Rwanda | |
| Sao Tome and Principe | |
| Senegal | |
| Seychelles | |
| Sierra Leone | |
| Somalia | |
| South Africa* | |
| Sudan | |
| Swaziland | |
| Togo | |
| Tunisia | |
| Uganda | |
| United Republic of Cameroon | |
| United Republic of Tanzania | |
| Zaire | |
| Zambia | |

Associate Members

- | | |
|---|----------------|
| France | United Kingdom |
| Spain | |
| Non-self-governing territories in Africa, including African islands | |

*The Economic and Social Council passed a resolution in 1963 to exclude South Africa from participation in ECA activities until "conditions for constructive cooperation have been restored by a change in its racial policy."

Gisenyi, Rwanda; Lusaka, Zambia; Niamey, Niger; and Tangier, Morocco. MULPOCS efforts focus on manpower training, intraregional trade, and financial relations with developing countries in other regions.

14.2.3 Interagency Cooperation

ECA works closely with a number of UN specialized agencies, including FAO, the UN Development Programme, and the UN Children's Fund. In addition, ECA maintains liaison relations with the Organization of African Unity.

14.3 Renewable Energy Project Opportunities

No detailed information is available on specific ECA activities in the renewable energy area. However, the development and industrialization objectives pursued by ECA are well-suited to applications of renewable energy technologies for end-uses such as irrigation and water supply, rural development, health care, and agro-industries.

14.4 Lending and Procurement Procedures

ECA does not provide capital resources; however, it collaborates with other development institutions to mobilize funds for African needs. Transfers of funds and procurement of project inputs are governed by the regulations of the executing agencies.

14.5 Key Contacts

For additional information on ECA programs and objectives, contact:

Mr. Magnus Peter Mukoko-Mokeba
Liaison Officer
Economic Commission for Africa
Room S-31278
The United Nations
New York, New York 10017
Telephone: (212) 754-5564

WORLD BANK GROUP HIGHLIGHTS

- The World Bank Group consists of three separate institutions: the International Bank for Reconstruction and Development, commonly known as the World Bank; the International Development Association, the "soft loan window" of the World Bank; and the International Finance Corporation.
- The common objective of these three institutions is to help improve the standard of living in developing countries by channeling financial resources from developed countries to the developing world.

15.0 World Bank Overview

The World Bank Group is comprised of three institutions: the International Bank for Reconstruction and Development (IBRD), commonly known as the World Bank; the International Development Association (IDA), the "soft loan window" of the World Bank; and the International Finance Corporation (IFC). Exhibit 15-1 summarizes the relationship of these organizations. The common goal of these institutions is to help improve the standard of living in developing countries by channeling financial resources from the developed countries to the developing world.

Each of these three institutions is described in greater detail in Chapters 16.0 through 18.0.

EXHIBIT 15-1: WORLD BANK MEMBER AGENCY OVERVIEW

WORLD BANK =

**INTERNATIONAL BANK
FOR RECONSTRUCTION
& DEVELOPMENT
(IBRD)**

+

**INTERNATIONAL
DEVELOPMENT
ASSOCIATION
(IDA)**

+

**INTERNATIONAL
FINANCE
CORPORATION
(IFC)**

**LENDS FOR ALL TYPES OF
CAPITAL INFRASTRUCTURE
PROJECTS.**

**PROVIDES "SOFT LOANS"
FOR THE VERY POOREST
COUNTRIES.**

**HELPS MOBILIZE
CAPITAL TO PROMOTE
PRIVATE SECTOR
GROWTH IN DEVELOPING
COUNTRIES.**

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT HIGHLIGHTS

- The IBRD finances various capital infrastructure projects, such as roads and railways, ports, power generating facilities, and telecommunications.
- Loans are extended to stimulate economic growth in developing countries, and to carry near-market rate interest charges.
- Lending for technical assistance is provided to finance feasibility and engineering studies, policy analyses, and training support.
- IBRD, in cooperation with the UN Development Programme (UNDP), finances energy sector analyses, technical assistance, and assessments of financing requirements for renewable energy investments.
- IBRD is the implementing agency for a global UNDP-financed project to test and demonstrate PV- and solar thermal-powered small irrigation pumps for small-scale farm irrigation and village water supply pumping requirements.

IBRD loans are generally directed at those developing countries in more advanced stages of economic growth. Loans have a grace period of 5 years and a repayment term of up to 20 years. The interest rate charged is calculated in proportion to the Bank's borrowing costs.

The Bank traditionally finances various types of capital infrastructure projects, such as roads and railways, ports, telecommunications, and power generating facilities. However, its overriding development strategy emphasizes investments that can directly affect the well-being of the poor people of developing countries. In response to deteriorating economic conditions in developing countries, the Bank added a program of structural adjustment lending in 1980. This lending supports initiatives to effect policy changes and institutional reforms in developing countries that will achieve a more efficient use of resources.

The IBRD is owned by the governments of 144 countries. (These countries are listed in Exhibit 16-1.) The Bank finances its lending operations primarily from borrowings in world capital markets; these borrowings are backed by capital subscriptions of member countries.

16.1.3 Activities

The Bank's charter dictates that loans must be extended only for "productive purposes" and must stimulate economic growth in the developing countries in which financial assistance is provided.

The Bank's objectives are to aid in reconstruction and development of member countries by mobilizing capital investment for productive purposes, to promote private foreign investment, and to encourage the balanced growth of international trade and the maintenance of equilibrium in members' balance of payments.

16.1.2 Mission

The International Bank for Reconstruction and Development (IBRD) (World Bank) was established on December 27, 1945, when representatives of 28 countries signed the Articles of Agreement originally drawn up at the 1944 United Nations Monetary and Financial Conference at Bretton Woods, New Hampshire.

16.1.1 History

16.1 Agency Background

16.0 International Bank for Reconstruction and Development (World Bank)

1818 H Street, N.W.
Washington, D.C. 20433
Telephone: (202) 477-1234
President: Mr. Barber Conable



Exhibit 16-1: WORLD BANK - MEMBER COUNTRIES

Pakistan	Grenada	Afghanistan
Panama	Guatemala	Algeria
Papua New Guinea	Guinea	Antigua and Barbuda
Paraguay	Guinea-Bissau	Argentina
Peru	Guyana	Australia
Philippines	Haiti	Austria
Portugal	Honduras	Bahamas
Qatar	Hungary	Bahrain
Romania	Iceland	Bangladesh
Rwanda	India	Barbados
Saint Christopher and Nevis	Indonesia	Belgium
Saint Lucia	Iran, Islamic Republic of	Belize
Saint Vincent	Iraq	Benin
Sao Tome and Principe	Ireland	Bhutan
Saudi Arabia	Israel	Bolivia
Senegal	Italy	Botswana
Seychelles	Ivory Coast	Brazil
Sierra Leone	Jamaica	Burkina Faso
Singapore	Japan	Burma
Solomon Islands	Jordan	Burundi
Somalia	Kampuchea, Democratic	Cameroon
South Africa	Kenya	Canada
Spain	Korea, Republic of	Cape Verde
Sri Lanka	Kuwait	Central African Republic
Sudan	Laos People's Democratic	Chad
Suriname	Republic (Laos)	Chile
Swaziland	Lebanon	China
Sweden	Lesotho	Colombia
Syrian Arab Republic	Libera	Comoros
Tanzania	Libya	Congo, People's Republic of the
Thailand	Luxembourg	Costa Rica
Turkey	Madagascar	Cyprus
Uganda	Malawi	Denmark
United Arab Emirates	Malaysia	Dominica
United Kingdom	Mali	Dominican Republic
United States	Malta	Ecuador
Uruguay	Mauritania	Egypt, Arab Republic of
Vanuatu	Mauritius	El Salvador
Venezuela	Mexico	Equatorial Guinea
Viet Nam	Morocco	Ethiopia
Western Samoa	Mozambique	Fiji
Yemen Arab Republic	Nepal	Finland
Yemen, People's Democratic	Netherlands	France
Republic of	New Zealand	Gabon
Yugoslavia	Nicaragua	Gambia
Zaire	Niger	Germany, Federal Republic of
Zambia	Nigeria	Ghana
Zimbabwe	Norway	Greece
	Oman	

16.1.4 Organization

In 1973, the operational structure of the Bank was reorganized along regional lines. There are six regional offices at IBRD headquarters: Eastern and Southern Africa; Western Africa; South Asia; East Asia and the Pacific; Europe, the Middle East and North Africa; and Latin America and the Caribbean. Each office is responsible for executing the Bank's development assistance programs within its assigned countries, and has the necessary sector specialists, financial analysts, economists, and loan officers to carry out its responsibilities. The Projects Department within each regional office includes specialists in agriculture, energy, water and sewerage, health and nutrition, and transportation. Overseas missions in developing countries report to the regional office responsible for their respective country. Exhibit 16-2 provides an illustration of the IBRD's organizational structure.

16.2 Program Emphases

16.2.1 Sectoral Focus

The sectoral distribution of IBRD lending for fiscal year 1985 (ending June 30, 1985) was as follows:

Sector	\$(U.S. Millions)	Percent
Agriculture and Rural Development	2,389.6	21.04
Development Finance Companies	506.1	4.46
Education	514.9	4.53
Energy	3,365.3	29.63
(Oil, gas, and coal - \$1,193.7M) (Power - \$2,171.6M)		
Industry	635.0	5.59
Non-Project Lending	435.0	3.83
Population, Health, and Nutrition	160.9	1.42
Small-Scale Enterprises	553.1	4.87
Technical Assistance	44.5	0.39
Telecommunications	59.6	0.52
Transportation	1,866.9	16.44
Urban Development	204.6	1.80
Water Supply and Sewerage	622.8	5.48
Total	11,358.3	100.00

Source: World Bank 1985 Annual Report

Lending for technical assistance is extended to finance project preparation activities, feasibility and engineering studies, and general institution-building initiatives. World Bank technical assistance is divided into two categories: (1) engineering-related assistance such as feasibility studies, engineering design, and construction supervision (these activities are considered "hardware"); and (2) institution-related assistance such as diagnostic policy studies, institutional studies, and management support and training (these activities are considered "software").

In recent years, as part of its general development strategy to fund projects that will directly benefit the poor people of developing countries, the Bank has expanded its lending activities for energy development. In particular, lending for power constitutes the largest part of the Bank's energy program (78.8%).

16.2.2 Regional Emphases

The regional breakdown of IBRD lending for fiscal year 1985 was as follows:

Region	(\$U.S. Millions)	Percent
East Asia and the Pacific	2,654.3	23.37
Eastern and Southern Africa	74.5	0.66
Europe, Middle East, and North Africa	2,387.1	21.02
Latin America and the Caribbean	3,654.3	32.17
South Asia	2,169.0	19.09
Western Africa	419.1	3.69
Total	11,358.3	100.00

Lending to the three largest regional recipients of IBRD funding in 1985 -- East Asia and the Pacific; Europe, Middle East, and North Africa; and Latin America and the Caribbean -- focused on structural adjustment, with Latin American and East Asian economies adjusting to high external debt burdens. In the Middle East, the decline in world petroleum prices has necessitated severe fiscal retrenchment by the governments of the region. This readjustment of government spending priorities has sharply curbed growth and caused increased unemployment.

16.2.3 Interagency Cooperation

As a member of the United Nations "family" of specialized agencies, the Bank cooperates with numerous UN components. A special cooperative agreement calls for the Food and Agriculture Organization, the UN Educational, Scientific, and Cultural Organization, the World Health Organization, and the UN Industrial Development Organization to provide specialized UN staff support to Bank activities. In addition, the Bank maintains close working relations with UN regional commissions, regional development banks, and government agencies that provide development assistance.

World Bank projects are identified in several ways. For example, a member country may propose a project to the Bank; a Bank mission may suggest a follow-on project to an earlier effort they are supervising; the Bank may dispatch missions with the specific objective of identifying projects; or projects may be identified through the work of other United Nations agencies.

16.4.1 Project Evaluation

16.4 Lending and Procurement Procedures

The World Bank is also the executing agency for a global project financed by the UNDP to test and demonstrate PV- and solar thermal-powered small irrigation pumps. The World Bank views PV as a competitive technology for low-lift, small-scale farm irrigation and village water supply pumping requirements.

In the area of preinvestment activities, the World Bank strives to help renewable energy technologies make the transition from laboratory to commercial applications. Several technologies are categorized by the Bank as requiring further operational experience before widespread use in developing countries is feasible. Photovoltaics, specifically PV-powered water pumping, is included in this category.

In 1978, the World Bank and the UN Development Programme (UNDP) agreed to provide financial and non-financial cooperation in preinvestment activities and actual project implementation. This cooperation is accomplished through three programs: the Energy Sector Assessment Program (ESAP); the Energy Sector Management Assistance Program (ESMAP); and a program to study the financing requirements for preinvestment activities for renewables. ESAP was initiated in 1980 to help developing countries establish strategies for increasing energy production and using energy more efficiently. The program consists of missions by World Bank energy economists to individual countries, followed by reports assessing the countries' energy sectors. ESMAP, inaugurated in 1983, follows up on ESAP reports by assisting countries, as well as donor agencies and the private sector, to implement priority investment and technical assistance activities. These two programs are used by the World Bank to gain experience with the most promising renewable energy technologies and applications and to build indigenous host country capabilities to independently plan, design, and implement energy programs.

In 1978, the World Bank and the UN Development Programme (UNDP) agreed to provide financial and non-financial cooperation in preinvestment activities and actual project implementation. This cooperation is accomplished through three programs: the Energy Sector Assessment Program (ESAP); the Energy Sector Management Assistance Program (ESMAP); and a program to study the financing requirements for preinvestment activities for renewables. ESAP was initiated in 1980 to help developing countries establish strategies for increasing energy production and using energy more efficiently. The program consists of missions by World Bank energy economists to individual countries, followed by reports assessing the countries' energy sectors. ESMAP, inaugurated in 1983, follows up on ESAP reports by assisting countries, as well as donor agencies and the private sector, to implement priority investment and technical assistance activities. These two programs are used by the World Bank to gain experience with the most promising renewable energy technologies and applications and to build indigenous host country capabilities to independently plan, design, and implement energy programs.

World Bank project opportunities in the energy sector are not limited to loans. On the contrary, end-use applications for which renewable energy technologies are proven to be reliable and cost-competitive constitute enormous sales potential. These end-use applications include health, agro-industry, irrigation, water supply, and telecommunications.

The World Bank renewable energy program includes sponsoring demonstration projects and institution-building activities aimed at obtaining operational experience with these technologies and determining the most economical renewable energy systems and applications.

16.3 Renewable Energy Project Opportunities

For additional information on the lending activities of the sector-specific offices and on how renewables may be incorporated into those activities, contact:

Mr. Dosik has worked closely with the members of the Committee on Renewable Energy Commerce and Trade (CORRECT) in their efforts to identify and implement renewable energy project opportunities.

Mr. Richard S. Dosik
New Energy Sources Advisor
Energy Department
The World Bank
1809 G Street, N.W., Room D-430
Washington, D.C. 20433
Telephone: (202) 477-6894

For information on specific renewable energy activities at the World Bank, contact:

16.5 Key Contacts

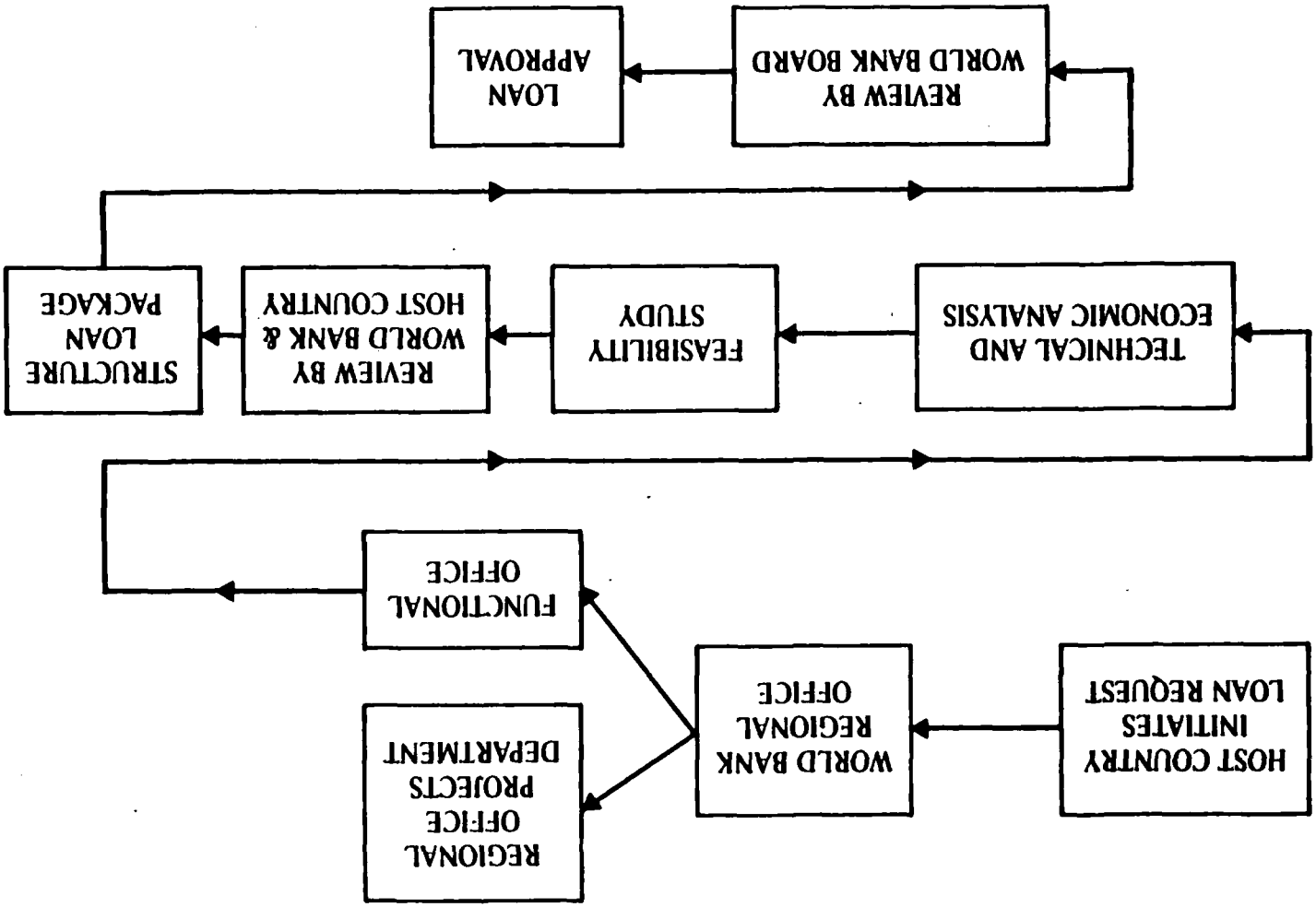
Procurement of project inputs is open to suppliers in member countries and Switzerland, and is conducted by international competitive bidding (ICB). Switzerland is not an IBRD member, but works closely with IBRD and has opened its capital markets to sales of World Bank bonds. ICB procedures are used to give all eligible bidders sufficient advance notification of borrowers' needs, and to provide all bidders with an equal opportunity to bid on the acquisition of project supplies. For the period 1981-1985, 19.5 percent of IBRD project procurement, valued at \$3.82 billion, was sourced in the United States.

16.4.2 Procurement

Project appraisal is followed by preparation of loan documentation, internal Bank review, and negotiations with the borrowing government. After these activities are completed, the loan package is presented to the Board of Executive Directors for approval. Project evaluation includes special emphasis on the prospects for repayment; therefore, each loan must be guaranteed by the recipient government. This process, from initial project identification to final loan approval, typically takes approximately 2 years.

As the flow chart in Exhibit 16-3 indicates, the project sequence is generally initiated at the host country's request. This request is passed on to the corresponding regional office at IBRD headquarters, where it is assigned to a country officer. This individual is responsible for ensuring that preliminary economic and technical analyses are prepared for the proposed project and for securing the necessary reviews from other Bank components. If the preliminary assessment indicates that the project merits further consideration, a feasibility study is conducted.

Exhibit 16-3: WORLD BANK PROJECT SEQUENCE



Mr. G. Edward Schuh

Director

Agriculture and Rural Development Department

The World Bank

801 19th Street, N.W., Room N-1136

Washington, D.C. 20433

Telephone: (202) 676-1755

Mr. Ping-Cheung Loh

Director

Water Supply and Urban Development Department

The World Bank

801 19th Street, N.W., Room N-736

Washington, D.C. 20433

Telephone: (202) 676-9484

Mr. John D. North

Director

Population, Health, and Nutrition Department

The World Bank

801 19th Street, N.W., Room N-437

Washington, D.C. 20433

Telephone: (202) 676-1571

As noted in Section 16.4, host country requests for project assistance are initially directed to regional offices. Persons to contact in these offices include:

Mr. Bisset Aitabah

Director

Projects Department

Western Africa Regional Office

The World Bank

1800 H Street, N.W., Room B-404

Washington, D.C. 20433

Telephone: (202) 477-6388

Mr. Hans Wyss

Director

Projects Department

Eastern and Southern Africa Regional Office

The World Bank

1818 H Street, N.W., Room A-1042

Washington, D.C. 20433

Telephone: (202) 477-2668

Mr. Robert Picciotto

Director

Projects Department

Latin America and the Caribbean

The World Bank

1818 H Street, N.W., Room A-813

Washington, D.C. 20433

Telephone: (202) 477-5906

Public Affairs Office
The World Bank
1818 H Street, N.W.
Washington, D.C. 20433
Telephone: (202) 477-1234

More detailed information on World Bank procurement regulations is contained in Guidelines: Procurement under IBRD Loans and IDA Credits. This brochure is available from:

Development Business
P.O. Box 5850
Grand Central Station
New York, New York 10163-5850
Telephone: (212) 754-4460

Announcements of upcoming World Bank projects and related procurements are published in Development Business, the business edition of the UN's Development Forum newspaper. Development Business is published 24 times a year and carries an annual subscription fee of \$250. For further information, contact:

16.6 Additional References

Mr. Suibertus M.L. van der Meer
Director
Projects Department
East Asia and Pacific Regional Office
The World Bank
1850 Eye Street, N.W. Room I-7-015
Washington, D.C. 20433
Telephone: (202) 676-1811

Mr. Visvanathan Rajagopalan
Director
Projects Department
Europe, Middle East, and North Africa Regional Office
The World Bank
600 19th Street, N.W. Room H-10-067
Washington, D.C. 20433
Telephone: (202) 473-2707

Mr. Enrique Lerdau
Director
Projects Department
South Asia Regional Office
The World Bank
600 19th Street, N.W. Room H-4049
Washington, D.C. 20433
Telephone: (202) 473-2776

INTERNATIONAL DEVELOPMENT ASSOCIATION HIGHLIGHTS

- The IDA provides credits, not loans, to the very poorest countries, to help developing countries mobilize capital investment, promote foreign investment, and encourage balanced growth.
- IDA programs are administered by the same officers and staff as the International Bank for Reconstruction and Development (IBRD), and carry the same procurement and project evaluation procedures.
- Agriculture and rural development projects received nearly one-half of IDA funds in 1985, which are well-suited to applications of renewable energy technologies.

17.0 International Development Association



1818 H Street, N.W.
Washington, D.C. 20433
Telephone: (202) 477-1234

President: Mr. Barber Conable

17.1 Agency Background

17.1.1 History

The International Development Association (IDA) was established in September 1960 to provide assistance for the same objectives as the IBRD, but on concessional terms. These objectives include providing aid in reconstruction and development of member countries by mobilizing capital investment for productive purposes, promoting private foreign investment, and encouraging the balanced growth of international trade and the maintenance of equilibrium in members' balance of payments.

17.1.2 Mission

IDA assistance is concentrated on the very poorest countries -- those whose per capita gross national product (GNP) is below \$791 in 1983 dollars. More than 50 countries are eligible under this standard (see Exhibit 17-1). IDA's objectives are to promote economic development and increased productivity and to raise standards of living by providing its members with financial assistance that will not aggravate balance of payments burdens.

17.1.3 Activities

IDA provides credits, as distinct from IBRD loans, that are made only to governments and carry a 10-year grace period and repayment terms of up to 50 years. These credits are extended with no interest, except for a small service fee of 0.75 percent to defray administrative expenses. IDA resources are derived from transfers from IBRD net earnings, capital subscriptions of member countries, and contributions from IDA's relatively wealthier members.

17.1.4 Organization

IDA is administered by the same officers and staff as the IBRD, although IDA is legally and financially distinct from the World Bank. Membership in the IDA is open to all members of the IBRD, and 133 countries have joined to date. These countries are listed in Exhibit 17-1.

17.2 Program Emphasis

17.2.1 Sectoral Focus

The sectoral distribution of IDA-funded projects in fiscal year 1985 (ending June 30, 1985) was as follows:

Exhibit 17-1: IDA - MEMBER COUNTRIES

Contributing Countries

Algeria
Argentina
Australia
Austria
Belgium
Belize
Botswana
Brazil
Cameroon
Canada
Cape Verde
Chile
Colombia
Comoros
Congo, People's Republic of the
Costa Rica
Cyprus
Denmark
Djibouti
Dominica
Dominican Republic
Ecuador
Equatorial Guinea
Fiji
Finland
France
Gabon

Gambia
Germany, Federal Republic of
Greece
Grenada
Guatemala
Guinea-Bissau
Guyana
Hungary
Iceland
Iran, Islamic Republic of
Iraq
Ireland
Israel
Italy
Japan
Jordan
Korea, Republic of
Kuwait
Lebanon
Libya
Luxembourg
Malaysia
Maldives
Mauritius
Mexico
Netherlands
New Zealand

Nicaragua
Norway
Oman
Panama
Paraguay
Peru
Saint Lucia
Saint Vincent
Sao Tome and Principe
Saudi Arabia
Solomon Islands
South Africa
Spain
Swaziland
Sweden
Syrian Arab Republic
Thailand
Trinidad and Tobago
Tunisia
Turkey
United Arab Emirates
United Kingdom
United States
Vanuatu
Western Samoa
Yugoslavia

Countries Eligible For Assistance

Afghanistan
Bangladesh
Benin
Bhutan
Bolivia
Burkina Faso
Burma
Burundi
Central African Republic
Chad
China
Egypt, Arab Republic of
El Salvador
Ethiopia
Ghana
Guinea
Haiti
Honduras
India

Indonesia
Ivory Coast
Kampuchea, Democratic
Kenya
Lao People's Democratic
Republic (Laos)
Lesotho
Liberia
Madagascar
Malawi
Mali
Mauritania
Morocco
Mozambique
Nepal
Niger
Nigeria
Pakistan
Papua New Guinea

Philippines
Rwanda
Senegal
Sierra Leone
Somalia
Sri Lanka
Sudan
Tanzania
Togo
Uganda
Viet Nam
Yemen Arab Republic
Yemen, People's Democratic
Republic of
Zaire
Zambia
Zimbabwe

<u>Sector</u>	<u>\$(U.S. Millions)</u>	<u>Percent</u>
Agriculture and Rural Development	1,359.7	44.90
Development Finance Companies	59.3	1.96
Education	412.9	13.63
Energy	216.4	7.14
(Oil, gas, and coal - \$137.7M)		
Industry	9.0	0.30
Non-Project Lending	194.2	6.41
Population, Health, and Nutrition	30.1	0.99
Small-Scale Enterprises	7.5	0.25
Technical Assistance	67.2	2.22
Telecommunications	62.0	2.05
Transportation	271.8	9.00
Urban Development	180.0	5.94
Water Supply and Sewerage	158.0	5.21
Total	<u>3,028.1</u>	<u>100.00</u>

17.2.2 Regional Emphasis

The regional distribution of IDA funding in fiscal year 1985 (ending June 30, 1985) was as follows:

<u>Region</u>	<u>\$(U.S. Millions)</u>	<u>Percent</u>
East Asia and Pacific	446.3	14.74
Eastern and Southern Africa	711.5	23.50
Europe, Middle East, and North Africa	42.1	1.38
Latin America and Caribbean	45.9	1.52
South Asia	1,390.1	45.91
Western Africa	392.2	12.95
Total	<u>3,028.1</u>	<u>100.00</u>

As the figures above indicate, countries in South Asia received the largest regional share of IDA funding in 1985. This large funding allocation reflects the persistent and pervasive poverty in the region, as well as the infrastructural bottlenecks -- power shortages, inadequate transport facilities and irrigation systems, and unreliable urban services -- that inhibit the region's economic activity and growth.

17.2.3 Interagency Cooperation

Similar to the IBRD, IDA maintains liaison relationships with the members of the UN family of organizations, the regional development banks, and other multilateral aid institutions.

17.3 Renewable Energy Project Opportunities

IDA's activities provide the same type of project opportunities as those available with the World Bank. These opportunities are far from limited to energy sector loans; they include end-use sector projects that can apply renewable energy to power their particular needs. These projects include agriculture, irrigation and water supply, health, rural development, and telecommunications.

17.4 Lending and Procurement Procedures

17.4.1 Project Evaluation

IDA projects undergo an evaluation process similar to that used by the World Bank (see Chapter 16.0 for a detailed description of the World Bank (IBRD) project development and evaluation process).

IDA's charter dictates that credit be extended only for "productive purposes" and that it must stimulate economic growth in the developing countries in which assistance is provided. Project evaluation includes specific emphasis on the prospects of repayment; therefore, each loan must be guaranteed by the recipient government.

17.4.2 Procurement

The procurement requirements of the IDA are identical to those of the World Bank (Chapter 16.0 provides a description of World Bank (IBRD) procurement procedures). As an indication of sales opportunities, 15.1 percent of IDA project procurement, valued at \$1.17 billion, was sourced in the United States for the period 1981-1985.

17.5 Key Contacts

As noted in 17.1.4 above, IDA programs are administered by the officers and staff of the IBRD. For a listing of sectoral and regional contacts, refer to Chapter 16.0.

17.6 Additional References

Announcements of upcoming IDA projects and related procurements are published in Development Business, the business edition of the UN's Development Forum newspaper. Development Business is published 24 times a year and carries an annual subscription fee of \$250. For further information, contact:

Development Business
P.O. Box 5850
Grand Central Station
New York, New York 10163-5850
Telephone: (212) 754-4460

More detailed information on IDA procurement regulations is contained in: Guidelines: Procurement Under IBRD Loans and IDA Credits. This brochure is available from:

Public Affairs Office
The World Bank
1818 H Street, N.W.
Washington, D.C. 20433
Telephone: (202) 477-1234

INTERNATIONAL FINANCE CORPORATION HIGHLIGHTS

- As an affiliate of the World Bank, the IFC's function is to accelerate the economic growth of developing member countries by promoting private sector growth in these economies.
- Technical assistance is provided to finance feasibility studies of potentially viable investment projects in developing member countries, and for broader sectoral development projects.
- The Caribbean Project Development Facility was initiated by the IFC in 1981 to assist businesses owned by Caribbean citizens to raise funds for new investment projects.

18.0 International Finance Corporation



1818 H Street, N.W.
Washington, D.C. 20433
Telephone: (202) 477-1234

President: Mr. Barber Conable

18.1 Agency Background

18.1.1 History

The International Finance Corporation (IFC) was established as an affiliate of the World Bank in 1956 to accelerate the economic development of the Bank's less developed member countries by promoting the growth of the private sector of their economies.

18.1.2 Mission

The main objectives of the IFC are to mobilize domestic and foreign capital for private enterprise, to encourage the development of local capital markets, and to stimulate the international flow of private capital.

18.1.3 Activities

The IFC makes investments, in the form of share subscriptions and long-term loans, in private enterprises in developing member countries. In fiscal year 1985 (ending June 30, 1985), the IFC approved 75 investments in 38 developing countries totaling \$937.2 million.

Technical assistance is provided through a cooperative program with the United Nations Development Programme (UNDP). This special facility, created in 1982, helps finance feasibility studies for potentially viable investment projects in less developed countries. Two such studies were funded in 1985.

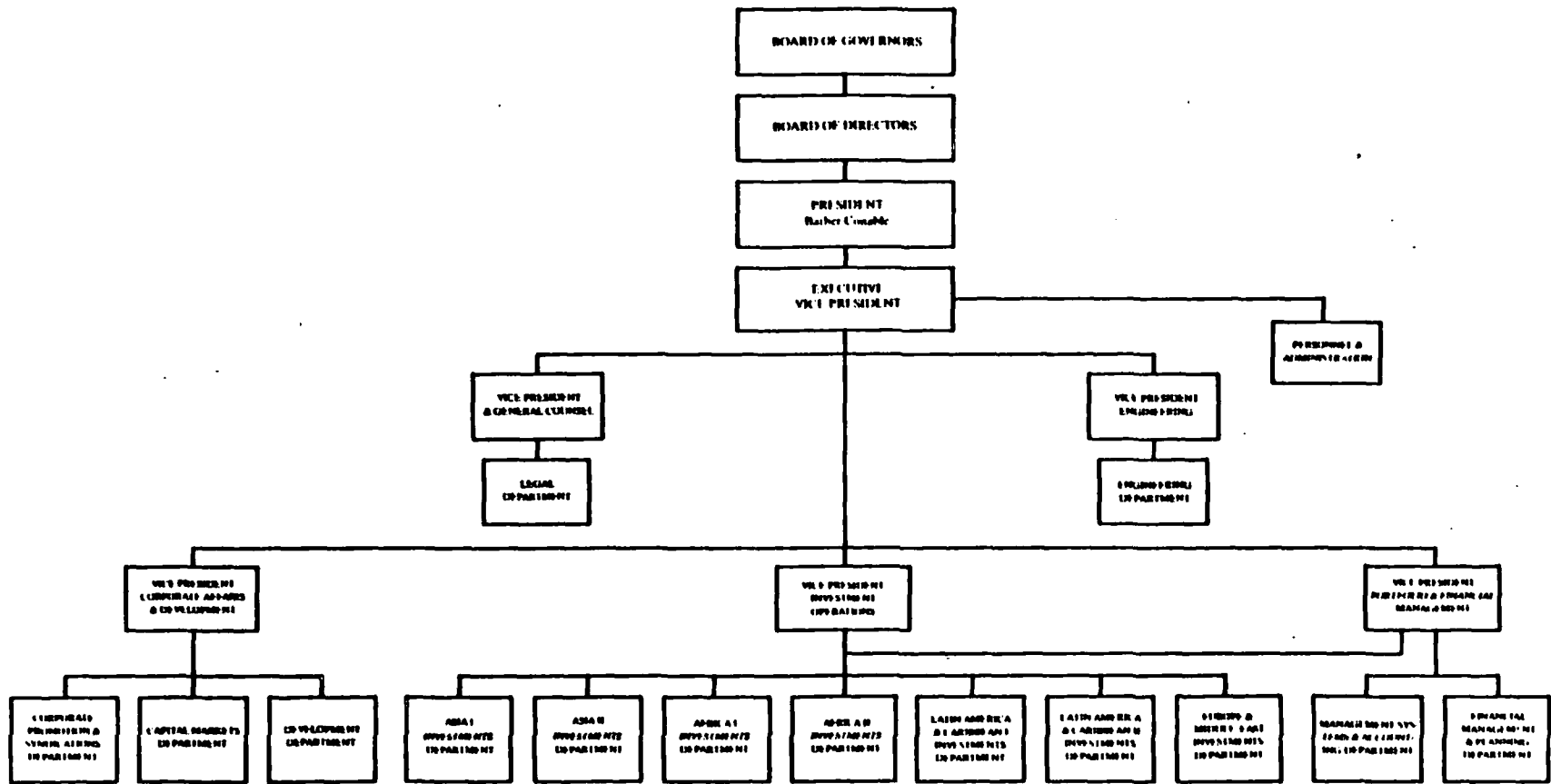
In addition, the IFC funds traditional technical assistance for broader sectoral development projects. Examples of technical assistance projects funded in 1985 include substitution of alcohol for diesel fuels in Malawi, technical and management improvements for a fertilizer complex in Cyprus, and substitution of alcohol for lead as a gasoline octane enhancer in East Africa.

18.1.4 Organization

The IFC is closely associated with the World Bank, yet it is a separate legal entity and its staff and funds are distinct from those of the Bank. The IFC organizational structure is illustrated in Exhibit 18-1.

Membership in the IFC is open to all governments that are members of the World Bank. There are currently 127 members, 106 of which are developing countries. Exhibit 18-2 provides a listing of IFC members.

Exhibit 18-1
ORGANIZATIONAL STRUCTURE OF THE INTERNATIONAL FINANCE CORPORATION



Note: Investment department functions report to the Vice President, International Operations at investment matters & to the Vice President, Finance & Planning at financial matters; the Executive Special Markets also reports to the Vice President, Finance & Planning at financial matters.

DEPARTMENT HEADS
 General Manager, U.S. Office
 London Office, U.K. Office
 Paris Office, U.S. Office
 Tokyo Office, U.S. Office

DEPARTMENT HEADS
 East Asia (Manila), U.S. Office
 South Asia (New Delhi), U.S. Office
 East Africa (Nairobi), U.S. Office
 West Africa (Lagos), U.S. Office

DEPARTMENT HEADS
 Investment (Lagos), U.S. Office
 Technical Assistance (Lagos), U.S. Office

Exhibit 18-2: IFC - MEMBER COUNTRIES

Afghanistan	Haiti	Panama
Argentina	Honduras	Papua New Guinea
Australia	Hungary	Paraguay
Austria	Iceland	Peru
Bangladesh	India	Philippines
Barbados	Indonesia	Portugal
Belgium	Iran, Islamic Republic of	Rwanda
Belize	Iraq	Saint Lucia
Bolivia	Ireland	Saudi Arabia
Botswana	Israel	Senegal
Brazil	Italy	Seychelles
Burkina Faso	Ivory Coast	Sierra Leone
Burma	Jamaica	Singapore
Burundi	Japan	Solomon Islands
Cameroon	Jordan	Somalia
Canada	Kenya	South Africa
Chile	Korea, Republic of	Spain
China	Kuwait	Sri Lanka
Colombia	Lebanon	Sudan
Congo, People's Republic of the	Lesotho	Swaziland
Costa Rica	Liberia	Sweden
Cyprus	Libya	Syrian Arab Republic
Denmark	Luxembourg	Tanzania
Djibouti	Madagascar	Thailand
Dominica	Malawi	Togo
Dominican Republic	Malaysia	Trinidad and Tobago
Ecuador	Maldives	Tunisia
Egypt, Arab Republic of	Mali	Turkey
El Salvador	Mauritania	Uganda
Ethiopia	Mauritius	United Arab Emirates
Fiji	Mexico	United Kingdom
Finland	Morocco	United States
France	Mozambique	Uruguay
Gabon	Nepal	Vanuatu
Gambia	Netherlands	Venezuela
Germany, Federal Republic of	New Zealand	Viet Nam
Ghana	Nicaragua	Western Samoa
Greece	Niger	Yemen Arab Republic
Grenada	Nigeria	Yugoslavia
Guatemala	Norway	Zaire
Guinea	Oman	Zambia
Guinea-Bissau	Pakistan	Zimbabwe
Guyana		

18.2 Program Emphasis

18.2.1 Sectoral Focus

The sectoral distribution of IFC-funded projects in fiscal year 1985 (ending June 30, 1985) was as follows:

<u>Sector</u>	<u>\$(U.S. Millions)</u>	<u>Percent</u>
Fertilizers, Chemicals, and Petrochemicals	374.88	40
Capital Markets/Financial Services	253.04	27
Energy and Minerals	84.35	9
Other Manufacturing	74.98	8
Agri-business	65.60	7
Wood, Pulp, and Paper	37.49	4
Tourism	28.12	3
Cement and Steel	18.74	2
Total	<u>937.20</u>	<u>100</u>

18.2.2 Regional Emphasis

The regional distribution of IFC-funded projects in fiscal year 1985 was as follows:

<u>Region</u>	<u>\$(U.S. Millions)</u>	<u>Percent</u>
Africa	107.2	11.43
Asia	163.5	17.45
Latin America and Caribbean	546.2	58.28
Middle East and Europe	120.3	12.84
Total	<u>937.2</u>	<u>100.00</u>

18.2.3 Interagency Cooperation

As noted above, IFC works closely with UNDP on a number of programs. IFC also works with other UN specialized agencies and with government-related development finance institutions such as the Denmark Fund for Developing Countries, the German Company for Economic Cooperation, and the Commonwealth Development Corporation of the United Kingdom.

18.3 Renewable Energy Project Opportunities

The IFC's approach to development assistance is oriented toward investment in specific enterprises. As such, U.S. renewable energy firms could access IFC financing programs by proposing a joint venture in a developing member country.

Technical assistance funding poses another opportunity for U.S. renewable firms. IFC plans to broaden its technical assistance efforts, with the objective of identifying suitable technologies and innovative products and processes and

adapting them to entrepreneurs in developing member countries.

Additional renewable energy opportunities may be available through the Caribbean Project Development Facility (CPDF). This program was established under the auspices of UNDP in 1981 to assist small- and medium-sized businesses owned by Caribbean citizens to raise funds for new investment projects. In its first 3-1/2 years of operation, the Facility has completed 30 projects in 18 Caribbean countries, with an aggregate investment of \$57 million.

18.4 Lending and Procurement Procedures

18.4.1 Project Evaluation

The IFC's ultimate objective is to improve the well-being of the populations of developing member countries. In keeping with this objective, project investments are evaluated on the basis of their potential to promote economic growth and increase capital investment in the developing country. In addition, IFC's environmental policy ensures that projects include measures to protect the general environment and the health of the people living in that environment.

18.4.2 Procurement

Because IFC is an investment finance institution, it is not involved in procurements of project inputs. Its assistance takes the form of equity investments or direct loans in developing member countries' private enterprises.

18.5 Key Contacts

For information on the regional activities of the IFC, contact:

Mr. Douglas Gustafson
Director
Department of Investments, Europe
and the Middle East
International Finance Corporation
I 9-015
1850 Eye Street, N.W.
Washington, D.C. 20433
Telephone: (202) 676-0571

Mr. Torstein Stephansen
Director
Department of Investments, Asia
International Finance Corporation
I 11-179
1850 Eye Street, N.W.
Washington, D.C. 20433
Telephone: (202) 676-0601

Mr. Daniel F. Adams
Director
Department of Investments,
Latin America and the Caribbean
International Finance Corporation
I 10-015
1850 Eye Street, N.W.
Washington, D.C. 20433
Telephone: (202) 676-0731

Mr. Andre G. Hovaguimian
Director
Department of Investments, Africa
International Finance Corporation
I 11-015
1850 Eye Street, N.W.
Washington, D.C. 20433
Telephone: (202) 676-0511

Additional information on the Caribbean Project Development Facility is available from:

Mr. Hugh Henry-May
Manager
Caribbean Project Development Facility
International Finance Corporation
R 4053
1722 Eye Street, N.W.
Washington, D.C. 20433
Telephone: (202) 676-1011

AFRICAN DEVELOPMENT BANK HIGHLIGHTS

- The African Development Bank was founded in 1963 to contribute to the economic and social progress of member countries.
- The African Development Fund, a separate entity created in 1972, provides financing to member countries whose economic condition requires that such financing be on concessional terms.
- The African Development Bank is just beginning to gain operational experience with renewable energy projects. The current emphasis on drought and famine relief in Africa presents numerous opportunities to apply these technologies to development needs.

19.0 African Development Bank



P.O. Box 1387
Abidjan 01, Ivory Coast
Telephone: 32 07 11
Telex: 3717 or 3498

President: Mr. Babacar N'Diaye

19.1 Agency Background

19.1.1 History

The African Development Bank was founded in Khartoum, Sudan, in August 1963, under the auspices of the UN Economic Commission for Africa. By 1981, the Bank comprised 50 member states. Aside from the 50 African member states, the Bank includes 22 nonregional members. Exhibit 19-1 lists African Development Bank member countries.

19.1.2 Mission

The purpose of the African Development Bank is to contribute to the economic and social progress of the member states. The African Development Fund (ADF), a separate entity formed in 1972, aims to mobilize concessional funds for Africa's very poorest countries.

19.1.3 Activities

The Bank uses its resources to finance investment projects and programs that will foster economic and social development in Africa. Other Bank functions include encouraging public and private capital investment in Africa and providing technical assistance to study, prepare, finance, and execute development projects.

There are two special funds within the Bank: the Fonds Africain de Développement (ADF) or African Development Fund, created in 1974; and the Fonds Spécial du Nigeria (NDF) or Nigerian Trust Fund, introduced in 1976. These funds are used to implement and finance projects that cannot be financed from ordinary capital.

19.1.4 Organization

The African Development Bank is divided into seven departments: the General Secretary's Office, Administration and Personnel, Planning and Development, Operations, Finance, Legal, and Projects. The Projects Department is responsible for implementing the engineering work related to identifying, preparing, assessing, and supervising projects. This department also acts in an advisory capacity for project design and evaluation as requested by member states. See Exhibit 19-2 for an illustration of the African Development Bank's organizational structure.

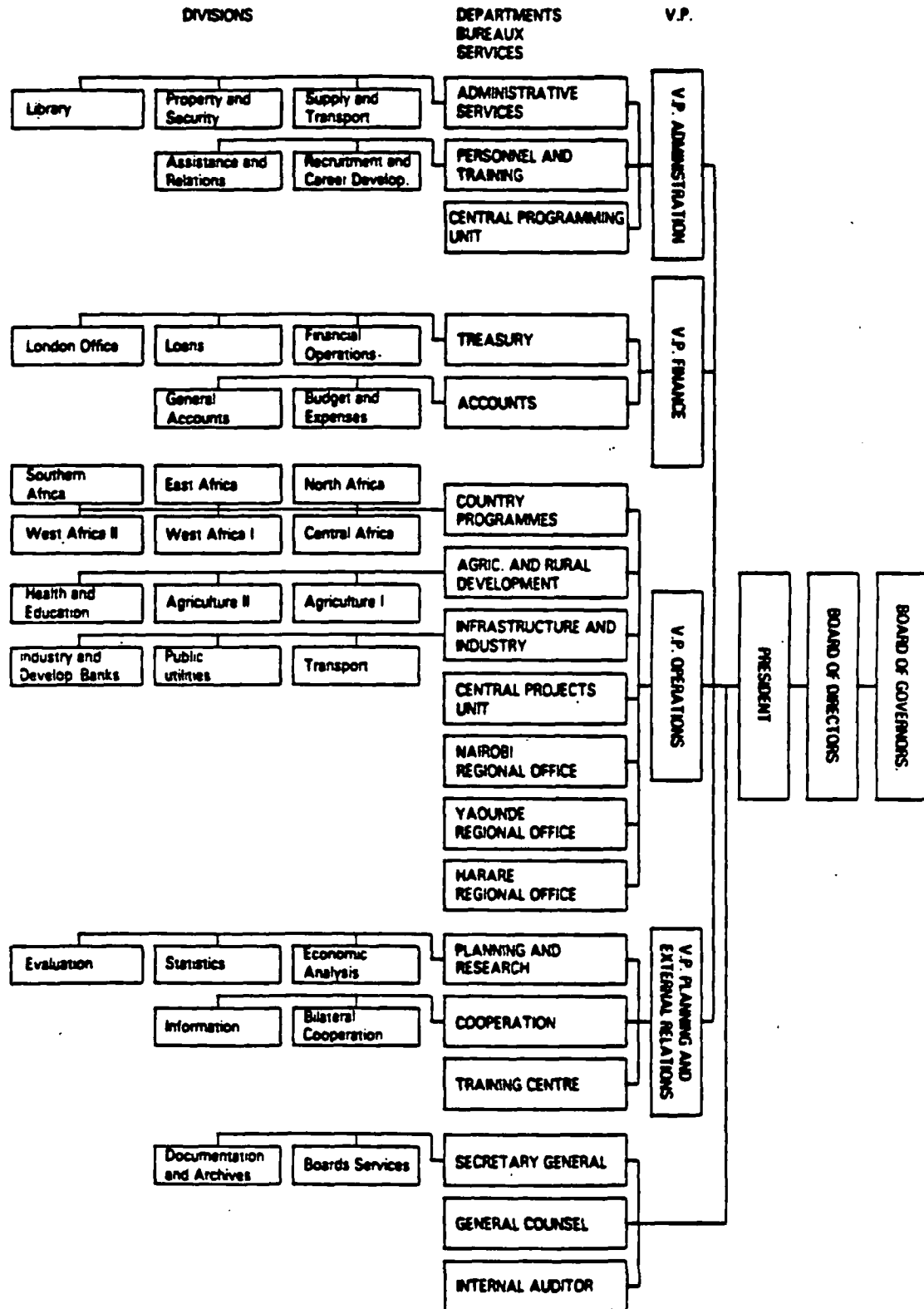
Voting power within the Bank is proportional to a country's subscription to Bank capital. The regional member countries hold 64 percent of the voting

Exhibit 19-1: AFRICAN DEVELOPMENT BANK - MEMBER COUNTRIES

Algeria
Angola
Benin
Botswana
Burkina Faso
Burundi
Cameroon
Cape Verde
Central African Republic
Chad
Comoros
Congo
Djibouti
Egypt
Equatorial Guinea
Ethiopia
Gabon
Gambia
Ghana
Guinea
Guinea Bissau
Ivory Coast
Kenya
Lesotho
Liberia

Libya
Madagascar
Malawi
Mali
Mauritania
Mauritius
Morocco
Mozambique
Niger
Nigeria
Rwanda
Sao Tome and Principe
Senegal
Seychelles
Sierra Leone
Somalia
Sudan
Swaziland
Tanzania
Togo
Tunisia
Uganda
Zaire
Zambia
Zimbabwe

EXHIBIT 19-2: ORGANIZATIONAL STRUCTURE OF THE AFRICAN DEVELOPMENT BANK



power; the remaining 36 percent is allocated among the nonregional member countries (e.g., the U.S. holds 6 percent, France holds 3 percent, and West Germany holds 4 percent of the voting shares).

19.2 Program Emphasis

19.2.1 Sectoral Focus

According to its 1985 Annual Report, the sectoral distribution of African Development Bank projects for that year was as follows:

<u>Sector</u>	<u>\$ (U.S. Millions)</u>	<u>Percent</u>
Agriculture	423.56	36.7
Education and Health	136.18	11.8
Industry	64.63	5.6
Public Utilities	221.59	19.2
Transportation	308.14	26.7
Total	<u>1,154.10</u>	<u>100.0</u>

In spite of declining crude oil prices in recent years, energy imports continued to consume a considerable percentage of the export earnings of many member countries. Therefore, in addition to oil and gas exploration, increased attention was directed to the search for less expensive sources of energy. In particular, Algeria inaugurated the first phase of a solar energy power station in 1985. Work on hydroelectric power sources also progressed in Burkina Faso and Ethiopia. The Bank is anxious to pursue the possibility of applying alternative energy resources, such as solar, wind, and biomass, to agricultural and rural development projects.

Lending programs are directing resources to the poorest sections of the population, especially in those countries suffering from food shortages. Member countries have been given greater assistance for famine and drought relief programs. The African Development Fund, in particular, allocated its assistance for the 1985-1987 period according to a new division of African member countries:

- Category "A": Per capita gross national product (GNP) below \$510
- Category "B": Per capita GNP between \$511 and \$990
- Category "C": Per capita GNP above \$990.

The African Development Bank's 1984 commitments in the amount of \$874.46 million illustrate this reallocation of resources: \$472.8 million to category "A" countries (53.8 percent), \$267.98 million to category "B" countries (31 percent), and \$133.68 million to category "C" countries (15.2 percent). In addition, 19 feasibility studies were financed in 17 member countries for a total of \$19.3 million (2.3 percent of total lending in 1984).

19.2.2 Regional Emphasis

The regional distribution of African Development Bank lending in 1984 was as follows: 19 East African member countries (with a total population of 134 million) received 13.1 percent of loan commitments; 14 West African member

countries (with a total population of 66 million) received 17.4 percent of annual funding; 5 North African member countries (with a total population of 92 million) received 34.6 percent of the year's assistance; 11 Central African member countries (whose populations total 66 million) received 20.1 percent of 1984 loan commitments; and Southern African member countries received 14.8 percent of the year's assistance.

19.2.3 Interagency Cooperation

In 1984, financing assistance totaling \$307 million was applied to 15 projects. The European Development Fund, Arab Bank for Economic Development in Africa, International Development Association, Food and Agriculture Organization, Islamic Development Bank, International Fund for Agricultural Development, U.S. Agency for International Development, UN Development Programme, and the Governments of Belgium, France, Italy, Switzerland, West Germany, and Norway participated in these projects.

19.3 Renewable Energy Project Opportunities

As mentioned above, the African Development Bank is devoting special attention to searching for less expensive sources of energy, including alternative resources such as solar, wind, and biomass. In addition, the current emphasis on drought and famine relief in Africa presents numerous opportunities to apply renewable energy to the areas of water pumping, irrigation, crop-drying and agroprocessing, and general power needs for rural development schemes.

19.4 Lending and Procurement Procedures

19.4.1 Project Evaluation

The Bank evaluates projects based on their potential to contribute to economic development and social progress in regional member states, and chooses to finance those projects that would otherwise be unable to obtain financing, on reasonable terms, from alternative sources. During 1985, the Bank added environmental impact criteria to the project evaluation process, given the ongoing degradation of the African environment and the need to safeguard natural resources such as soil, water, plants, and energy.

19.4.2 Procurement

According to the Bank's charter, loan proceeds are to be used only to procure goods and services produced in member countries (except under special circumstances approved by the Board of Directors).

19.5 Key Contacts

As the organizational chart in Exhibit 19-2 indicates, the Agriculture and Rural Development Department includes the Health and Education Division. Therefore, this department would provide project opportunities in end-use applications such as irrigation and water pumping, agroprocessing, medical refrigeration,

village power and lighting, and telecommunications. The Agriculture and Rural Development Department is headed by Mr. I.B.C. John (Director) and Mr. K.S.M. Nyahe (Deputy Director), who can be contacted at:

African Development Bank
P.O. Box 1387
Abidjan 01, Ivory Coast
Telex: 3717 or 3498

19.6 Additional References

The African Development Bank distributes several pamphlets describing Bank programs and policies, including:

"Energy Development in Africa: The Role of the ADB Group"

"Agreement Establishing the African Development Bank"

"Rules of Procedure for Procurement Under African Development Fund Loans"

African Development Bank Annual Report 1985

which can be obtained from the address listed above.

ASIAN DEVELOPMENT BANK HIGHLIGHTS

- The Asian Development Bank (AsDB) was founded in 1966 to facilitate the economic and social advancement of developing member countries, provide technical assistance for project development and execution, and coordinate development policies among member countries.
- The Asian Development Fund is the Bank's "soft loan window" which provides concessional financing to poorer member countries.
- Technical assistance pilot projects, resource assessments, and training programs are planned for a variety of renewable energy technologies.
- The Bank's current development priorities -- water supply and irrigation, sanitation and health, and rural development -- are well-suited to applications of renewable energy technologies.

The Bank also funds activities to stimulate the private sector in developing member countries. Specifically, the Bank offers lines of credit to development finance institutions for lending to small- and medium-sized industrial enterprises. Other support to the private sector includes technical assistance loans to increase productivity and to direct equity investments.

In 1984, the Bank approved loans for 47 projects totaling \$2.234 billion, 18 percent above the 1983 total of \$1.893 billion. Technical assistance valued at \$22.1 million was provided for 120 projects in 1984. Cofinancing was also a critical element of Bank activities; 23 projects received \$1.163 billion in contributions from cofinanciers, along with \$1.460 billion from the Bank.

The Bank lends funds through two major categories: ordinary operations and special operations. Ordinary operations are lending activities financed from the ordinary capital resources of the Bank. As of late 1984, the lending rate on loans from ordinary operations was 9.65 percent per annum, with maturities ranging from 10 to 30 years and grace periods of 2 to 7 years. Special operations are financed through two vehicles -- the Asian Development Fund (AsDF), which was implemented in 1974, and the Technical Assistance Special Fund (TASF). Loans from the AsDF, the Bank's "soft loan" window, carry a service charge of 1 percent per annum, with repayment extending over 40 years and a grace period of 10 years. These concessional terms are provided to the poorer member countries, based on per capita GNP and limited repayment capacity.

20.1.3 Activities

The principal objectives of the Asian Development Bank are to facilitate the economic and social advancement of developing member countries (DMCs); to provide technical assistance for preparing and executing development projects; to promote private and public capital investment; to coordinate development policies and programs of member countries; and to foster economic growth and cooperation in the region.

20.1.2 Mission

The Asian Development Bank (AsDB) was established under the auspices of the United Nations Economic Commission for Asia and the Far East (ECAFE), now known as the Economic and Social Commission for Asia and the Pacific (ESCAP), by an agreement signed on December 4, 1966, in Wellington, New Zealand.

20.1.1 History

20.1 Agency Background

20.0 Asian Development Bank

2330 Roxas Boulevard
Metro Manila 2800, Philippines
Telephone: (63-2) 711-3851
Telex: 23103 ADB PH

President: Mr. Masao Fujitoka



- Energy - \$767 million (34.3 percent of the total), a 70 percent increase over 1983; included four loans to four large projects valued at \$515.4 million. Major emphasis continues to be on reducing the balance of payments burden of energy imports and on developing indigenous energy resources, as evidenced by increased lending for hydropower, coal, and natural gas development projects.
- Agriculture - \$758 million (33.9 percent of the total), 17 percent higher than lending to this sector in 1983. The Bank supported projects to increase food production and improve living standards in rural areas.
- Transportation and Communications - \$381 million (17.1 percent of the total), up from \$65 million in 1983. These projects will benefit the rural poor by providing improved access to schools, hospitals, and other services.
- Urban Development, Education, Health, and Population - \$136 million (6.1 percent of the total).
- Water Supply and Sanitation - \$102.8 million (4.6 percent of the total).
- Development Banks - \$53.6 million (2.4 percent of the total).
- Multisector - \$35.7 million (1.6 percent of the total).

The sectoral distribution of the Bank's \$2.234 billion in loans approved in 1984 was as follows:

20.2.1 Sectoral Emphasis

20.2 Program Emphasis

There are 21 offices and departments within the Bank (Exhibit 20-2 provides an illustration of the Bank's organization). Within the Industry and Development Banks Department, the Energy Planning Unit analyzes the energy implications of Bank projects, advises DMCs on energy sector plans and policies, and collects and disseminates information on the energy-related technical assistance activities of other multilateral agencies.

The Bank is comprised of 45 member countries, including 31 regional members (providing 62 percent of Bank capital) and 14 nonregional members (providing 38 percent of Bank capital). Exhibit 20-1 provides a list of Bank members. Of the 12 Directors on the Bank's Board, 8 represent regional members and 4 represent nonregional members.

20.1.4 Organization

Technical assistance is provided to DMCs in the form of loans, grants, or a mixture of the two, and is increasingly being directed to the needs of the least developed member countries. The Bank also serves as executing agency for technical assistance projects financed by other sources, such as the UN Development Programme, the European Economic Community, and the International Fund for Agricultural Development.

Exhibit 20-1: ASIAN DEVELOPMENT BANK - MEMBER COUNTRIES

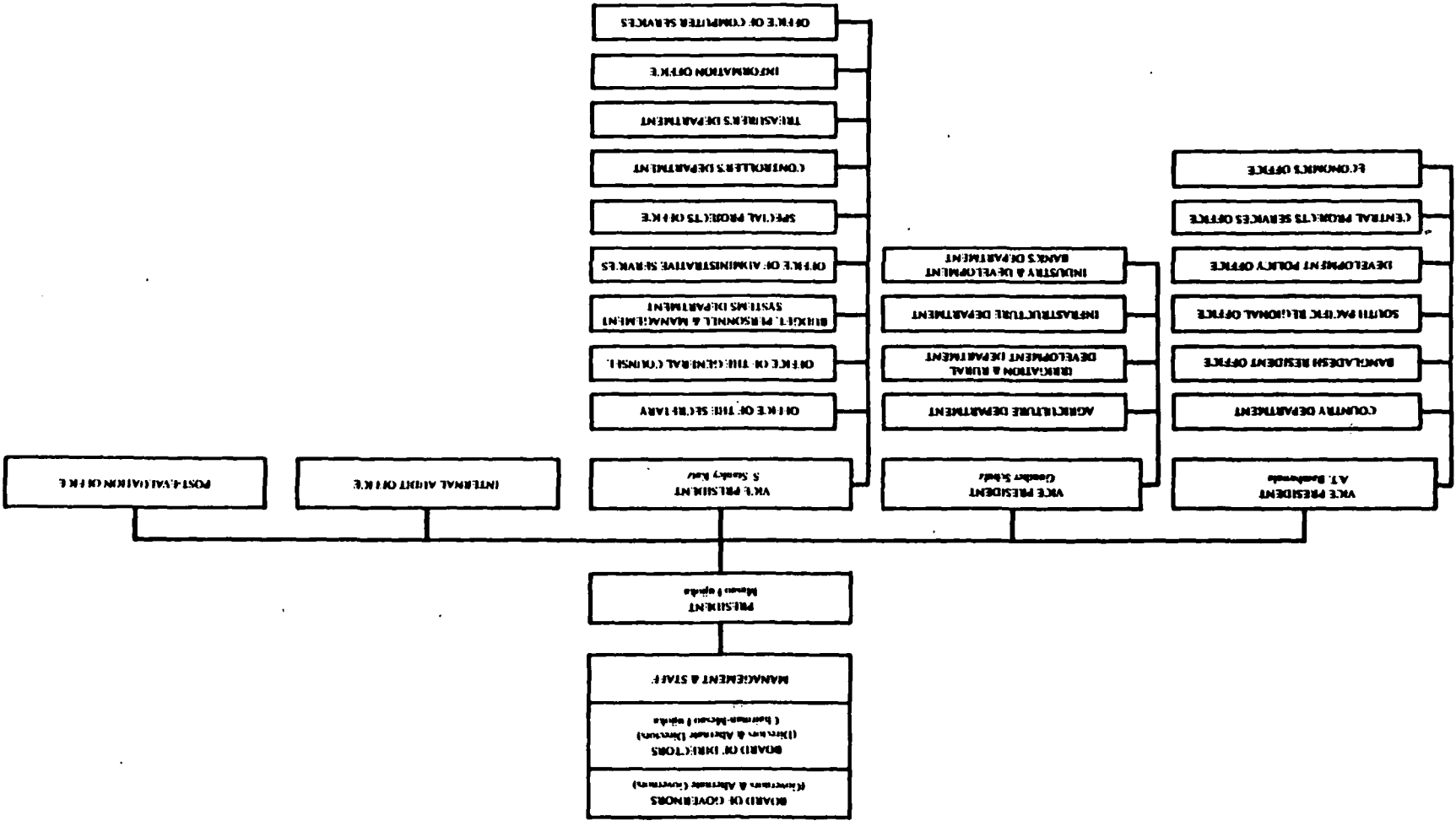
Regional Members

Afghanistan
Australia
Bangladesh
Bhutan
Burma
Cook Islands
Fiji
Hong Kong
India
Indonesia
Japan
Kampuchea
Kiribati
Korea
Laos
Malaysia
Maldives
Nepal
New Zealand
Pakistan
Papua New Guinea
Philippines
Singapore
Solomon Islands
Sri Lanka
Taiwan
Thailand
Tonga
Vanuatu
Viet Nam
Western Samoa

Nonregional Members

Austria
Belgium
Canada
Denmark
Finland
France
Germany
Italy
Netherlands
Norway
Sweden
Switzerland
United Kingdom
United States

EXHIB 20-2: ORGANIZATIONAL STRUCTURE OF THE ASIAN DEVELOPMENT BANK



20.2.2 Regional Emphasis

The Bank's charter calls for special attention to the needs of the smaller, less developed member countries. However, these countries generally have difficulty meeting the terms of the Bank's ordinary loans. As a result of aggressive project identification and preparation efforts, the proportion of smaller, lesser developed countries in annual Bank lending has grown from less than 10 percent in 1971 to an annual average of 32 percent between 1972 and 1984. The bulk of this assistance was provided on concessional terms.

Special attention has now been focused on the needs of the South Pacific DMCs. The principal focus of Bank operations in the South Pacific is on providing institutional support, offering technical assistance, and enhancing aid in-flows from additional sources.

20.2.3 Interagency Cooperation

The Bank maintains strong ties with various international organizations concerned with development issues in the Asia-Pacific region. Co-financing has been provided by the World Bank Group, the OPEC Fund for International Development, and the Islamic Development Bank. In addition, the Bank has agreed to serve as executing agency for technical assistance projects financed by other sources, such as the United Nations Development Programme (UNDP), International Fund for Agricultural Development (IFAD), the European Economic Community (EEC), and the Government of Switzerland.

20.3 Renewable Energy Project Opportunities

The Bank's energy development lending for the period 1981-1987 is expected to total \$6 billion. Traditionally, over 90 percent of energy sector loans have been allocated to electricity generation (primarily for hydroelectric power plants). Since 1976, however, greater emphasis has been focused on developing indigenous energy resources such as geothermal, small-scale hydropower, and biomass. An ASDB energy survey released in 1982 noted that rural energy demand is met largely by noncommercial energy sources. Technical assistance pilot projects, resource assessments, and training programs are planned for a variety of renewable energy technologies.

The agricultural and agro-industry sectors are receiving increased attention as the Bank's lending operations are directed at improving food and commercial crop production, expanding employment, and raising rural living standards. The range of subsectoral activities includes irrigation, fisheries, fertilizer, agro-processing, and overall agricultural training.

Water supply and sanitation facilities, particularly small-scale projects to benefit provincial towns and rural areas, are receiving greater emphasis in Bank operations. Similarly, the Bank is increasingly active in the area of health and nutrition services.

The major restriction on procurement is that the proceeds of a Bank loan can be used only for procurement of goods and services supplied or produced by member countries of the Bank. Procurements under loans from Special Funds resources are restricted to developed member countries that have contributed to Special Funds resources and to all developing member countries. For a more detailed description of Bank regulations, refer to "Guidelines for Procurement Under Asian Development Bank Loans" (see section 20.6, "Additional References").

Responsibility for procurement of the goods and services required for development projects ultimately rests with the borrower. However, the Bank is obligated to ensure that loan proceeds are used effectively. For this reason, the Bank requires its borrowers to obtain goods and services through international competitive bidding (ICB). ICB allows the borrower to exercise the maximum range of choices in selecting the best bid and gives prospective bidders from eligible countries (i.e., members of the Bank) fair and equal opportunity to bid on procurements under Bank loans.

20.4.2 Procurement

After the initial project evaluation is completed, a fact-finding mission is sent to hold preliminary discussions with officials of the recipient country and the project executing agency. After a feasibility study has been completed, an appraisal mission from the Bank is dispatched to the field. This mission reviews the project, prepares an appraisal report, and then returns to the Bank to draft loan documents. Loan negotiations are conducted and, when completed, the Bank President submits his recommendations to the Board of Directors for loan approval. On average, the loan approval process spans approximately 9 months.

The Bank evaluates projects in terms of their economic, technical, and financial feasibility; their contribution to the general development of the country concerned; the capacity of the borrowing country to assume additional external debt; the introduction of new technologies; and the expansion of employment opportunities. Increased attention is being directed to the social impact of Bank lending as well, that is, additional employment opportunities, land reform, vocational training, equity in income distribution, and provision of basic necessities to large numbers of people.

Projects are identified through a general review of a country's economic development, with emphasis on national and sectoral development plans and potential. Periodic project identification missions are dispatched to DMCs for discussions with local authorities to select suitable projects for Bank assistance. After determining that a project is intended for a sector that merits investment, the Bank undertakes a project assessment.

20.4.1 Project Evaluation

20.4 Lending and Procurement Procedures

20.5 Key Contacts

The following officials are all based at ASDB Headquarters and can be reached at:

Asian Development Bank
P.O. Box 789
Metro Manila 2800, Philippines
Telephone: (63-2) 711-3851
Telex: 23103 ADB PH

- Industry and Development Banks Department: Mr. Jayanta Madhab, Energy Advisor
- Infrastructure Department: Mr. Javier M. Gomez, Manager, Water Supply and Sanitation, and Mr. Mazhar Ali, Manager, Health, Population, and Urban Development.
- Agriculture Department: Mr. A.I. Aminul Islam, Manager, Agricultural Support Services.

For general information about the Bank's programs and policies, contact Mr. Truman E. Becker, Senior Information Officer.

20.6 Additional References

The Asian Development Bank distributes several pamphlets with useful information on Bank programs and policies. Particular pamphlets of interest include:

- "Asian Development Bank: Basic Information"
- "Asian Development Bank: Questions and Answers"
- "Guidelines for Procurement Under Asian Development Bank Loans."

ASDB publishes a monthly report entitled "Operational Information on Proposed Projects" that provides extensive information on development projects under consideration as well as those already in progress. A 1-year subscription to this report costs \$28 and can be obtained by writing to:

Operational Information on Proposed Projects
Information Office
Asian Development Bank
P.O. Box 789
Metro Manila 2800, Philippines

Announcements of upcoming ASDB projects and related procurements are also published in Development Business, the business edition of the UN's Development Forum newspaper. Development Business is published 24 times a year and carries an annual subscription fee of \$250. For further information, contact:

Development Business
P.O. Box 5850
Grand Central Station
New York, New York 10163-5850
Telephone: (212) 754-4460

CARIBBEAN DEVELOPMENT BANK HIGHLIGHTS

- The Caribbean Development Bank (CDB) was founded in 1969 to promote regional economic integration and cooperation, and help member countries implement their development objectives.
- A Technical Assistance Fund was established to finance feasibility studies, sectoral analyses, and training activities.
- The CDB created an Alternative Energy System Fund in 1980 to study new and renewable sources of energy. The Fund has financed resource assessments for wind, solar, hydropower, and biomass energy.

The Caribbean Development Bank assists regional member countries in coordinating their development programs by providing technical assistance and project financing.

Development project loans are available in two forms: "hard loans" from ordinary capital resources comprising subscribed capital and Bank borrowings; and "soft loans" from the Special Development Fund. Hard loans are extended to the more developed member countries and carry near market-rate interest charges (10.75 percent as of April 1985). Soft loans carry an interest rate of between 4 and 6 percent (depending on the borrowing country), a grace period of up to 5 years, and repayment terms of 15 to 20 years. These loans are extended to member governments and government agencies for projects with high development priority. Through loans to development finance institutions, concessional financing can be directed to small-scale enterprises and infrastructure projects.

Technical assistance is provided to borrowing member countries, primarily in the area of project formulation. This assistance includes feasibility studies, project management, economic analysis, and sectoral planning. The Bank established a Technical Assistance Fund, with initial capital contributions of \$4 million, to finance activities for project-oriented and general development needs.

21.1.3 Activities

The Bank's main objective, according to its charter, is "to contribute to the harmonious economic growth and development of the member countries in the Caribbean and to promote economic cooperation and integration among them."

21.1.2 Mission

The Caribbean Development Bank (CDB) was established under the auspices of the UN Development Programme (UNDP) by an agreement signed on October 18, 1969, in Kingston, Jamaica, which became effective on January 26, 1970. The Bank is comprised of 20 regional and 3 nonregional members (Exhibit 21-1). In addition, nonmember contributors to the Bank have included the United States, Federal Republic of Germany, Netherlands Antilles, New Zealand, Nigeria, and Sweden.

21.1.1 History

21.1 Agency Background

President: Mr. William G. Demas

P.O. Box 408
 Willey, St. Michael
 Barbados, West Indies
 Telephone: (809) 426-1152
 Telex: WB 2287



21.0 Caribbean Development Bank

Exhibit 21-1: CARIBBEAN DEVELOPMENT BANK - MEMBER COUNTRIES

Regional Members

Anguilla	Guyana
Antigua	Jamaica
Bahamas	Mexico
Barbados	Montserrat
Belize	Saint Kitts-Nevis
British Virgin Islands	Saint Lucia
Cayman Islands	Saint Vincent and the Grenadines
Colombia	Trinidad and Tobago
Dominica	Turks and Caicos Islands
Grenada	Venezuela

Nonregional Members

Canada	United Kingdom
France	

In 1982, (the most recent year for which renewable technology-specific data are available) the Bank approved a total of \$1.92 million in loans to renewable energy activities, as follows:

The Bank's alternative energy program is being implemented with the assistance of an energy policy advisor from the Latin American Energy Organization (OLADE). In a related effort, in June 1982, CDB, OLADE, and the Inter-American Development Bank co-sponsored the first Regional Seminar on Financing Energy Development, which included participants from throughout the region.

In response to the United Nations initiative for developing new and renewable sources of energy, the Bank established the Alternative Energy System Fund in 1980 to study nonconventional energy sources. The Fund has financed resource assessments for wind, solar, hydropower, and biomass energy. In 1985, the Fund approved six grants totaling \$291,000 for projects such as hotel energy audits in the British Virgin Islands; a wind energy conversion system in Montserrat; and a pre-investment study of electricity from sawmilling wastes in Jamaica.

Sector	\$U.S. Millions	Percent
Agriculture, Forestry, and Fisheries	36.53	6.58
Mining and Quarrying	.68	0.12
Manufacturing	99.49	17.91
Tourism	18.89	3.40
Transportation and Communications	169.22	30.46
Power, Energy, and Water	25.97	4.67
Electric Power	3.03	0.55
Alternative Energy	20.13	3.62
Water Supply	45.73	8.23
Social Services	35.66	6.42
Multi-Sector	100.22	18.04
Financing and Distribution	555.55	100.00
Total		

The sector distribution of Caribbean Development Bank loans for the 1970-1985 period was as follows:

21.2.1 Sectoral Focus

21.2 Program Emphases

The Board of Governors is the highest policy-making body of the CDB, with each member country represented by a Governor and an Alternate Governor. Voting power is approximately proportional to subscriber shares in the Bank. However, in 1971, the Board decided that Commonwealth Caribbean Members should always have a majority of the voting power in the Bank and a majority of the number of Directors. The Board of Directors, comprising ten regional member representatives and three non-regional member representatives, takes decisions concerning loans, guarantees, and other CDB investments, borrowing programs, technical assistance and other operations, and approves the CDB's administrative budget.

21.1.4 Organization

In 1985, for example, eleven biogas digesters were installed in Barbados, Dominica, Guyana, St. Lucia, and St. Vincent and the Grenadines. These units have been well received, and additional digesters are expected to be requested. The Regional Energy Action Plan (REAP) also received funding in 1985 for technical assistance to encourage the utilization of bagasse, firewood, charcoal, and agricultural wastes, and to develop small-scale hydropower potential. As mentioned above, technical assistance was also provided to Montserrat Electricity Services, Ltd., to install a wind energy conversion system, and to assess the future role of wind power in Montserrat.

The Caribbean Development Bank has devoted increased resources to regional energy needs, as evidenced by the formation of the Alternative Energy System Fund. Energy needs assessments that are currently being conducted are expected to lead to the identification of investment projects in renewable energy equipment that may be funded by CDB.

21.3 Renewable Energy Project Opportunities

In 1977, the Board of Governors of the Inter-American Development Bank amended its charter to enable the Bank to lend through the Caribbean Development Bank to all CDB member states, regardless of whether these states are members of the Inter-American Development Bank.

The Caribbean Development Bank is represented at the Caribbean Economic Community (CARICOM) Council of Ministers and Technical Committee. The Alternative Energy System Fund is being implemented in close cooperation with CARICOM and the Latin American Energy Organization.

21.2.3 Interagency Cooperation

The Bank extends loans to governments of regional member countries, government agencies of member countries, public or private entities operating within those countries, and regional agencies concerned with the economic development of the Caribbean region.

21.2.2 Regional Emphasis

Energy Sources	\$(U.S.)	Percent
Biomass	163,400	8.5
Fuelwood	204,800	10.7
Hydropower	220,900	11.5
New and Renewable Energy Sources (General)	128,200	6.7
Peat	6,000	0.3
Solar	765,900	39.8
Use of Waste Products	46,500	2.4
Wind	386,900	20.1
Total	1,922,600	100.0

21.4 Lending and Procurement Procedures

21.4.1 Project Evaluation

The Caribbean Development Bank determines suitability for project funding based on technical, financial, legal, managerial, environmental, and social aspects; the general development impact on the recipient country; the capacity of the borrowing country to assume additional external debt; the appropriateness of the technology embodied in the project; and the creation of employment opportunities. The Bank's charter dictates that project lending is provided only when it is determined that financing on reasonable terms is not otherwise available.

21.4.2 Procurement

According to the CDB's Articles of Agreement, proceeds of project funding from ordinary operations must be used for goods and services produced in "territories of members," and "the Bank shall pay due regard to the need to develop and strengthen undertakings, entities, and skills of individuals belonging to the region."

Procurement contracts are made on the basis of tenders in response to either advertisements in local publications or in response to letters of invitation to at least three competent contractors or suppliers approved by CDB.

21.5 Additional References

The Caribbean Development Bank publishes several pamphlets on bank programs and policies, including:

Caribbean Development Bank Annual Report 1985
CDB News

"The Caribbean Development Bank -- Its Purpose, Role, and Functions"

"Financial Policies"

"Guidelines for Procurement"

"Technology and Energy Unit (TEU) Newsletter"

which may be obtained by contacting:

The Vice President for Corporate Services and Bank Secretary
Caribbean Development Bank
P.O. Bank Box 408
Wilkey, St. Michael
Barbados, West Indies
Telephone: (809) 426-1152
Telex: WB 2287.

Regional Members

- | | |
|------------------------|--------------------|
| Haiti | Argentina |
| Honduras | Bahamas |
| Jamaica | Barbados |
| Mexico | Bolivia |
| Nicaragua | Brazil |
| Panama | Canada |
| Paraguay | Chile |
| Peru | Colombia |
| Suriname | Costa Rica |
| Trinidad and
Tobago | Dominican Republic |
| United States | Ecuador |
| Uruguay | El Salvador |
| Venezuela | Guatemala |
| | Guyana |

Nonregional Members

- | | |
|----------------|---------|
| Japan | Austria |
| Netherlands | Belgium |
| Portugal | Denmark |
| Spain | Finland |
| Sweden | France |
| Switzerland | Germany |
| United Kingdom | Israel |
| Yugoslavia | Italy |

During 1983 and early 1984, the Bank also financed a number of efforts in the field of renewable energy. These included a regional training program for geothermal energy, a study on the design of small-scale hydropower projects,

Through year-end 1983, the Bank had committed 194 loans totaling \$6.696 billion to finance projects in the energy sector. These loans are helping to expand Latin America's generating capacity, power transmission and distribution lines, and gas and petroleum pipelines.

In 1978, the Bank adopted guidelines providing that at least 50 percent of proposed loans would be directed to benefit lower-income groups. Low-income benchmarks have been established based on the cost of a typical "food basket" designed to meet nutritional requirements and on the need for other basic necessities such as clothing, housing, and transportation. The Bank has given priority to the improvement of rural areas; specifically, to increasing food production and farm employment, and upgrading the standard of living for rural populations. At the same time, the Bank seeks to foster energy development and diversification to help lessen the region's dependence on imported energy.

22.2.1 Sectoral Emphases

22.2 Program Emphases

In addition to its headquarters in Washington, D.C., the Bank maintains offices in most of the Latin American member countries. The staffs of these offices help to identify new projects, administer approved loans, and supervise project implementation.

The basic authority of the Bank rests with the Board of Governors, composed of one Governor and one Alternate Governor appointed by each member country. The Board of Executive Directors, elected or appointed by the Governors of the Bank, establishes the Bank's operational policies, approves loans and technical cooperation proposals, sets interest rates, and authorizes Bank borrowings in capital markets. The Bank President is elected by the Board of Governors to a 5-year term. Exhibit 22-2 presents an illustration of the Bank's organizational structure.

The Bank is owned by its 43 member countries. Each country's voting power is proportional to its subscription to Bank capital stock, as follows: the Latin American countries as a group hold 54 percent, the United States holds 35 percent, Canada has 4 percent, and the nonregional members as a group hold 7 percent.

22.1.4 Organization

The Bank has also supported the establishment of an Inter-American Investment Corporation (IIC), which, as an independent organization affiliated with the Bank, will supplement the Bank's activities in private sector development. The IIC will seek to foster economic development in Latin America by encouraging the establishment, expansion, and modernization of private enterprises, particularly those of small- and medium-scale. The Corporation will make direct investments in such enterprises through equity participation, loans, cofinancing, and joint ventures, as well as by providing technical, financial, and managerial assistance.

The transfer of "appropriate" (i.e., less capital-intensive) technology is a major consideration in Bank-financed projects. The Bank has established a committee to review proposed projects to determine how appropriate technologies can be incorporated into the development process. The Bank also supports research and training projects to develop and disseminate intermediate technologies and encourages cooperation between Latin American countries to facilitate technology transfer throughout the region.

The Bank provides technical cooperation to assist borrowing countries in acquiring skills in two major areas: preparing, financing, and implementing development plans and projects; and developing and improving the skills of personnel specializing in preparing and executing development plans and projects. By the end of 1984, the Bank had committed \$1.143 billion to technical cooperation projects, 56 percent (\$643 million) of which was provided on a reimbursable basis and 44 percent (\$499.8 million) of which was provided in grant or contingent recovery basis. Reimbursable cooperation is provided in the form of preinvestment loans used to finance advisory services.

22.2.2 Technical Assistance

The remaining project funding was directed to the urban sector, including industry and urban services such as water supply, sanitation, health, education, infrastructure facilities such as highways, ports and communications systems, and mining projects.

Approximately one-third of 1985 Bank loans were directed to projects for increased agricultural output and improved rural living conditions. These projects included farm credit, irrigation, integrated rural development, fishing, rural water supply, health and education facilities, and rural electrification and communications programs.

Loans to the energy sector in 1985 totaled \$826 million, \$765.8 million (92.7 percent) of which was allocated to electricity generation projects, primarily hydropower. Other energy expenditures were for gas pipelines and electric transmission systems.

Sector	\$(U.S. Millions)	Percent
Energy	826.5	27
Agriculture and Fisheries	642.8	21
Industry and Mining	551.0	18
Transportation and Communications	397.9	13
Environment and Public Health	244.9	8
Education, Science and Technology	122.5	4
Urban Development	122.4	4
Multisector	153.0	5
Total	3,061.0	100

In 1985, the sectoral breakdown of the Bank's \$3.061 billion in approved loans (63 projects) was as follows:

the funding of a solar technology testing center in the Dominican Republic, and a project loan for the installation of biogas digesters in rural areas.

Loan applications are reviewed on the basis of institutional, technical, socio-economic, financial, and legal considerations. In 1980, the Bank added the criterion of benefits distribution analysis in order to determine the impact of proposed projects on low-income groups. The Bank also seeks to minimize adverse environmental effects from the projects it funds. A standing Committee on Environmental Management, housed at Bank headquarters in Washington, D.C., monitors the impact of Bank-financed projects on the environment.

Possible projects are identified in the course of periodic programming missions to various Latin American countries. In conjunction with host country officials and technical experts, Bank specialists review the country's development plans to help identify candidate projects for Bank financing. In response to requests from potential borrowers, the Bank may provide technical assistance for feasibility and project definition studies.

22.4.1 Project Evaluation

22.4 Lending and Procurement Procedures

Projects embodying renewable energy technologies are developed through Bank programming missions that periodically visit member countries to discuss energy and other development issues with government officials. Furthermore, special missions from the Non-Conventional Energy Section are sent to member countries to identify potential projects for implementing renewable energy technologies.

As the organizational diagram in Exhibit 22-2 indicates, the Bank's Energy Division is a subdepartment of the Department of Project Analysis. More specifically, there is a Non-Conventional Energy Section within the Energy Division that was created in April 1981 to broaden the Bank's activities in the energy sector. This reorganization of Bank functions resulted from an August 1980 proposal of operational policy for the energy sector. The policy stresses the development of alternative and renewable sources of energy in the region, as well as the need to expand energy supplies in rural areas. In addition, the policy provides for Bank support in developing, financing, and adapting renewable energy technologies for use in Latin America.

22.3 Renewable Energy Project Opportunities

The Bank cooperates with numerous international and regional development and funding institutions committed to the economic development of Latin America. These organizations include the Organization of American States; the Pan American Health Organization; the World Bank Group; United Nations agencies such as the Food and Agriculture Organization, UN Development Programme, the Economic Commission for Latin America and the Caribbean, the UN Environment Programme, and the International Fund for Agricultural Development; the agencies of the Organization for Economic Cooperation and Development; the European Economic Community; and the Organization of Petroleum Exporting Countries (OPEC). The Bank also cooperates with subregional financial organizations such as the Central American Bank for Economic Integration, the Andean Development Corporation, the Caribbean Development Bank, and the River Plate Basin Financial Fund (FONPLATA).

22.2.3 Interagency Cooperation

22.4.2 Procurement

Goods and services for Bank-financed projects are procured primarily from private firms in the Bank's member countries. In the interest of maximum economy and efficiency, Bank loan contracts specify that international public competitive bidding must be applied to the procurement process for public sector projects when the value of goods and services exceeds \$100,000.

22.5 Key Contacts

For further information on Inter-American Development Bank lending programs and policies, contact:

Mr. Gustavo Calderon

Chief

Non-Conventional Energy Section

Inter-American Development Bank

1300 New York Avenue, N.W.

Washington, D.C. 20577

Telephone: (202) 623-1978

Mr. Calvin Depass

Macroeconomist

Division of Country Studies

Inter-American Development Bank

1300 New York Avenue, N.W.

Washington, D.C. 20577

Telephone: (202) 623-2441

22.6 Additional References

The Inter-American Development Bank publishes a monthly newsletter, IDB News, that provides brief descriptions of approved loans. Free subscriptions to IDB News are available by writing to:

Office of External Relations

Inter-American Development Bank

1300 New York Avenue, N.W.

Washington, D.C. 20577

The Bank also distributes a number of pamphlets that contain useful information on Bank programs and policies, including:

"Basic Facts About Inter-American Development Bank"

"Business Opportunities in Latin America Through the Inter-American Development Bank"

"Inter-American Development Bank 1985 Annual Report"

"The Development of New and Renewable Sources of Energy in Latin America" (August 1984).

In addition, announcements of upcoming Bank projects and related procurements are published in Development Business, the business edition of the UN's Development Forum newspaper. Development Business is published 24 times a year and carries an annual subscription fee of \$250. For further information, contact:

Development Business
P.O. Box 5850
Grand Central Station
New York, New York 10163-5850
Telephone: (212) 754-4460

ISLAMIC DEVELOPMENT BANK HIGHLIGHTS

- The Islamic Development Bank was founded in 1974 to promote social progress and economic development in member countries and Muslim communities.
- The Bank extends loans for infrastructure projects, feasibility studies and technical assistance, equipment leasing, and foreign trade financing operations.
- Although no information is available on the Bank's experience with renewable energy, their development priorities -- health, water supply, and irrigation -- are well-suited to applications of renewable energy technologies.

- Technical Assistance: The Bank provides technical assistance to finance feasibility studies of projects that can subsequently qualify for Bank financing. Ten technical assistance operations, valued at \$7.7 million, were approved in 1980-1981.
- Foreign Trade: The foreign trade financing operation of the Bank assists member countries in importing commodities essential to development objectives, such as fertilizer, petroleum products, and construction materials.
- Leasing: The Bank finances leasing of equipment, including ships and tankers, for use by member countries.
- Equity: The Bank will participate in the equity capital of industrial and agro-industrial enterprises in member countries.
- Loans: The Bank extends loans for infrastructural projects (e.g., dams, roads, airports, and telecommunications), agricultural projects, and social welfare and educational projects. In accordance with the principles of Shariah (Islamic Law), no interest charge is assessed on loans. Instead, the Bank charges a nominal service fee of 2-3 percent to cover the administrative cost of the loan.

Operations of the Islamic Development Bank include project financing, foreign trade financing, and a Special Assistance Account. In the period November 1980-October 1981 (the last period for which data are available), the Bank approved financing for 63 operations for a total of \$557.8 million. The Islamic Development Bank provides assistance in the following areas:

23.1.3 Activities

The purpose of the Islamic Development Bank is to promote social progress and economic development in member countries and Muslim communities in accordance with Islamic law.

23.1.2 Mission

The Islamic Development Bank was founded on August 10, 1974, by agreement of the Ministers of Finance of the Islamic Countries. The Bank is comprised of 41 member states, with membership contingent on participation in the Islamic Conference. Exhibit 23-1 provides a list of member countries.

23.1.1 History

23.1 Agency Background

P.O. Box 5925
 Jidda 21432, Kingdom of Saudi Arabia
 Telephone: 6361400
 Telex: 401137 ISDB SJ
 President: Dr. Ahmad Mohammad Ali



Exhibit 23-1: ISLAMIC DEVELOPMENT BANK - MEMBER COUNTRIES

Maldives	Malaysia
Mali	Libya
Mauritania	Lebanon
Morocco	Kuwait
Niger	Jordan
Oman	Iraq
Pakistan	Indonesia
Palestine	Guinea-Bissau
Qatar	Guinea
Saudi Arabia	Gambia
Senegal	Gabon
Sierra Leone	Egypt
Somalia	Djibouti
Sudan	Comoros
Syria	Chad
Tunisia	Cameroon
Turkey	Burkina Faso
Uganda	Benin
United Arab Emirates	Bangladesh
Yemen Arab Republic	Bahrain
Yemen, People's	Algeria
Democratic Republic of	Afghanistan

23.2 Program Emphases

23.2.1 Sectoral Focus

Financing operations approved in 1984-1985 were distributed among the following sectors:

Sector	\$(U.S. Millions)	Percent
Agriculture	99.25	36.3
Industry and Mining	65.92	24.1
Social Services	26.58	9.7
Transport and Communications	7.28	2.7
Utilities	71.75	26.3
Total	273.11	100.0

More generally, loans are extended to activities such as expanding irrigation and power capabilities, expanding airport facilities, constructing roads, developing ports, and supplying school equipment.

23.2.2 Regional Emphases

Lending priority is given to the least developed member countries, although the Bank is attempting to broaden the geographic range of its assistance.

23.2.3 Interagency Cooperation

The Islamic Development Bank works closely with several subregional development funds, including the Arab Bank for Economic Development in Africa, the Arab Fund for Economic and Social Development, and the OPEC Fund for International Development.

23.3 Renewable Energy Project Opportunities

At this time, there is limited information available on the renewable energy experience of the Islamic Development Bank. However, the development objectives pursued by this institution are well-suited to applications of renewable energy technologies.

23.4 Key Contacts

For further information on Islamic Development Bank lending programs and policies, contact:

Mr. Abdul Rahman Yousef
 Acting Director
 Operations and Projects Department
 Islamic Development Bank
 P.O. Box 5925
 Jidda 21432, Kingdom of Saudi Arabia
 Telephone: 6361400
 Telex: 401137 ISDB SJ

ORGANIZATION OF AMERICAN STATES HIGHLIGHTS

- The Organization of American States (OAS) was established in 1890 to promote peace and security in the continent, and cooperative efforts for the region's economic, social, and cultural development.
- OAS has conducted a variety of renewable energy pilot projects, including: a study of solar dryers for agroprocessing; investing the use of bagasse from sugarcane mills in El Salvador; and pilot applications of photovoltaics (PV) in Panama.
- Through the Pan American Health Organization (PAHO), a component of OAS, the U.S. Department of Energy will install PV systems in six rural health centers in Central America.

24.0 Organization of American States

1889 F Street, N.W.
Washington, D.C. 20006
Telephone: (202) 789-3760

Secretary-General: Mr. Joao Clemente Baena Soares



24.1 Agency Background

24.1.1 History

The Organization of American States (OAS) was established in 1890, when 18 independent republics held the First International Conference of American States in Washington, D.C. Later that year, an agreement was signed creating the International Union of American Republics. The Ninth International Conference of American States, held in Bogota, Colombia in 1948, adopted the basic charter, and the International Union of American Republics became the Organization of American States. Exhibit 24-1 lists the member countries of the OAS.

24.1.2 Mission

The basic objectives of the OAS are to: strengthen the peace and security of the continent; prevent, or peacefully resolve, disputes that may arise among member states; seek the solution to political, judicial, and economic problems among members; and promote, through cooperative action, the economic, social, and cultural development of the region.

24.1.3 Activities

The OAS assists member countries on both policy and operational levels. At the policy level, the OAS provides a forum for inter-American negotiation and consultation in pursuit of collective defense, protection of human rights, and economic, social, and cultural development. At the operational level, OAS facilitates regional cooperation for development by providing technical assistance and planning advisory services.

24.1.4 Organization

The primary components of the OAS are: the General Assembly, the Conference of Ministers of Foreign Affairs, the various councils (Permanent Council, Inter-American Economic and Social Council, and Inter-American Council for Education, Science, and Culture), the Inter-American Commission on Human Rights, the General Secretariat, specialized conferences and organizations, and other panels. The only specialized organization described in detail in this report is the Pan American Health Organization (PAHO), which is discussed in Section 24.2.1.

The organizational structure of the OAS is illustrated in Exhibit 24-2. The components of the Office of the Secretary-General are illustrated in Exhibit 24-3.

Exhibit 24-1: ORGANIZATION OF AMERICAN STATES - MEMBER COUNTRIES

Honduras	Argentina
Jamaica	Bahamas
Mexico	Barbados
Nicaragua	Bolivia
Panama	Brazil
Paraguay	Chile
Peru	Colombia
Saint Christopher-Nevis	Costa Rica
Saint Lucia	Dominica
Saint Vincent and the Grenadines	Dominican Republic
Suriname	Ecuador
Trinidad and Tobago	El Salvador
United States	Grenada
Uruguay	Guatemala
Venezuela	Haiti

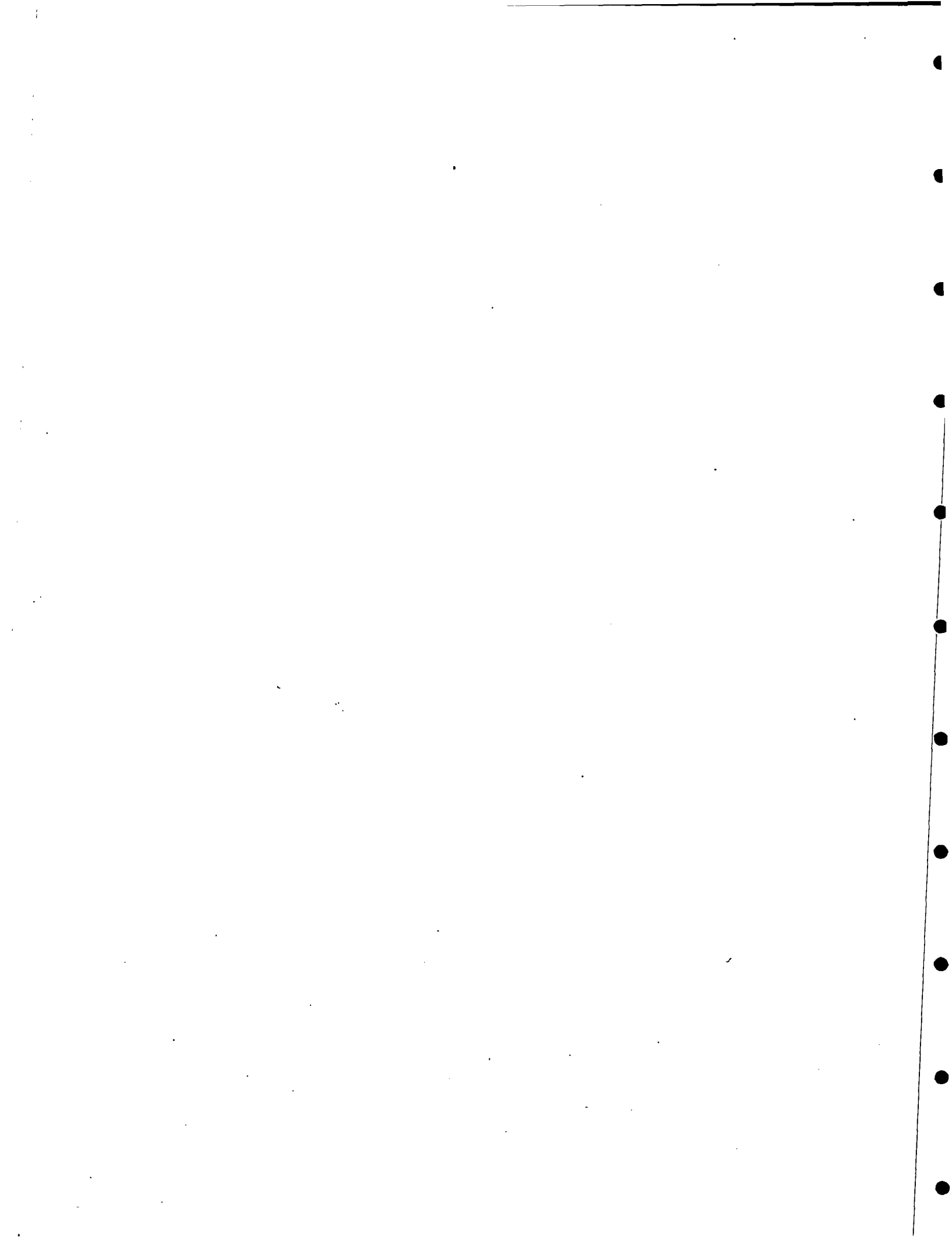
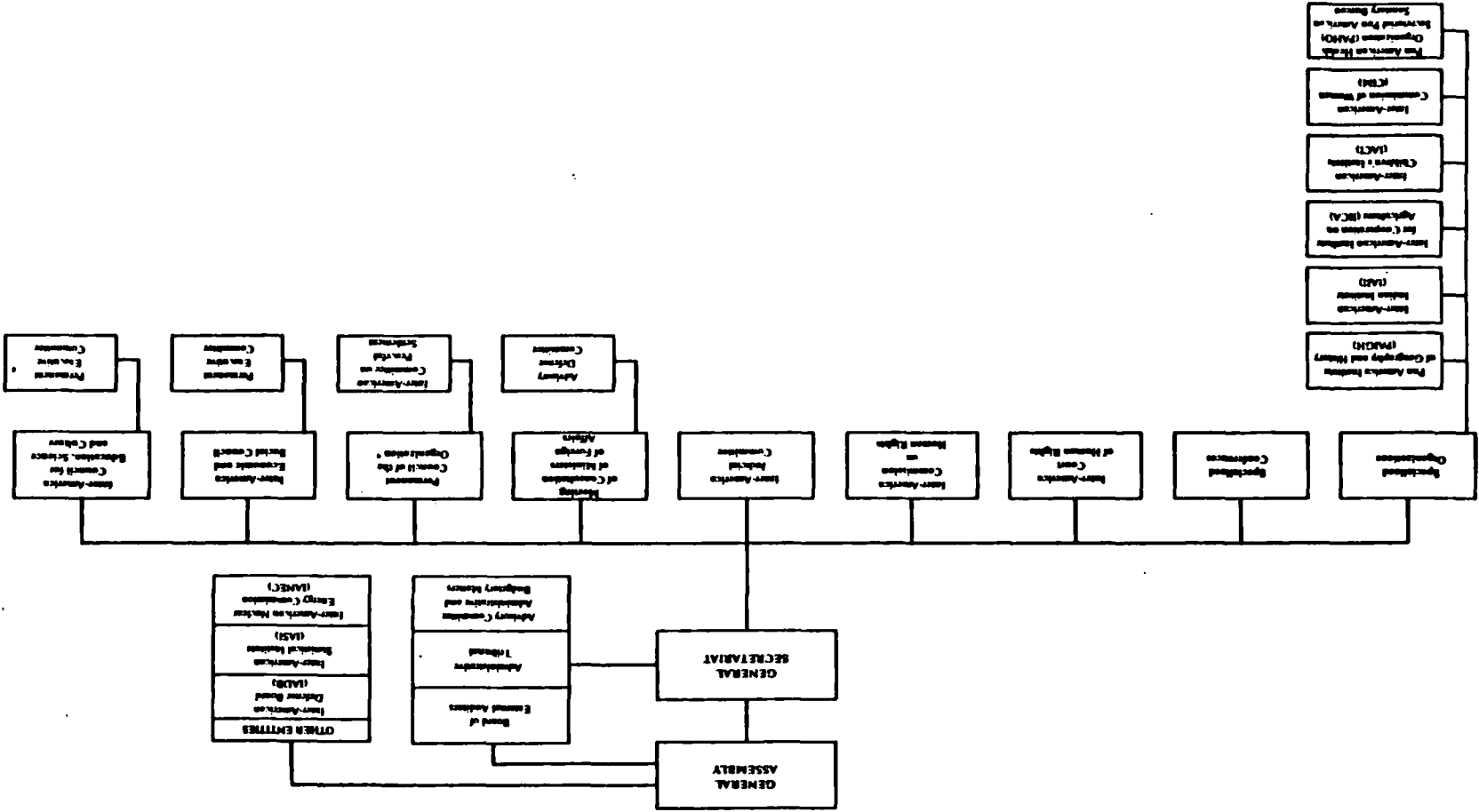
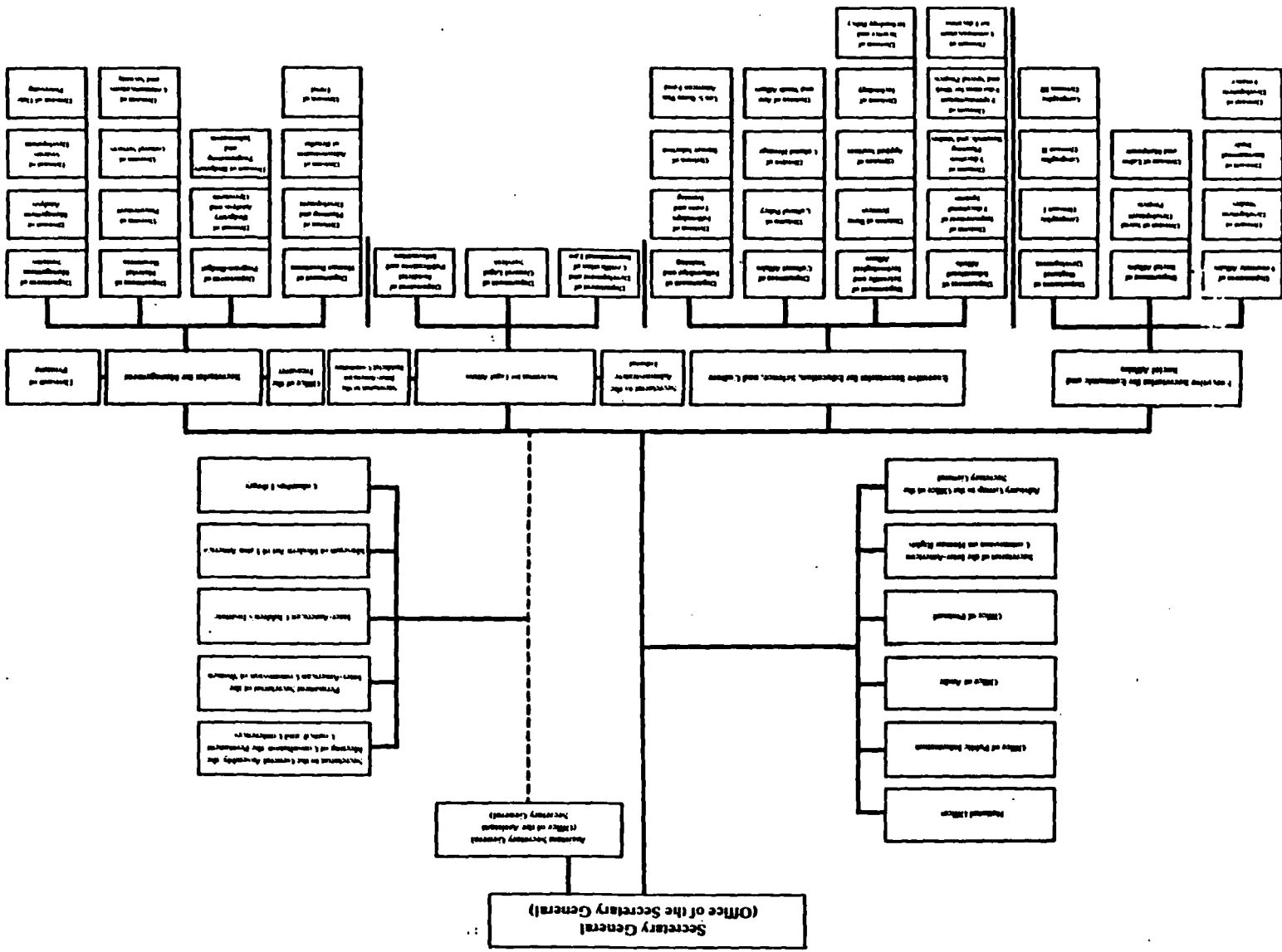


EXHIBIT 24-4: ORGANIZATIONAL STRUCTURE OF THE OAS



* Also in Property Committee of the General Assembly and the Assembly

EXHIBIT 24-3: OFFICE OF THE SECRETARY-GENERAL



OAS maintains close liaison relations with the Inter-American Development Bank and with the various development institutions operating in OAS member countries (e.g., the World Bank, UN component agencies, and the U.S. Agency for International Development).

24.2.2 Interagency Cooperation

PAHO works with member countries (listed in Exhibit 24-4) and their national health services to combat disease and promote improved health and living standards. Conducting mass immunization campaigns, providing safe water and basic sanitation, and improving nutrition are the major means of achieving these regional health goals.

When the United Nations created the World Health Organization (WHO) in 1946, it was agreed that PAHO would serve as WHO's Regional Office for the Americas. Simultaneously, OAS recognized PAHO as the specialized organization for inter-American health matters. PAHO thus functions as a component of both the UN and the OAS.

The Pan American Health Organization (PAHO) was first organized at the second International Conference of the American Republics, held in Mexico City in 1902. PAHO's earliest priorities focused on reducing cholera and yellow fever epidemics and conducting general information campaigns concerning public health in the region.

Health

In the regional development sector, a study conducted in El Salvador investigated the use of bagasse from sugarcane mills for energy purposes. In Guatemala, the prospects of using solar energy in the country's eastern region were evaluated. In Honduras, a study of nonconventional energy was initiated; the study included developing a national program for wood-based gasification. In Panama, photovoltaic equipment donated by the Government of France was installed as part of a nonconventional energy development program.

In the area of scientific and technological development, OAS sponsored the Project on Utilization of Solar Energy. This effort, conducted in cooperation with Antigua and Barbuda, Dominica, Saint Lucia, and Saint Vincent and the Grenadines, studied the use of solar dryers for processing agricultural products.

Scientific and Technological Affairs

As the illustration of the Secretariat in Exhibit 24-3 indicates, technical studies and projects are divided into departments of economic affairs, social affairs, regional development, educational affairs, scientific and technological affairs, cultural affairs, and training. Each department is further subdivided into divisions. Selected relevant projects conducted during the period of July 1984-June 1985 are described below.

24.2.1 Sectoral Focus

24.2 Program Emphases

EXHIBIT 24-4: PAHO - MEMBER COUNTRIES

Member Governments

Antigua and Barbuda	Guyana
Argentina	Haiti
Bahamas	Honduras
Barbados	Jamaica
Belize	Mexico
Bolivia	Nicaragua
Brazil	Panama
Canada	Paraguay
Chile	Peru
Colombia	Saint Christopher and Nevis
Costa Rica	Saint Lucia
Cuba	Saint Vincent and the Grenadines
Dominica	Suriname
Dominican Republic	Trinidad and Tobago
Ecuador	United States
El Salvador	Uruguay
Grenada	Venezuela
Guatemala	

Participating Governments

France
Netherlands
United Kingdom

24.3 Renewable Energy Project Opportunities

The regional development goals being pursued by OAS -- agricultural improvements, irrigation and water supply, rural health services, and regional energy planning, among others -- are well-suited to applications of renewable energy technologies.

OAS is currently conducting a project, in cooperation with the U.S. Department of Energy (DOE) and PAHO, to install photovoltaic (PV) power systems in six rural health centers in Central America. These systems are scheduled to be installed in February 1987. If this pilot effort is successful, PV could provide power for up to 2,000 rural health centers that currently lack access to electricity. As the project descriptions in Section 24.2.1 indicate, OAS is also gaining experience with other renewable energy technologies.

24.4 Lending and Procurement Procedures

OAS works closely with development finance institutions to mobilize funds for regional development needs. Therefore, transfers of funds and procurement of project inputs are governed by the regulations of the particular executing agency.

24.5 Key Contacts

For general information regarding OAS structures, programs, and policies, contact:

Mr. Gross
Department of Public Information
Organization of American States
1889 F Street, N.W.
Washington, D.C. 20006
Telephone: (202) 789-3760

Additional information on OAS technical assistance programs can be obtained from:

Mr. Walter Vergara
Senior Technical Advisor
Department of Regional Development
Organization of American States
1889 F Street, N.W.
Washington, D.C. 20006
Telephone: (202) 789-3625.

24.6 Additional References

An overview of recent OAS activities is provided in the Annual Report of the Secretary-General: July 1, 1984-June 30, 1985. This document is available from:

Organization of American States
Department of Public Information
1889 F Street, N.W.
Washington, D.C. 20006
Telephone: (202) 789-3760.

APPENDIX

LIST OF ACRONYMS

(English Definitions)

African Development Bank	ADB
African Development Fund	ADF
Arab Fund for Economic and Social Development	AFESD
Arab Gulf Programme for United Nations Development Organizations	AGFUND
Asian Development Bank	ASDB
Asian Development Fund	ASDF
Bahrain National Oil Company	BANOCO
Regional Network on Biomass, Solar and Wind Energy	BSW
Cooperative for American Relief Everywhere	CARE
Caribbean Economic Community	CARICOM
Caribbean Development Bank	CDB
Latin American Demographic Centre	CELADE
Committee on Renewable Energy Commerce and Trade	CORECT
Caribbean Project Development Facility	CPDF
Division for Administrative and Management Services	DAMS
developing member country	DMC
Department of Technical Cooperation for Development	DTCD
Economic Commission for Africa	ECA
Economic Commission for Asia and the Far East (see ESCAP)	ECAFE
Economic Commission for Europe	ECE
Economic Commission for Latin America	ECLA
Economic Commission for Latin America and the Caribbean	ECLAC
European Economic Community	ECC
Expanded Programme on Immunization	EPI
Energy Sector Assessment Programme	ESAP
Economic and Social Commission for Asia and the Pacific	ESCAP
Economic and Social Commission for Western Asia	ESCWA
Energy Sector Management Program	ESMAP
Food and Agriculture Organization	FAO
River Plate Basin Financial Fund	FONPLATA
gross national product	GNP
United Nations Centre for Human Settlements	HABITAT
International Atomic Energy Agency	IAEA
Inter-Agency Procurement Services Unit	IAPSU
International Bank for Reconstruction and Development	IBRD
International Civil Aviation Organization	ICAO
international competitive bidding	ICB
International Development Association	IDA
Inter-American Development Bank	IDB
International Fund for Agricultural Development	IFAD
International Finance Corporation	IFC
Inter-American Investment Corporation	IIC
International Labour Organization	ILO
Latin American Institute for Social and Economic Planning	ILPES
Inter-Governmental Maritime Consultative Organization	IMCO
International Monetary Fund	IMF
International Maritime Organization	IMO
International Trade Centre	ITC
International Telecommunication Union	ITU
Kuwait Institute for Scientific Research	KISR
less developed countries	LDC

LIST OF ACRONYMS (Continued)

MULTPOCS	Multinational Programming and Operational Centres
MW	megawatt
NDF	Nigerian Trust Fund
NGOS	nongovernmental organizations
NRC	National Research Center
NRSE	New and Renewable Sources of Energy
OAS	Organization of American States
OLADE	Latin American Energy Organization
OPF	Office for Projects Execution
OPEC	Organization of Petroleum Exporting Countries
OXFAM	Oxford Committee for Famine Relief
PAHO	Pan American Health Organization
PDRY	People's Democratic Republic of Yemen
PV	photovoltaic(s)
RD&D	research, development and demonstration
SOLETRAS	Saudi-U.S. Program for Cooperation in Solar Energy
SPM	Specialized Program Missions
TASF	Technical Assistance Special Fund
UN	United Nations
UNCDF	United Nations Capital Development Fund
UNCTAD	United Nations Conference on Trade and Development
UNCTC	United Nations Centre on Transnational Corporations
UNDP	United Nations Development Programme
UNDRC	Office of the United Nations Disaster Relief Coordinator
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNESOB	United Nations Economic and Social Office in Beirut
UNFDAC	United Nations Fund for Drug Abuse Control
UNFPA	United Nations Fund for Population Activities
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
UNIDO	United Nations Industrial Development Organization
UNITAR	United Nations Institute for Training and Research
UNIPAC	UNICEF Packing and Assembly Center
UPU	Universal Postal Union
USDOE	United States Department of Energy
WFP	World Food Programme
WHO	World Health Organization
WIPO	World Intellectual Property Organization
WMO	World Meteorological Organization
WTO	World Tourism Organization
YAR	Yemen Arab Republic

EXPORT MANAGERS ASSOCIATION OF CALIFORNIA

FOREIGN SALES CORPORATION (FSC)

Presented by:

Gregory P. Hickey
Price Waterhouse
Los Angeles

FOREIGN SALES CORPORATIONS (FSC)

Price Waterhouse

I. Introduction

The Foreign Sales Corporation (FSC) is the vehicle created by Congress under the Tax Reform Act of 1984 to enable U.S. corporations to defer federal income tax on export income. The FSC replaces the Domestic International Sales Corporation (DISC) which essentially terminates as a tax incentive on December 31, 1984. DISC treatment is available after that date but only to a limited extent.

II. Background

A. DISC

1. In 1971 (effective as at Jan. 1, 1972), Congress authorized the formation of DISCs.
2. DISCs were permitted to earn 4% of the gross income or one-half of the net income generated by export sales of products manufactured, produced or grown in the U.S.
3. If properly reinvested, one half of the income of the DISC was not subject to current U.S. taxation (this deferred portion was reduced in 1976 and further reduced in 1982).

B. DISC Objections

1. Almost immediately our trading partners objected that DISC was an illegal export subsidy in violation of the General Agreement on Tariffs and Trades (GATT) to which the U.S. is a signatory.
2. At the same time, the U.S. objected to certain export tax practices of Belgium, France and the Netherlands, particularly, the non-enforcement of arm's length pricing.
3. In 1976, a GATT investigation panel issued its findings that certain elements of the DISC, as well as certain export tax practices of Belgium, France and the Netherlands, were in violation of the GATT.
4. While the U.S. has not conceded the DISC is a violation, it agreed to the December 1981 adoption of the four GAAT reports.
5. Adoption was subject to an important understanding:
 - a. GATT signatories are not required to tax export income attributable to economic processes located outside their territorial limits.
 - b. Arm's length pricing standards are to be observed between exporting companies and foreign buyers under common control.

- c. GATT does not prohibit the adoption of measures to avoid the double taxation of foreign source income.
6. During 1982, the GATT Council continued to debate the interpretation of the understanding as it applied to DISC, rejecting the U.S.'s arguments that the effect of DISC approximated the effect of the territorial tax system (GATT-legal) used throughout Europe.
7. The EEC went as far as requesting authorization from the GATT Council to impose trade restrictions on U.S. products in the amount of \$2.3 billion, the alleged harm caused by DISC.
8. On October 1, 1982, the U.S. promised the GATT Council that it would introduce legislation to amend or replace DISC.

C. Proposed Replacement

On August 4, 1983, Administration prepared legislation was introduced by House Ways and Means Chairman Dan Rostenkowski (D-Ill.) and Ranking Minority Member Barber Conable (R-N.Y.) (H.R. 3810). Identical legislation was introduced in the Senate by Finance Committee Chairman Robert Dole (R-Kans.) (S. 1804).

III. Definitional Requirements of an FSC

A. Incorporation Outside the United States

1. The FSC must be a corporation created or organized under the laws of any foreign country or U.S. possession. For this purpose, the term possession means Guam, American Samoa, the U.S. Virgin Islands and the Northern Mariana Islands, but not Puerto Rico.

2. If the FSC is incorporated under the laws of a foreign country, the foreign country must have either a bilateral or multilateral agreement providing for exchange of information with the United States (e.g. Caribbean Basin country), or an income tax treaty with the U.S. whereby the IRS certifies that the exchange of information approach embodied in treaty article is suitable.

B. It must not have more than 25 shareholders at any time during the taxable year.

C. It must not have any preferred stock outstanding at any time during the year.

D. An FSC must maintain the following foreign presence:

1. An office located in an IRS approved jurisdiction outside the U.S. (as in III.A.2 above).

2. A permanent set of records in the foreign office.

C. Economic process requirement

The FSC must perform the following activities, either itself or through any person/agent acting under contract with the FSC, in connection with any transaction qualifying as a foreign trading gross receipt.

1. Sale participation test - the FSC (or its agent) must participate outside the U.S. (with respect to a transaction), in:

- a. The solicitation (other than advertising);
- b. The negotiation; or
- c. The making of the contract

and

2. Direct cost test - the "foreign direct costs" incurred by the FSC attributable to the transaction must equal or exceed 50% of the "total direct costs" incurred by the FSC, or the "foreign direct costs" incurred by the FSC must be at least 85% of the "total direct costs" attributable to at least two (of the five) categories of activities listed below. "Total direct costs" refers to the costs of performing the following activities:

- a. Advertising and sales promotion,
- b. The processing of customer orders and the arranging for delivery (outside the U.S.) of the export property,

- V. Foreign Trading Gross Receipts (FTGR)/Export Property
- A. The FSC will generate foreign trading gross receipts by meeting the foreign management and economic requirements with respect to certain transactions. Like the DISC, the FSC's foreign trading gross receipts include gross receipts from:
1. The sale, exchange or other disposition of export property;
4. The term "total direct costs" means all of those costs incurred by the FSC, or its agents, attributable to activities described above. The term "foreign direct costs" includes only that portion of the "total direct costs" attributable to activities performed outside the U.S.
 5. Outside the U.S. is defined for the above tests as outside the U.S. and Puerto Rico.
- e. The assumption of credit risk.
- d. The determination and transmittal of the final invoice or statement of account and the receipt of payment and
 - c. Transportation from the time of acquisition by the FSC (or, in the case of a commission relationship, from the beginning of the commission relationship) to the delivery to the customer,

2. The lease or rental of export property for use outside the U.S.;

3. The performance of services relating to (1) and (2);
4. The performance of engineering or architectural services for construction projects located outside the U.S.;

5. The performance of managerial services to assist other FSCs or DISCs produce foreign trading gross receipts. However, managerial services are only eligible if the gross receipts for the taxable year are at least 50 percent from 1, 2 or 3 above.

B. The FSC's foreign trading gross receipts does not include receipts from:

1. Export property or services ultimately used in the U.S.;

2. Export property or services used by the U.S. or an instrumentality thereof if such use of export property or services is required by law or regulations;

3. Transactions financed by U.S. government subsidy;

4. Receipts from sales to an FSC which is a member of the same controlled group;

3. Oil and gas (or any primary product therefrom);

other like property;

2. Intangibles, such as patents, inventions, models, designs, formulas, processes, copyrights (other than films, tapes, records or similar reproductions), goodwill, trademarks, trade brands, franchises, or

an affiliate of the FSC;

1. Property leased or rented by an FSC to (for use by)

D. Export property does not include the following:

3. Not more than 50% of the fair market value of which is attributable to articles imported into the U.S.

U.S., and

2. Property held primarily for sale, lease or rental in direct use, consumption or disposition outside the the ordinary course of business; by or to an FSC, for

1. Property manufactured, produced, grown or extracted in the U.S. by a person other than an FSC;

types:

C. Export property includes property of the following

6. Investment income or carrying charges.

property;

5. Half of the receipts from the sales of military

3. The FSC may earn taxable income using the arm's length pricing method based upon transfer prices determined under the Section 482 regulations.

2. The FSC may earn 1.83% of the foreign trading gross receipts. Income determined under this method cannot exceed twice the taxable income determined under the 23% combined taxable income method.

1. The FSC may earn 23% of the combined taxable income (CTI) of the FSC and its related supplier from the sale of export property.

Handwritten note:
 1. The FSC may earn 23% of the combined taxable income (CTI) of the FSC and its related supplier from the sale of export property.

to the greater of the following:

A. Export property sold by a related supplier to an FSC may be priced to allow the FSC to earn taxable income equal

VI. Transfer Pricing Methods

in the domestic economy.

5. Property found by the President to be in short supply

Export Administration Act or

4. Products and export of which is prohibited by the

gross income, called foreign trade income (FTI), between the next step is to allocate and apportion the FSC's

A. Once the appropriate transfer pricing has been computed,

VII. U.S. Taxation of an FSC's Income

DISC.

treated in a manner similar to their treatment under other income. It is expected that these items will be transactions, marginal costing, commissions, rentals and

described above will be provided for grouping C. Regulations consistent with the transfer pricing rules

threshold set forth in IV.C.1. and 2.

abroad to the extent necessary to meet the basic 3. Note that the activities only have to be performed

the FSC or an agent under a contract.

and assumption of credit risk are performed either by for delivery, transportation, invoicing, collection promotion, processing of customer orders, arranging 2. All of the activities of advertising and sales

its contractual agent, and

of the contract of sale are performed by the FSC or (other than advertising), negotiation and the making

1. All of the activities relating to the solicitation

pricing rules" are available only if:

ing gross receipts pricing methods ("the administrative B. The 23% combined taxable income and 1.83% foreign trad-

exempt and non-exempt foreign trade income. Foreign trade income is the FSC's taxable income plus expenses or the foreign trading gross receipts from the sale less the transfer price.

B. The amount of exempt foreign trade income is the aggregate of

1. 30% of the foreign trade income derived from transactions in which the arm's length pricing method of Section 482 is used, plus
2. 15/23 (65.21739%) of the foreign trade income derived from transactions in which either the 1.83% foreign trading gross receipts method or 23% combined taxable income pricing method is used.

C. Taxation of exempt foreign trade income - The income which qualifies as exempt foreign trade income is treated as foreign source income which is not effectively connected with a U.S. trade or business. Thus, exempt foreign trade income is not subject to U.S. income tax.

D. Taxation of non-exempt foreign trade income

1. Non-exempt foreign trade income determined under the 1.83% gross receipts or 23% combined taxable income method is treated as U.S. source income effectively connected with a U.S. trade or business and taxable to the FSC.

1. Investment income includes:
- a. dividends,
 - b. interest,
 - c. royalties,
 - d. annuities,
 - e. rents (other than rents from the lease or rental of export property for use by a lessee outside the U.S.),
 - f. gains from the sale or exchange of stock or securities,
 - g. gains from futures transactions other than certain hedging transactions,

E. Taxation of Other Income - All interest, dividends, royalties and other investment income received by an FSC and all carrying charges received by an FSC are treated as effectively connected with a U.S. trade or business and subject to U.S. tax. The regular sourcing rules of Section 861 apply.

2. Non-exempt foreign trade income determined under the Section 482 method is sourced and taxed according to the regular rules for taxation of foreign corporations, which means it could be deferred from tax until repatriation, taxed under Subpart F and conceivably taxed as foreign source effectively connected income.

3. Investment tax credit, Section 936 possession credit, research credit, etc., are not available to the FSC.
2. Foreign tax credit is allowed to the shareholder of an FSC for the non-exempt foreign trade income determined under the arm's length method, however, it is subject to a separate foreign tax credit limitation.
1. Foreign tax credit is allowed to the FSC on income other than foreign trade income.

G. Tax Credits

Deductions must be allocated between exempt foreign trade income and non-exempt foreign trade income on a proportionate basis. Accordingly, deductions allowable in computing the FSC's income subject to U.S. tax do not include any deductions properly allocated to exempt foreign trade income.

F. Allocation of Deductions -

2. Carrying charges include any amount in excess of the price for an immediate cash sale and any other unstated interest to be prescribed by regulations.
1. Income from estates or trusts, gains from the sale or disposition of any interest in an estate or trust.

- H. Foreign trade income is excluded from Subpart F income treatment (except for non-exempt foreign trade income determined under the arm's length method).
- I. Possessions of the U.S. cannot impose income tax on any foreign trade income until 1987.

VIII. Treatment of Distributions to Shareholders

- A. Domestic corporate shareholders receive a 100% dividends received deduction with respect to distributions from a FSC out of foreign trade income (except for the non-exempt portion of foreign trade income determined under the arm's length method). Distributions are considered to come first out of foreign trade income before being treated as out of any other earnings and profits. Distribution of other earnings are not eligible for any dividend received deduction.

- B. Non-corporate shareholders are subject to tax on dividends from an FSC in the same manner as dividends from any other foreign corporation.

- C. Distributions out of foreign trade income paid to a nonresident alien individual or foreign corporation are treated as effectively connected U.S. source income subject to U.S. tax.

IX. Foreign country aspects

A. Country of incorporation

1. Since any taxes paid by an FSC will dilute the benefit, it will be preferable to incorporate in such a location which offers no or low foreign income taxes.

2. Due to the IRS exchange of information approval

requirement, the FSC must not only incorporate in a low tax country, but the country must also have a treaty currently in effect with the United States that contains an exchange of information article or must otherwise enter into such an agreement. The renegotiation of a treaty would not make the particular country unacceptable if it had previously qualified.

B. Operation of the FSC

1. Since significant activities must be performed outside the U.S., the FSC must have either employees or agents (related or unrelated) outside the U.S. who can perform these activities.

2. The following possibilities might be considered for structuring the FSC, since the economic process requirements for the most part can be handled by agents for the FSC.

- X. Alternatives to the FSC**
- A. Interest Charge DISC**
- a. The activities could be conducted by the FSC's employees in the country of sale or at the FSC's foreign office.
 - b. The activities could be conducted by an unrelated service company located, for example, in or near the location where the sales take place.
 - c. The activities could be performed by sales personnel employed by existing operating subsidiaries.
- 1. The new rules will require a deemed distribution of 1/17 of a DISC's taxable income, after certain adjustments (but excluding the incremental rule) with the remaining taxable income (16/17) deferred. This treatment applies with respect to taxable income attributable to up to \$10 million of qualified export receipts.**
2. The amount of tax deferred is computed as the difference between what the shareholder's tax liability would be if all of the DISC income were taxable and the actual liability. This amount is in effect a loan (at interest) from the U.S. government.
 3. Interest is charged on the amount of tax associated with the deferred income at a rate to be determined annually by the IRS using one year T-bill rates.

4. Interest must be paid at the same time the tax would have been paid.
 5. Taxable income of a DISC related to qualified export receipts in excess of \$10,000,000 is deemed distributed and taxed to the shareholder.
 6. Only post-1984 income of a DISC is subject to the interest charge rules.
 7. The taxable year of an interest charge DISC must be the same as the taxable year of the shareholder with the highest percentage of voting power.
 8. An interest charge DISC must still meet the qualified export asset and qualified export receipts test.
 9. Deferred income is the excess of the accumulated income of an interest charge DISC (for periods after 1984) over the amount of actual distributions that exceed the current year's DISC income.
- B. Small FSC Alternative to FSC
- A small FSC is a corporation which meets the requirements of an FSC, and elects such treatment with the following to be noted:
1. It need not satisfy the foreign management or the foreign economic process tests.

B. A terminating DISC is not required to meet the qualified export asset test on the DISC termination date.

The new provisions are effective for transactions occurring after December 31, 1984. In addition, the taxable year of all existing DISC's will end on December 31, 1984. The close of the 1984 taxable year changes the DISC status to a "former DISC".

A. Effective Date

XII. Other Rules

The related supplier's sales to an FSC (or through an FSC on a commission basis) which are treated as foreign source income cannot exceed the amount which would have been treated as foreign source income under the DISC pricing methods corresponding to the FSC's administrative pricing methods (50/50 combined taxable income and 4% gross receipts).

XI. Related Supplier Source Rule

2. It may not be a member of a controlled group which includes an FSC unless it is also a small FSC.
3. Foreign trading gross receipts of up to a total of \$5 million only qualify for small FSC benefits.
4. If there are multiple small FSCs in a controlled group, their gross receipts must be aggregated in measuring against the \$5 million gross receipts ceiling.

C. Exemption for accumulated DISC income

All accumulated DISC income as at December 31, 1984 is to be treated as previously taxed income and nontaxable.

D. Installment treatment on certain DISC deemed

distribution

A shareholder of a DISC can elect to receive the deemed distribution from the final DISC taxable year in 10 equal installments on the last day of the 10 taxable years of the shareholder beginning after 1984.

E. Application of Section 367

Transfers of qualified export assets from a DISC to an FSC will be exempt from Section 367 if made before the later of January 1, 1986, or one year after the corporation ceases to be a DISC. A DISC must have held the assets on August 4, 1983 (the date the legislation was introduced) to qualify for this exemption.

F. International boycott rules

The exempt foreign trade income will be subject to the international boycott provisions.

A. Alternatives

- 1. FSC
- 2. Small FSC
- 3. Interest-charge DISC

B. Income of FSC/small FSC and interest-charge DISC

- 1. FSC/small FSC
 - a. 23% of combined taxable income
 - b. 1.83 of gross receipts (limited to 2 X 23% amount)
 - c. Arms-length profit (Section 482 price)
- 2. Interest-charge DISC
 - a. 50% of combined taxable income
 - b. 4% of gross receipts
 - c. Arm's - length profit

C. Taxation of FSC/small FSC and interest-charge DISC

- 1. FSC/small FSC
 - a. Determination of exempt income
- 2. Interest-charge DISC

	Corporate shareholder	Individual shareholder
23% or 1.83%	15/23	16/23
Sec. 482	30%	32%

a. 16/17 deferred
 b. Deferred balance subject to interest charge.

EXAMPLE OF TRANSFER PRICING BETWEEN AN FSC AND A RELATED SUPPLIER, INCLUDING EXEMPT INCOME CALCULATIONS

Gross receipts from the export sale
 Related supplier cost of manufacture
 FSC marketing expenses
 Related supplier allocated expenses
 Combined taxable income (CTI): FSC-supplier

\$1,000
 600
 200
 100
 \$ 100

Supplier-FSC arm's length transfer price

\$ 750

	DISC	FSC	50/50 method
1. Foreign trading gross receipts	\$1,000	\$1,000	\$1,000
2. FSC (DISC) selling expense	200	200	200
3. FSC (DISC) profit	18.31	232	50
4. Transfer price to FSC	781.7	777	750
5. Cost of manufacture	600	600	600
6. Related supplier expenses	100	100	100
7. Related supplier's taxable income	\$ 81.7	\$ 77	\$ 50
8. Foreign trading gross receipts	\$1,000	\$1,000	\$1,000
9. Transfer price to FSC	781.7	777	750
10. Foreign trading income (FTI)	218.3	223	250
11. Exempt FTI	142.4	145.4	75
12. Non-exempt FTI	\$ 75.9	\$ 77.6	\$ 175
13. FSC profit (DISC income)	\$ 18.31	\$ 232	\$ 50
14. FSC exempt profit	11.96	156	0
15. FSC (DISC) taxable income - Subpart F income	\$ 6.47	\$ 87	\$ 33.88
Total taxable income (line 7 plus line 15)	\$ 88.1	\$ 85	\$ 83.8
Total U.S. tax @ 46 percent	\$ 40.5	\$ 39.1	\$ 38.5
Total savings from 46 tax on \$100 of CTI	\$ 5.5	\$ 6.9	\$ 7.59

1. 83 percent of FSC export sales gross receipts

2. 23 percent of combined taxable income

3. Gross receipts less arm's length transfer price less FSC selling expenses

4. 15/23rds of foreign trading income (FTI)

5. 30 percent of foreign trading income (FTI)

6. Exempt FTI (line 11)/FTI (line 10) times FSC profit (line 13)

7. Non-exempt FTI (line 12)/FTI (line 10) times FSC profit (line 13) - arm's length pricing taxed as Subpart F income

8. Computed at 67.5-percent of DISC taxable income (assumed 10 percent income attributable to base period)

9. Does not include 37.5 potential tax on \$16.2 DISC deferred income

*For comparison
 Shamshad*

**EXAMPLE OF SPECIAL SOURCE RULE FOR RELATED SUPPLIERS
WITH INCOME EARNED PARTLY WITHIN AND PARTLY
WITHOUT THE UNITED STATES**

Assumptions

Gross receipts from the export sale
Related supplier cost of sales
FSC marketing expenses
Related supplier expenses

Combined taxable income (CTI): FSC-supplier

\$1,000
600
200
100
\$ 100
\$ 750

Supplier-FSC arm's length transfer price

Section 863(b) foreign source income allocation percentages:

50%

Arm's length pricing
No FSC

Income sourcing before special rule

Foreign trading gross receipts
FSC selling expense
FSC profit

\$1,000
200
18.3

Transfer price to FSC

781.7

Cost of sales
Related supplier expenses

600
100

Related supplier's taxable income

\$ 81.7

Section 863(b) foreign source income allocation percentage

50%

Foreign source income under Section 863(b)
before special rule

\$ 40.9

Application of special rule

Related supplier's taxable income
under corresponding DISC pricing method:

\$ 60

(\$100 - 4% (\$1,000))
(\$100 - 50% (\$100))
(\$750 - 700)

Section 863(b) foreign source income allocation percentage

50%

Limitation on related supplier's foreign source income

\$ 30

\$ 25

\$ 25

50%

\$ 50

50%

\$ 50

\$ 50

50%

\$ 100

\$ 25

50%

\$ 50

100

750

200

\$1,000

\$ 38.5

50%

\$ 77

100

777

200

\$1,000

CTI

Gross receipts

1.83% of

23% of

**INTEREST CHARGE DISC
EXAMPLE OF TAXATION AND LOAN ARRANGEMENT**

Assume that a calendar year interest charge DISC is 100% owned by a calendar year corporation, and the base period T-Bill rate is 10% for 1987. Also assume that the DISC had taxable income as follows:

Year	DISC taxable income
1985	\$2,000,000
1986	\$1,000,000
1987	\$1,500,000

Year	DISC taxable income	With Actual Distribution of \$2,000,000 in 1987	Actual Distribution Without
1985	\$2,000,000	\$2,000,000	\$2,000,000
1986	\$1,000,000	\$1,000,000	\$1,000,000
1987	\$1,500,000	\$1,500,000	\$1,500,000

Computation of Interest Charge for 1987

DISC taxable income 1985	\$2,000,000
DISC taxable income 1986	\$1,000,000
Total taxable income at January 1, 1987	\$3,000,000
Deferred ratio 16/17	
Accumulated DISC income at January 1, 1987	\$2,823,529
Actual distribution	500,000
Less: current DISC taxable income	\$2,323,529
Deferred DISC income	\$1,068,823
Income tax rate	46%
DISC-related deferred tax liability (the loan from the U.S. Government)	\$1,298,823
Base period T-Bill rate	10%
Interest payable to U.S. Government	\$129,882

U.S. Taxation and Cash Flow to Shareholder for 1987

1987 Deemed distribution (1/17 of \$1,500,000)	\$88,235
Actual distribution	2,000,000
Less: Previously taxed income (1/17 of \$3,000,000)	176,471
Less: Interest charge deduction	106,882
Taxable income (loss) of shareholder	\$1,804,882
Income tax rate	46%
Income tax liability	\$830,246
Income tax paid	\$830,246
Interest paid to U.S. Government	106,882
Total paid to U.S. Government	\$937,128

DISC taxable income 1985	\$2,000,000
DISC taxable income 1986	\$1,000,000
Total taxable income at January 1, 1987	\$3,000,000
Deferred ratio 16/17	
Accumulated DISC income at January 1, 1987	\$2,823,529
Actual distribution	None
Less: current DISC taxable income	\$2,823,529
Deferred DISC income	\$1,298,823
Income tax rate	46%
DISC-related deferred tax liability (the loan from the U.S. Government)	\$1,298,823
Base period T-Bill rate	10%
Interest payable to U.S. Government	\$129,882

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Income tax paid	\$830,246
Interest paid to U.S. Government	106,882
Total paid to U.S. Government	\$937,128

For CFO's, tax directors and DISC executives

DISC REVISITED

A focus on
increasing DISC commissions and
deferring additional income to
effect cash tax savings.

P
rice
Waterhouse



RICARDO J. BORDALLO
Governor of Guam



EDWARD D. REYES
Lt. Governor of Guam

Si Yu'us Masee

When President Reagan made his trip to China, he used Guam as his jumping-off point. Territory's significance as America's Gateway to Asia.

With the enactment of the 1984 Tax Act, the federal government has enhanced Guam's incentives to trade through the Territory. Guam's FSC Export Incentive Act, signed August 29, 1997, territorial legislation to guarantee continued benefits to Foreign Sales Corporations through 1997.

With the focus of American trade continuing to shift to Asia and the Pacific, Guam is legally and geographically to develop as the business and financial hub of the region. The federal territorial government are enthusiastic about exploiting this natural potential.

We are confident that once you have had the opportunity to consider Guam, you will share We are eager to welcome you.

Dear Mr. Businessman:

Secretary of Guam
 OFFICE OF THE GOVERNOR
 AGANA, GUAM 96910
 U.S.A.



FOREIGN SALES CORPORATIONS

A Summary

of commissions available to a commission agent FSC. However, under either of the administrative pricing rules the commission agent or buy-sell FSC will be required to perform by itself, or by contract, all of the following activities, to the extent they are performed at all, with respect to the export transaction in question—(1) solicit, negotiate and make the contract of sale, (2) provide advertising and sales promotion, (3) process customer orders and arrange for delivery, (4) provide for transportation, (5) assemble and transmit final invoices and receive payment, and (6) assume the credit risk. For FSCs generating more than \$5 million in export sales to obtain the corporate tax exemption on its qualifying income some, but far from all, of the above listed activities will be required to be performed, either directly or by contract, outside the U.S. customs territory.

In order to set up a FSC it must be incorporated and have its main office in a foreign country or U.S. possession, defined as the U.S. Virgin Islands, American Samoa, Guam or the Northern Marianas. Since any foreign country where a FSC can be located will be required to have a satisfactory exchange of tax information agreement with the U.S. and, for practical reasons, impose little or no income tax on the FSC operations there, no such country is currently known to be suitable for FSC location. However, the Treasury Department has indicated that a few suitable countries are likely to be determined within a year's time. The FSC has to have at least one director, who is not a U.S. resident, and keep one set of its books of account (including copies of invoices) at its main offshore office. Finally, the offshore corporation must file an election to become a FSC with the International Revenue Service.

For small Foreign Sales Corporations, which can afford to limit the partial corporate tax exemption to the income generated by \$5 million or less in gross revenues on exports, the only activity in a foreign country or U.S. possession that will be required are those set forth in the previous paragraph plus an election filed with the IRS to be a "small FSC". Although such small FSCs will be required to undertake all the economic activities enumerated above to obtain the FSC corporate tax exemption if they use either of the two administrative pricing rules, none of the activities will be required to be done offshore.

Finally, the FSC legislation allows an exporter, in lieu of establishing a FSC, to keep its DISC or start a new DISC with enhanced deferral benefits for the income derived on up to \$10 million of export sales, provided an interest charge at Treasury Bill rates is unpaid by its shareholders on the accumulated tax deferrals. The details for operating such an interest charge DISC will be identical to the provisions in the law and regulations for the operation of current DISCs, except that a new election will have to be made and the tax year of the new DISC must match the tax year of its majority stockholder. The tax treatment of the interest charge DISC will be different in that the income tax on 94 percent of its income may be deferred, if such income is retained by the DISC in qualified assets, no incremental rules will apply, and an annual interest charge will be payable by the DISC stockholders on their proportionate share of the accumulated taxes deferred. However, such interest payments by DISC shareholders will be deductible.

On July 8, 1984, President Reagan signed the Foreign Sales Corporation Act of 1984 into law. This is an export tax incentive enacted to replace the DISC. Effective for tax years beginning after December 31, 1984, its provisions are part of the Tax Reform Bill of 1984. They add new sections 921 through 927 of the Internal Revenue Code, as well as amending the DISC provisions currently in sections 991 through 997, and section 291(a)(4) of the tax code. This new tax incentive for U.S. exports was sponsored by the Administration to accommodate claims by our trading partners in the Council of the General Agreement on Tariffs and Trade that the DISC was an illegal tax subsidy to exports.

The proposed regulations interpreting the Foreign Sales Corporation Act should be prepared by the Internal Revenue Service in November of 1984. Therefore, many of the details on how the new law will operate are not available as of the date of this publication.

In brief, a Foreign Sales Corporation (FSC) is a corporation set up in a foreign country or U.S. possession, other than Puerto Rico, that can obtain corporate tax exemption on a portion of the earnings generated by the sale or lease of export property (50 percent U.S. content and other limitations) and services related and subsidiary to the export of such property. The only pure service exports which qualify are architectural and engineering services for foreign construction projects and management services for unrelated FSCs.

FSCs can be formed by manufacturers, non-manufacturers and export groups, such as Export Trading Companies. A FSC can function as a principal, buying and selling for its own account, or as a commission agent. It can be related to a manufacturing parent or can be an independent merchant or broker.

The portion of the FSC income exempt from U.S. corporate taxation will be 32 percent, if it buys from independent suppliers or uses the special administrative pricing rules with related suppliers. However, a related entity.

The first administrative pricing rule will allow FSCs to share the profit from the export transaction on the basis of 23 percent allocated to the FSC and 77 percent allocated to the related supplier. If the FSC then conducts the required minimum of activity outside the U.S. customs territory 16/23 of its 23 percent of combined profits would be exempt from U.S. corporate taxation and 7/23 would not, i.e., 16 percent of the combined income should be tax exempt. The second alternative for FSCs, particularly those with low profit margin exports purchased from related suppliers, is for the FSC to take as its share of combined income 1.83 percent of gross receipts, not to exceed 46 percent of combined income, of which 1.27 percent of gross receipts, not to exceed 32 percent of combined income, would be FSC income exempt from U.S. corporate taxation, provided it conducts the required minimum of "offshore" activity.

The administrative pricing rules can be used to determine the amount

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Incorporating your foreign sales office in Guam is like incorporating in Delaware. Guam, the southernmost island in the Mariana Islands Chain, has been a U.S. Territory since 1898. As a U.S. Territory we don't have any confusing foreign laws to interpret. We operate under the same federal laws as every other state in the Union. English is the language, the U.S. dollar is the currency, and we drive on the right-hand side of the road.

OUR FSC TAX STRUCTURE IS AS COMPATIBLE AS OUR CLIMATE.

Guam recently enacted a foreign sales corporation export incentive act offering substantial tax incentives through 1997 to FSCs operating on Guam:

- No sales or use tax
- No franchise tax
- No state or gross receipts tax
- 100% income tax exemption/rebate on foreign trade income

INVESTMENT INCENTIVES

Other advantageous investment incentives programs are available through the government, particularly for labor-intensive light industries (i.e., watch and electronic components assembly, textile manufacturing, etc.) Listed below are various incentives offered to business firms interested to do business on Guam:

- 75% tax rebate on corporate income tax up to 20 years.
- 100% abatement on real property tax up to 10 years.
- 75% rebate on corporate dividend tax up to 5 years.
- Abatement of taxes levied on income derived from leases of land, building, machinery and equipment.
- Abatement of gross receipts tax on petroleum and alcoholic beverages.

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It's as easy to communicate with your operation in Guam as it is with your office across the hall. Guam is the telecommunications center of the Western Pacific. Satellite communications, 24-hour telegraph, telephone, telex and facsimile facilities are provided by RCA's global network and by other carriers. High-speed data communication services are provided by ITT, DHL and other courier services provide overnight delivery of documents via U.S. air carriers and our U.S. postal system. Zip code is 96910. Remember, we are on the other side of the International Date Line, so money transfers and high-speed messages sent from Guam will arrive in the United States mainland and Europe the day before they were transmitted from Guam. While Guam is definitely part of the U.S., we are also close to markets in Asia. Japan, China, Taiwan, HongKong and the Philippines are all within three to five hours flying time from Guam, and Japan, Korea and the Philippines maintain consular offices in Guam.

YOUR BANK IS PROBABLY ALREADY HERE.

Because of Guam's closeness to major Asian markets and its very favorable banking climate, most of the major U.S. banks have had offices here for years:

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OUR PROFESSIONAL INFRASTRUCTURE IS SUPERB.

Major accounting firms like Peat Marwick and Touche Ross have fully-staffed offices as do a number of local accounting firms—all with complete knowledge of local tax laws. Guam also has numerous law firms, both multi-state and local, which specialize in corporate law. IBM, Wang, Xerox and Apple provide excellent up-to-date computer and office equipment services and supplies. Modern office facilities are available at very reasonable rates. Guam offers a multi-ethnic, multi-lingual and well-educated work force with managerial and clerical skills.

GUAM'S PORT FACILITIES

Guam International Air Terminal. Six international air carriers provide daily services throughout the Pacific and the rest of the world on DC-10's, 727's and 747's, through Guam's new international air terminal. Inter-island and commuter services are available almost hourly.

Commercial Port. Apra Harbor, the largest natural deep-water harborage in the Western Pacific, houses Guam's duty free commercial seaport with over 2,000 linear feet of dock space and 30 acres of modern container yard facilities. Equipped with two giant Facoco gantry cranes, commercial port authority personnel exceed 30 container moves per hour. American President and U.S. Lines, as well as several foreign flag carriers, have regular schedules to and from Guam. Guam also serves as a trans-shipment center for tuna and other commodities.

INCENTIVES TO VISIT YOUR FOREIGN SALES OFFICE.

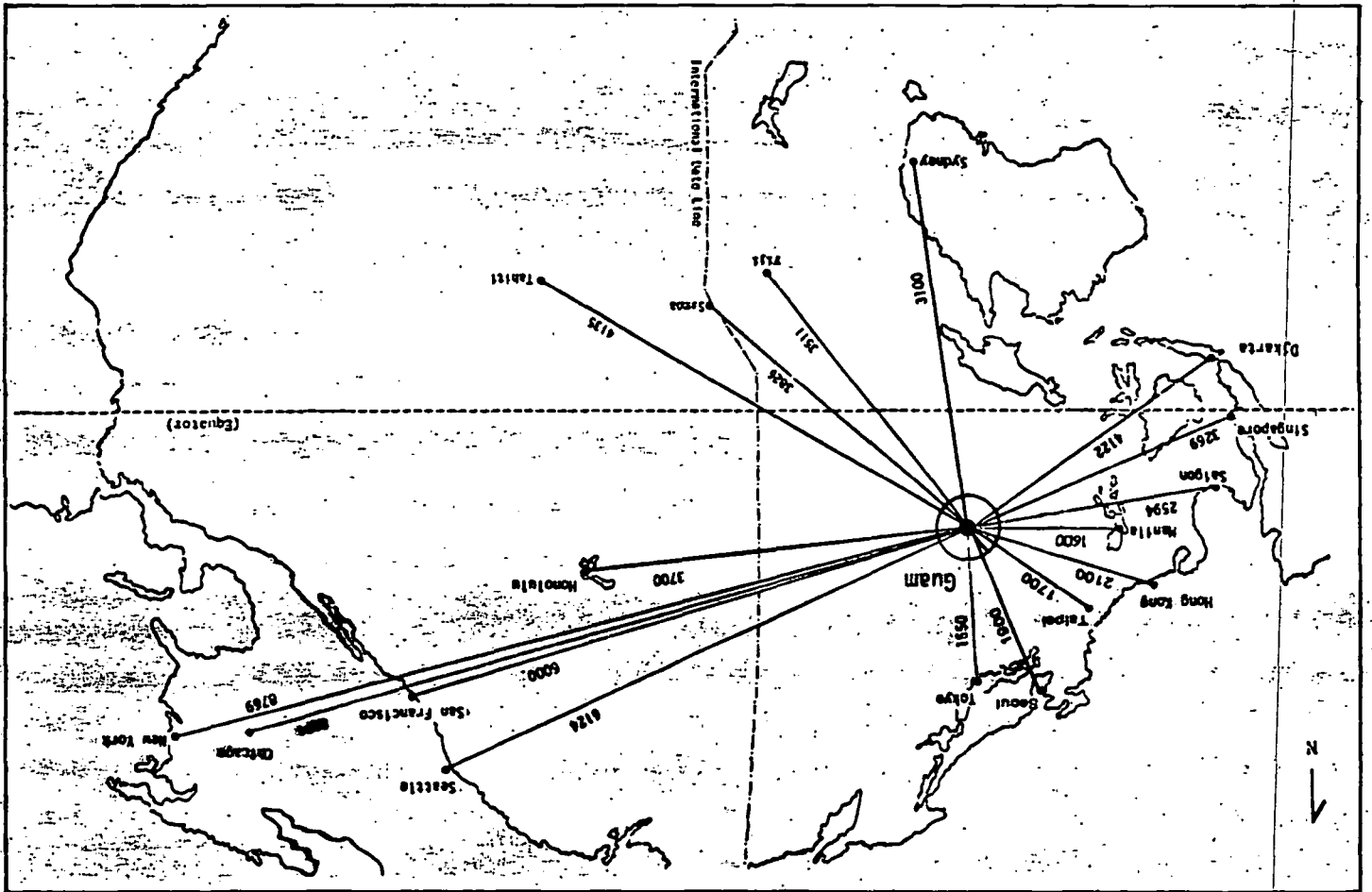
Hotels. Guam has an abundance of international hotels including a 500-room Hilton. Reservations are easily made through any domestic travel agent.

Recreation. Guam's unique and abundant recreational facilities are the lure which attracts nearly 400,000 tourists annually to our shores. We have championship golf courses, lighted tennis courts and indoor racquetball courts. Guam's offshore waters offer some of the finest fishing in this part of the world with blue marlin being the prime sport fish. Skin-diving, snorkeling, beachcombing and sunbathing are also very popular.

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You may contact our Guam FSC Office at Post Office Box 2950, Agaña, Guam 96910, by calling (671) 477-FSC1/2 or 472-8931, or by telex at 721-6218. If you would like to contact Guam's Washington, D.C. Liaison Office, their toll-free number is (800) FSC-GUAM.

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Dear Fellow American:

The Foreign Sales Corporation Act of 1984 provides federal tax incentives if you locate certain functions of your export activities in an approved area outside the continental United States.

Overall, the U.S. Virgin Islands is the best location in the world for your Foreign Sales Corporation. We offer far more than federal and local tax relief. We offer the best climate in the world, a proven, sophisticated infrastructure, an enthusiastic white-collar labor pool, advanced telecommunications and banking, frequent flights from the United States, a time zone adjacent to the east coast of the United States, and a community enthusiastic about your FSC locating here.

Additionally, we are an American territory under American laws. English and business are our primary languages. If you choose the U.S. Virgin Islands, you'll be in good company. Kodak and Citicorp, after due diligence, have chosen to locate their FSC operations on St. Croix and St. Thomas, respectively. We hope to convince you of the wisdom of their choice.

This is what Secretary of Commerce Malcolm Baldrige has to say about the U.S. Virgin Islands: "I wholeheartedly recommend the U.S. Virgin Islands for consideration by any U.S. business that is ready to profit through use of the FSC legislation."

On behalf of the people of the U.S. Virgin Islands, I extend a warm welcome to you and appreciate the opportunity to be independent of major banks and law firms and

We are served by 20 branches of some of the world's largest international banks, with deposits in excess of \$1 billion, and we fall within the purview of the Federal Reserve Board, FDIC, and the Comptroller of the Currency.

Our communications facilities are as varied and as sophisticated as those available in any major mainland city. We have two conveniently located international airports with 160 daily flights.

The St. Croix and St. Thomas Chambers of Commerce have published special directories of the members which offer goods and services necessary for the operation of FSCs. They have organized and briefed a corps of volunteer executives to meet and host representatives of potential FSCs visiting the islands. The Chambers are prepared to provide individual briefings on employment resources, the business infrastructure, taxation and fees, housing and other local resources. A territory is known by the company it keeps: Amerapda Hess operates one of the world's largest refineries; Martin Marietta employs over 500 in its alumina manufacturing plant; Transducer Technologies (Bection Dickinson), ITT and numerous other companies conduct business profitably in the Virgin Islands.

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For information on the U.S.V.I. as a location for your Foreign Sales Corporation, call the U.S.V.I. Department of Commerce
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Virgin Islands. These companies were attracted to the Virgin Islands by favorable tax laws and a commerce-oriented government. The U.S. Virgin Islands offer more than tax advantages for FSCs. Call our toll-free FSC hotline or either Chamber of Commerce for additional information.

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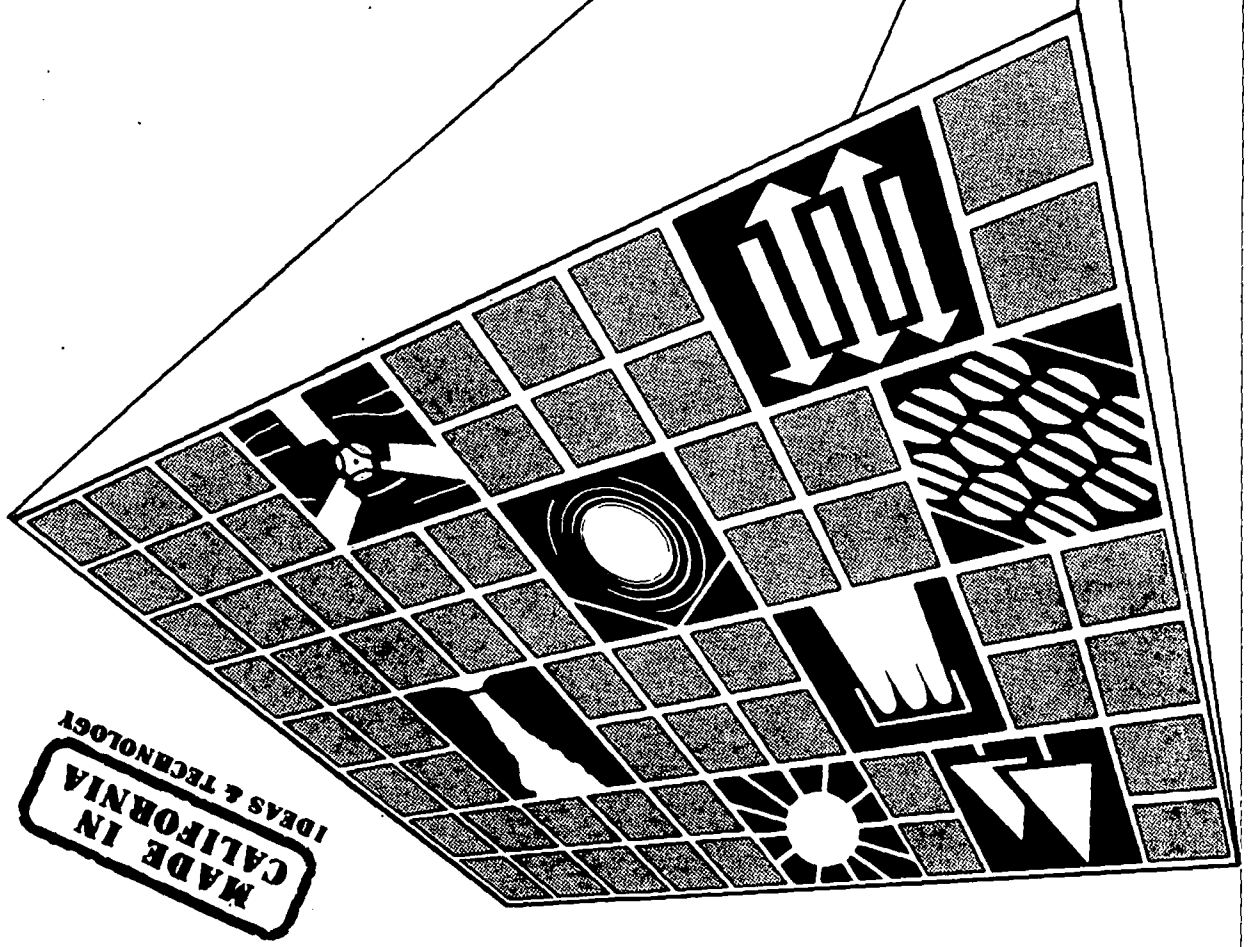
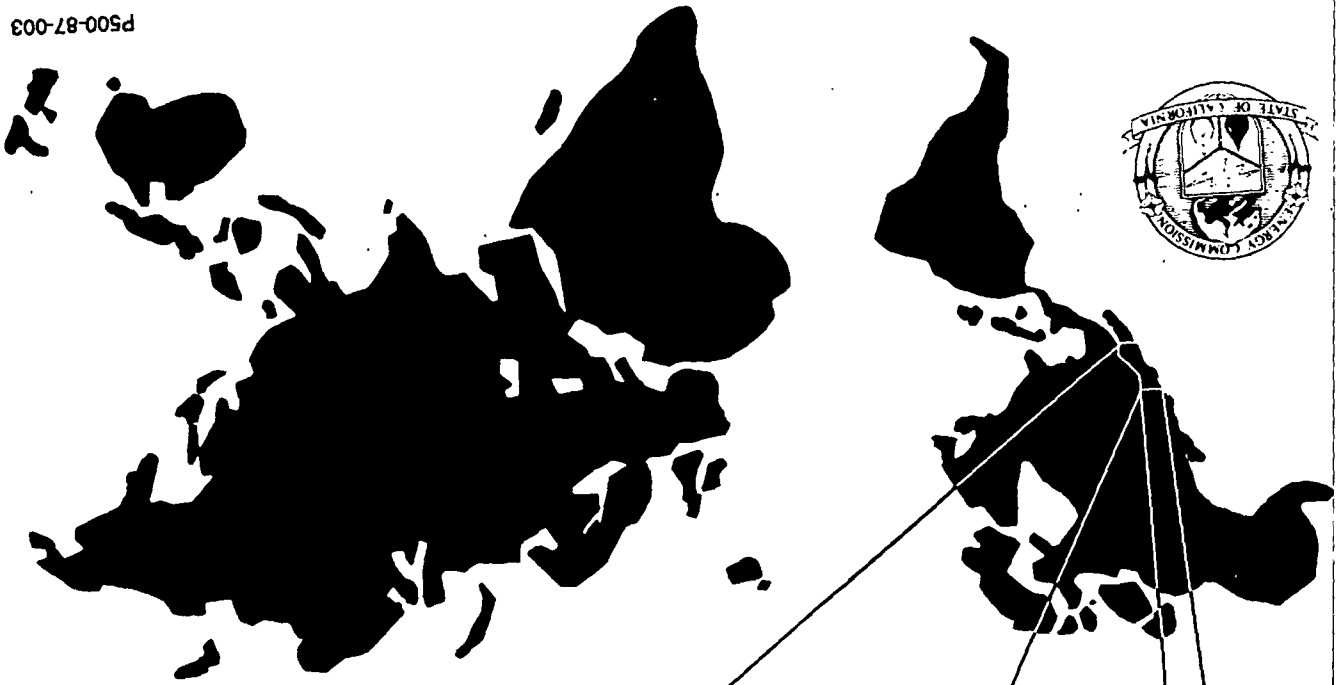
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EXECUTIVE SUMMARY

This report evaluates the international market for geothermal technology as it exists today, as well as prospects for its continued development. The work is funded as part of the California Energy Commission's (CEC) Energy Technology Export Program, and is intended for use by the CEC in assisting California's geothermal industry to develop export markets.

Geothermal energy, the natural heat of the earth, has been exploited since prehistoric times for direct heating uses, and has been used for electricity generation since 1904. The basic geothermal technologies, many of which evolved from the gas and oil industries, are mature. They include geosciences technologies for exploration and field development and conversion technologies for drilling and energy production. Some twenty-four countries currently utilize their geothermal resources, an additional twenty-eight have high-grade resources that are not yet tapped, and dozens of other countries have significant lower-grade resources.

At this time, seventeen countries are producing electricity from geothermal resources. Some 42% of the world's total operating geothermal electricity generation capacity of 4,733 MW is located in the U.S. The Philippines, Mexico, and Italy are the other major geothermal electricity producers. The total worldwide investment in geothermal power plants is estimated to be \$11.6 billion, of which \$2.4 billion was invested in 1985. A total of twenty-four countries make direct use of geothermal energy for heating purposes. The major users of direct geothermal heating are Japan, Hungary, and Iceland.

Industry participants can be classified by function as follows:
exploration, oilfield service/supply companies, engineering/consulting services, operating companies, project design and construction management, turbo-generator manufacturers, and other component manufacturers and suppliers. Five countries currently account for the majority of geothermal technology exports: the U.S., Italy, New Zealand, Japan, and France. While data on precise market shares are not available, the U.S. has a commanding lead in exploration, oilfield service/supply, and operating companies. Italy and New Zealand lead in providing engineering/consulting services, and Japan leads in manufacturing turbo-generators.

California firms dominate the U.S. geothermal industry. Many of the leaders in both domestic and export markets for exploration, field service/supply, engineering/consulting services, and operating companies are located in California. In addition, over 97% of the operating U.S. geothermal electric power plants are located in California.

Major technology and market-driving factors affecting growth of the California geothermal industry include resources at economic temperatures, an increasing demand for electricity especially in developing countries, and the perceived need of petroleum-importing countries to develop indigenous energy sources. Significant technological trends include an increasing sophistication with handling harsh, corrosive geothermal fluids, facilitating exploitation of

1.0 MARKET OVERVIEW

This market overview describes the geothermal technologies and services that are marketed overseas, the historical development of the industry, and the principal applications for the energy that is produced from the technology.

1.1 Technology Description

Geothermal energy, the natural heat of the earth, originates from the earth's hot interior and the decay of radioactive materials in the crust. In some places, this heat comes to the surface in natural vents of hot water or steam which have been used since prehistoric times for cooking and bathing. In other places, man-made water or steam wells convey the heat from deep in the earth to homes, factories, and electric turbine generators.

The U.S. Department of Energy divides geothermal technology into two broad categories: "geoscience technology and conversion technology." "Geoscience technology" is used to discover and understand the geothermal resource in all its forms, such as subsurface geophysics and analysis for exploration and reservoir engineering. "Conversion technology" embraces all aspects of practical utilization of geothermal energy including access to it, its production from the ground, and its modification to meet end-use needs. Exhibits 1-1a and 1-1b illustrate examples of these technologies.

Geosciences Technology

Geothermal geosciences technologies were initially adapted from petroleum and mining industry exploration methods, and the more recent technologies were also based originally on methods used in historically established dry steam fields (e.g., Larderello, Italy, and The Geysers, California). Activities assumed under geosciences include exploration, reservoir engineering, and field development.

Exploration. Geothermal development begins with exploration to find and confirm the existence of a reservoir by determining the reservoir's economically exploitable temperature, depth, and volume. This phase of development starts with surface assessments by geophysicists, geologists, and geochemists. Many of the known reservoirs were discovered from surface manifestations such as hot springs and water-altered minerals. Exploration now relies increasingly on surface geophysical measurements of subsurface properties using methods such as seismic and magnetotelluric surveys to develop subsurface models. The accuracy and efficiency of exploration depends on adequate instrumentation, accurate subsurface mapping, and good strategies for selecting appropriate measurements. Effective exploration strategies and interpretations depend on geothermal exploration experience and extensive analysis of data provided by industry and government sources.

Reservoir engineering and field development. After an economically exploitable resource is confirmed by drilling, conceptual geological models are developed to define the geometry and physical properties of the reservoir, and geochemical models are used to analyze changes in reservoir fluids and rocks, and simulations are used to predict long-term reservoir behavior. Model parameters are confirmed and refined by additional drilling and are, in turn, used as tools for siting wells to produce the resource as well as for injection wells used to dispose of the spent brines.

Exhibit 1-1b. Example of Conversion Technology (Flash Steam Electric System) Source: CEC, 1983

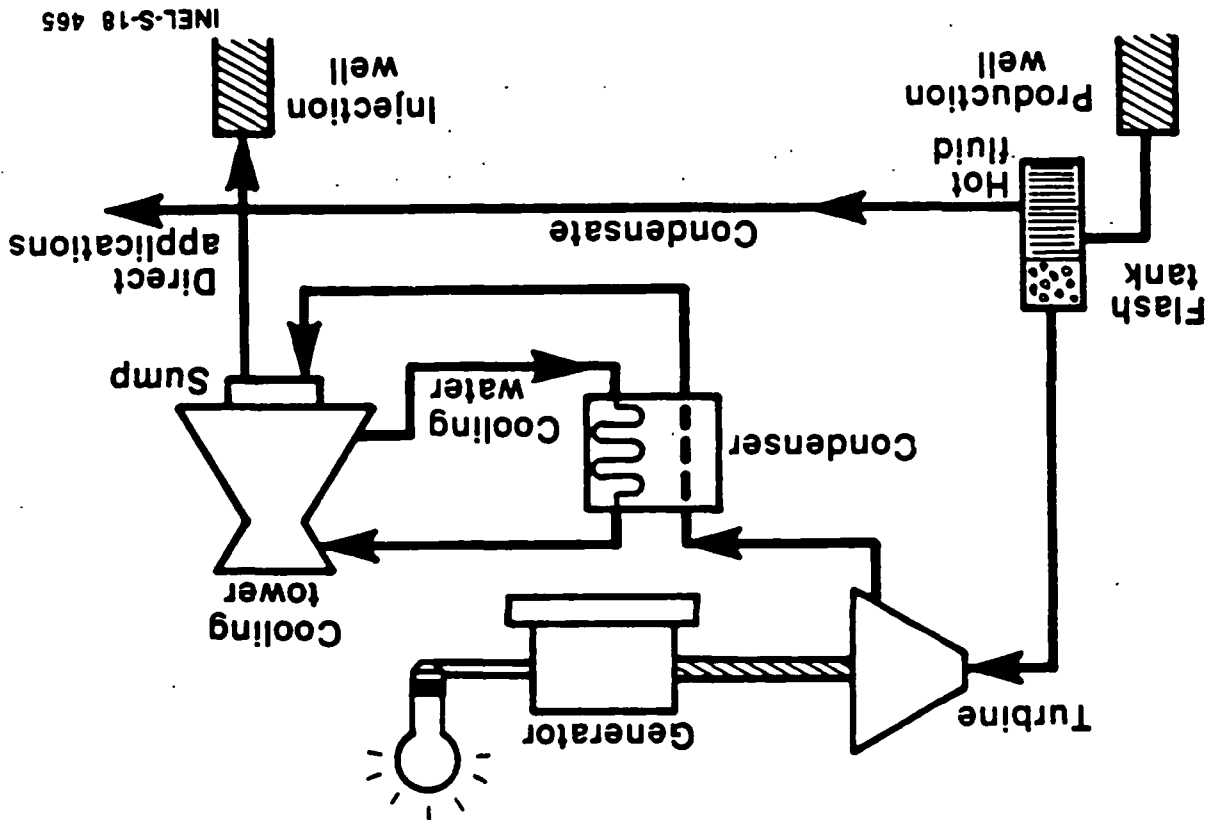
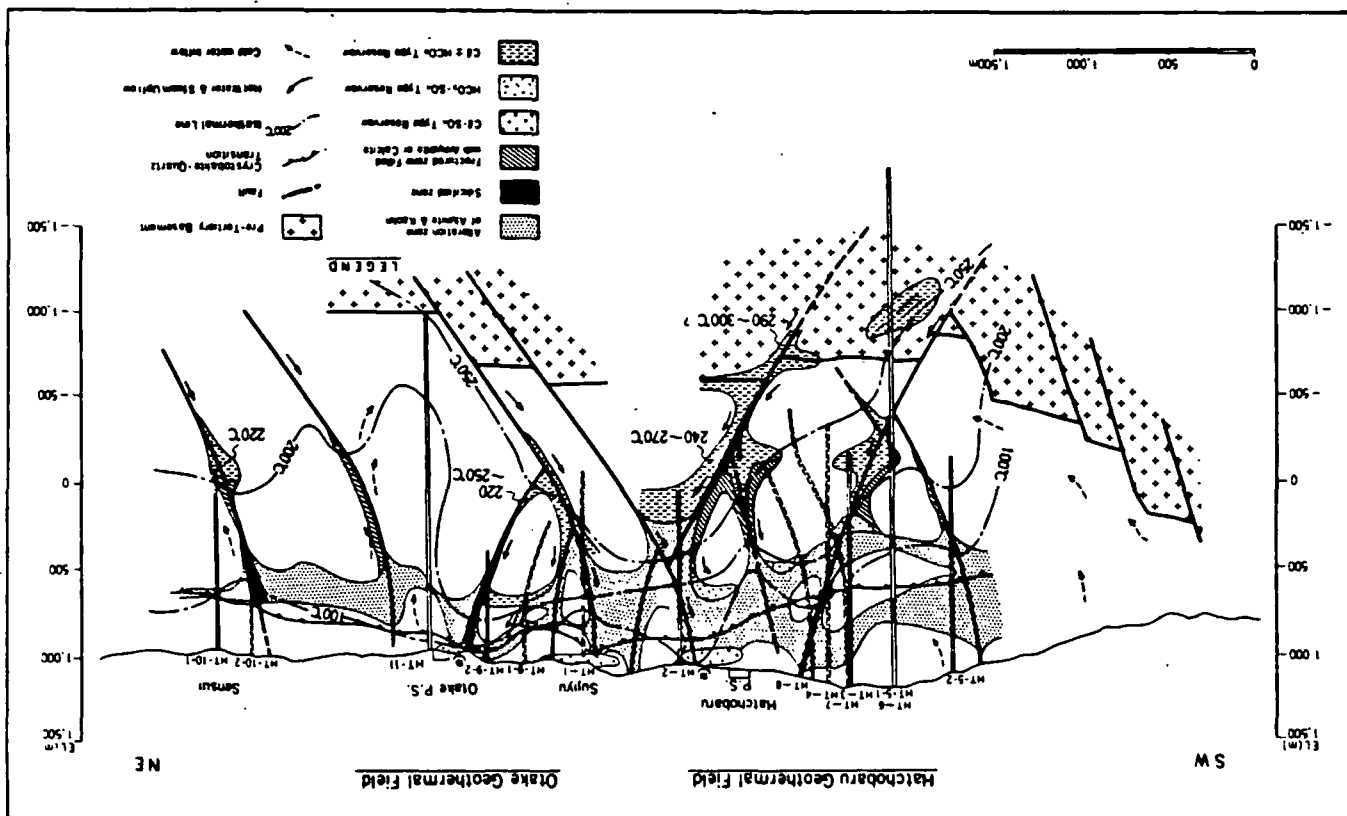


Exhibit 1-1a. Example of Geosciences Technology (Well-Field Model) Source: Fujino & Yamasaki, 1985

A MODEL OF GEOTHERMAL SYSTEM OF THE OAKE-HATCHOBARU GEOTHERMAL AREA



Direct uses of geothermal fluids are the simplest applications. These include space heating and cooling, agricultural and aquacultural heating, industrial process heating, and the traditional use in baths. Where the fluids are relatively pure, they can be used directly to raise fish, to warm soil to stimulate crop growth, and to extend the growing season. In most cases, the fluids are pumped through heat exchangers to heat air or liquids. These systems are constructed from conventional off-the-shelf components, with

End Use. End-use geothermal conversion technologies are derived from conventional space heating and cooling, process heat, and steam turbine/electric generator technologies. Choice of application and system design are very dependent on the cost and physical characteristics of the formation fluid.

Geopressured resource recovery requires high-pressure technology which uses heavy drilling muds to control wells that penetrate geopressured zones. Hot dry rock technology is dominated by requirements for: (1) drilling deep wells with high directional accuracy in very hard rock; and (2) creating artificial heat exchange fissures by which fluid can be circulated through a pair of deep wellbores. Magma energy recovery is as yet untried.

Hydrothermal drilling technology requires increasingly stringent engineering developments as the resource becomes hotter, deeper, and more difficult to drill. Costs of drilling a geothermal well can be four times higher than those for oil and gas wells of similar depths.

Well completion is the final step. Casing pipes are lowered into the hole and usually cemented permanently in place. The formation may be treated by high-pressure fracturing operations to increase the flow rate of the well.

The maintenance of drilling fluid circulation is critical to successful drilling. Circulation is often lost in geothermal wells when the borehole penetrates fissures into which the drilling fluid flows. These fissures must be plugged with "lost circulation" materials or cemented shut before drilling can progress. Alternatively, if the fissures are production zones, they must be kept open, requiring water or foam to be used as the drilling fluid.

Drilling. Most geothermal wells are drilled using a rotary drilling rig. The rig rotates a string of pipe, to which a drill bit is fixed that crushes or grinds rock from the well bottom. Pumps on the rig drive a drilling fluid -- air, water, foam, or a water-solid mixture called "mud" -- down the center of the rotating pipe, through the bit, and back up between the pipe and the wellbore. This circulating fluid removes rock cuttings and cools the hole, provides lubrication between the rotating pipe (the "drill stem") and the wellbore, and prevents pressurized formation fluids from blowing out of the well.

Conversion Technology for accessing and producing the resource is also drawn in large part from oil and gas production technology.

Most geothermal resources exploited to date have been hydrothermal, consisting of hot water or steam trapped in fractured or porous rocks. Other geothermal resource types include geopressured or high-temperature/pressure water containing dissolved methane gas; hot dry rock into which water must be injected; and magma (molten volcanic rock).

Geothermal energy has been used by man for centuries for cooking, bathing, and space heating. Large-scale use of geothermal energy for district heating began in the late nineteenth century in Europe, and started in the U.S. in the year 1890 with the Boise, Idaho district heating system. In 1904, electricity was first produced successfully from steam vents at Lardarello, Italy, using reciprocating steam engines. The successful use of Rankine cycle steam turbines was accomplished in the 1930s, also at Lardarello. The first successful attempts to produce electricity from steam were at the Geysers, California which began operation in 1960, producing 12 Mwe. By 1973, 441 Mwe

1.2 Market History

- Hybrid electric plants supplement geothermal heat with biomass or fossil fuel. Hybrid plants are appropriate for resources too cool to generate electricity economically from the hot water alone, but in which geothermal energy can play an efficient "fuel-saving role."
- Binary cycle electric plants are appropriate for liquid-dominated reservoirs that are not hot enough for efficient flash steam production, but contain enough heat to evaporate an organic working fluid in the 150° - 200°C (300° to 400°F) temperature range. Binary plants usually require downhole production evaporated in a primary heat exchanger, expanded through a turbine, and condensed in a secondary heat exchanger. Current technology keeps the hot water and working fluid separate in conventional heat exchangers. Advanced technology might mix the two fluids in "direct contact" heat exchangers to increase efficiency. Binary plants are beginning to be constructed, with sizes ranging from 0.3 Mwe to 45 Mwe (gross).
- Flash steam electric plants are used to produce energy from liquid-dominated reservoirs with sufficient heat -- typically above 200°C (400°F) -- to flash a large proportion of the liquid to steam. Downhole production pumps can be used to keep the fluid from flashing in the production wellbores and to prevent the deposition of scale that could reduce the flow. Flash tanks separate the liquid and steam, and the steam drives one- or two-stage expansion turbines. These systems evolve substantial waste liquid, which is either used for cooling water or pumped back into the reservoir. This technology is economic at many locations, and is being developed in sizes of 10 to 45 Mwe as industry gains confidence with it.
- Steam electric plants are used to produce energy from vapor-dominated reservoirs. The steam is cleaned to remove solids and liquids, and is then fed into turbines which drive generators. The turbine exhaust is usually condensed and cooled in wet cooling towers for use as make-up cooling water for injection back into the reservoir. This technology is well developed. Typical plants range from 35 to 120 Mwe net capacity.

Geothermal electric generating systems must be matched to resource characteristics. The types of systems in use include steam, flash steam, binary cycle, and hybrid electric plants.

materials compatibility and overall costs being the major design issues. More complex systems, such as absorption refrigerators, can cool air or liquids.

had been installed in the U.S. The energy crises of the 1970s sparked interest in geothermal energy around the world and exploration and development expanded.

The 1973 oil embargo and the resulting fuel price increases spurred the enactment by the U.S. Congress of the Geothermal Energy Research, Development, and Demonstration Act on September 3, 1974, thus establishing the first formal federal geothermal research and development (R&D) program in the U.S. Under this Act, earlier R&D efforts by the Atomic Energy Commission and National Science Foundation were consolidated and then expanded under the Energy Research and Development Administration (ERDA) in 1975, and further expanded under the Department of Energy when it was created in 1977.

Federal funding of geothermal R&D rose from \$28 million in 1975 to a peak of \$188 million in 1979. Since then, it has declined to 1975 funding levels. Private funding of geothermal developments exceeds the cumulative government investment in the industry, and has expanded steadily throughout the 1970s and 1980s. Only recently, under the influence of softening oil prices and excess electricity production capacity in California, has the rate of industry growth leveled off [Fenn et al., 1986]. Given federal reductions in spending, low oil prices and excess capacity, geothermal firms are looking to export markets for their services and technologies. Today, there are over 3,700 MW of electricity being generated from geothermal resources in 15 countries. Several other countries are studying or planning geothermal development in the near future.

1.3 Principal Applications

Over 60% of the geothermal resources currently in use are dedicated to electricity generation. The remainder is devoted to direct heating uses such as space and water heating. The usefulness of a geothermal resource is dictated in part by its temperature. The vast majority of geothermal electric power plants in the world use resources with temperatures in excess of 150°C, and most are above 200°C.

Therefore, geothermal reservoirs with significant near-term electric power development potential are assumed to have a minimum temperature of 150°C. Reservoirs with temperatures below this level are assumed to have application only for direct use. The few exceptions currently on-line include:

- some plants in Italy use temperatures as low as 122°C [Allegri et al., 1981]
- prototype electric plants in China reportedly operate at temperatures as low as 60°C [Canren, 1985]
- recently installed modular binary plants in the U.S. operate on temperatures as low as 106°C [Dippolito, 1985].

Similarly, low-temperature/enthalpy direct heating applications do not represent a realistic market for California geothermal technology exporters. The technologies involved in recovering and utilizing these low enthalpy resources are fairly simple, relatively low cost, and well within the capabilities of the plumbers and well-drillers of most developing and industrialized countries. It is likely that the indigenous industry will take advantage of these resources. Therefore, very few developers will seek significant foreign expertise to help them exploit such resources.

2.0 CURRENT MARKET STATUS

The current status of the international market for geothermal/electric energy technology is discussed in this section. Topics covered include: worldwide business volume, regional market distribution, supplier country market shares, principal competitors, and applications.

2.1 Worldwide Business Volume

Seventeen countries worldwide are currently producing electricity from geothermal resources, resulting in the 1986 total of 4,733 MW of on-line capacity. These countries are listed in Exhibit 2-1, along with their total on-line operating capacity.

Five countries currently account for the majority of geothermal technology exports: France, Italy, Japan, New Zealand, and the U.S. The remainder of this market is accounted for by indigenous firms within each producer country and by other developed countries with minor geothermal exports (Iceland, Sweden, England, etc.) [Meridian Corp., 1986]. Based on an assumed cumulative exploration/drilling/installation cost of \$2.43 million/MW [Stockton, 1985], this represents a total worldwide investment in geothermal power plants of \$11.6 billion, of which \$2.4 billion was invested in 1985. This does not include investment in exploration and drilling where plants have not yet to come on-line.

2.2 Regional Market Distribution

Most of the countries currently using significant amounts of geothermal energy are located along the "Ring of Fire" surrounding the Pacific Rim, and other areas with active volcanism (see Exhibit 2-1). Additional nations are in the process of identifying and developing geothermal resources. It is informative to examine their status on a country-by-country basis.

The countries of the world can be divided into three categories for the purposes of this geothermal resources characterization: (1) industrialized nations with significant geothermal resources and established indigenous geothermal industries (see Exhibit 2-2); (2) nations with negligible geothermal potential or for which no information is available (see Exhibit 2-3); and (3) nations with geothermal resources but with no established indigenous industry (see Exhibit 2-4). Those countries falling into this third category can be considered as having the most market potential for the U.S. geothermal industry. It is likely that resources located in countries in the first category will be exploited primarily by indigenous firms, and those in the second category are unlikely to have significant resources exploitable in the near- to mid-term [Meridian Corporation, 1986]. This study, therefore, focuses on those nations possessing geothermal resources but lacking an indigenous geothermal industry. A list of countries in this category is provided in Exhibit 2-4. This list was derived from an initial survey of 177 countries and geographic entities.

The level of geothermal development in a country can be described using the categories outlined in Exhibit 2-5.

Exhibit 2-1
GEOHERMAL ELECTRIC CAPACITY ON-LINE AS OF 1986
 Source: DiPippo, 1986

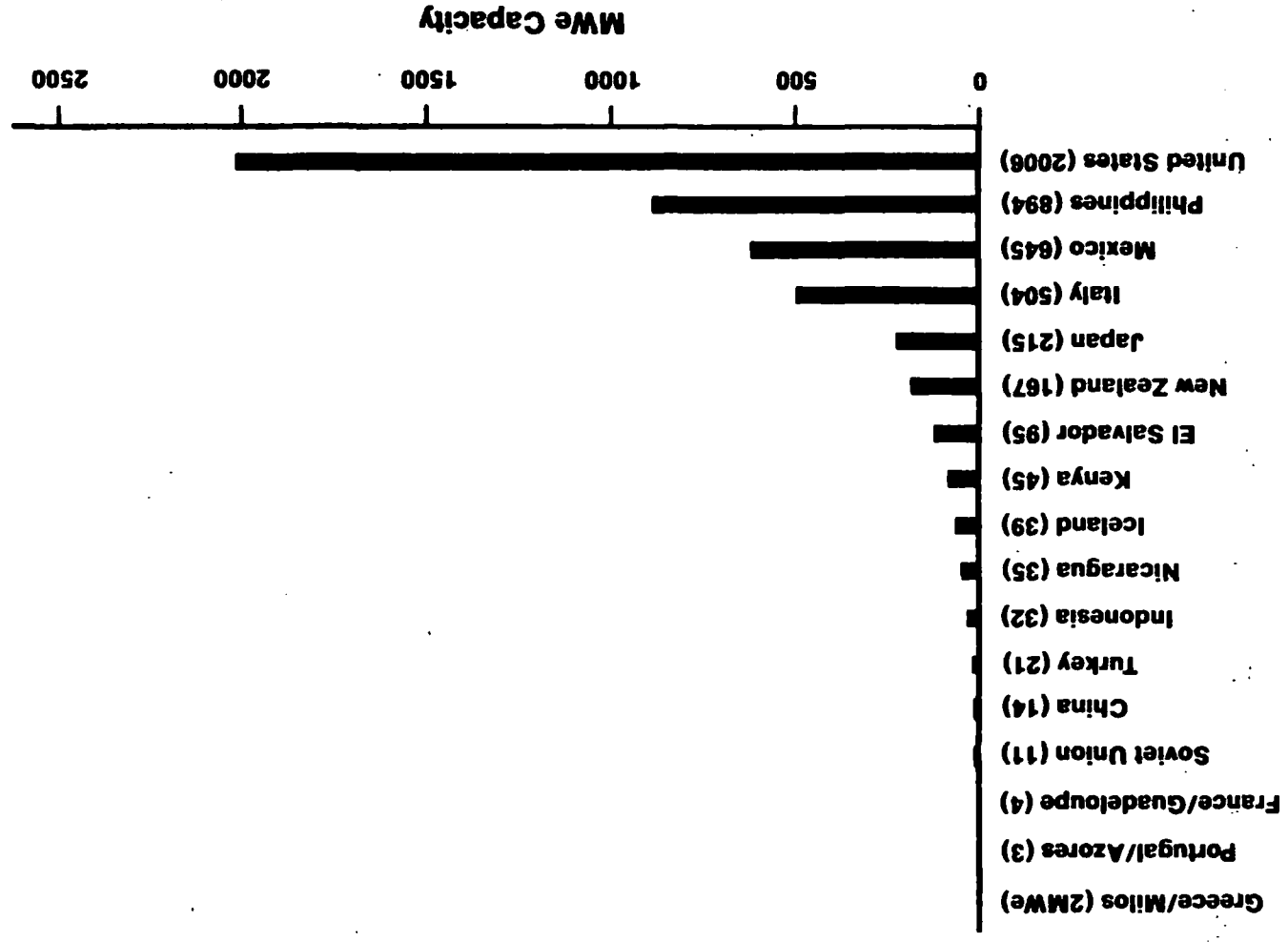


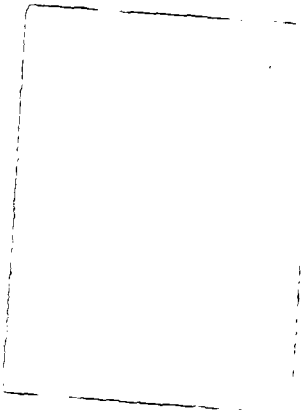
Exhibit 2-2. Industrialized Nations with Established Domestic Geothermal Expertise

- Austria
- Australia
- Belgium
- Canada
- Czechoslovakia
- Denmark
- Finland
- France (including Guadeloupe, Reunion Island)
- Germany, East
- Germany, West
- Great Britain
- Hungary
- Iceland
- Ireland
- Italy
- Japan
- Netherlands
- New Zealand
- Poland
- Portugal
- Romania
- Spain
- Sweden
- Switzerland
- U.S.S.R.

EXHIBIT 2-3. Countries and Areas with No Information Available on Geothermal Potential or Low Likelihood of Having Exploitable Resources

- | | |
|----------------------------|----------------------------|
| Afghanistan | Laos |
| Albania | Kuwait |
| Andorra | Korea, North |
| Angola | Kampuchea (Cambodia) |
| Antigua and Barbuda | Jamaica |
| Bahamas | Ivory Coast |
| Bahrain | Israel |
| Bangladesh | Iraq |
| Barbados | Iran |
| Belize (British Honduras) | Hong Kong |
| Bermuda | Guyana |
| Botswana | Guinea-Bissau |
| Bulgaria | Guinea |
| Burkina Faso (Upper Volta) | Greenland |
| Central African Republic | Ghana |
| Comoros | Gabon |
| Congo | French Polynesia |
| Cyprus | French Guinea |
| Cuba | Equatorial Guinea |
| Cyprus | Cyprus |
| Dominican Republic | Cuba |
| Ecuador | Congo |
| Egypt | Comoros |
| El Salvador | Burkina Faso (Upper Volta) |
| Equatorial Guinea | Bulgaria |
| Ethiopia | Brunel |
| Fiji | Botswana |
| France | Bermuda |
| Germany | Belize (British Honduras) |
| Ghana | Bermuda |
| Greenland | Belize (British Honduras) |
| Guinea | Bermuda |
| Guinea-Bissau | Belize (British Honduras) |
| Guyana | Belize (British Honduras) |
| Hong Kong | Belize (British Honduras) |
| Iran | Belize (British Honduras) |
| Iraq | Belize (British Honduras) |
| Israel | Belize (British Honduras) |
| Ivory Coast | Belize (British Honduras) |
| Jamaica | Belize (British Honduras) |
| Kampuchea (Cambodia) | Belize (British Honduras) |
| Korea, North | Belize (British Honduras) |
| Kuwait | Belize (British Honduras) |
| Laos | Belize (British Honduras) |
| Lebanon | Belize (British Honduras) |
| Libya | Belize (British Honduras) |
| Lesotho | Belize (British Honduras) |
| Liberia | Belize (British Honduras) |
| Liechtenstein | Belize (British Honduras) |
| Luxembourg | Belize (British Honduras) |
| Macao | Belize (British Honduras) |
| Mali | Belize (British Honduras) |
| Malta | Belize (British Honduras) |
| Mauritania | Belize (British Honduras) |
| Mauritius | Belize (British Honduras) |
| Monaco | Belize (British Honduras) |
| Mongolia | Belize (British Honduras) |
| Namibia | Belize (British Honduras) |
| Nauru | Belize (British Honduras) |
| Netherlands Antilles | Belize (British Honduras) |
| New Caledonia | Belize (British Honduras) |
| Niger | Belize (British Honduras) |
| Norway | Belize (British Honduras) |
| Oman | Belize (British Honduras) |
| Pakistan | Belize (British Honduras) |
| Paraguay | Belize (British Honduras) |
| Qatar | Belize (British Honduras) |
| Sao Tome and Principe | Belize (British Honduras) |
| San Marino | Belize (British Honduras) |
| Seychelles | Belize (British Honduras) |
| Sierra Leone | Belize (British Honduras) |
| Singapore | Belize (British Honduras) |
| South Africa | Belize (British Honduras) |
| Sri Lanka | Belize (British Honduras) |
| Suriname | Belize (British Honduras) |
| Swaziland | Belize (British Honduras) |
| Syria | Belize (British Honduras) |
| Togo | Belize (British Honduras) |
| Tonga | Belize (British Honduras) |
| Trinidad and Tobago | Belize (British Honduras) |
| Tuvalu | Belize (British Honduras) |
| United Arab Emirates | Belize (British Honduras) |
| Uruguay | Belize (British Honduras) |

Exhibit 2-4. Countries and Areas Selected as Having Potential for Penetration by the U.S. Geothermal Industry



- Mexico
- Morocco
- Mozambique
- Nepal
- Nicaragua
- Nigeria
- Panama
- Papua New Guinea
- Peru
- Philippines
- Puerto Rico
- Rwanda
- Somalia
- Samoa
- Saudi Arabia
- St. Christopher and Nevis
- St. Lucia
- St. Vincent and the Grenadines
- Solomon Islands
- Sudan
- Taiwan
- Tanzania
- Thailand
- Tunisia
- Turkey
- Vanuatu
- Venezuela
- Vietnam
- Yemen, North
- Yemen, South
- Yugoslavia
- Zaire
- Zimbabwe

- Algeria
- Argentina
- Ascension Island
- Azores
- Bhutan
- Bolivia
- Brazil
- Burma
- Burundi
- Cameron
- Cape Verde
- Chad
- Chile
- China
- Colombia
- Costa Rica
- Djibouti
- Dominica
- Dominican Republic
- Ecuador
- Egypt
- El Salvador
- Ethiopia
- Fiji
- Greece
- Guatemala
- Haiti
- Honduras
- India
- Indonesia
- Jordan
- Kenya
- Madagascar
- Malawi
- Malaysia

Exhibit 2-5. Level of Development by Country

MAX.DEV.	NAME OF COUNTRY	MAX.DEV.	NAME OF COUNTRY
Ic	Jordan	Ib	Algeria
IIC	Kenya	Ia	Argentina
Ia	Korea, South	Ic	Ascension Island
Ia	Madagascar	IIa	Azores
Ia	Malawi	Ic	Bhutan
0	Malaysia	Ic	Bolivia
0	Mexico	0	Brazil
IIC	Morocco	0	Burma
Ia	Mozambique	0	Burundi
0	Nepal	0	Cameroon
IIC	Nicaragua	Ib	Cape Verde
Ia	Nigeria	0	Chad
Ic	Panama	Ib	Chile
Ia	Papua New Guinea	IIc	China
Ia	Peru	Ic	Colombia
Ib	Philippines	Ib	Costa Rica
IIC	Puerto Rico	Ib	Djibouti
0	Rwanda	Ic	Dominica
0	St. Christopher And Nevis	Ib	Dominican Republic
Ic	St. Lucia	IIc	Ecuador
0	St. Vincent and The Grenadines	Ia	Egypt
0	Samoa, Western	IIc	El Salvador
Ia	Saudi Arabia	Ib	Ethiopia
Ia	Solomon Islands	Ib	Fiji
0	Somalia	IIa	Greece
0	Sudan	Ia	Grenada
IIa	Taiwan	Ib	Guatemala
Ib	Tanzania	Ib	Haiti
Ib	Tunisia	Ib	Honduras
Ia	Turkey	Ic	India
IIC	Uganda	IIc	Indonesia
Ic	Vanuatu		
Ia	Vietnam		
IIa	Yemen, North		
Ia	Yemen, South		
Ib	Yugoslavia		
0	Zaire		
0	Zimbabwe		

Exhibit 2-5. Level of Development by Country (Cont'd)

0 --	No development	
I --	Exploration	
	a. Nationwide Preliminary Assessment	
	b. Site-Specific Reconnaissance	
	c. Detailed Geophysical Studies	
II --	Field Development	
	a. Exploratory Drilling	
	b. Production Drilling	
III --	Resource Utilization	
	a. Demonstration or small R&D plant	
	b. Construction of commercial-scale (10MW) plant	
	c. Operation of commercial facility	

Turbo-generator Manufacturers: This category encompasses those companies that supply turbines or turbine generator sets for geothermal applications. This sector includes companies that build large turbines components and work.

Project Design and Construction Management: This sector of industry refers to those companies involved in designing and/or building end-use facilities, either for electric production or direct use. This is primarily a service sector, where the contractor is hired to manage the project from the design through the construction phase. These companies will often be responsible for subcontracting various power plant

Operating Companies: This classification includes those companies that develop and operate geothermal fields, usually selling the steam produced by the field to a utility or power plant owner. These are primarily management/engineering companies that perform the complete management task from exploration through production. These companies will often fund their own projects and will generally subcontract to drilling service/supply companies.

Engineering/Consulting Services: This category includes drilling, production, and reservoir engineers whose services may be required throughout the exploration, drilling, field development, and production phases.

Oilfield Service/Supply Companies: This category includes the industry needed to drill deep exploratory and production wells. Subsets of this sector include drilling contractors, mud companies, cement companies, logging companies, tubular manufacturers/suppliers, etc.

There are seven categories, or sectors, that describe the various activities that comprise the geothermal industry. These are: Exploration: This category incorporates all phases of geothermal exploration up to the point of deep exploratory drilling, including geological and geochemical studies, geophysical equipment and services, and the drilling of shallow heat flow/thermal gradient wells.

2.3.1 Functional Classification of the Geothermal Industry

The world geothermal industry can be segmented along functional lines and by country or state of origin. Both approaches are used in the sections that follow.

2.3 Supplier Country Market Shares

Based on detailed development and trade information presented in Exhibit 2-5 and Appendix A, the current major developing country importers of geothermal technologies are listed below in Exhibit 2-6. It is important to differentiate a country at this level of detail because participants in the geothermal industry often specialize their work in one of these categories. Note that in Exhibit 2-5 the level of development is assigned for the major fields within each country whose resources are considered. This exhibit indicates that there are many countries with significant geothermal resources that are in the early stages of development.

(a) Exploration

Botivia
 China
 Costa Rica
 Greece
 Honduras
 Indonesia
 Mexico
 Nicaragua
 Philippines
 St. Lucia

(c) Engineering/Consulting Service

Botivia
 China
 Costa Rica
 Djibouti
 El Salvador
 Greece
 Indonesia
 Kenya
 Nicaragua
 Philippines

(e) Project Design & Construction Mngt

Portugal/Azores
 El Salvador
 Indonesia
 Mexico
 Nicaragua
 Philippines
 Turkey

(b) Oilfield Service & Supply

Botivia
 China
 El Salvador
 Ethiopia
 Greece
 Indonesia
 Kenya
 Nicaragua
 Philippines
 Thailand

(d) Operating Companies

Ethiopia
 Indonesia
 Kenya
 Philippines
 Turkey

(f) Turbo Generator Manufacturer

Portugal/Azores
 Costa Rica
 El Salvador
 Greece
 Indonesia
 Kenya
 Mexico
 Philippines
 Turkey

The overall role of U.S. companies in the world geothermal electric power market can be seen in Exhibit 2-8. The U.S. currently has approximately 36% of

available information. Detailed information on market penetration is best shown on a matrix that indicates business volume for each major exporter (plus "other" and "indigenous" categories) by country market and by functional classification. This is illustrated in Appendix A. The information presented in Appendix A has been developed from published and unpublished sources and represent the best

available information. Much of the investment in geothermal power projects occurs in the earlier stages of development, during exploration, drilling, and construction. To understand the disposition of current market shares, it is important to estimate the levels of effort being applied to all of the functional classifications including exploration, oilfield service/supply companies, engineering/consulting services, operating companies, project design and construction management firms, turbo-generator and other component manufacturers.

There are a limited number of countries that currently participate in the global geothermal industry, either as energy producers or as technology suppliers. The five key geothermal technology exporting nations (France, Italy, Japan, New Zealand, U.S.) have uneven shares of the world geothermal technology market. They vary by region served and by functional classification of work performed. Exhibit 2-7 depicts the number of countries in which each major exporter has significant market penetration within each functional classification. It shows market penetration rather than market shares.

2.3.3 The International Geothermal Industry

The U.S., in turn, is the dominant force in geothermal development worldwide. Some 42% of the world's operating geothermal electricity generation capacity is located in the U.S., more than twice the capacity of the world's second largest producer [Dippio, 1985].

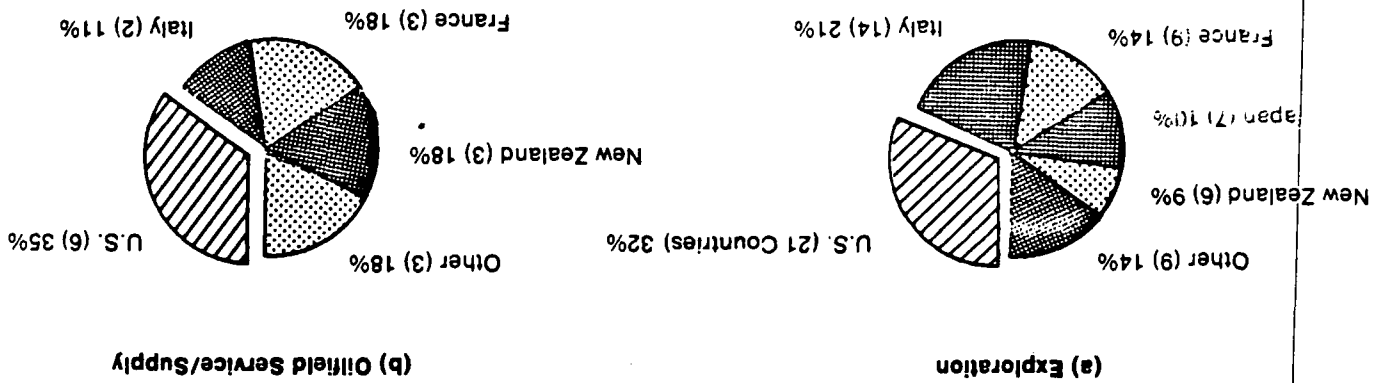
Out of a total of 2,006 MW of geothermal electricity generating capacity on-line in the U.S. in 1986, some 1,947 MW (approximately 97%) are located in California [Dippio, 1986]. Many of the key participants in the industry are California-based. While Hawaii, Idaho, Nevada, Oregon, and Utah also have electric plants and direct use (heating) applications on-line, they currently represent only a fraction (approximately 3%) of the U.S. geothermal energy capacity. In this study, the U.S. and California geothermal industry are considered to be synonymous.

2.3.2 The California Geothermal Industry

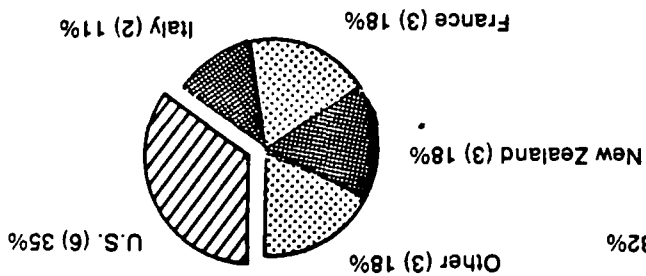
Other Component Manufacturers/Suppliers: This is the sector of industry that supplies generic materials, such as valves, pipes, and controls. Most of these components are nongeothermal-specific. The companies in this category will generally be contracted by the firm managing the construction.

For power plants over 100 MW, down to those companies who produce small (>1 MW), modular systems.

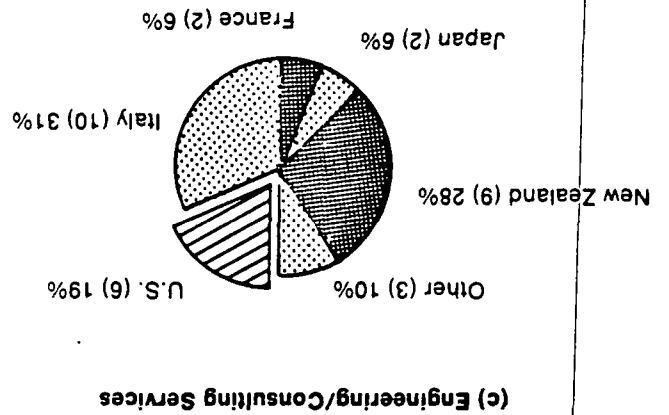
**Exhibit 2-7
INTERNATIONAL GEOTHERMAL MARKET INVOLVEMENT
OF MAJOR EXPORTERS BY MARKET SEGMENT**



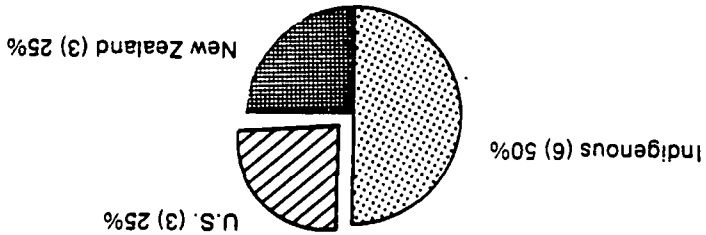
(a) Exploration



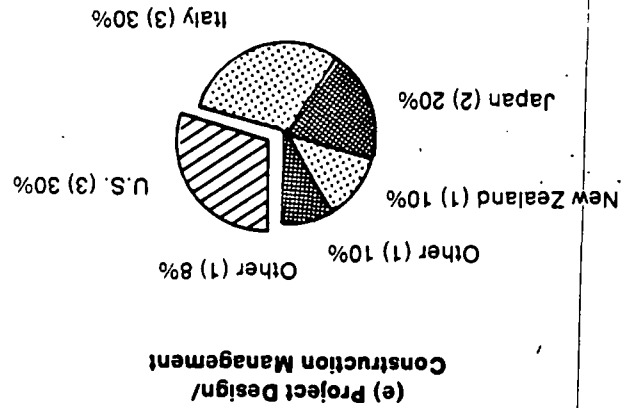
(b) Oilfield Service/Supply



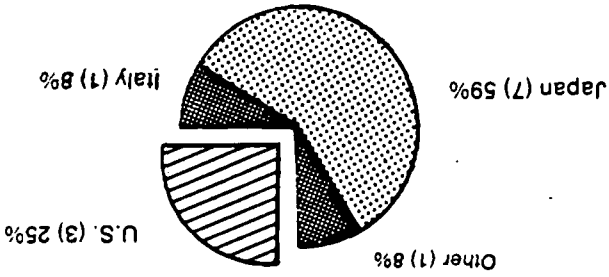
(c) Engineering/Consulting Services



(d) Operating Companies



(e) Project Design/Construction Management



(f) Turbo-Generator Manufacturers

Source: Meridian, 1986

the world market share, however, the world market is expanding faster than the U.S. share.

2.4 Principal Competitors

The country-by-country information presented in Appendix A is summarized by functional classification to indicate the worldwide market penetration by each of the five major exporters of geothermal energy within each classification (see Exhibit 2-9). Reliable dollar estimates of market shares are not available. Therefore, the number of countries in which each exporter has a significant level of involvement (more than brief visits) is used to rank the exporters, as follows:

Exploration: The U.S. has a commanding lead (21 countries), followed by Italy (14), and then France, Japan, and New Zealand, (9, 7, and 6, respectively). Several other countries have performed international work in this sector, although to lesser extent.

Oilfield Service/Supply: The U.S. once again has the lead (6), undoubtedly due to the global nature of the U.S. oil industry. However, other countries also have some representation in this sector. France has performed work in 3 countries; New Zealand, 3; and Italy, 2. Other countries that have performed work in this sector include Great Britain and Hungary.

Engineering/Consulting Services: Italy and New Zealand, with work performed in 10 and 9 countries, respectively, have the lead in this category, primarily owing to the government-owned Italian companies and Geothermal Energy of New Zealand (GENZL). The U.S. follows, with France and Japan at the bottom of this sector.

Operating Companies: Only the U.S. and New Zealand (3) are represented. The U.S. company being UNOCAL and the New Zealand company is once again GENZL. Both UNOCAL and GENZL are companies that combine exploration and engineering/consulting on particular projects.

Project Design/Construction Management: The information available does not indicate a clear superiority for any of the major exporters of geothermal energy technology. It does, however, point out that France is absent from this particular sector.

Turbo-generator Manufacturers: Japan has the clear lead (7), followed by the U.S. (3) and Italy (1).

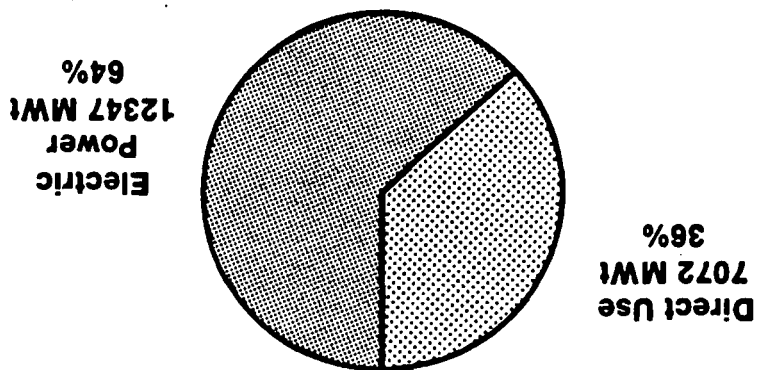
2.5 Applications

The two general categories of geothermal energy applications described in Chapter 1 are electricity production and direct use. Electricity power vs. direct use statistics for the most recent year available (year-end 1984) can be compared as follows.

The electric power total of 4692 MWe (electric) is roughly equivalent to 12,347 MWT (thermal) assuming an overall conversion efficiency of 38% (DiPippo & Marcille, 1984). This is substantially greater than the reported direct use

PRIMARY GEOTHERMAL APPLICATIONS WORLDWIDE
BASED ON: DIPPO, 1984-8-1985

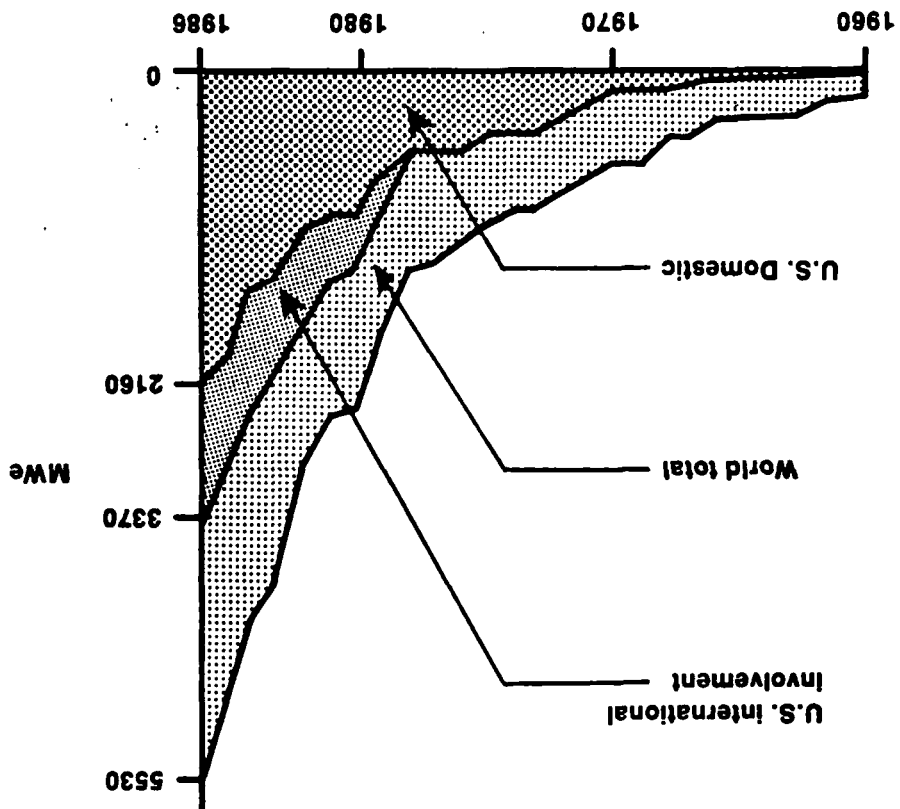
Exhibit 2-9



Source: USDOE/ID-10130, 1985.

U.S. PARTICIPATION IN WORLDWIDE GEOTHERMAL
ELECTRIC CAPACITY

Exhibit 2-8



total of 7,072 Mwt (see Exhibit 2-9). Electric power applications represent not only the majority of total capacity, but also the application for which the best (hottest) resources are used. Electric power plants typically require larger financial commitments than direct-use applications, and appear to be the primary market application for export. Geothermal electric power plants are usually owned by electric utilities or operating companies that in turn sell power to utilities. Unit sizes for operating geothermal power plants range from 0.05 Mwe to 133 Mwe, with a worldwide mean of 25 Mwe capacity [Dipippo, 1985].

3. MARKET GROWTH AND TRENDS

The geothermal industry has shown steady growth in recent years in the face of fluctuating oil prices and other changes (See Exhibit 3-1). This growth results from a number of factors including resource availability, electricity demand, technological development, and government involvement. International market growth is influenced by additional factors, including domestic energy availability, economic strength, and trade barriers such as discriminatory financing. Each of these factors is discussed in this section.

3.1 Market Growth and Development -- Major Driving Factors

The market for geothermal technology is not currently resource-constrained. The geothermal resources of the world are significant, and in the countries possessing them, only a small portion are currently being exploited [DiPippo, 1985]. Even in the U.S., which has twice the amount of geothermal power on-line as any other country, more well fields have been identified than are currently being exploited. The existence of plentiful, untapped resources is thus a significant factor driving market growth.

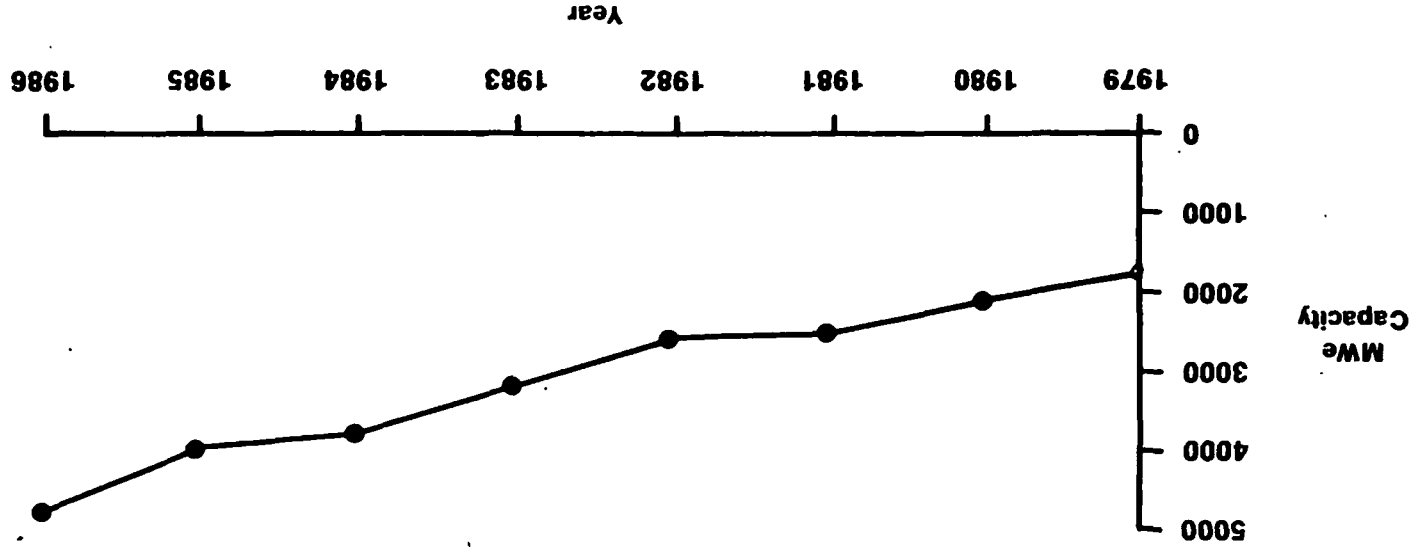
The increasing demand for electricity [Roberts & Kruger, 1986] is another factor driving the expansion of the geothermal power production industry. Geothermal power plants can provide economic base-load electricity generation to meet this demand. Unlike other renewable energy sources, which typically generate power in watt or kilowatt increments, geothermal power plants are typically sized in the tens of megawatts range, which is more compatible with utility-scale electricity generation.

In response to the oil supply and price shocks of 1973 and 1979, many oil-importing countries have sought to develop indigenous energy resources whenever feasible. In the U.S. and other industrialized countries, this is being done primarily to ensure stability of supply and to dampen the effects of fuel price increases [USDOE NEPP, 1985]. In developing countries, there is an added incentive to minimize the foreign exchange burden associated with continued dependence on imported energy [USAID, 1986]. Geothermal energy represents an indigenous resource that can substitute for imported fuels used for electricity production and heating. Its status as a local resource has encouraged geothermal market growth. If the current low price of oil were to persist for an extended period of time, it is likely that international geothermal development would eventually decline [DiPippo, 1986].

The recent decline in oil prices has not detrimentally affected the U.S. geothermal industry as much as it has many of the other renewable energy industries. There are two primary reasons for this. First, the recent glut of cheap oil has slowed the pace of exploration and drilling for petroleum worldwide. This has caused exploration and drilling companies to lower their prices to keep their rigs and crews working. This, in turn, has improved the overall economics of geothermal resource development. Second, because electricity prices do not closely track petroleum prices (electric utilities' fixed equipment costs substantially outweigh their fuel costs [EPRI, 1982]), electric power production has remained a stable and attractive market for geothermal developers. Many geothermal developers have contracts in place for future power plants at guaranteed electricity prices.

RECENT GROWTH IN WORLDWIDE GEOTHERMAL ELECTRIC PLANT CAPACITY
Source: DIPPo, 1985 & 1986

Exhibit 3-1



Note: 1979 through 1985 figures are for plants on-line as of mid-year according to DIPPo (1985). 1986 data are for plants expected to be on-line at the end of 1986 (DIPPo, 1986).

The factors affecting geothermal development can be quantified on a country-by-country basis using economic and energy statistics. Specific factors that profoundly affect the near-term potential for developing geothermal resources include each country's economic health and the local availability of alternative energy sources.

Geothermal electricity generation is the primary target market for this study. Our best estimates of the resource temperature for each field and country are shown in Exhibit 3-2, with scaling as follows:

- ***** Resource temperature >150 C° confirmed by drilling. Adequate for electricity generation.
- **** Resource temperature >150 C° suspected based on geothermometry or shallow thermal gradient wells. Assumed adequate for electricity generation.
- *** Resource temperature >90 C° confirmed by drilling or measurement of hot spring temperatures.
- ** Resource temperature >90 C° suspected based on geothermometry or shallow thermal gradient wells.
- * Resource temperature >50 C° confirmed by drilling or measurement of hot spring temperatures.
- 0 stars No information available.

Countries with 4-star and 5-star markings are prime candidates for geothermal electric power development. Their large number indicates that there is a significant potential for geothermal electric power technology exports based on resource availability. The market is not resource-constrained.

The information presented in this section and Exhibits 2-5 and 3-2, is used to identify target countries with significant potential for U.S. exports of geothermal technology (see Section 4). These major driving factors vary widely on a country-by-country basis.

3.2 Government Involvement

There is significant U.S. federal and state government involvement in the domestic geothermal industry. On the regulatory side, government agencies control drilling permits and sometimes require environmental impact assessments for projects; lease public land and drilling rights to geothermal developers; and fund R&D efforts and demonstration projects. Direct federal program support for geothermal development has declined dramatically, from its high of \$188.4 million in 1979 to about \$20 million in 1986 [USDOE/Geothermal Technologies Division, 1986].

In the U.S., independent power producers have benefited greatly from enactment of the Public Utility Regulatory Practices Act (PURPA), which effectively guarantees markets for the power they generate. PURPA provides a stable climate for investors in the smaller U.S. geothermal plants (<80 MW), and has likely encouraged increased exploitation of geothermal resources in the U.S.

Exhibit 3-2. Resource Quality by Country

Source: Meridian, 1986

NAME OF COUNTRY	EST. TEMP.	NAME OF COUNTRY	EXT. TEMP.
Algeria	****	Jordan	**
Argentina	*****	Kenya	*****
Ascension Island	****	Korea, South	**
Bhutan	**	Madagascar	**
Bolivia	*****	Mexico	*****
Brazil	**	Morocco	**
Burma	***	Mozambique	**
Burundi	****	Nepal	****
Cameroon	****	Nicaragua	**
Cape Verde	****	Nigeria	**
Chad	****	Panama	****
Chile	****	Papua New Guinea	****
China	****	Peru	****
Colombia	****	Philippines	*****
Costa Rica	****	Puerto Rico	****
Djibouti	*****	Rwanda	****
Dominica	****	St. Christopher And Nevis	**
Dominican Republic	**	St. Lucia	****
Ecuador	****	St. Vincent and The Grenadines	****
Egypt	**	Samoa, Western	**
El Salvador	*****	Saudi Arabia	**
Ethiopia	*****	Solomon Islands	**
Fiji	****	Somalia	**
Greece	*****	Sudan	**
Grenada	**	Taiwan	*****
Guatemala	*****	Tanzania	****
Haiti	**	Thailand	****
Honduras	****	Turkey	*****
India	****	Uganda	**
Indonesia	*****	Vanuatu	****
		Venezuela	****
		Vietnam	**
		Yemen, North	****
		Yemen, South	**
		Yugoslavia	**
		Zaire	*
		Zimbabwe	**

* <50°C
 ** possibly >90°C
 *** >90°C
 **** possibly >150°C
 ***** >150°C

Temperature

Previous and pending U.S. tax laws have encouraged domestic geothermal investments by permitting depletion allowances similar to those enjoyed by the oil and gas industries, and by depreciating intangible drilling costs as capital costs.

In the international marketplace, U.S. government involvement in the geothermal industry has been less pervasive. The United States Agency for International Development (USAID) has funded a few small exploration and study projects in developing countries such as Jordan, Philippines, and Thailand. In 1985, the U.S. Export-Import Bank funded a 7.4% fixed-rate loan to Mexico for the purchase of \$11.4 million in geothermal plant equipment. While other agencies have not sponsored geothermal-related work, they could theoretically be required to do so as it is in their domain to assist the U.S. renewable energy industry and to promote exports in general. These agencies include the Office of the U.S. Trade Representative, Overseas Private Investment Corporation, Small Business Administration, Trade and Development Program, Department of Commerce, Department of Energy, Department of State, and International Development Cooperation Agency [Meridian Corp., 1986]. Under the rubric of the Gramm-Rudman budget legislation, as well as changing Administration foreign policy priorities, the non-military components of bilateral U.S. foreign aid may be reduced by as much as 30% in the coming year. This would impair the ability of USAID and other agencies to finance foreign geothermal projects.

Multilateral agencies have been quite active in sponsoring international geothermal projects, as follows: the United Nations Development Programme has funded at least 39 geothermal projects; the World Bank has funded at least 18 projects; the European Economic Community has funded 5 major projects; the Inter-American Development Bank has funded 5 projects; the Asian Development Bank has funded 2 geothermal studies; the African Development Bank has funded one project; and the Caribbean Development Bank has also funded one study [Meridian Corp., 1986].

Governments of the other primary exporters of geothermal technology (France, Italy, Japan, New Zealand) actively support the international marketing efforts of their domestic geothermal industries through project financing, loan guarantees, or other forms of overt government support.

3.3 Technology Trends

Two important trends are becoming evident which may improve both the economics and applicability of geothermal technology for electric power generation.

The first is an increasing level of sophistication with handling harsh, corrosive geothermal fluids. This opens up a variety of geothermal resources for use by power plant developers. Resources that were previously considered too harsh, corrosive or severe can now be exploited using new materials and component configurations. Much of the basic technology used in geothermal drilling is derived from equipment developed for the gas and oil industries, which do not face geothermal's heat, scaling, and corrosion problems. In recent years, this technology has been adapted so that it better matches the harsher geothermal environment. Thus, components last longer and a wider range of geothermal resources may be exploited. Techniques and materials have also

The governments of other industrialized nations, such as Italy, France, New Zealand, and Japan, often provide financing to developing countries for geothermal projects which mandates the use of donor country products and services in conducting the work. The U.S. Government reportedly has not used this tool as actively for geothermal projects as other geothermal technology-exporting countries [Meridian Corp., 1986].

The multilateral aid organizations have played a substantial role in developing geothermal resources in developing countries. They have disbursed dozens of loans and funded numerous studies for these areas. However, between 1981 and 1985, less than 20% of the total World Bank procurements and only 15% of the International Development Association's procurements for all types of projects were sourced in the U.S. [Meridian 1986]. The overvalued U.S. dollar played a significant role in reducing the competitiveness of the U.S. industry in these markets. Recent declines in the value of the dollar may improve the industry's position.

A typical feature of the market in developing countries is that the host governments often require assistance in financing their geothermal projects. They often turn to the industrialized countries and the multilateral aid organizations for grants and loans.

U.S. participation in the expanding world geothermal market has been substantial, and U.S. firms dominate in many segments of the industry. However, there are several features of the international marketplace that are inhibiting greater involvement by U.S. companies.

3.4 Factors Inhibiting Market Growth

An additional feature of some of these modular power plants is that they can produce electricity with lower-temperature geothermal resources than was previously economical. This is achieved by the use of packaged organic Rankine cycle engine generators. A wider range of geothermal resources (lower temperatures and harsher fluids) may now be exploited for electricity generation than was feasible five years ago.

The second important technological trend is increasing modularity in power plant design. Small, ready-to-install turbo-generator packages are now being manufactured in several countries including the U.S., Italy, Japan, and Israel. These significantly reduce the construction time of power plants by providing several major components together in a pre-assembled module. The sizes of these modular systems are small (300 kW and larger) compared to traditional built-up power plants (50 MW to 140 MW). Their small size allows for incremental development of a geothermal well-field. Instead of making a single large investment in several wells feeding into one large power plant, the developer may now invest in one initial well supplying one power-generation module, and expand it in well-by-well increments as power demand and funding availability permit. An example of a power plant using small modular units is the ORMESA project, in Costa Mesa, California, where 26 Ormat units (770 kW each) are connected in a generating network [Yahalom, 1986].

been developed for use in power plants to inhibit corrosion and allow power production (including reinjection) of extremely saline brines [USDOE/GTD, 1986].

It is believed that industry competitors in other geothermal technology-exporting countries receive government subsidies in the form of low-interest loans and/or grants to host countries. This assistance is intended to improve the international cost-competitiveness of those exporters. However, specific cases of discriminatory subsidization could not be documented.

The softening of oil prices is beginning to slow the demand for geothermal energy. Fenn et al. report that "while a period of retrenchment is likely to persist in the geothermal industry for as long as oil prices remain low, there is little danger of a long-term collapse of the industry (as with other renewable energy technologies)" [Fenn et al., 1986]. Slower growth, but not declining international demand for geothermal technology, is expected in the short run.

areas.

In general terms, the declining value of the U.S. dollar should improve the U.S. market share in exploration, field analysis, and development, given the experience base of U.S. companies and the continued R&D efforts in these areas.

In the short term (through 1990), no significant changes are expected in the U.S. market share of the world geothermal industry. Primary U.S. export areas are expected to continue to be geothermal production field analysis and field development services. The already small (less than 10%) U.S. market share within the turbo-generator manufacturing segment may continue to decline in the face of increased competition from Japan, Israel, and possibly Korea.

4.2 Outlook for U.S. Market Share

These estimates are made in an environment where U.S. domestic electric load growth is expected to increase at roughly 2% annually through 1990 [Roberts & Kruger, 1986]. Load growth rates for developing countries typically range between 5% and 15% annually [CORRECT, 1986]. Based on relative demand (load) growth, there is a great potential for expansion of the geothermal power industry in developing countries, presumably at a rate at least equivalent to that suggested by Dippio [1986].

Capacity (MWe)	1985		Annual % Change
	Actual	Estimated	
Announced	1,950	3,450	+15%
Probable		3,836	+19%
Possible		4,474	+26%

Domestic U.S. geothermal growth is forecasted each year by the Electric Power Research Institute (EPRI). EPRI reports that during the calendar year 1985, geothermal power consumption in the U.S. increased by 26%, a rate greater than for any other fuel type. The EPRI estimates that U.S. geothermal capacity by 1990 will be [Roberts & Kruger, 1986]:

As indicated in Section 2, worldwide geothermal power capacity has grown at an average annual rate of 14.5% between 1979 and 1985. This overall growth rate is not expected to continue unabated. Between 1986 and 1990, an annual worldwide growth rate is expected to be around 6.1%. This would result in about 6,000 MW of installed capacity by 1990. This is the only worldwide forecast available.

4.1 Growth Forecasts

This section provides a review of available growth forecasts for the geothermal industry, as well as an assessment to identify the countries likely to offer significant markets for U.S. firms. Factors likely to affect the world geothermal market and the expected change in the U.S. market share are also reviewed.

4.0 FUTURE MARKET GROWTH (1986-1990)

4.3 Regional Market Growth

The market factors described previously included level of geothermal development, resource temperatures, and economic and energy factors. The industry characteristics included functional classifications, levels of activity, and market shares. Section 3 discussed the factors affecting market growth, including resource constraints, substitute fuel prices, technological change, and government involvement.

Based on the prior descriptions of (1) level of geothermal development, (2) estimated resource temperature, (3) economic and energy factors, and (4) other political considerations, the countries of the world can be ranked in terms of their desirability as markets for U.S. geothermal technology. This is presented in Exhibit 4-1. This ordinal ranking, based on multiple, weighted attributes of the countries, has a number of subjective aspects which make it valid only for rough assessments of comparative market potential (see Appendix B).

The nine phases of geothermal development (Sec. 2.2), and the seven functional classifications of the geothermal industry (Sec. 2.3.1) are combined into five geothermal development stages corresponding to the industry sectors working in each phase. These indicate the requisite next steps for developing a particular geothermal resource. They are: (1) country-wide assessment, or phase 0; (2) preliminary site studies, or phases Ia & Ib; (3) detailed geophysics, or phase Ic; (4) exploratory drilling, or phase IIa; and (5) development, or phases IIb through IIc.

Exhibit 4-1 presents selected country-by-country opportunities available to the U.S. geothermal industry by stage of development required. These opportunities are roughly ranked by comparison across the country characteristics evaluated earlier. The information in Exhibit 4-1 should also be viewed in light of the data provided in Appendix A on the U.S. market share for sector and country. Furthermore, it is important to realize that ordinal rankings should not be used to eliminate countries from consideration, but only to provide focus on marketing efforts. This exercise will aid geothermal industry participants in targeting marketing efforts towards countries with high potential for business opportunities.

Exhibit 4-1 reveals that several countries have large potential markets for a large spectrum of U.S. geothermal exports. The countries of El Salvador, Mexico, Indonesia, Djibouti, and Turkey can benefit from four out of the five types of geothermal work. These can be considered prime target markets for U.S. exporters. The countries of Portugal/Azores, Philippines, China, and Taiwan could make use of American services in three out of the five categories, making them likely second-tier markets.

4.4 Effects of Trade Barriers

The most significant trade barriers faced by geothermal exporters will continue to be informational (i.e., learning about projects and gaining access to key decision-makers in host countries). Another important issue is the difficulty foreign entities sometimes have in acquiring geothermal exploration, drilling, and exploitation rights in developing countries. Many countries are unwilling or knowledgeable about geothermal leasing agreements, and thus reduce the rate of development of their resources.

4. Exploratory Drilling

EI Salvador
Mexico
Argentina
Philippines
Indonesia
Djibouti
Taiwan
Turkey
Guatemala
Chile

5. Development

EI Salvador
Mexico
Portugal/Azores
Philippines
Indonesia
China
Djibouti
Taiwan
Turkey
Costa Rica

1. Country-Wide Assessments

Puerto Rico
St. Vincent and Grenadines
Burma
Malaysia
St. Christopher and Nevis
Solomon Islands
Bhutan
Sudan
Somalia
Zimbabwe

2. Preliminary Site Studies

EI Salvador
Mexico
Portugal/Azores
Argentina
Philippines
China
Djibouti
Taiwan
Turkey

3. Detailed Geographics

EI Salvador
Mexico
Portugal/Azores
Indonesia
China
Djibouti
Turkey
Guatemala
Kenya
Nicaragua

*(Based on Appendix B. Only the top ten countries in each category are shown.)

In the past, oilfield and supply service companies have had their holdings nationalized by host countries. In anticipation of future nationalization efforts, some U.S. firms are reluctant to make investments in developing countries.

● Expanding the international geothermal data base and maintaining up-to-date information on international projects

Four recommendations which, if implemented, would assist U.S. geothermal businesses in accessing developing country export markets, include:

financing.

This study indicates that the potential worldwide market for geothermal technology is very large. Out of 177 countries examined, some 71 were identified as having exploitable geothermal resources, but needing foreign technical services to develop those resources. Business opportunities were identified for all levels of geothermal resource development, including exploration, field development, and resource utilization. Geothermal projects in developing countries are being funded in one of four ways: 1) multilateral organizations such as World Bank; 2) bilateral arrangements such as USAID; 3) host country governments; and 4) private sources such as through corporate

foreign markets.

As mentioned earlier, the geothermal technology export market is dominated by four other countries in addition to the U.S.: France, Italy, Japan, and New Zealand. The market share of each varies according to the market segment examined. The strengths of the U.S. geothermal industry are the exploration and drilling market segments. The largest geothermal company in the U.S. (and in the world) is UNOCAL Corporation. It is an integrated supplier of services from exploration through field development and operation. As a division of a large oil company, it finances many of its exploration and development projects. Other smaller companies that do not have available capital may need project financing assistance from multilateral funding institutions or assistance from federal, state, or local governments to successfully penetrate

- participated in exploration projects in 21 of the 53 countries where projects were identified
- supplied geothermal drilling equipment or services in at least 6 countries of the 24 that have reached this stage of development
- participated in field development, either as operator or consultant, in at least 10 of the 24 countries at this stage
- been involved in power plant design and construction in at least 3 of the 12 countries building plants
- supplied turbo-generator equipment to projects in 3 out of those 12 countries.

This study shows that the U.S. geothermal industry has extensive involvement in the world geothermal power market. More than 40% of the world's installed geothermal capacity is located within the U.S. An evaluation of the 71 countries identified as potential markets for the U.S. geothermal industry reveals that it has:

5.0 CONCLUSIONS AND RECOMMENDATIONS

- Measuring industry interest to affirm their commitment to international work
- Educating industry participants about the sources of international project financing and how to function successfully in the international market
- Financing international projects to improve the competitiveness of U.S. firms in a marketplace where discriminatory donor country financing is commonplace.

APPENDIX B:

RATING OF COUNTRIES AS POTENTIAL MARKETS

FOR U.S. GEOTHERMAL TECHNOLOGY

Based on the descriptions of (1) level of geothermal development, (2) estimated resource temperature, (3) economic and energy factors, and (4) other political considerations, the countries of the world can be ranked in terms of their desirability as markets for U.S. geothermal technology. This has been done in the attached spread sheet. This ordinal ranking, based on multiple, weighted attributes of the countries, has a number of subjective aspects which make it valid only for rough assessments of comparative market potential.

Data on the level of geothermal development and estimated resource temperature are taken from Meridian, 1986. Data on economic and energy factors are based on the World Bank's World Development Report 1985. Attribute weights are assigned by the authors. Countries with indigenous geothermal industries are assumed to have negative export potential for U.S. companies.

The level of geothermal development in a country can be described using the categories outlined below. It is important to differentiate a country at this level of detail because participants in the geothermal industry often specialize their work in the one of these categories.

0 -- No development.

(1) -- a. Nationwide Preliminary Assessment, based on preliminary geological evidence and the presence of hot springs.

(2) -- b. Site-Specific Reconnaissance.

Field Development

(4) -- a. Exploratory Drilling.

(5) -- b. Production Drilling.

Resource Utilization

(6) -- a. Demonstration or small R & D plant.

(7) -- b. Construction of commercial-scale (>10 MW) plant.

(8) -- c. Operation of commercial facility.

Since geothermal electricity generation is the primary target market for this study, estimates are provided of the resource temperature for each field and country. These are shown in column four of Exhibit 2-1, with scaling as follows:

5 -- Resource temperature >150 C° confirmed by drilling. Adequate for electricity generation.

4 -- Resource temperature >150 C° suspected based on geothermometry or shallow thermal gradient wells. Assumed adequate for electricity generation.

A "HIGH" rating is favorable to the involvement of U.S. firms in development of that country's geothermal resources. Additional important factors not quantified here include U.S.-host country governmental relations and host country political stability.

0 -- No information available.	
1 -- Resource temperature >50 C° confirmed by drilling or measurement of hot spring temperatures.	
2 -- Resource temperature >90C° suspected based on geothermometry or shallow thermal gradient wells.	
3 -- Resource temperature >90C° confirmed by drilling or measurement of hot spring temperatures.	
Definitions of the economic and energy factors are provided below:	
Gross Domestic Product per Capita:	3 (<\$1,000) 2 (<\$500 and <\$1,000) 1 (<\$500)
Investment Climate Potential	3 (<14%) 2 (<2% and <14%) 1 (<2%)
Degree of Energy Imports Dependence	3 (<0.7) 2 (>0.7 and <-1.0) 1 (<-1.0)
New Energy Reserves Needs	3 (<1.35) 2 (<1.35 and >0.75) 1 (<0.75)
(20-yr. annualized fossil & hydro resources/current annual consumption):	3 (<2) 2 (<2 and >10) 1 (<10)
Exports as a Percent of Imports	3 (<1.35) 2 (<1.35 and >0.75) 1 (<0.75)
Availability of International Reserves	3 (<60%) 2 (<30% and >60%) 1 (<30%)
(International \$ reserves/annual imports):	3 (<60%) 2 (<30% and >60%) 1 (<30%)
Debt Service Ability	High (>10%) Medium (<20% and >10%) Low (>20%)
(Debt service payments/annual imports):	High (>10%) Medium (<20% and >10%) Low (>20%)

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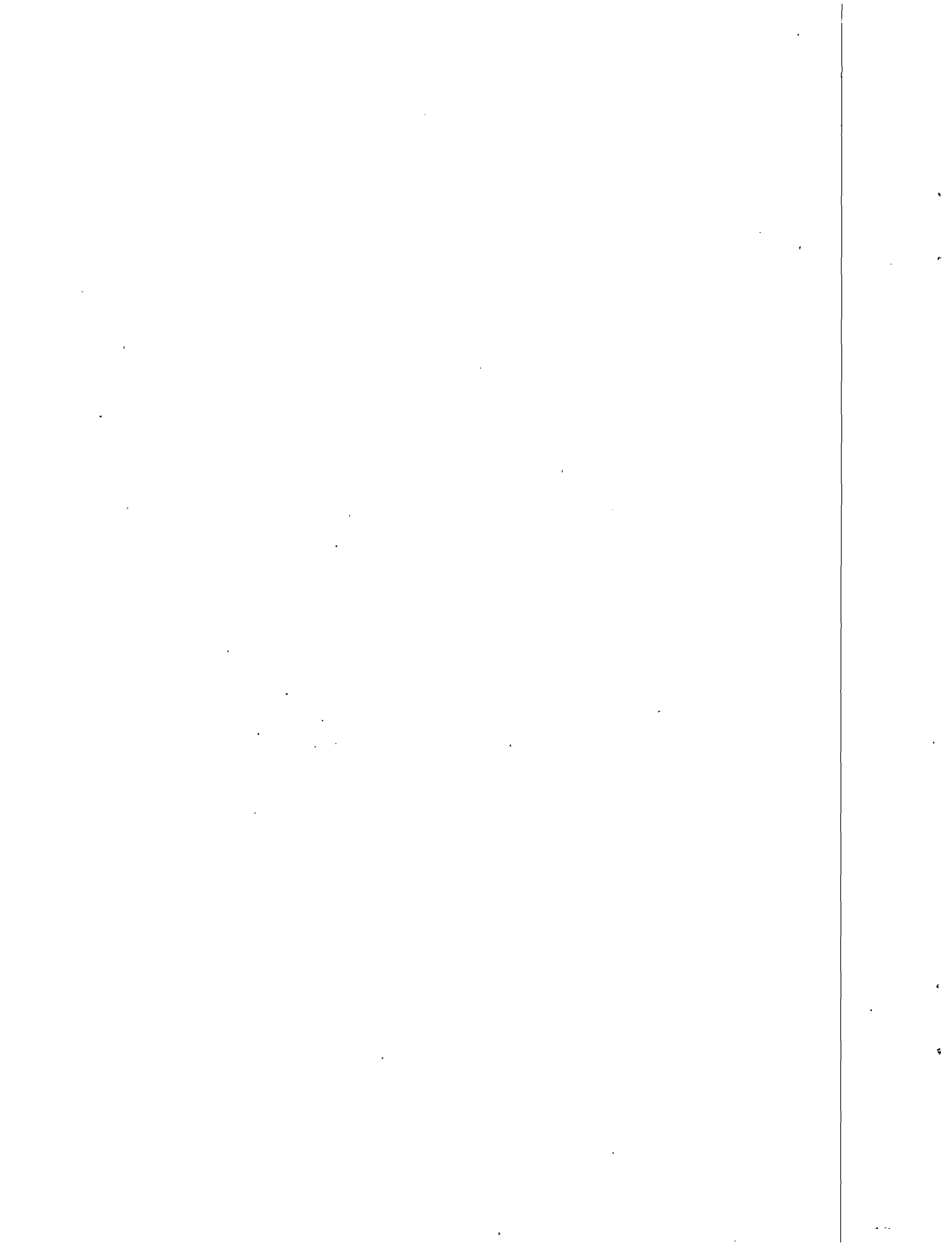
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REMARKS:

Mike -

For our conversation, the following pages are from a presentation I'd made at the Society for International Development Annual Conference on May 2, 1992. The slides were put together by Deepak. A quick comparison with the numbers you used show that they are fairly consistent.

Mike

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STATUS OF GEOTHERMAL POWER GENERATION WORLDWIDE

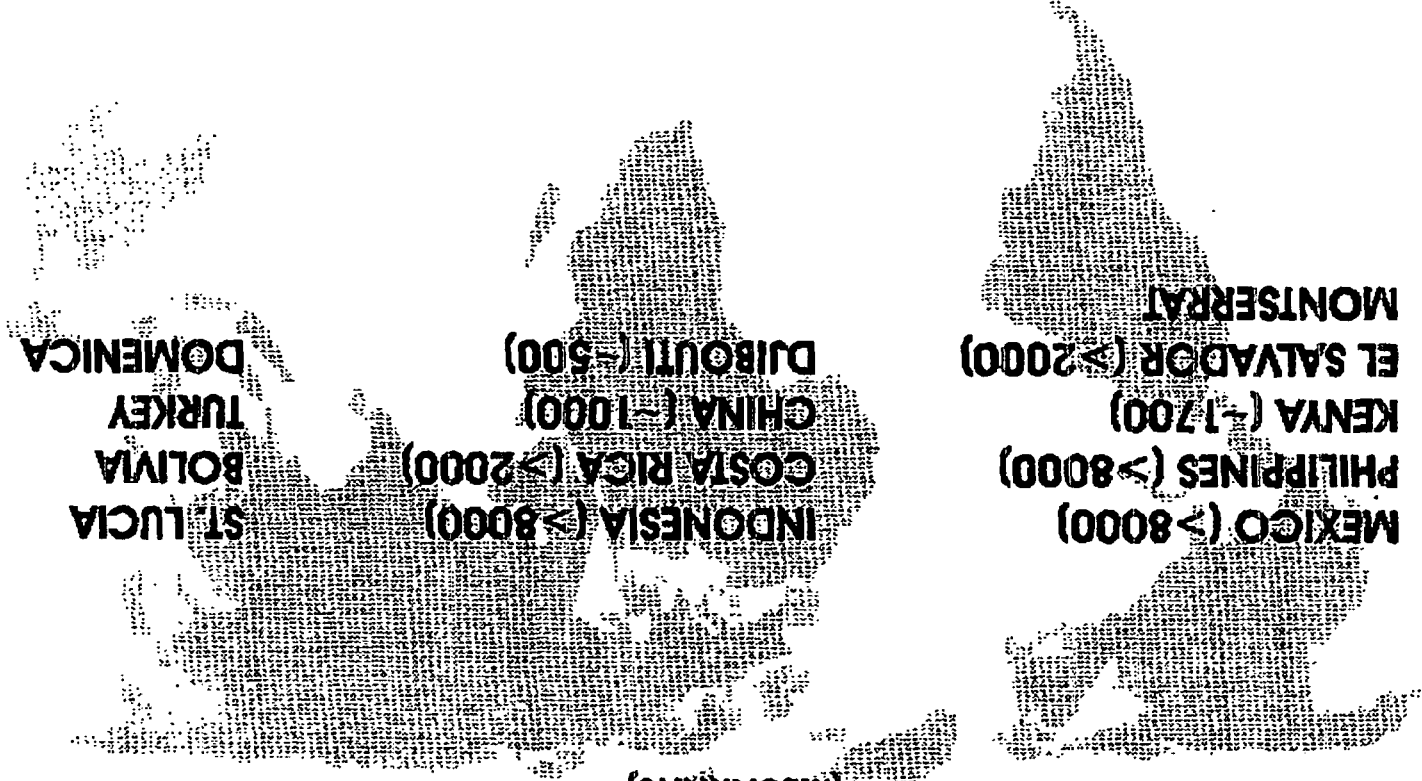
INSTALLED OR CONSTRUCTION FUNDED

COUNTRY	(Mwe)
UNITED STATES	2850
PHILIPPINES	885
MEXICO	750
ITALY	504
NEW ZEALAND	283
JAPAN	225
INDONESIA	143
EL SALVADOR	105
NICARAGUA	70
KENYA	45
ICELAND	41
CHINA	22
TURKEY	21
CIS	11
COSTA RICA	55
GUATEMALA	15
ARGENTINA	1
TOTAL	6026
	(130)*
	(190)*
	(260)*
	(118)*
	(55)*
	(55)*
	(608)*

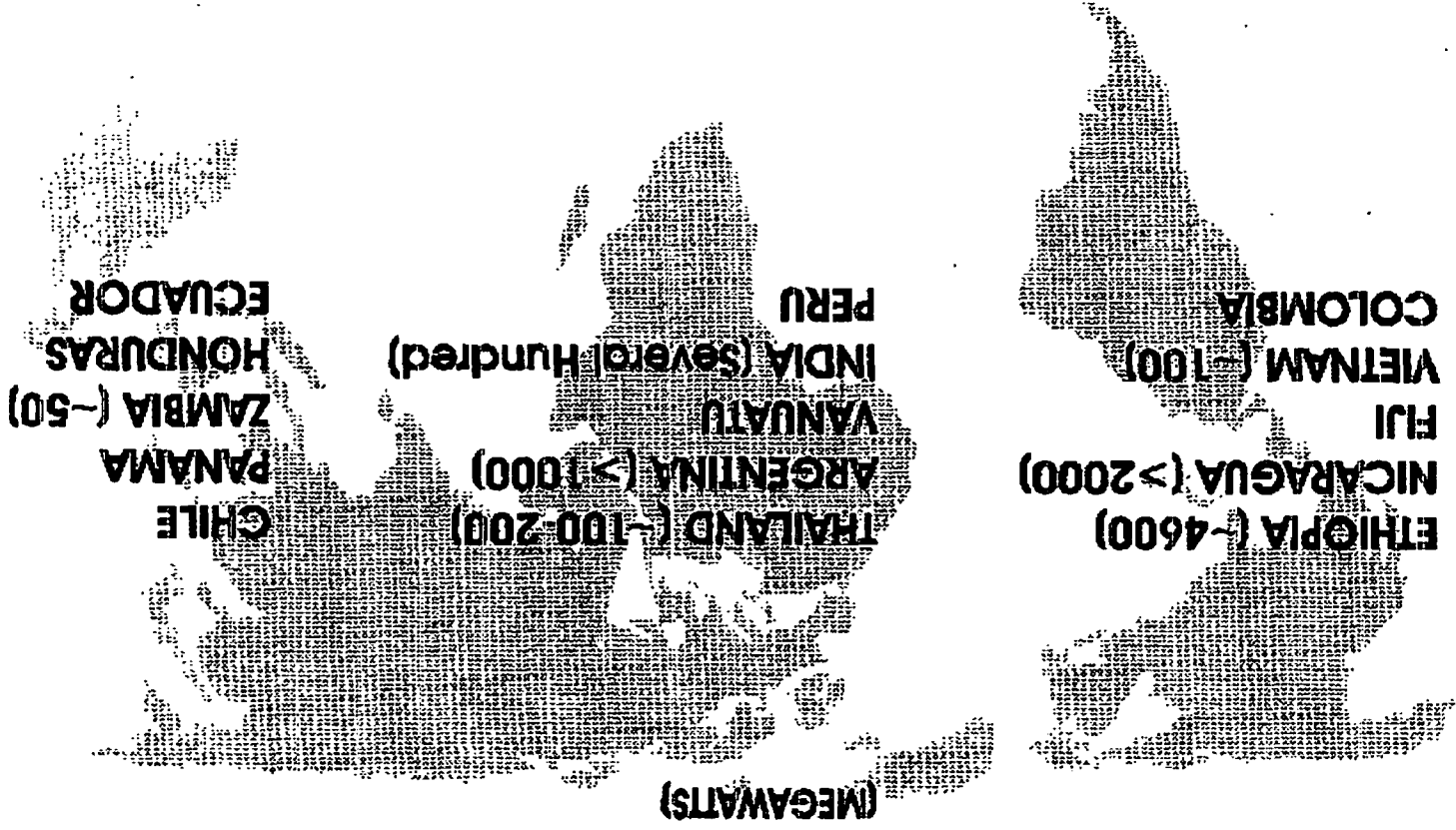
* Advanced Planning For Construction by 90%

DEVELOPING COUNTRIES PLANNING GEOTHERMAL PROJECTS IN THE 1990'S

(MEGAWATTS)



DEVELOPING COUNTRIES WITH ONGOING INTEREST IN GEOTHERMAL POWER



OTHER COUNTRIES WITH MAJOR GEOTHERMAL POWER POTENTIAL

(MEGAWATTS)

CAMEROON
SOLOMON ISLANDS
TONGA
ST. VINCENT

PAPUA NEW GUINEA

ZAIRE (~650)

RWANDA (~50)

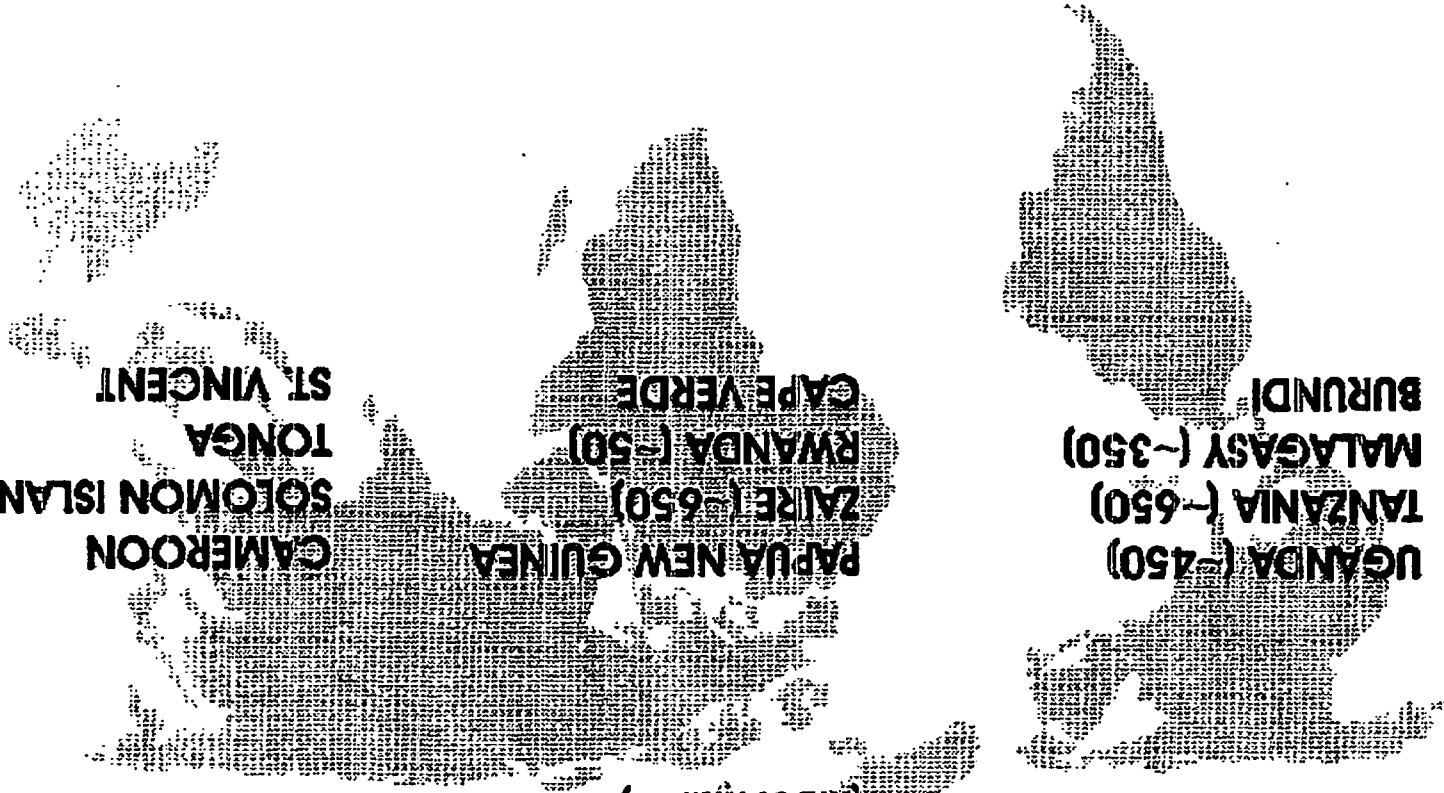
CAPE VERDE

UGANDA (~450)

TANZANIA (~650)

MALAGASY (~350)

BURUNDI



CONFERENCE SLIDES & TRANSPARENCIES

9601476

A. MAJOR PRIVATE POWER FINANCING ISSUES

Factors determining the financing structure and the types of investors:

1. Project Scale

- a. power plant > 50 MW
- b. power plant 5 - 50 MW
- c. industrial cogen 5 - 50 MW
- d. industrial cogen 1 - 5 MW
- e. small rural generators 0.05 - 50 kW

2. Project Complexity

- a. private power plant with direct sale to grid.
- b. private industrial cogen with surplus sale to grid.
- c. private industrial cogen or small power plant for captive demand only.
- d. rural decentralized generator dedicated to load.

WHERE TO FIND IT?

\$11.0m Hard Debt U.S. Bank OPIC/Exim

\$ 2.5m Local Bank Debt or Syndicator

\$ 1.5m Local Equity Project "Sponsor"

\$ 2.0m Local Equity Foreign Bank Swap

\$ 1.0m Hard Equity

- Supplier or

- Developer or

- IFC/AID/Funds

o Project \$18m

o Needs

25% Equity

75% Debt

\$12.0m Hard

\$ 6.0m Local

(Actual "Cost" - \$15m)

- o \$11.0m Hard Debt
- o \$2.5m Local Debt
- o \$3.5m Local Equity
- o \$1.0m Hard Equity

HOW TO MOBILIZE?

Turkish BOT Power Project Milestones

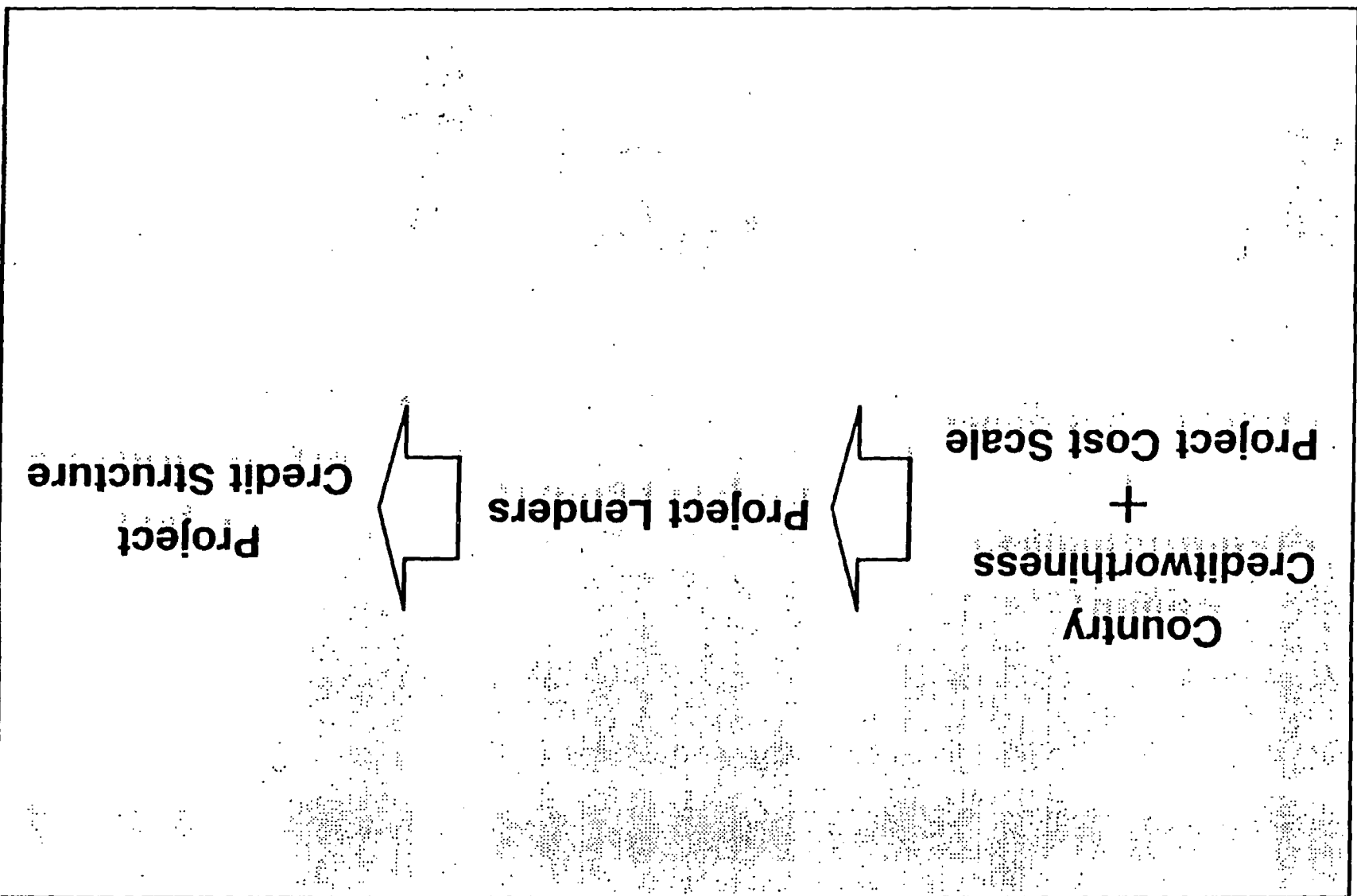
Chart 1

Project Month	Date	Milestone
0	September 1984	GOT prefeasibility study request
3	December	USTDP commits study funding
7	April 1985	Prefeasibility study submitted
12	September	Bechtel commercial proposal
27	January 1987	GOT/USXM agree credit structure
30	March	GOT calls for BOT tenders
35	September	GOT announces negotiation award
46	August 1988	GOT announces financing mandate
57(?)	July 1989(?)	Financial close
111(?)	January 1994(?)	Full commercial operation

(9.25 years)

Credit Structure Determinants

Chart 2



Basic BOT Risk-Reward Principles

Chart 6

- Accommodate lender security requirements
- Project company takes controllable risks
- Government covers remaining risks
- Each functional contract assigns responsibility/compensation/penalties
- Inducements for upside performance
- Upside compensation balances downside penalties

INSTITUTO COSTARRICENSE DE ELECTRICIDAD

**"Status of Costa Rica's Indigenous
Energy Development"**

**By: Manuel F. Corrales C.
Vice Manager for Institutional
Planning and Development**

Present before the RESTIE Conference

Santa Clara - California; June 20th, 1989

All these power generation projects have been accompanied with transmission line and substation additions as well as with new distribution facilities.

TOTAL COSTA RICA 72 859

I.C.E. Several plants DIESEL 7 1

II. Isolated Power Systems.

TOTAL, NATIONAL POWER SYSTEM 65 858

Subtotal, Other Utilities 28 33

C.N.F.L. Others
Several plants HYDRO 19 14
Small plants 9 19

Subtotal ICE power plants 37 825

I.C.E.	P.H. Corobicí	HYDRO	3	174
I.C.E.	P.H. Arenal	HYDRO	3	157
I.C.E.	P.H. Río Macho	HYDRO	5	120
I.C.E.	P.H. Cachí	HYDRO	3	101
I.C.E.	P.H. La Garita	HYDRO	4	130
I.C.E.	Colima	DIESEL	6	20
I.C.E.	San Antonio	STEAM & GAS	4	48
I.C.E.	Barranca	GAS	2	41
I.C.E.	Moin	DIESEL	4	32
I.C.E.	Small plants	HYDRO	5	2

I. National Interconnected System.

UTILITY	PLANT DENOMINATION	TYPE	No. of UNITS	INSTALLED CAPACITY (MW)
---------	--------------------	------	--------------	-------------------------

GENERATING POWER PLANTS (DECEMBER, 1988)

TABLE 1

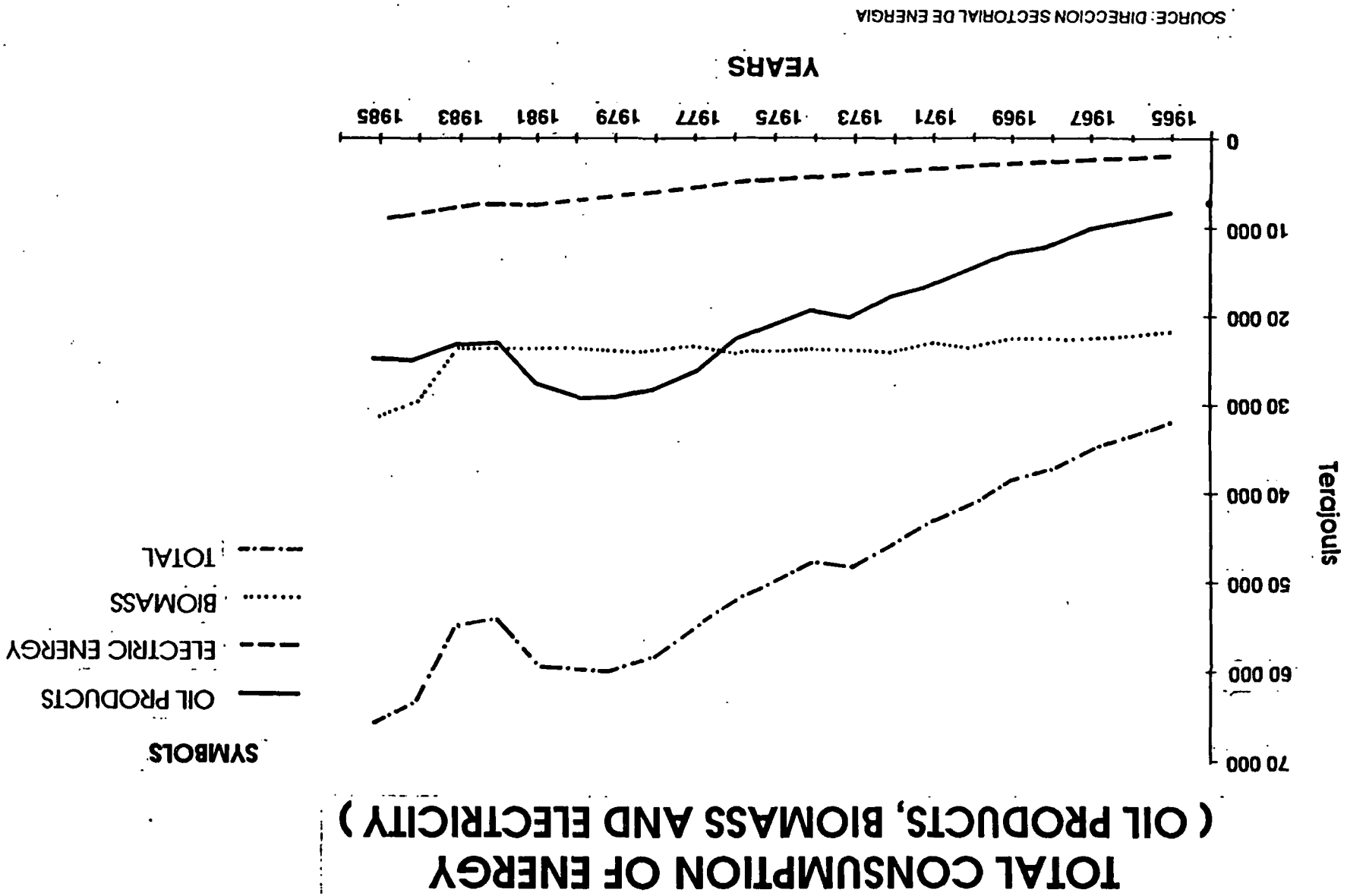
Costa Rica's most important plant nowadays is Arenal-Corobicí which went into service with a find installed capacity of 330 MW, and with a pluriannual reservoir of 1,800 millions of cubic meters of useful volume.

	ICE	OTHERS	COUNTRY
HYDRO-ELECTRIC POWER PLANTS	9	15	24
INSTALLED CAPACITY, MW	684	33	717
FIRM CAPACITY, MW	663	33	696
THERMO-ELECTRIC POWER PLANTS	5		5
INSTALLED CAPACITY, MW	141		141
DEPENDABLE CAPACITY, MW	70		70
ISOLATED THERMO-ELECTRIC SYSTEMS	1		1
INSTALLED CAPACITY, MW	1		1
TRANSMISSION SUBSTATIONS	81		81
INSTALLED CAPACITY, MVA	2800		2800
ISOLATED SYSTEMS' SUBSTATIONS	1		1
INSTALLED CAPACITY, MVA	1		1
TRANSMISSION LINES, KM	1338		1338
DISTRIBUTION SUBSTATIONS	28	32	60
INSTALLED CAPACITY, MVA	1323		1323
DISTRIBUTION SYSTEM, KM	9265	6175	15440
DISTRIBUT TRANSF. CAPACITY, MVA	571	980	1551
CUSTOMERS	239000	373000	612000
ELECTRIFICATION PERCENTAGE			88

THE COSTA RICAN ELECTRIC POWER SYSTEM
(1988 SUMMARY)

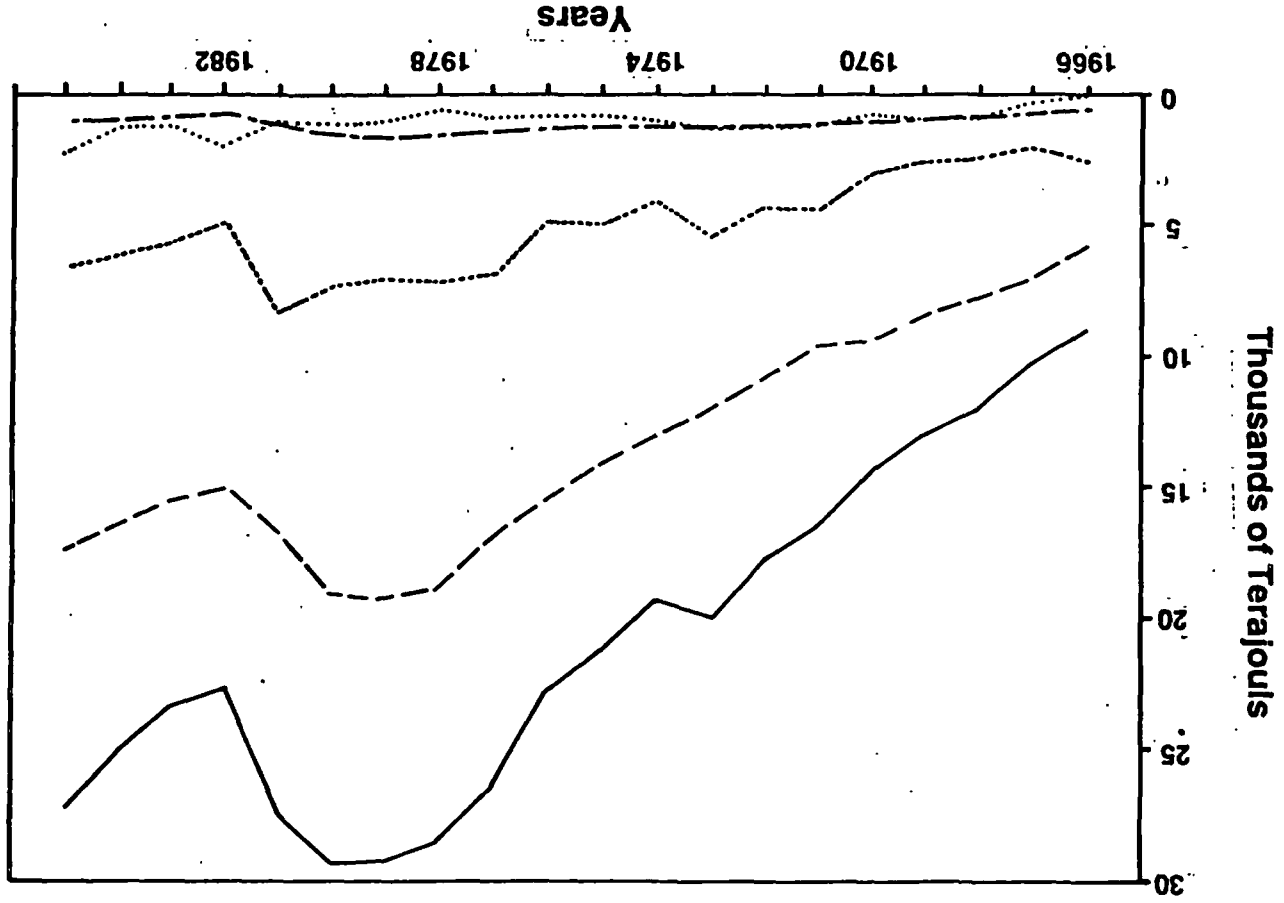
TABLE 2

FIG. 1



CONSUMPTION OF OIL PRODUCTS PER SECTOR

- SYMBOLS**
- TOTAL
 - - - TRANSPORT
 - · · · · AGRINDUSTRIAL
 - - - RESIDENTIAL - COMMERCIAL
 - · · · · OTHERS



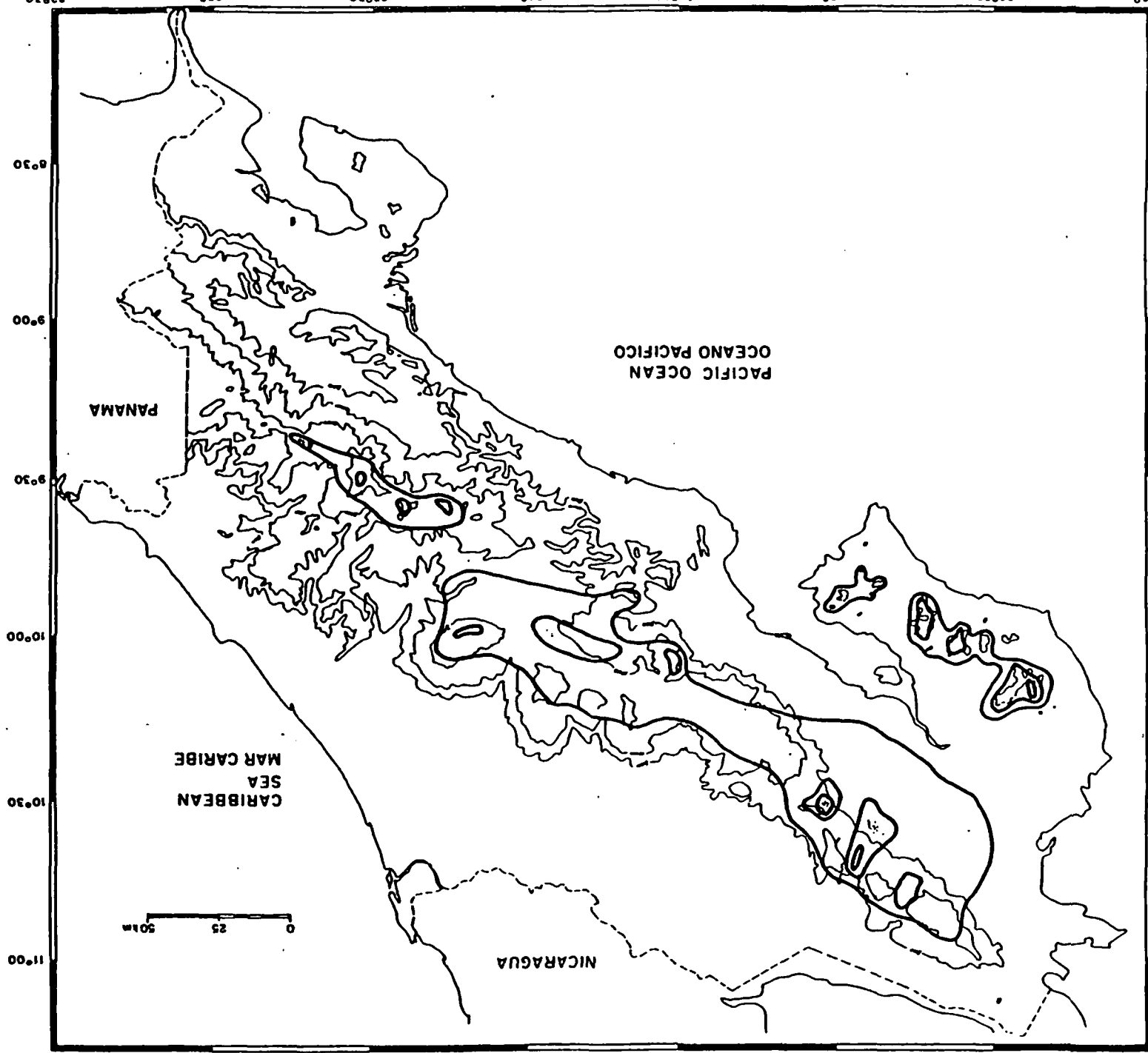
SOURCE: D.S.E., SERIE HISTORICA DE BALANES ENERGETICOS NACIONALES

FIG. 2

FIG. 3

WIND ENERGY MAP
OF COSTA RICA
MAPA DE LA ENERGIA
EOLICA DE COSTA RICA

Zone	Energy flux (Wm ⁻²)	Wind velocity (m sec ⁻¹)
1	≥ 470	≥ 7
2	171 - 470	5 - 7
3	37 - 171	3 - 5
4	0 - 37	0 - 3



SOLAR RADIATION MAP OF COSTA RICA

MAPA DE LA ENERGIA SOLAR DE COSTA RICA

Zone	Mean daily radiation	Mean annual radiation	Zone	Mean annual radiation	Mean daily radiation
	cal cm ² d	J cm ² d		cm ² h	W m ²
Zone	radiation	Radiation	Zone	radiation	de radiacion
Intensidad	radiation	Radiacion	Intensidad	radiacion	de radiacion
promedio	anual	promedio	promedio	anual	promedio
promedio	promedio	promedio	promedio	promedio	promedio
1	< 350	< 1465	1	< 170	< 170
2	350-400	1465-1675	2	1485-1700	170-192
3	400-450	1675-1885	3	1700-1910	192-218
4	> 450	> 1885	4	> 1910	> 218

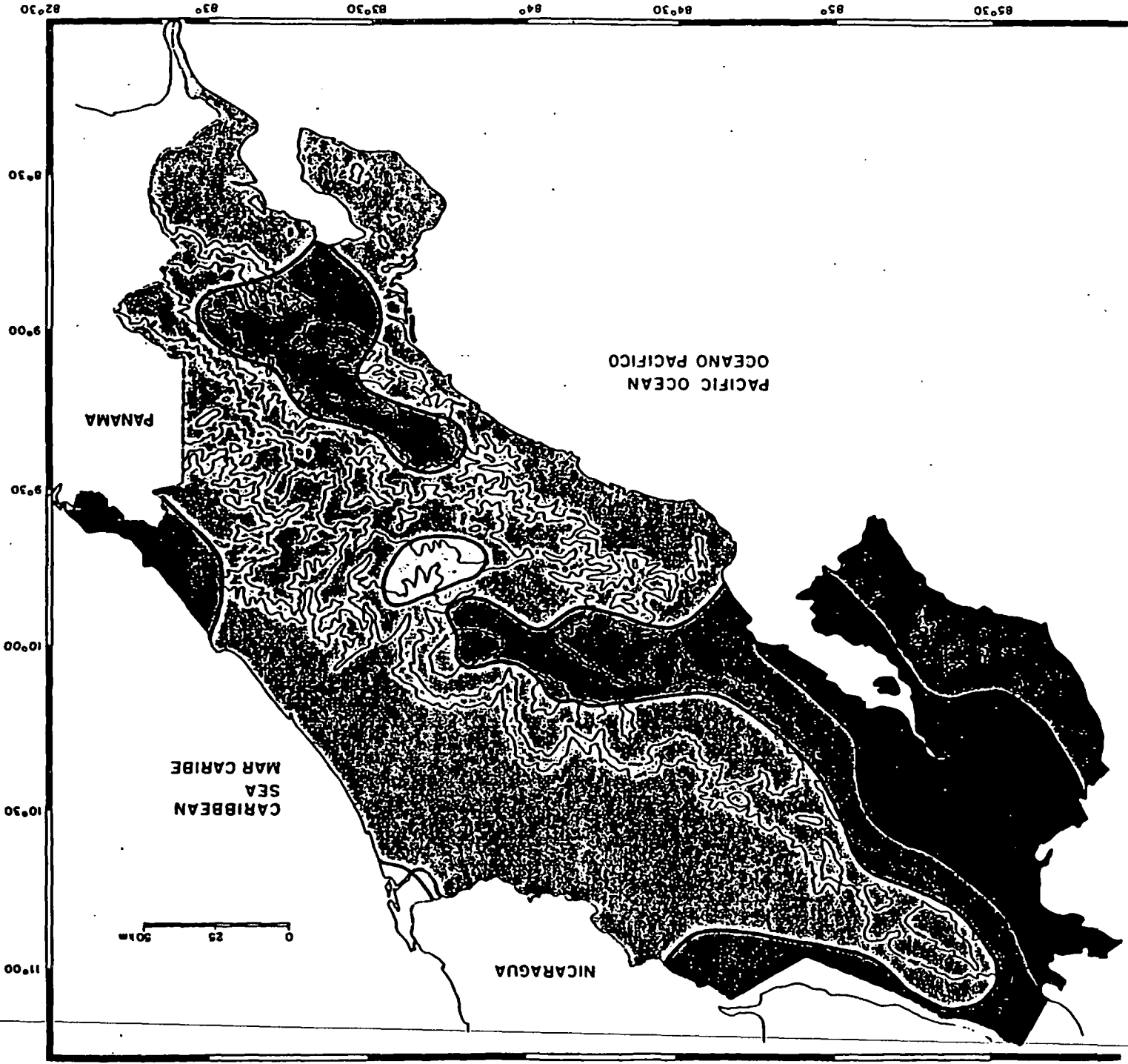
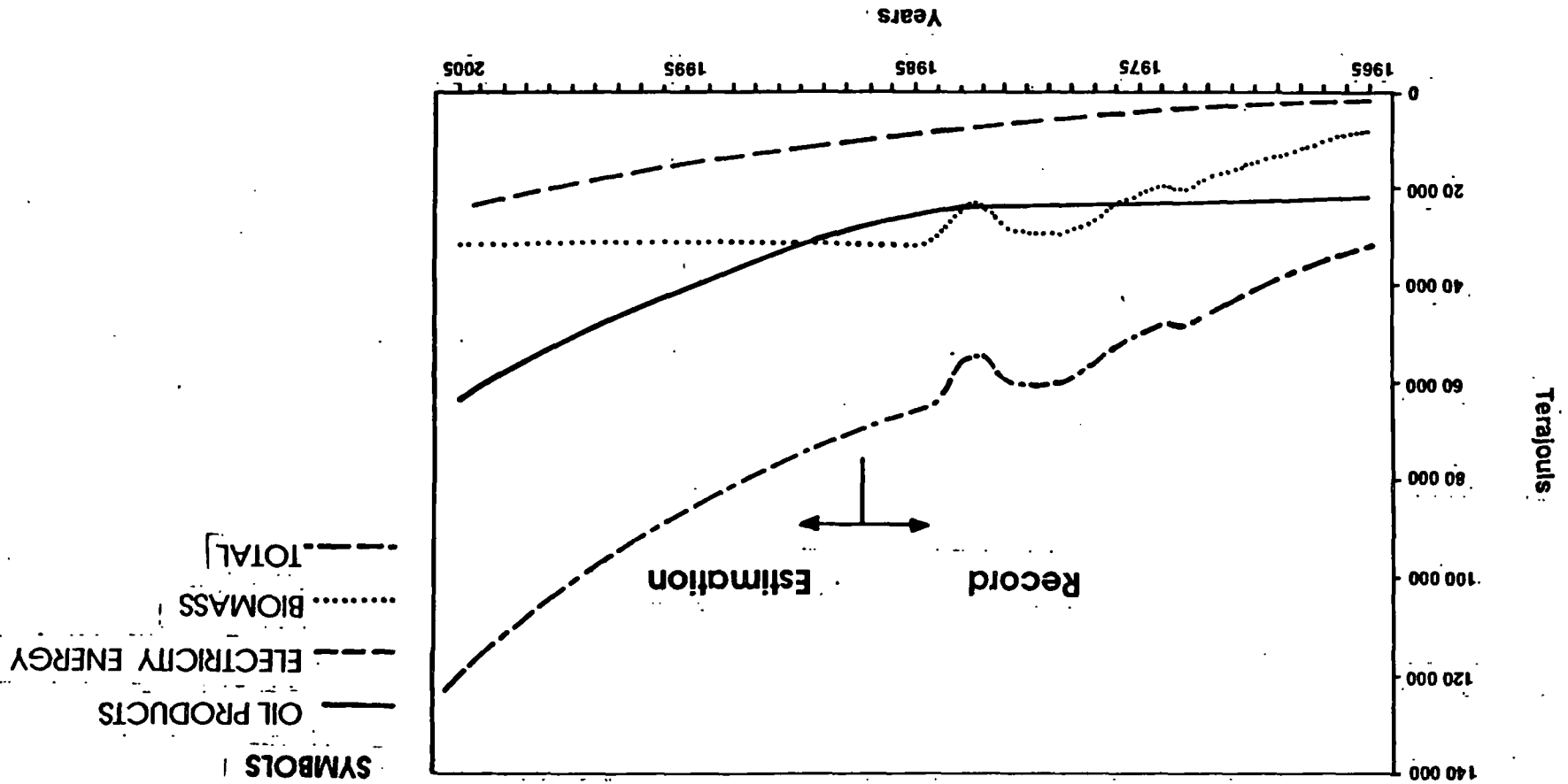


FIG. 4

**COSTA RICA: ANNUAL TOTAL ENERGY CONSUMPTION
1965-2005**

OIL PRODUCTS, BIOMASS AND ELECTRICITY



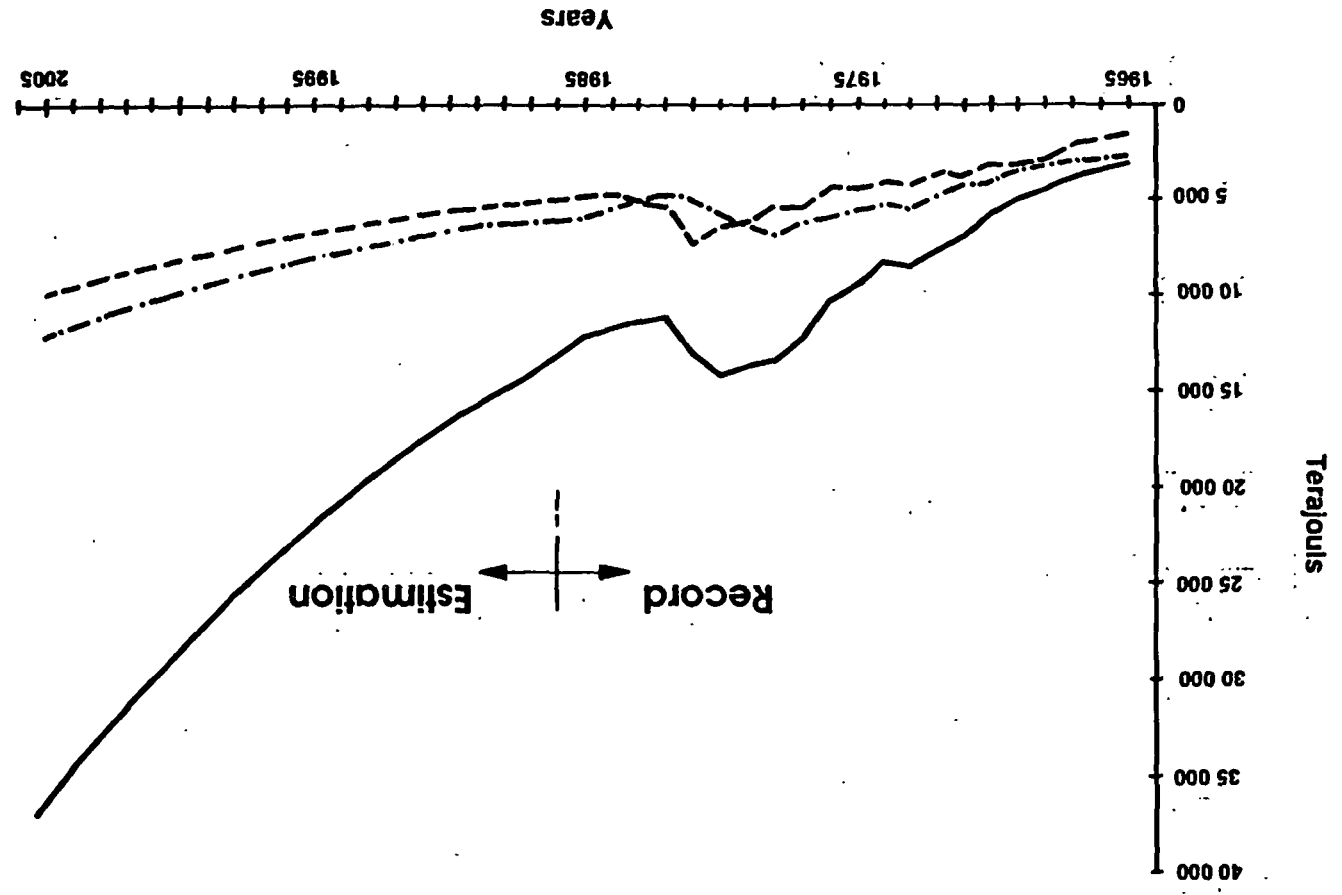
SOURCE: DIRECCION SECTORIAL DE ENERGIA

FIG. 5

COSTA RICA: ANNUAL OIL CONSUMPTION 1965-2005

OIL, FUEL OIL AND GASOLINE

- SYMBOLS**
- DIESEL OIL
 - - - FUEL OIL
 - · - · GASOLINE



SOURCE: DIRECCION SECTORIAL DE ENERGIA

FIG. 6

ICES ORGANIZATION STRUCTURE

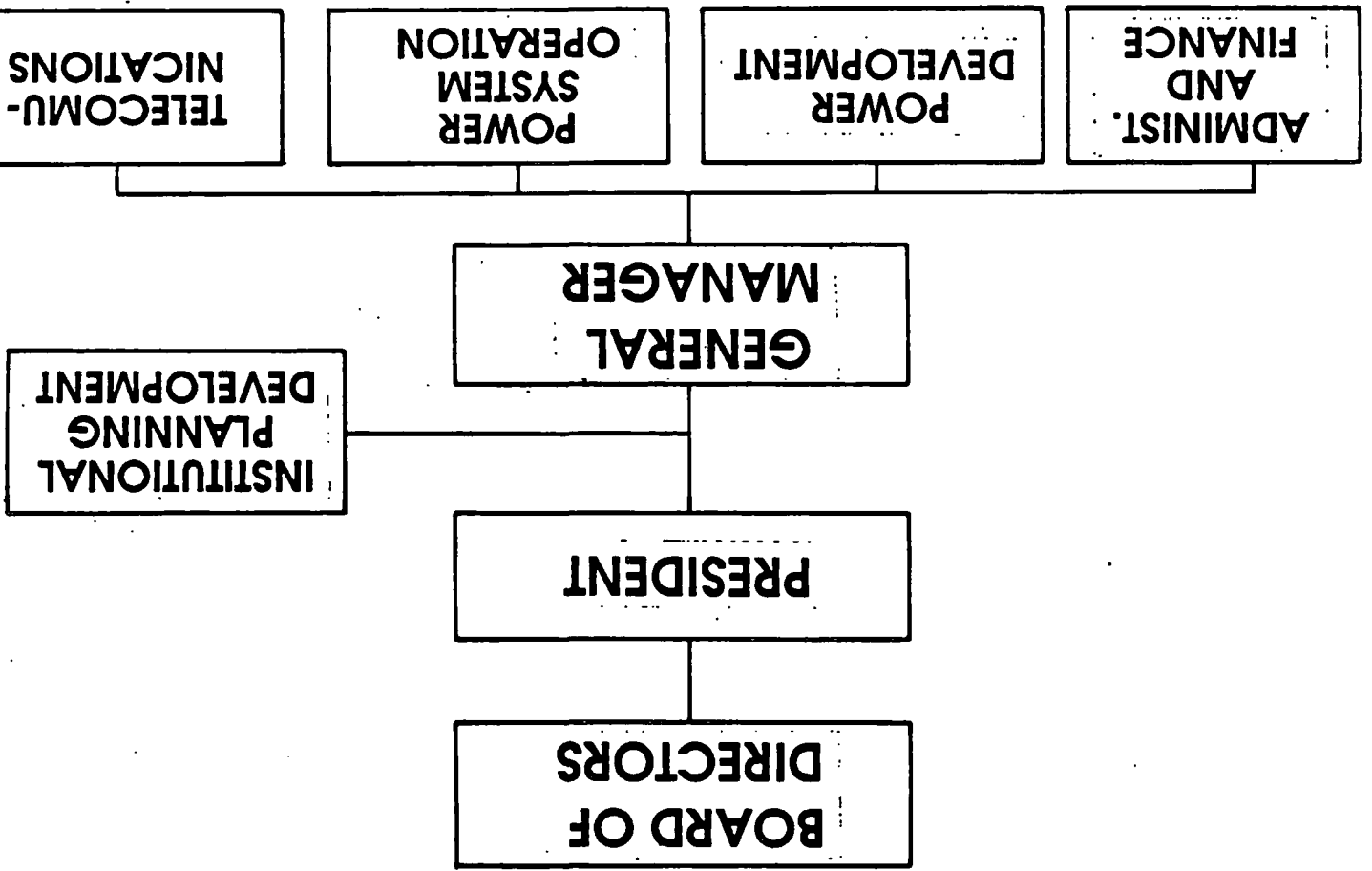




FIG. 8

TRANSMISSION LINES' GROWTH

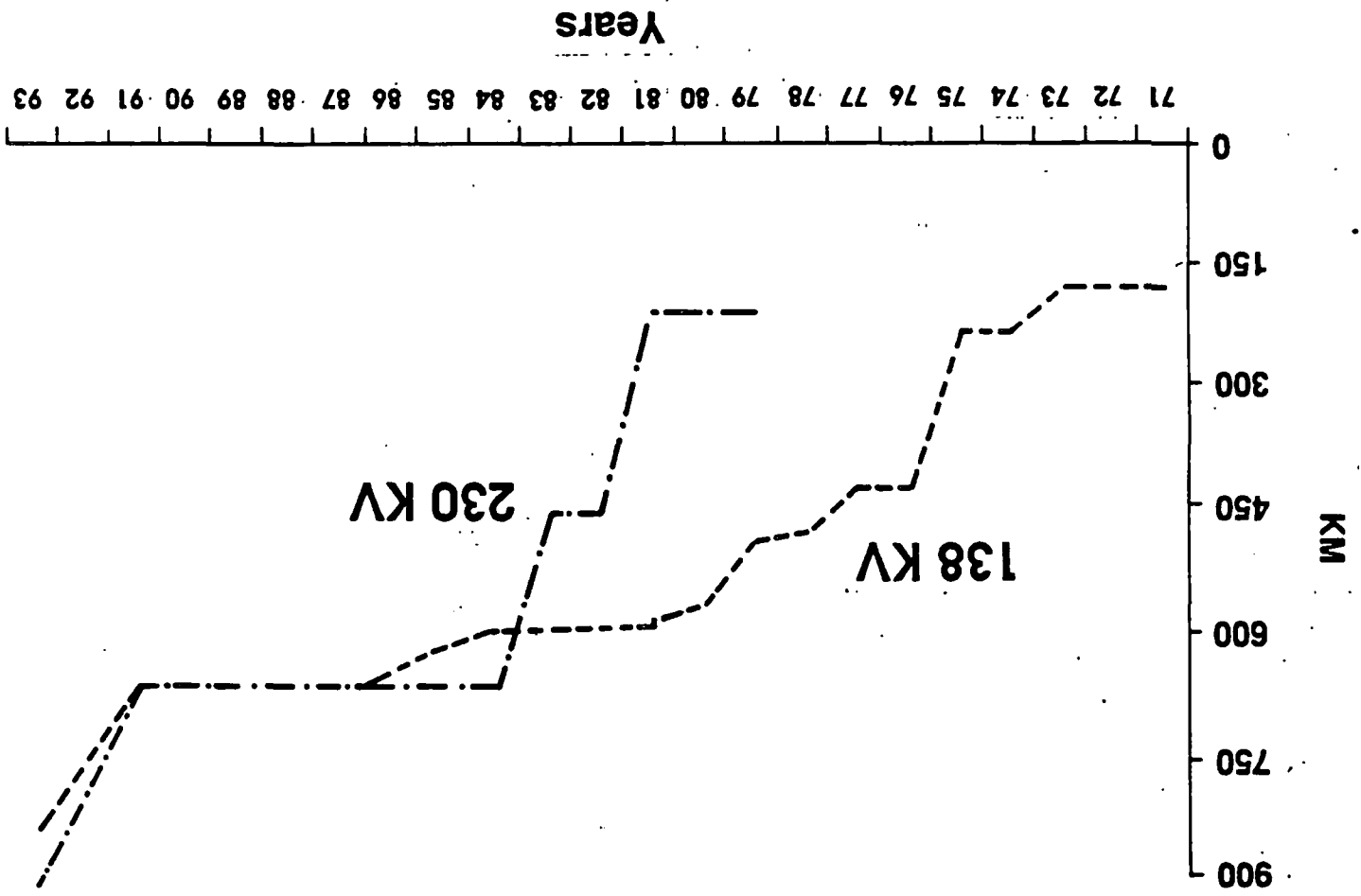
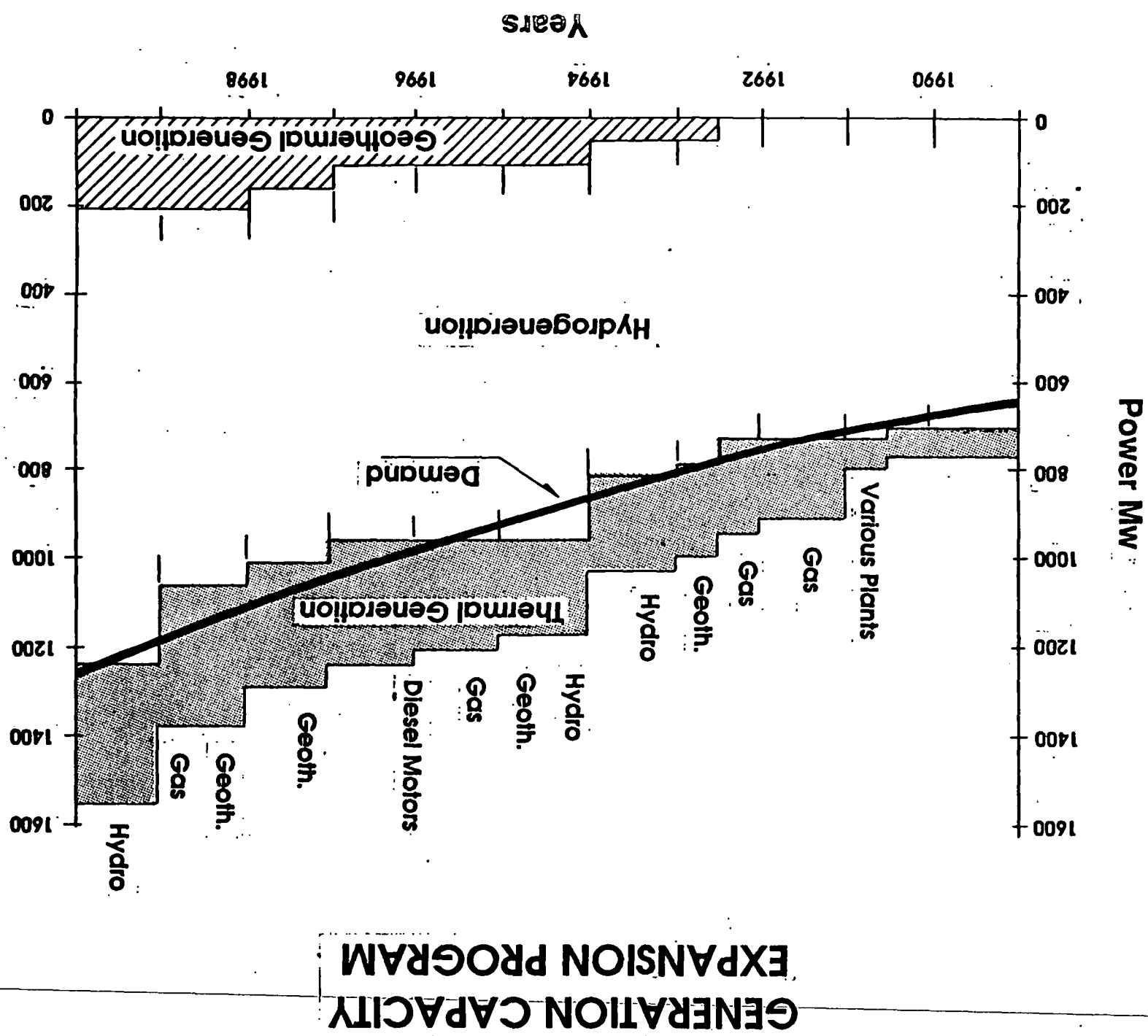
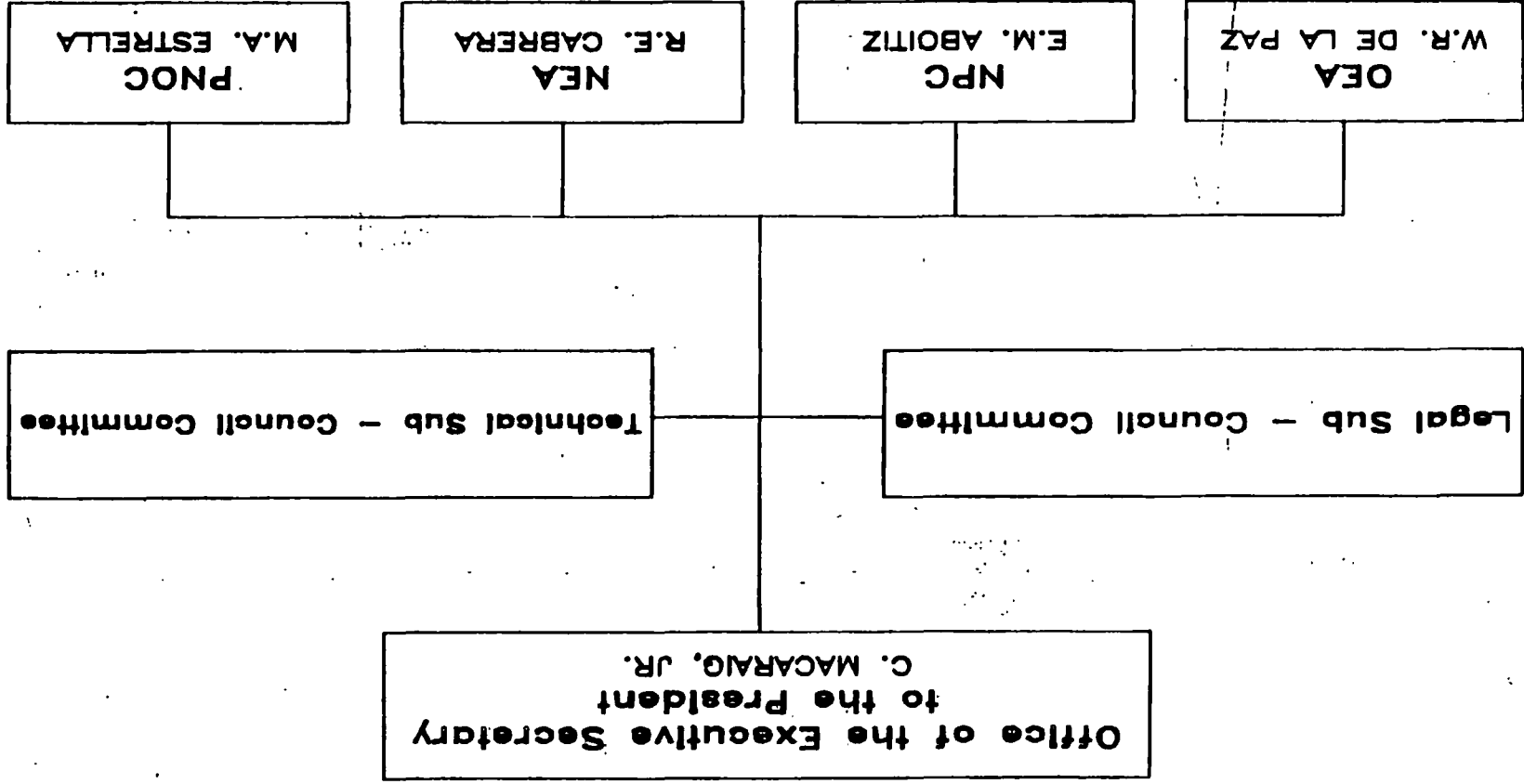


FIG. 10



**OFFICE OF THE PRESIDENT
ENERGY COORDINATING COUNCIL**



BRIEF HISTORICAL PERSPECTIVE

COMMONWEALTH ACT 120 (1936)

Creation of NPC as a non-stock corporation with resp. for hydro power development.

R.A. 2641 (1960)

Conversion to stock corporation with capitalization of P 100 M.

R.A. 6395 (1971)

Responsibility for development of power from all sources of energy and extension of corporate life to year 2036.

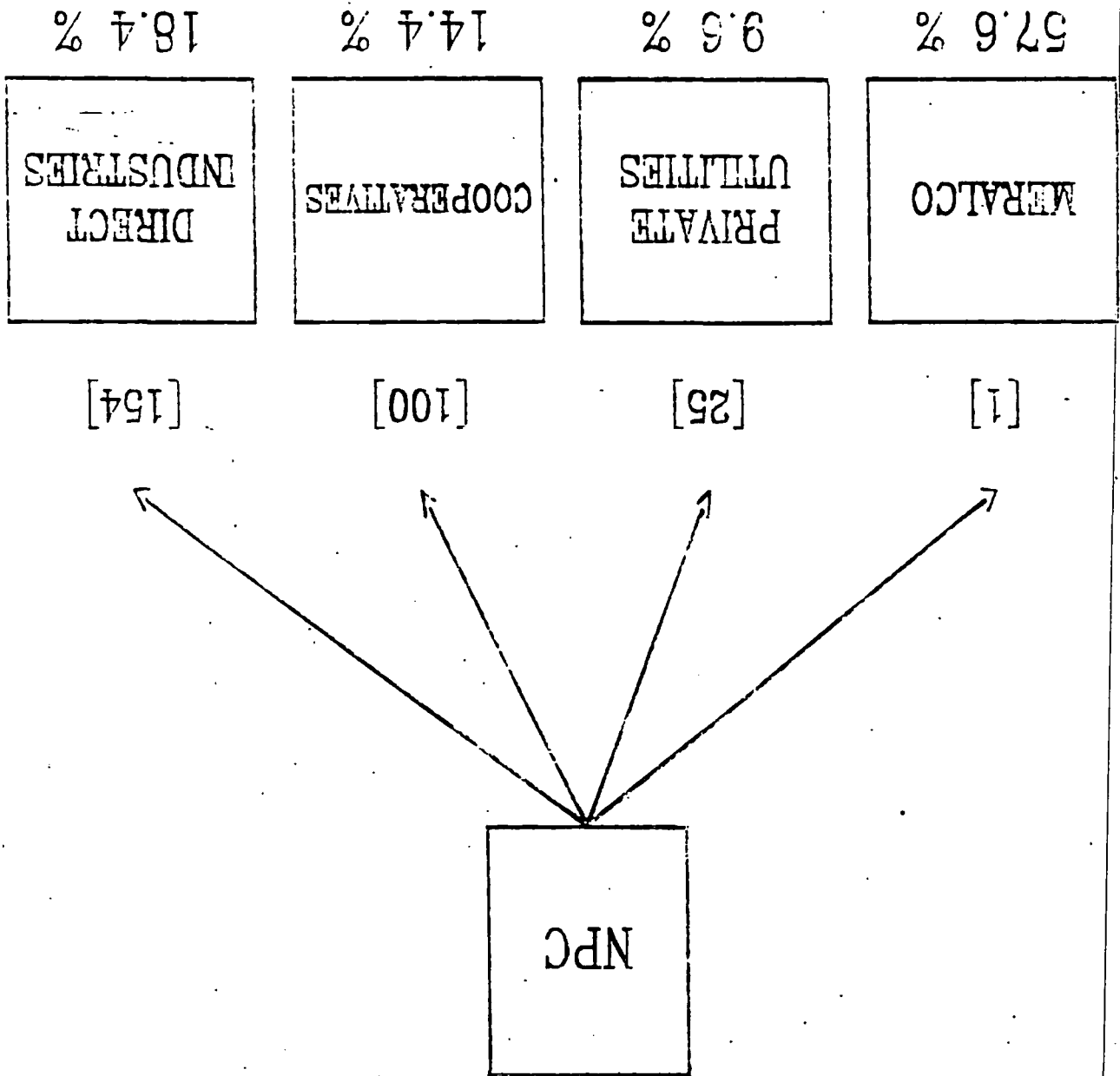
P.D. 40 (1972)

NPC to own and operate a single integrated system for all generation facilities in areas embraced by grids — set-up by NPC.

E.O. 215 (1987)

Amended P.D. 40 allowing private sector generation of power while continuing to mandate NPC for the rational development of the country's power grid.

1988 NPC SALES DISTRIBUTION



[No. of Customers]

016 case no 001

* ACCELERATE TECHNOLOGY TRANSFER

* SPUR COMPETITION TO LOWER PRICE

* TRANSFER CONSTRUCTION RISKS

* INCREASE INDUSTRY EFFICIENCY

* FREE UTILITY REVENUES
FOR OTHER PURPOSES

* WIDEN CAPITAL BASE

POWER GENERATION IS NOT A NATURAL MONOPOLY;
POWER TRANSMISSION AND DISTRIBUTION ARE
NATURAL MONOPOLIES

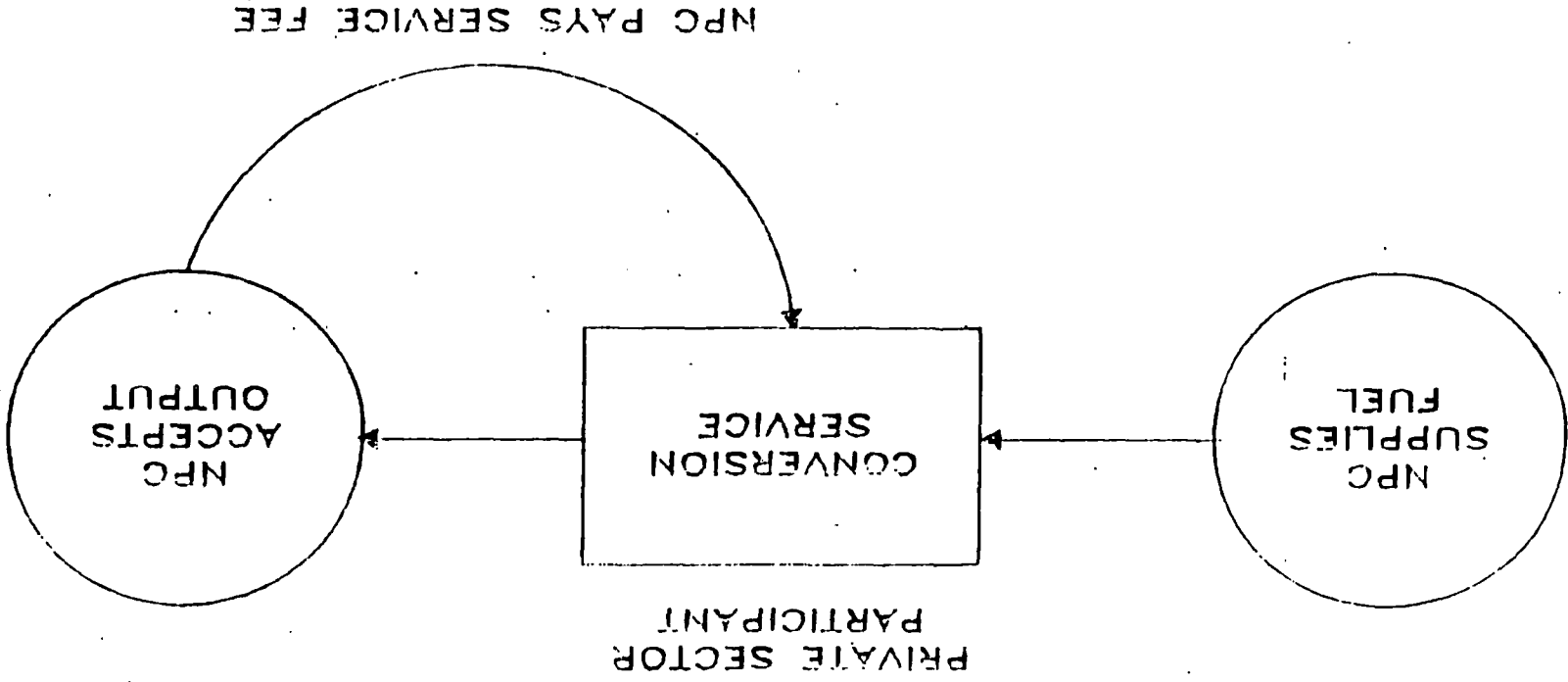
WHY PRIVATE GENERATION ?

DIESEL GENERATING SETS
GEOTHERMAL RESOURCES

- o
- o

PRIOR EXPERIENCES

DIESEL GENERATING SETS

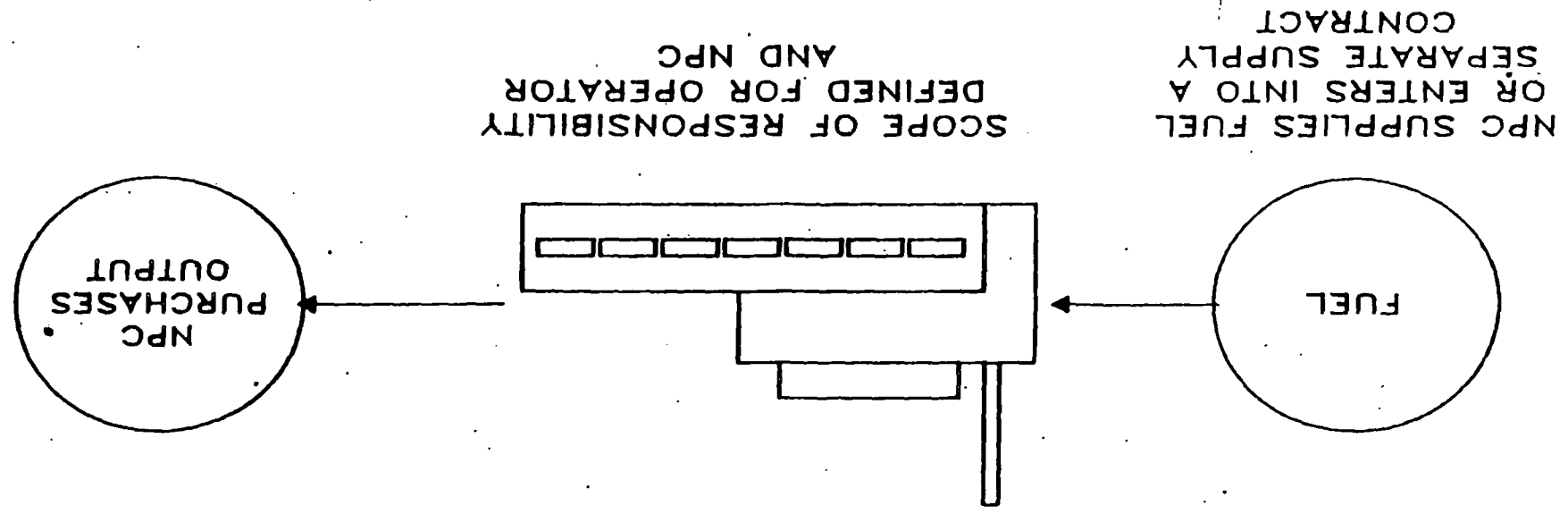


GEOHERMAL DEVELOPMENT

COMPANIES	:	NATIONAL POWER CORPORATION (NPC) PHILIPPINE GEOTHERMAL, INC. (PGI)
LOCATION	:	TIWI AND MAKILING - BANAHAW IN LUZON
CAPACITY	:	330 - MW FOR EACH SITE
RESOURCE	:	55/45 (NPC/PGI) SHARING
POWER PLANT	:	100% NPC
PAYMENT TERMS	:	○ COST RECOVERY FEE ○ SERVICE FEE ○ INFLATION IS RECOGNIZED
CONTRACT DURATION	:	25 YEARS (RENEWABLE FOR ANOTHER 25 YEARS)

**GAS TURBINE PLANT
(BUILD-OPERATE-TRANSFER SCHEME)**

	:	
HOPEWELL ENERGY, LTD. (HEL)	:	COMPANY
4 x 50 MW	:	PLANT CAPACITY
NPC	:	CONCEPT
<ul style="list-style-type: none"> o PROVIDES SITE AND OTHER INFRASTRUCTURES o SUPPLIES FUEL REQUIREMENT o HEL DESIGNS, FINANCES, CONSTRUCTS, OPERATES AND MAINTAINS FACILITIES 	:	
12 YEARS (AT THE END OWNERSHIP TRANSFERS TO NPC)	:	COOPERATION PERIOD
DISPATCHABLE	:	PLANT OPERATION
<ul style="list-style-type: none"> o FOREX REPATRIATION OF PROFITS o PERFORMANCE UNDERTAKING FROM GOP 	:	GUARANTEES
CAPACITY PAYMENTS	:	PAYMENT TERMS
<ul style="list-style-type: none"> - Fixed Cost/Profit - Performance-based 	:	
ENERGY PAYMENTS	:	
<ul style="list-style-type: none"> - Actual Generation - Heat Rate Guarantees 	:	
<ul style="list-style-type: none"> o FIVE-YEARS AFTER COMPLETION-DATE CHANGES IN "RULES-OF-THE-GAME" o FORCE MEASURE 	:	BUYOUT
<ul style="list-style-type: none"> o PROVIDED FOR DELAYS IN COMPLETION o CAPTURED THROUGH PAYMENT TERMS 	:	PENALTIES



COAL-FIRED PLANT

IMPROVEMENT AREAS

○ LEGAL/POLICY FRAMEWORK

○ INCENTIVES

○ GUARANTEES

○ OWNERSHIP

○ DEBT-EQUITY STRUCTURE

○ LICENSES/APPROVALS

○ PRICING

○ AVOIDED COST/METHODOLOGY/BASES

○ AND ASSUMPTIONS

○ FIRM/AS-AVAILABLE/DISPATCHABLE

○ SMALL/LARGE-SCALE PROJECTS

○ SYSTEMS AND PROCEDURES

○ MILESTONE SCHEDULE

○ EVALUATION METHODOLOGY (NON-PRICE FACTORS)

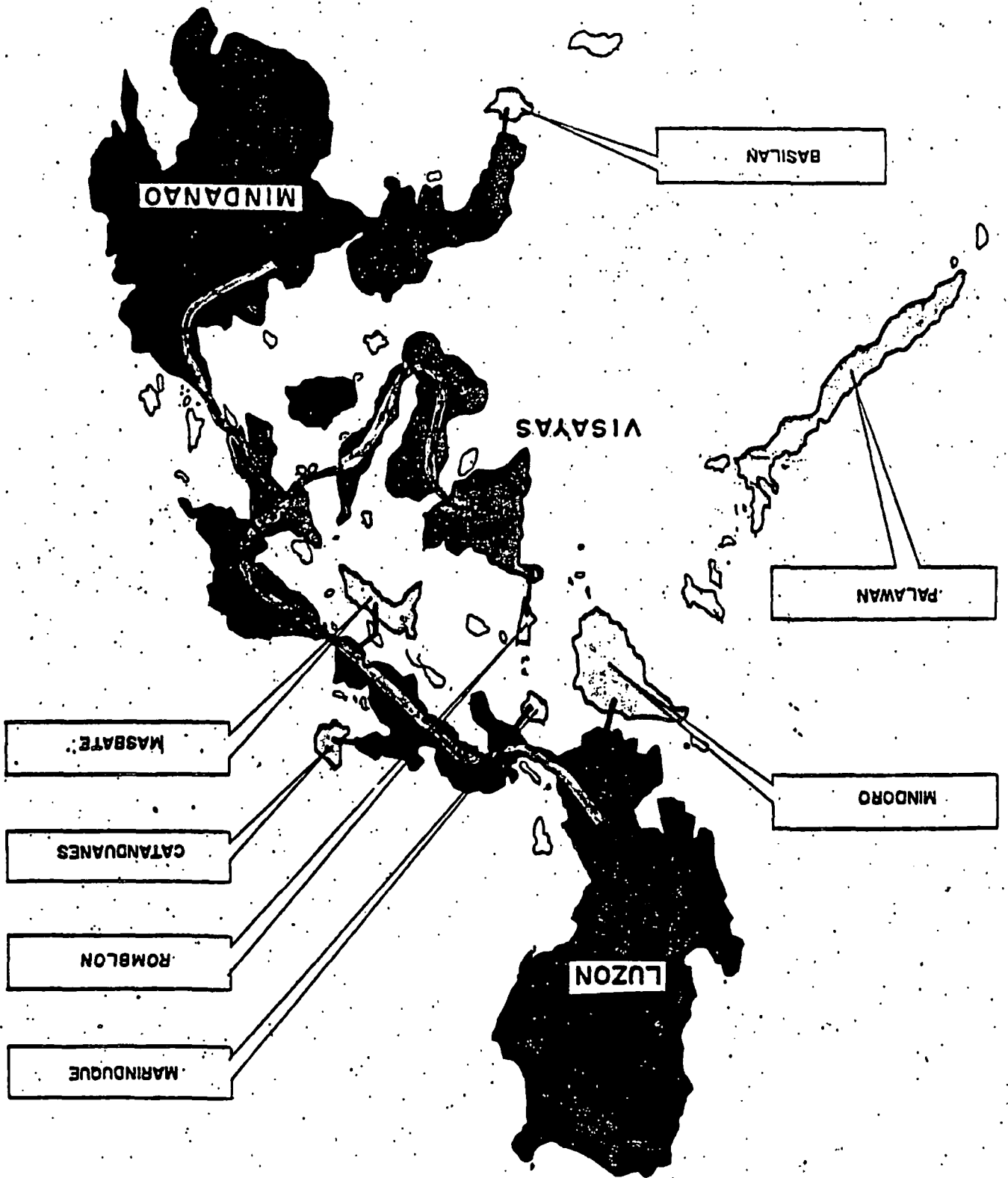
○ SOLICITATION PROCESS

○ SMALL/LARGE-SCALE PROJECTS

LIST OF COMPANIES WHICH SUBMITTED
PREQUALIFICATION DOCUMENTS FOR THE
300-MW COAL THERMAL POWER PROJECT
ON A BOT/BOO BASIS

1. ASEA BROWN BOVERI
2. AUSTPOWER PTY LTD.
3. BECHTEL CORPORATION
4. C. ITOH AND CO., LTD.
5. DANISH POWER CONSULT
6. GALAXY HOFFMANN POWER ENG. LTD.
7. HOWELL HOLDINGS LTD.
8. K & M ENG. & CONSULTING CORP.
9. LEIGHTON - HOCHTIEF
10. MARUBENI CORPORATION
11. MITSUBISHI CORPORATION
12. MITSUI & CO., LTD.
13. SUMITOMO CORPORATION

PROPOSED ISLANDS TO BE INTERCONNECTED TO NATIONAL POWER CORPORATION



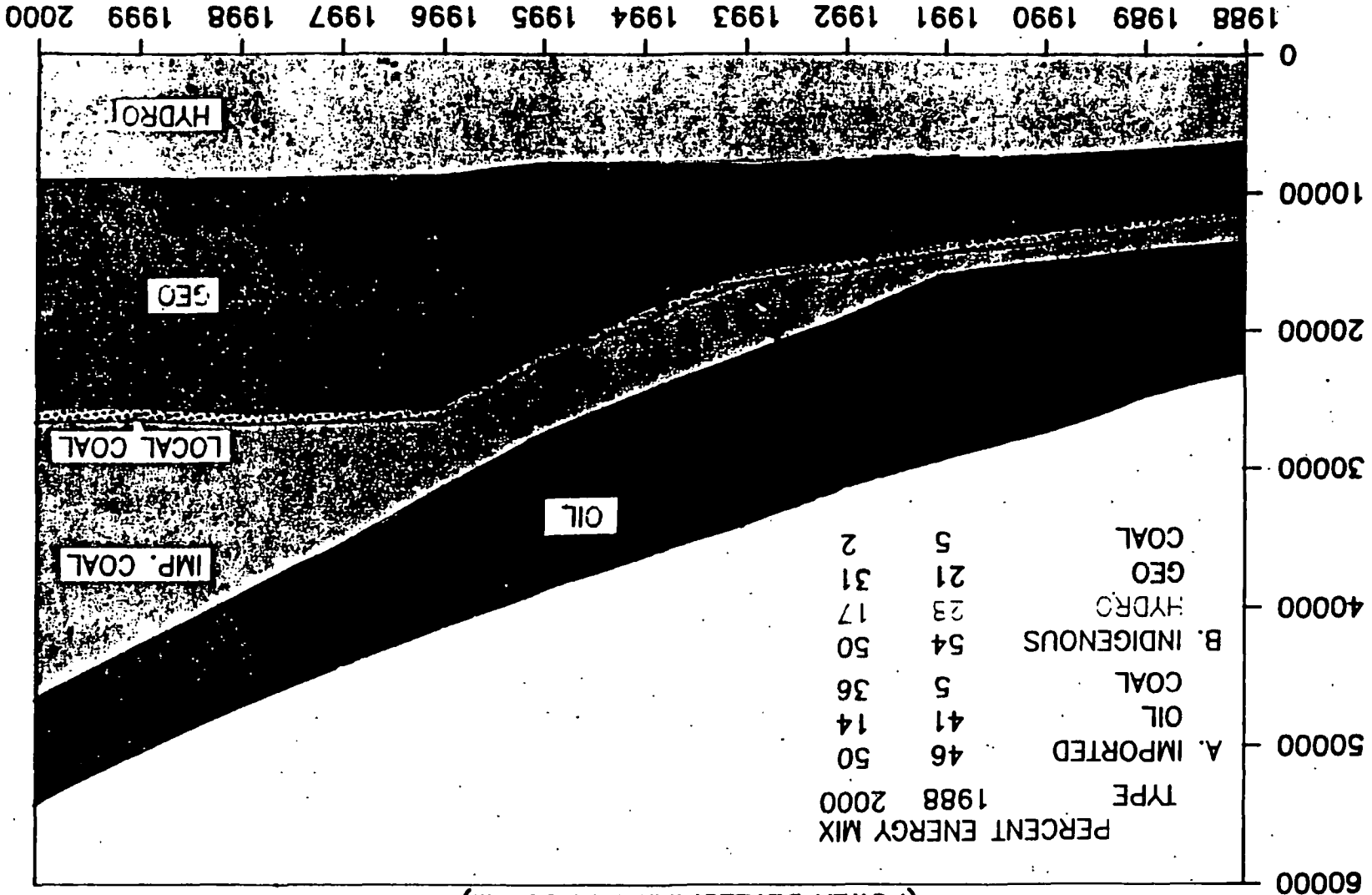
LEGEND :
MAJOR GRID INTERCONNECTION (National Grid)
ISLAND INTERCONNECTION

HIGHLIGHTS OF OPERATION (1988)

	TOTAL ASSETS	GENERATION	SALES	POPULATION (MILLION)	PER CAPITA SALES (KWHR)
<u>PHILIPPINES</u>	P 134 B (100%)	22,944 GWH	21,176 GWH	59	359
<u>LUZON</u>	81%	76%	76%	54%	502
<u>MECO</u>	—	—	58%	20%	1017
<u>PROVINCIAL</u>	—	—	18%	34%	194
<u>VISAYAS</u>	8%	8%	8%	23%	127
<u>MINDANAO</u>	11%	16%	16%	23%	266
<u>SMALL ISLANDS</u>	—	~ 0.3%	~ 0.3%	~ 5%	~ 24

PHILIPPINES

ENERGY GENERATION MIX, GWH
(POWER DEVELOPMENT PROGRAM)



ENERGY MIX
(In Million Barrels of Fuel Oil Equivalent, MMBF0E)

	1987*	1988**	1989	1990	1991	1992
I. CONVENTIONAL	38.16	38.07	41.25	37.78	45.16	39.65
INDIGENOUS ENERGY	22.83	22.77	25.10	22.99	28.40	24.93
OIL	1.75	1.75	1.59	1.46	1.91	1.68
COAL	4.27	4.26	4.74	4.34	6.57	5.77
HYDRO	9.00	8.98	10.34	9.47	11.80	10.36
GEOTHERMAL	7.81	7.79	8.43	7.72	8.12	7.13
II. NONCONVENTIONAL	15.33	15.29	16.15	14.79	16.76	14.71
BAGASSE	3.54	3.53	4.48	4.10	3.90	3.42
AGRIWASTE	11.23	11.20	11.04	10.11	12.04	10.57
OTHERS	0.56	0.56	0.63	0.58	0.82	0.72
IMPORTED ENERGY	62.09	61.93	67.93	62.22	68.74	60.35
OIL	59.58	59.43	64.02	58.64	66.50	58.39
COAL	2.51	2.50	3.91	3.58	2.24	1.97
TOTAL ENERGY	100.25	100.00	109.18	100.00	113.90	100.00
GROWTH RATE, % over previous year	36.79	36.70	42.47	38.90	42.93	37.69
OIL SHARE IN POWER USE, %	44.60	43.70	43.70	41.65	43.01	43.27
*Actual	**Full Year Based on Actual Jan. to Oct. 1988					
Volume Percent	Volume Percent	Volume Percent	Volume Percent	Volume Percent	Volume Percent	Volume Percent

45.67 61.78 44.43 56.78 42.11 50.98 39.65 45.16 37.78 41.25 38.07 38.16
32.47 43.92 30.76 39.31 28.00 33.90 24.93 28.40 22.99 25.10 22.77 22.83
7.54 10.20 6.61 4.45 4.00 4.84 1.68 1.91 1.46 1.59 1.75 1.75
6.17 8.35 6.10 7.80 6.11 7.40 5.77 6.57 4.34 4.74 4.26 4.27
9.83 13.30 10.16 12.99 10.46 12.66 10.36 11.80 9.47 10.34 8.98 9.00
8.92 12.07 7.88 10.07 7.43 9.00 7.13 8.12 7.72 8.43 7.79 7.81
13.20 17.86 13.67 17.47 14.11 17.08 14.71 16.76 14.79 16.15 15.29 15.33
3.08 4.17 3.18 4.06 3.29 3.98 3.42 3.90 4.10 4.48 3.53 3.54
9.40 12.72 9.76 12.48 10.10 12.22 10.57 12.04 10.11 11.04 11.20 11.23
0.72 0.97 0.73 0.93 0.73 0.88 0.72 0.82 0.58 0.63 0.56 0.56
54.33 73.48 55.57 71.03 57.89 70.07 60.35 68.74 62.22 67.93 61.93 62.09
49.41 66.83 53.13 67.91 55.95 67.73 58.39 66.50 58.64 64.02 59.43 59.58
4.92 6.65 2.44 3.12 1.93 2.34 1.97 2.24 3.58 3.91 2.50 2.51
100.00 135.26 100.00 127.81 100.00 121.05 100.00 113.90 100.00 109.18 100.00 100.25
5.83 5.58 6.28 4.32 4.32 4.32 4.32 4.32 4.32 4.32 4.32 4.32
39.89 39.04 39.04 39.04 38.92 47.11 38.92 38.90 42.47 38.90 36.70 36.79
37.53 43.27 43.01 43.27 43.01 43.27 43.01 43.27 43.01 43.27 43.01 43.27

COAL DEMAND TARGETS
(000 MT @ 10,000 BTU/LB)

1988	1,241	207	985	15	129	2,577
1989	1,030	394	1,051	14	131	2,620
1990	1,034	485	1,224	15	140	2,898
1991	1,041	605	1,441	16	149	3,252
1992	1,896	727	1,662	17	158	4,460

DOMESTIC COAL PRODUCTION TARGETS
(000 MT @ 10,000 BTU/LB)

1988*	640	230	183	246	1,299
1989	648	327	401	486	1,862
1990	720	293	502	582	2,097
1991	720	363	512	615	2,210
1992	720	402	602	641	2,365

* Full Year based on actual Jan. to Nov., 1988.

COAL DEMAND AND SUPPLY PROFILE
(000 MT @ 10,000 BTU/LB)

1988*	2,577	1,299	1,161	2,097	3,252
1989	2,620	1,862	758	2,097	2,898
1990	2,898	2,097	801	2,210	3,252
1991	3,252	2,210	1,042	2,210	3,252
1992	4,460	2,365	2,095	2,365	4,460

COAL DEMAND AND SUPPLY PROFILE
(MMBOE)

1988*	8.65	4.74	3.91	7.40	10.92
1989	8.81	6.57	2.74	7.40	10.92
1990	9.74	7.40	2.33	7.40	10.92
1991	10.92	7.80	3.12	7.80	10.92
1992	15.00	8.35	6.65	8.35	15.00

* Full Year based on actual Jan. to Oct., 1988.



JUNE 1988 GENERATION EXPANSION PROGRAM

YEAR	PLANT ADDITIONS	MW	PLANT ADDITIONS	MW	PLANT ADDITIONS	MW
1988	GAS TURBINE REHAB SUCAT 1	500	LETTE-SAMAR INTERCONNECTION 1/	-	AGUS I	80
1990	MAKBAN 7 GEO SMALL GEO REHAB SUCAT 4	55 40	JANOPOL HYDRO POWER BARGE 2 NEGROS-PANAY INTERCONNECTION	5 32	GAS TURBINE A (POWER BARGE 2)	150 (32)
1991	BAC-MAN I GEO GAS TURBINE	110 200	INTERCONNECTION	-	GAS TURBINE B	50
1992	CALACA II COAL BAC-MAN II GEO LUZON-MINDORO INTERCONNECTION	300 110	(POWER BARGE 2) PALIMPINON GEO 4 CEBU-NEGROS-PANAY INTERCONNECTION	(32) 37.5	POWER BARGE 2	32
1993	COAL III	300	2/	-	MT. APO GEO. 1&2	110
1994	LUZON GEO	330	PALIMPINON GEO 5	37.5	MT. APO GEO. 3	55
1995	TONGONAN GEO A HVDC-1 ± 350 KV	440	-	-	MT. APO GEO. 4	55
1996	TONGONAN GEO B HVDC-II ± 350 KV	440	PALIMPINON GEO 6	37.5	AGUS III	225
1997	COAL A	600	-	-	-	-
1998	COAL B	600	POWER BARGE 2 BOHOL DIESEL	32	(POWER BARGE 2)	(32)
1999	COAL C	600	-	5.5	COAL A	100
2000	COAL D	600	JALAUH HYDRO	24	COAL B	100

1/ National Electrification Administration Project
2/ Entry reset to 1992 due to uncertainties associated with non-NPC plants

NOTE: Parenthesis indicates pull out of Power Barge.

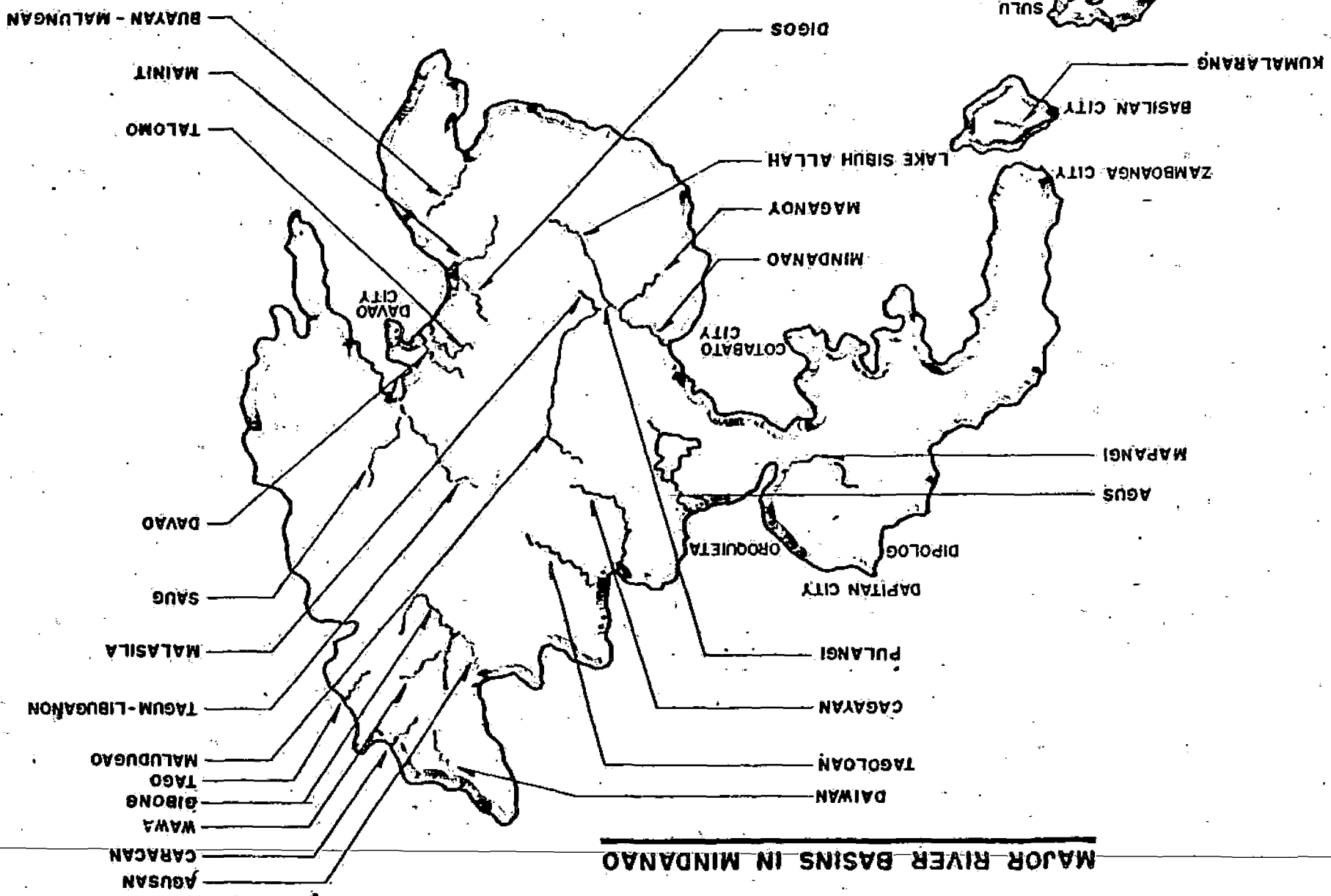
INDIGENOUS ENERGY SOURCES

- GEOTHERMAL

- HYDRO

- DOMESTIC GOAL

MAJOR RIVER BASINS IN MINDANAO



RIVER SYSTEM	NO. OF SITES	CAP. (MW)	ENERGY (GWH)
24	21	2239	9003

SUMMARY OF HYDRO POWER POTENTIAL IN MINDANAO

STATUS	NUMBER OF SITES	MM CAPACITY	%	GWH ENERGY	%	PROJECT FORECAST (PM)
EXISTING	7	895.6	29	4635.0	34	-
PRE-FEASIBILITY	20	1844.0	59	7116.2	52	112890.87
FEASIBILITY	2	315.0	10	1447.0	11	7621.30
DEFINITE DESIGN	1	80.0	3	440.0	3	-
TOTAL	30	3134.6	100	13638.2	100	120512.17
AVERAGE COST (\$/KW)						2563.05

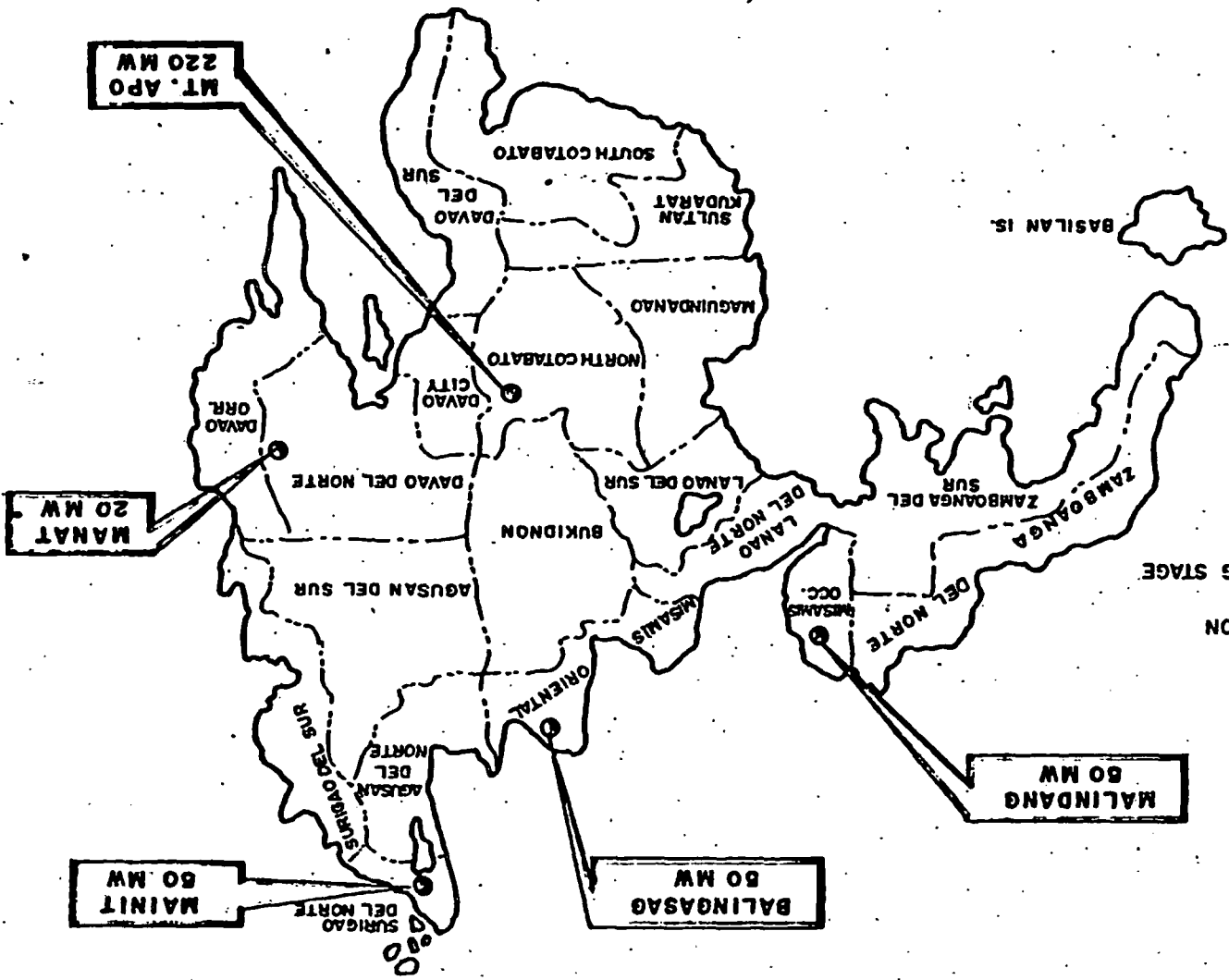
1 / Agus I On-going project in Mindanao.

SUM-POTM/v81
03 NOV 88

TAWI TAWI

SULU IS.

BASILAN IS.



LEGEND :

- ① EXPLORATORY WELL DRILLING STAGE
- ② UNDER SURFACE INVESTIGATION

NO. OF SITES	5
PROBABLE CAPACITY (MW)	390

GEOTHERMAL POTENTIALS IN MINDANAO

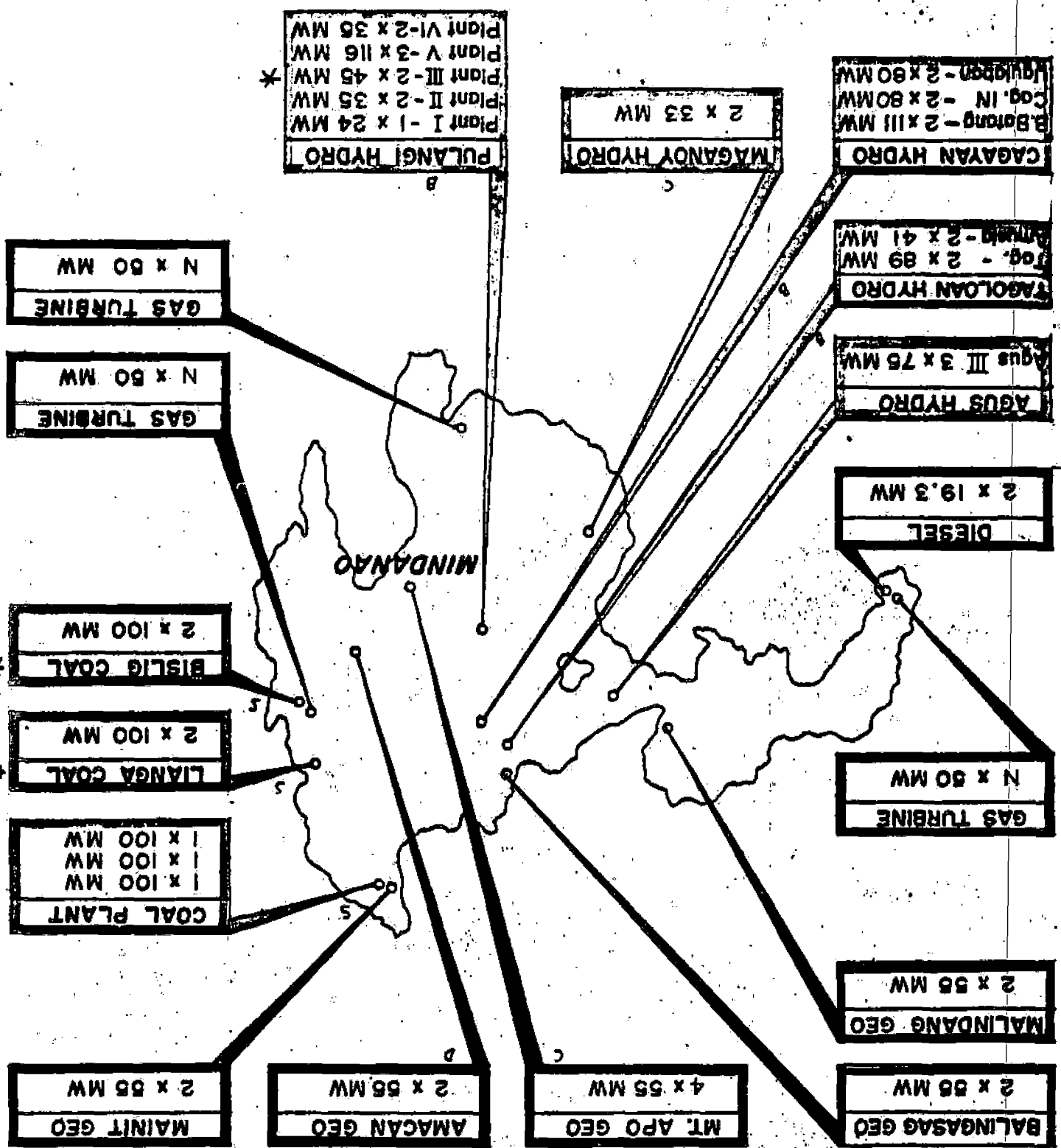
SUMMARY OF GEOTHERMAL POTENTIAL IN MINDANAO

PROJECT FORECAST (PM)	STATUS			NUMBER OF SITES	CAPACITY (MW)	CAPACITY (%)	ENERGY (%)	TYPICAL COST (\$/KW)	1200
	EXISTING	UNDER SURFACE INVESTIGATION	UNDER EXPLORATORY DRILLING						
-	-	-	-	-	-	-	-	-	-
4480	4	4	4	4	170	44	1117	44	4480
5526	1	1	1	1	220	56	1445	56	5526
-	-	-	-	-	-	-	-	-	-
10006	5	4	1	5	390	100	2562	100	10006
1200	TOTAL								
1200	AVERAGE COST (\$/KW)								
1200	TYPICAL COST (\$/KW)								

1/ Does not include sunk cost associated with the exploration of Mt. Apo geothermal fields.

GEO-SUMM/09
LPD-SPD/Jay
26 Oct 88

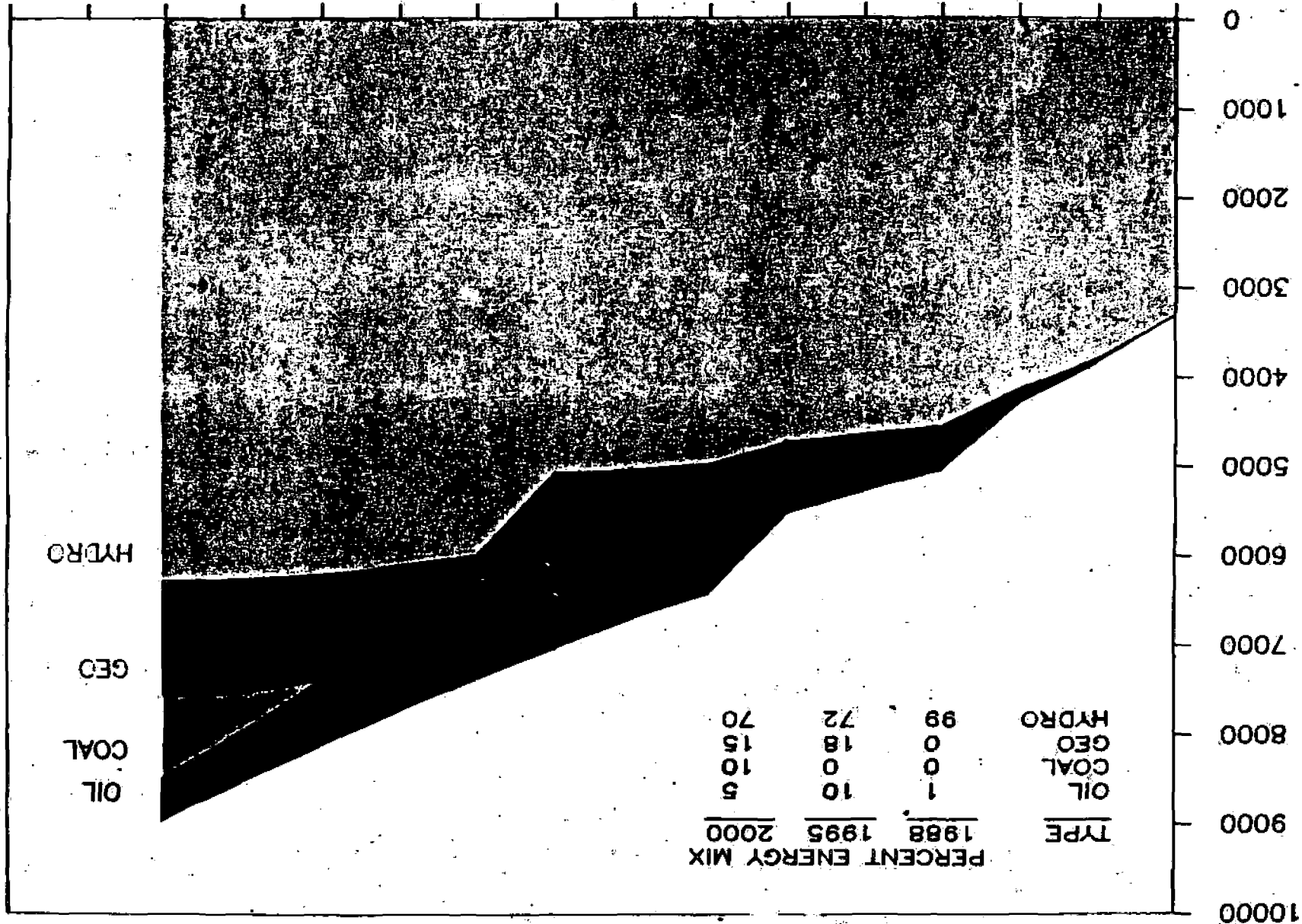
**GEOGRAPHICAL LOCATIONS OF
CANDIDATE GENERATION PROJECTS**



* WITH FEASIBILITY STUDIES

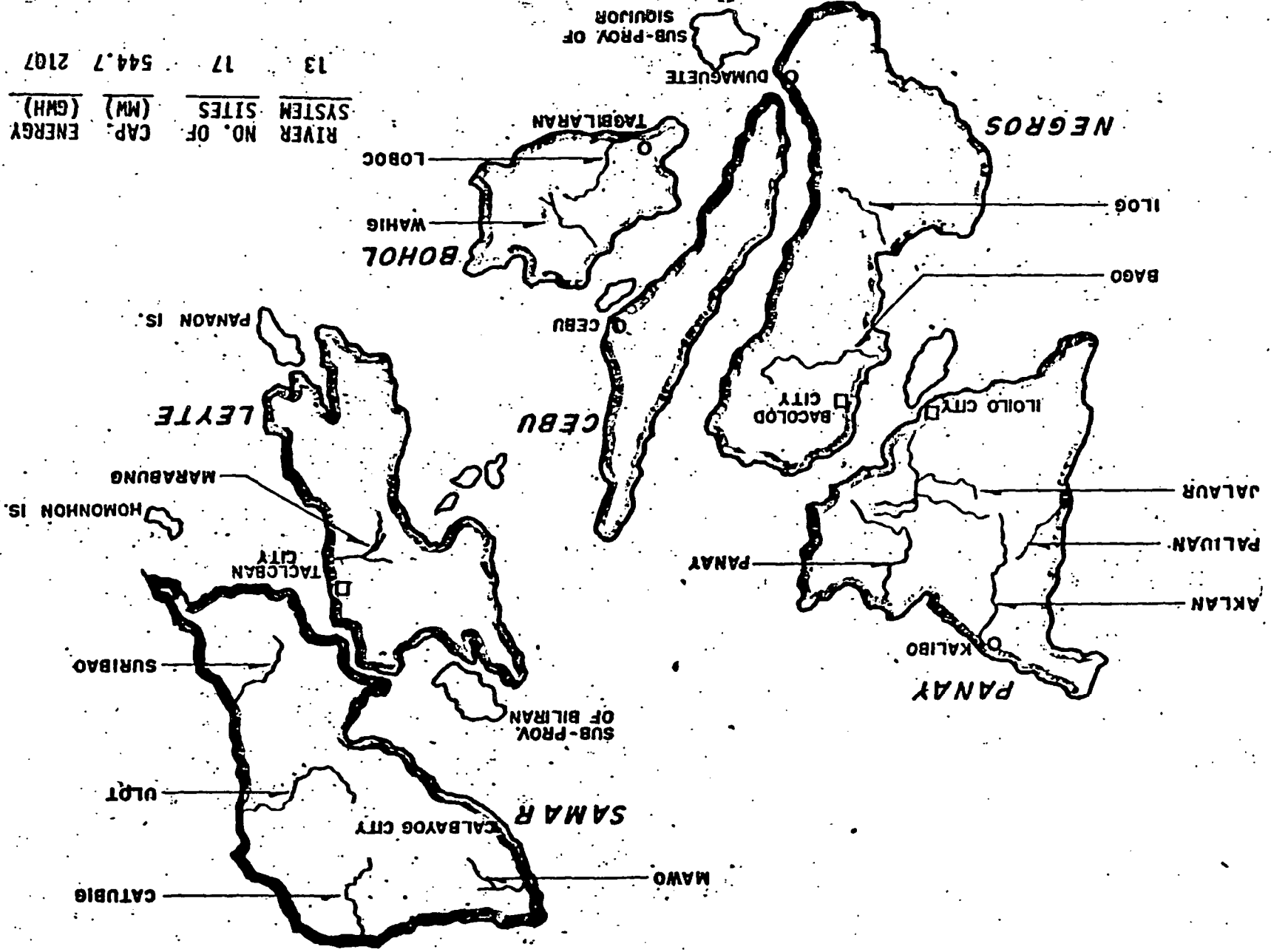
MINDANAO GRID

ENERGY GENERATION MIX, GWH



1987 88 89 90 91 92 93 94 95 96 97 98 99 2000

MAJOR RIVER BASINS IN VISAYAS

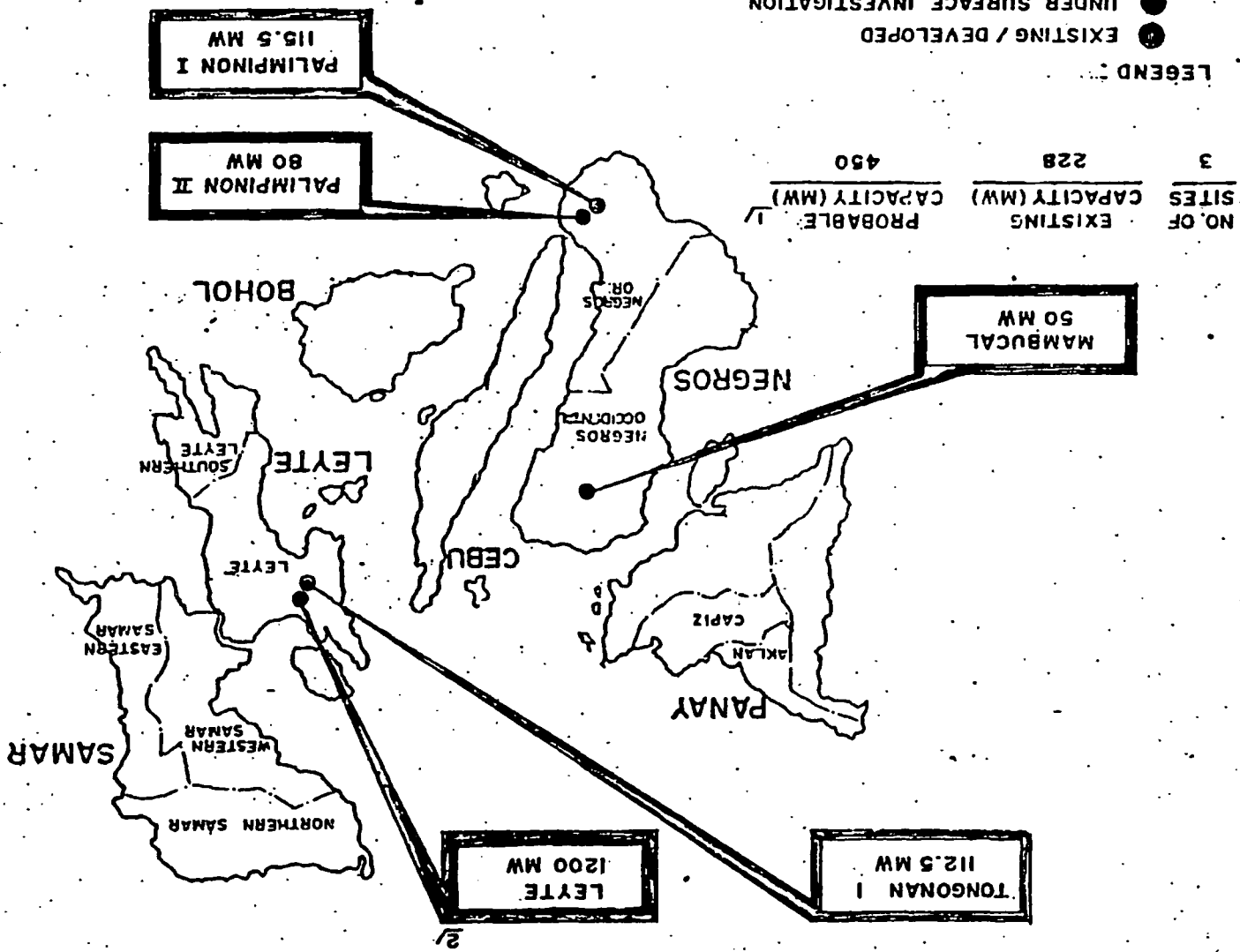


**SUMMARY OF HYDROPOWER POTENTIALS
VISAYAS GRIDS**

STATUS	NUMBER OF SITES	CAPACITY		ENERGY		PROJECT FORECAST (PM)
		MW	%	GWH	%	
EXISTING	2	2.00	0.37	14.45	0.68	—
PRE-FEASIBILITY	12	247.00	45.18	1182.70	55.75	6121.62
FEASIBILITY	5	297.70	54.45	924.30	43.57	5903.60
DEFINITE DESIGN	—	—	—	—	—	—
<u>TOTAL</u>	19	546.70	100.00	2121.45	100.00	12025.22
AVERAGE COST (\$/KW):						1051

file : hydsum-v/v101
veg_spd/rbd
07NOV88

GEOTHERMAL POTENTIALS IN VISAYAS



500 MW TO BE TAPPED VIA HVDC TO LUZON

IN ADDITION TO EXISTING GEOTHERMAL CAPACITY

PRODUCTION WELL DRILLING STAGE

EXPLORATORY WELL DRILLING STAGE

UNDER SURFACE INVESTIGATION

EXISTING / DEVELOPED

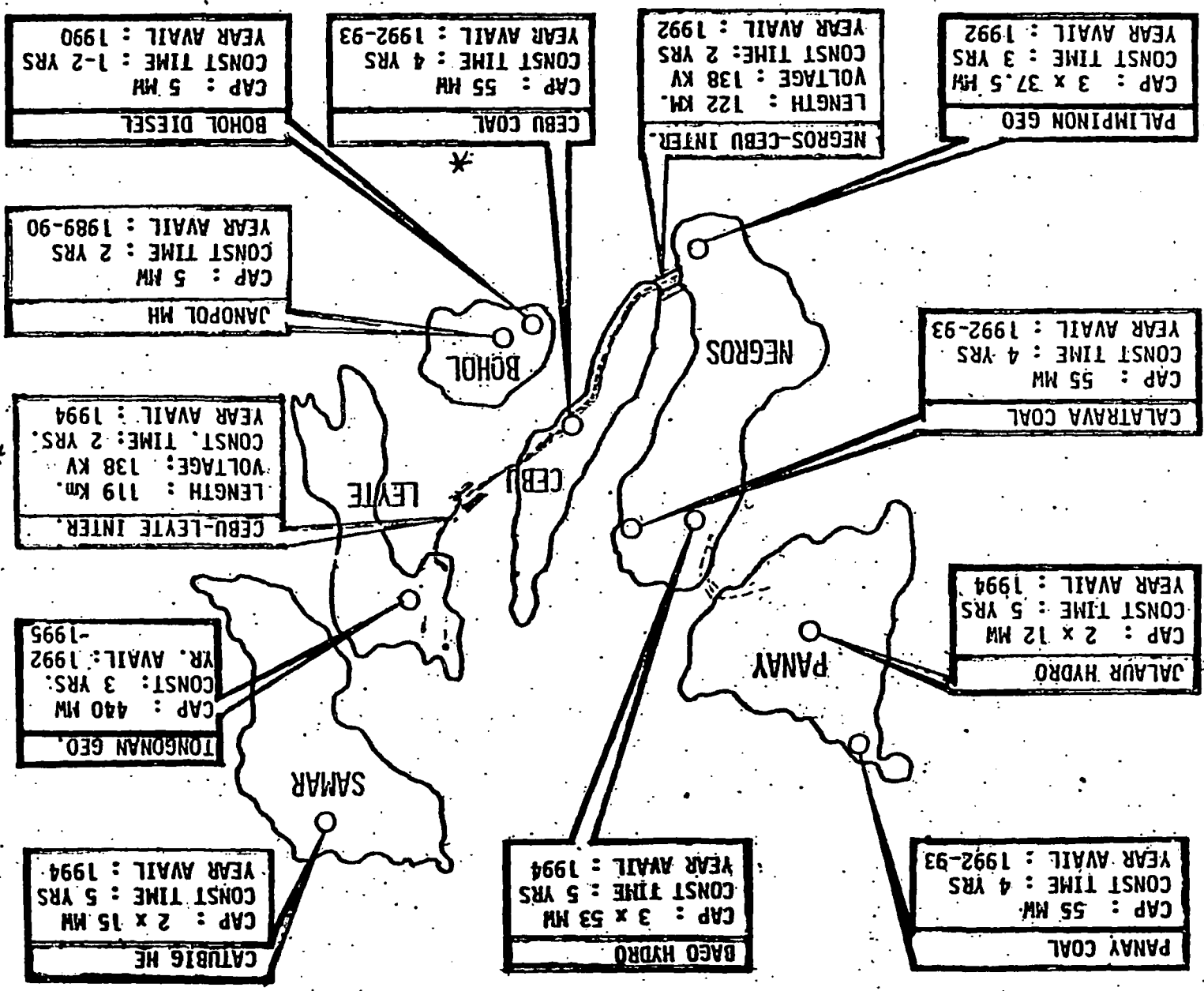
SUMMARY OF GEOTHERMAL POTENTIAL IN THE VISAYAS

PROJECT FORECAST (PM)	ENERGY		CAPACITY		NUMBER OF SITES	STATUS
	%	GWH	%	MW		
9751	15	1498	15	228	2	EXISTING
22103	56	5782	56	880	1	UNDER EXPLORATORY DRILLING
1104	5	526	5	80	1	UNDER PRODUCTION STAGE
32958	100	10237	100	1558	6	TOTAL
1200	TYPICAL COST (\$/KM)					

1/ Does not include sunk cost associated with the exploration of Palapinon II geothermal fields.
 2/ The six sites may be lumped into three(3) general localities.

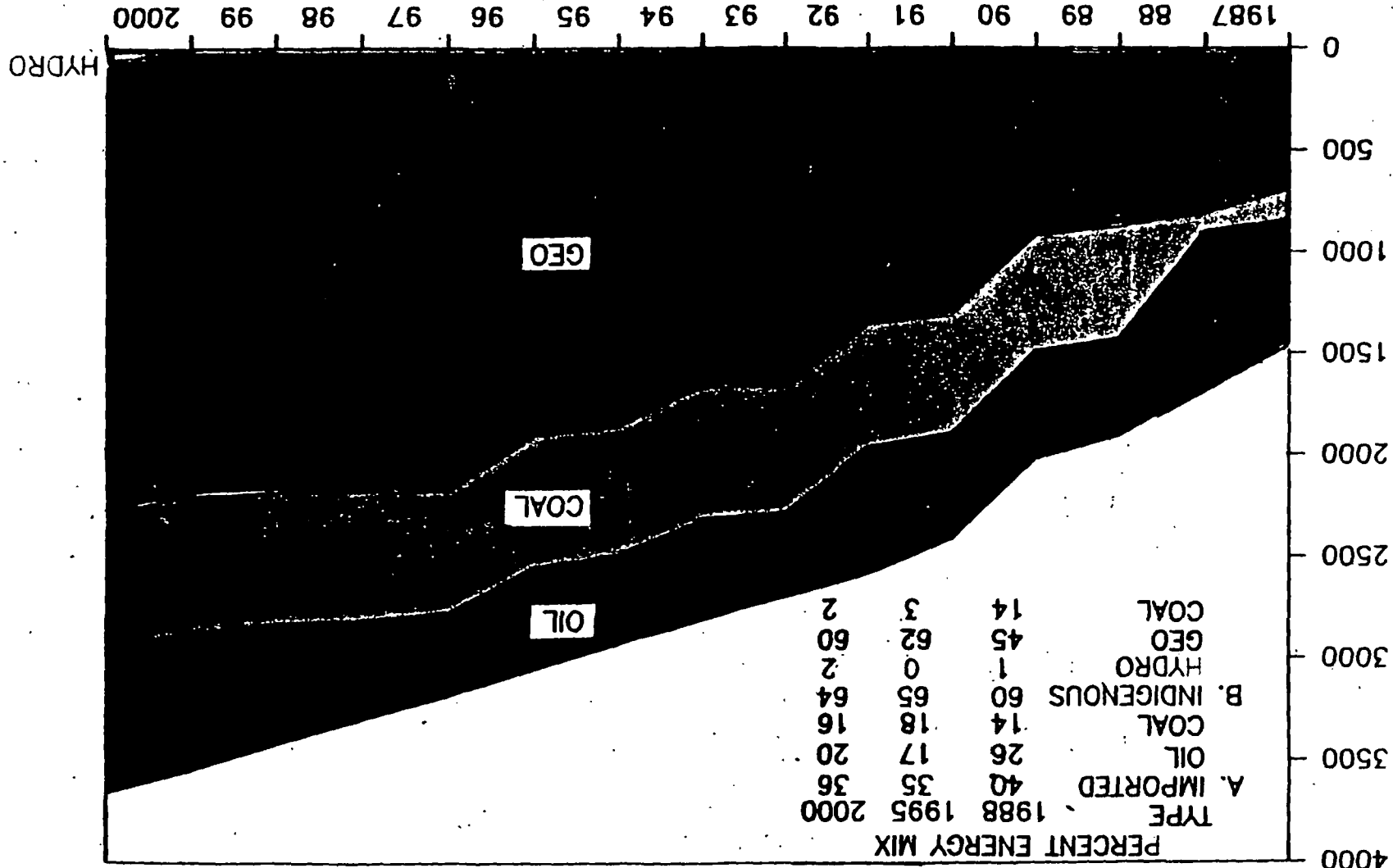
**VISAYAS GRID
GEOGRAPHICAL LOCATION OF
CANDIDATE GENERATION PROJECTS
JUNE 1988 POWER DEVELOPMENT PROGRAM**

FIGURE B.3

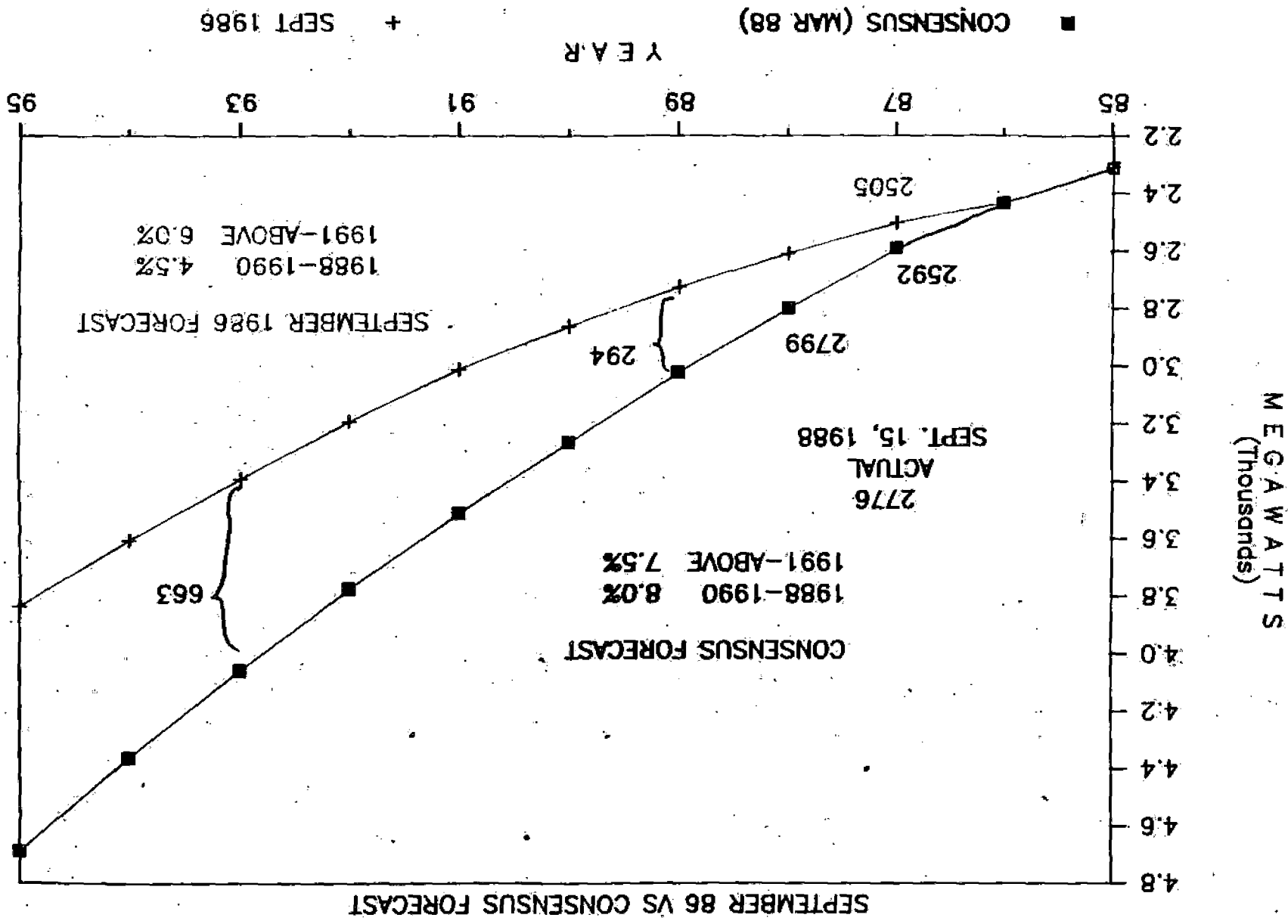


VISAYAS GRID

ENERGY GENERATION MIX, GWH

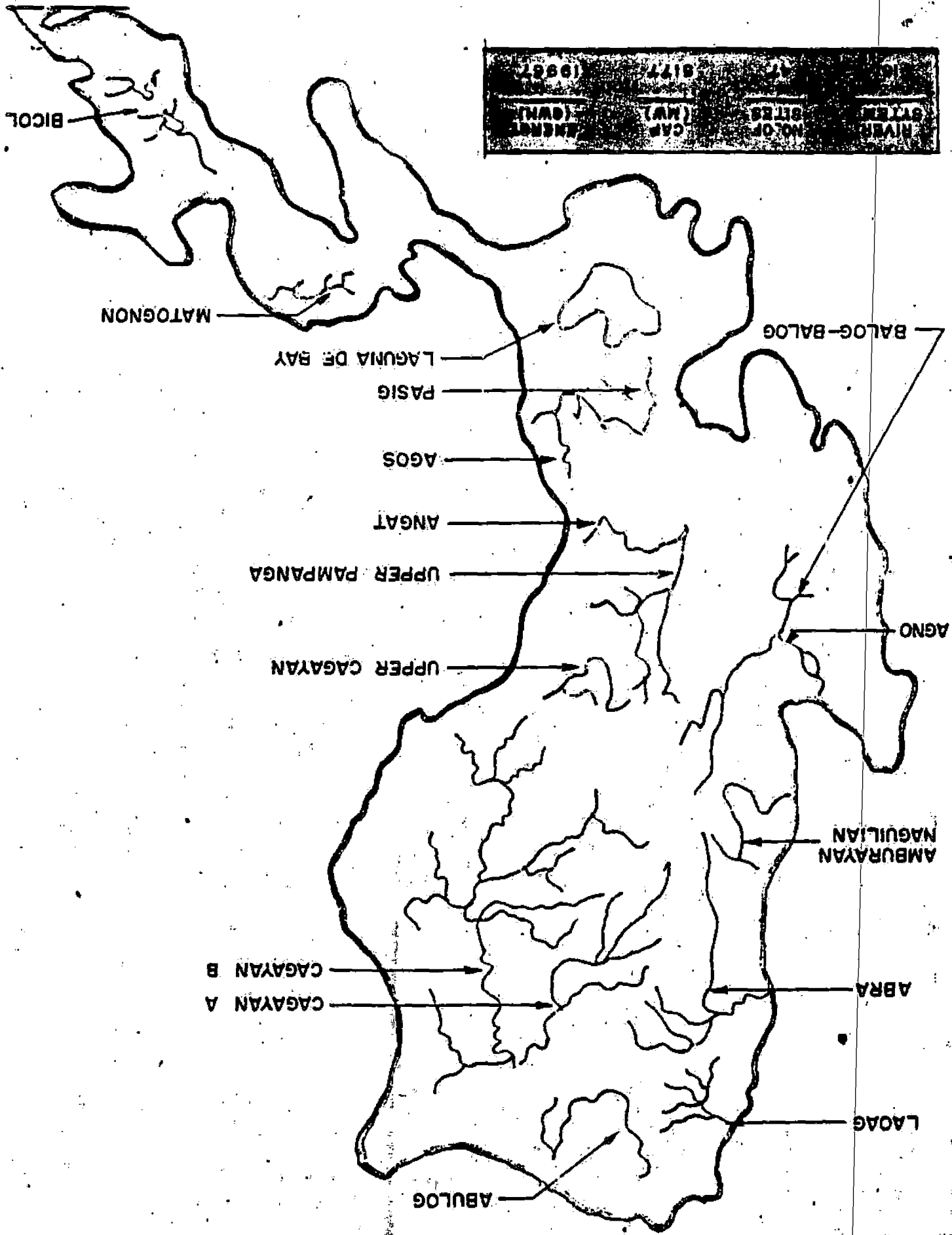


LUZON GRID



SEPTEMBER 86 VS CONSENSUS FORECAST

RIVER BASINS IN LUZON ISLAND

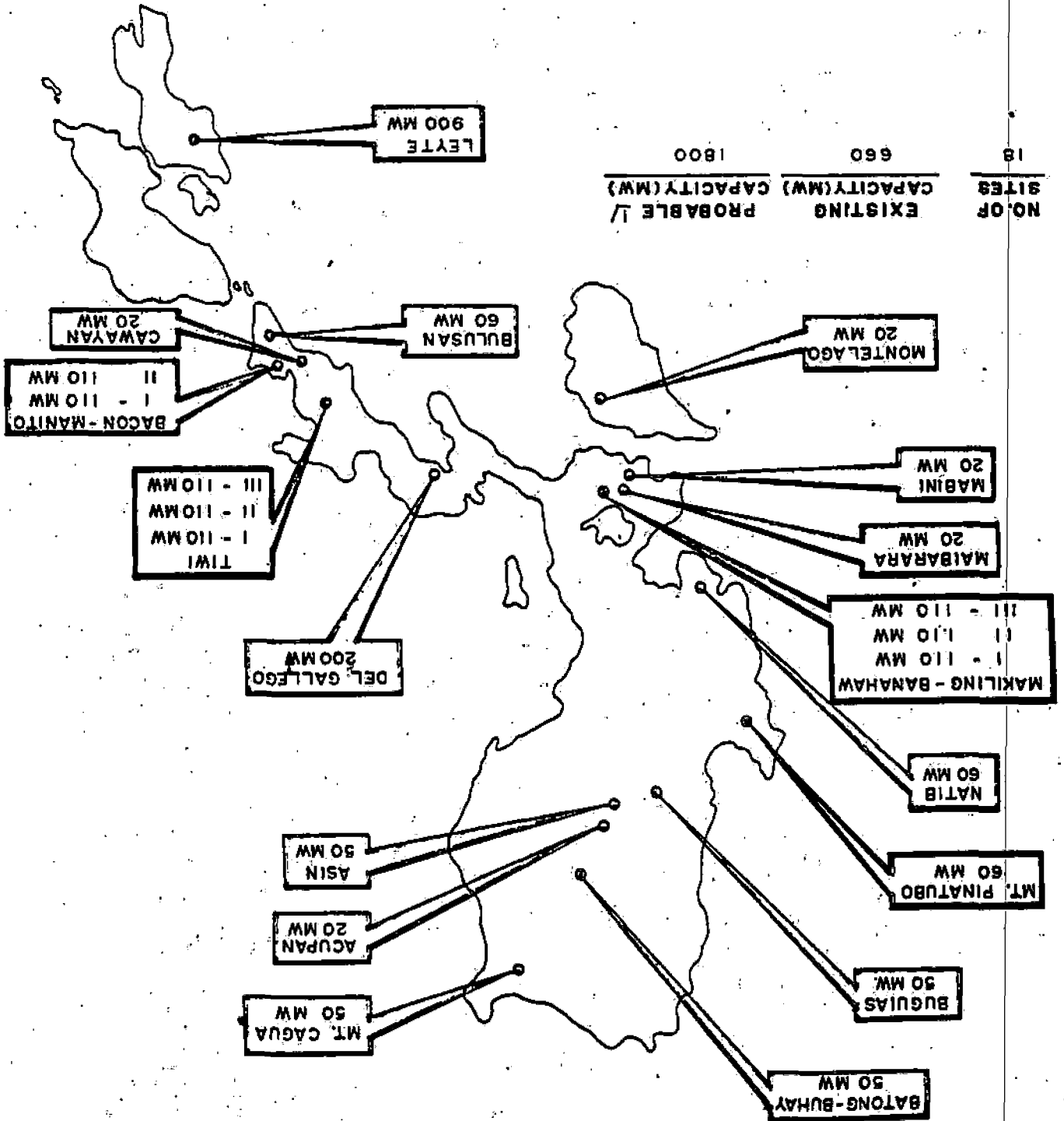


SUMMARY OF HYDROPOWER POTENTIAL IN LUZON

STATUS	NUMBER OF SITES	MW	% CAPACITY	GWH ENERGY	%	PROJECT FORECAST (PM)
PRE-FEASIBILITY	34	2538	40	11200	49	155378
FEASIBILITY	11	2338	36	7292	32	56567
DEFINITE DESIGN	2	301	5	1478	7	9125
		1226		2745		-
<p>221070</p>						
<p>AVERAGE COST (\$/KW) 2033</p>						

SUM-PT/L08
LPD-SPD/Jay
15 Oct 88

GEOHERMAL POTENTIALS IN LUZON AND LEYTE



LEGEND:

- EXISTING / DEVELOPED
- UNDER SURFACE INVESTIGATION
- EXPLORATORY WELL DRILLING STAGE
- PRODUCTION WELL DRILLING STAGE

∩ IN ADDITION TO EXISTING GEOHERMAL CAPACITY

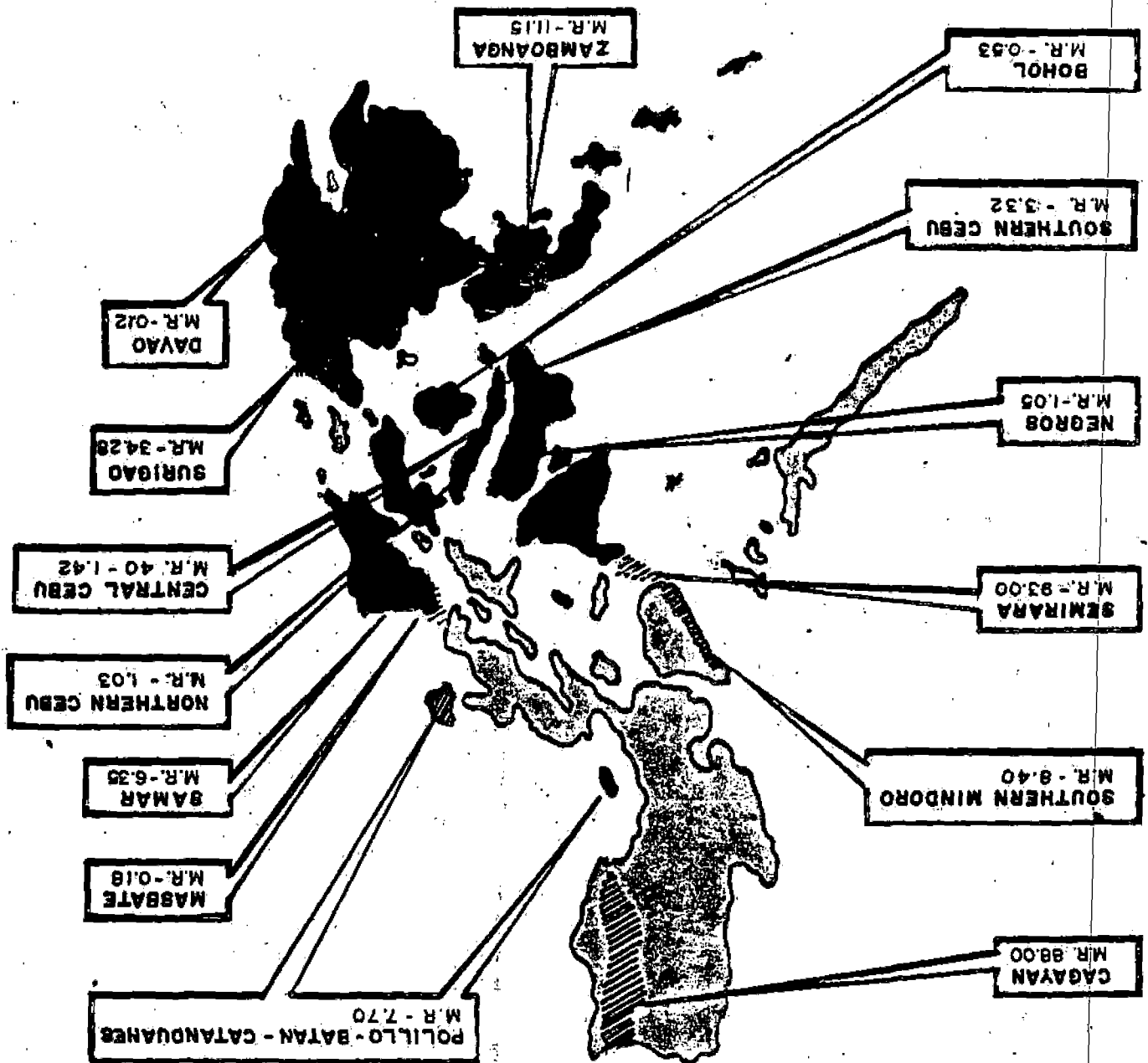
NO. OF SITES	EXISTING CAPACITY (MW)	PROBABLE ∩ CAPACITY (MW)
18	660	1800

SUMMARY OF GEOTHERMAL POTENTIAL IN LUZON & LETE

PROJECT FORECAST (PM)	ENERGY		CAPACITY		NUMBER OF SITES	STATUS
	GWH	%	MW	%		
	3975	25	660	97	2	EXISTING
30017	7483	47	1139	46	11	UNDER SURFACE INVESTIGATION
1507	393	3	60	2	1	UNDER EXPLORATORY DRILLING
8297	3950	25	601	24	4	UNDER PRODUCTION STAGE
39821	15801	100	2460	100	18	TOTAL
1053.17	AVERAGE COST (\$/KW)					
1200	TYPICAL COST (\$/KW)					

1/ Does not include sunk cost associated with the exploration of Tongonan and Bacon-Mantlo geothermal fields.

MAJOR COAL DEPOSITS IN THE COUNTRY
AS OF JUNE, 1988



M.R. = MINABLE RESERVE

MINABLE RESERVE (Million tons)	AVERAGE HEATING VALUE (BTU/LB)	PLANT CAPACITY (MW)
251	6628	1920

20x20-MW GEOTHERMAL UNITS

THE UNIVERSAL DESIGN

**MODULAR GENERATING UNITS CAPABLE OF ACCOMODATING
DIFFERENT MASS FLOW RATES, THERMODYNAMIC AND CHEMICAL
CHARACTERISTICS OF GEOTHERMAL STEAM**

WHY MODULAR UNITS

*** SHORTEN THE PERIOD OF GEOTHERMAL DEVELOPMENT**

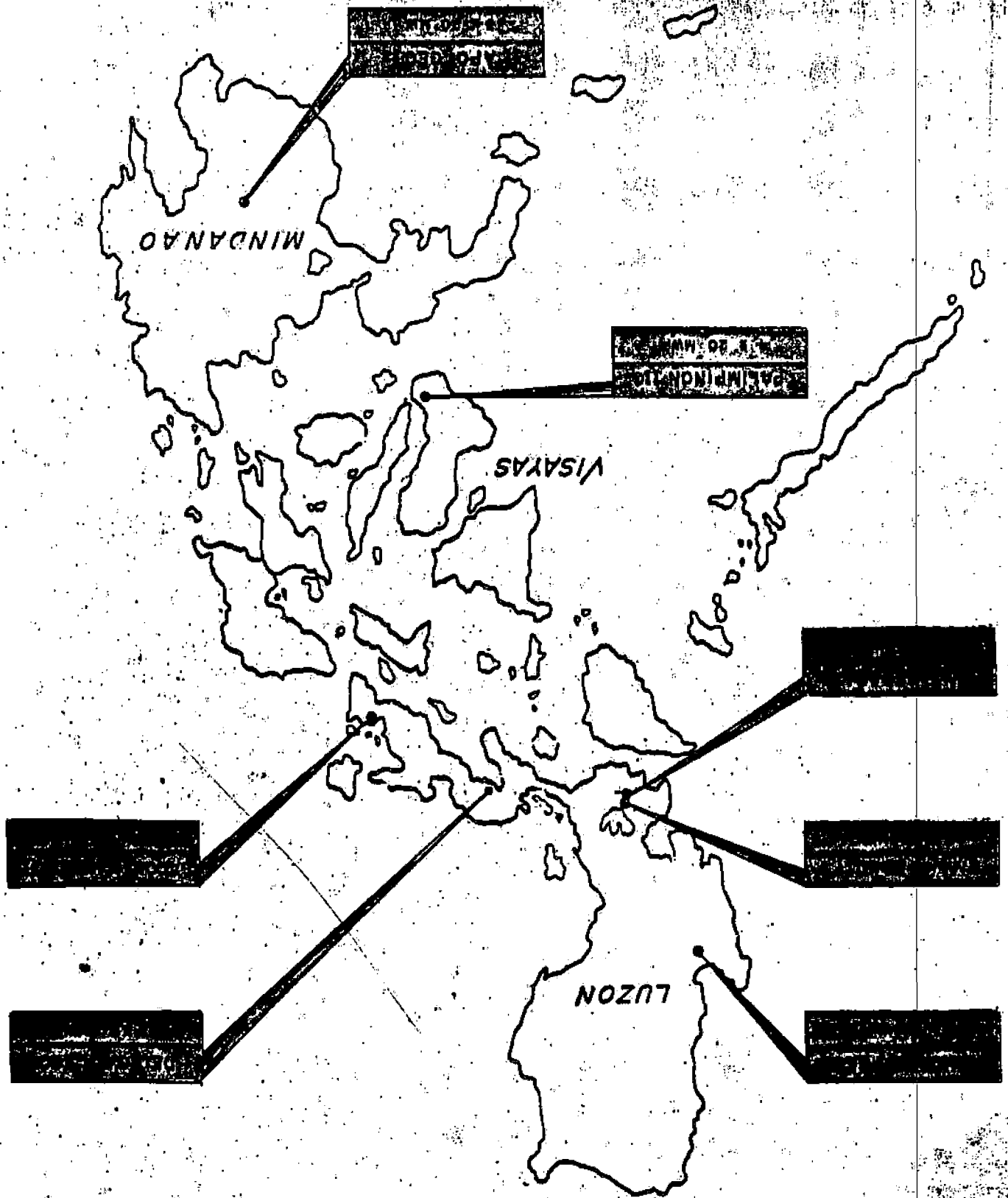
***** early capacity addition
*** reduced interest during construction**

*** EASIER MAINTENANCE PROCEDURES**

*** LOWER INVENTORY COST**

*** POSSIBILITY OF LOCAL MANUFACTURE**

UNIVERSAL MODULAR GEOTHERMAL POWER PLANT
(20 UNITS OF 20 MW)

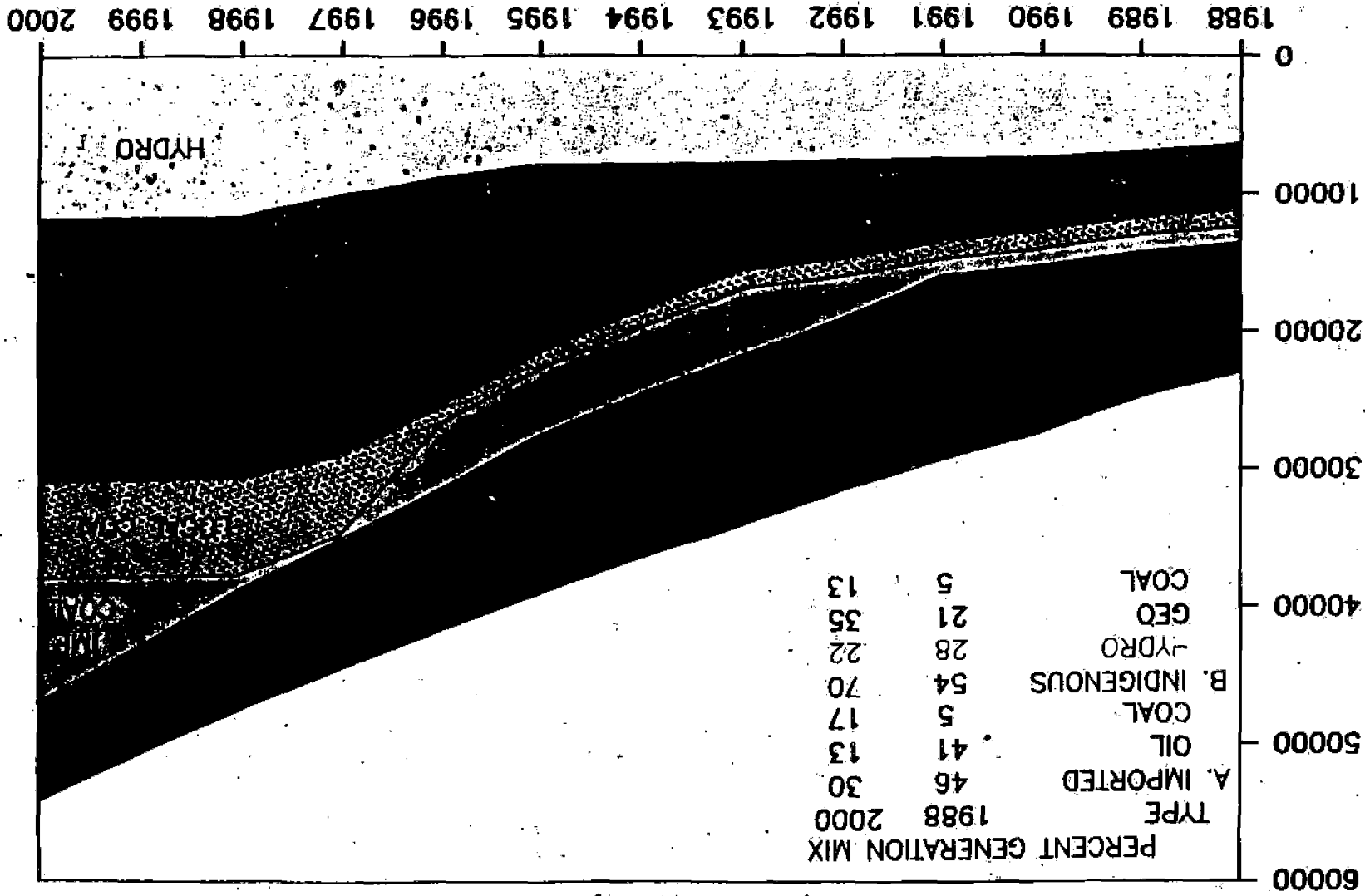


MINDANAO

VISAYAS

LUZON

PHILIPPINES ENERGY GENERATION MIX, GWH (RECOMMENDED)



ISLAMABAD
JUNE 1989

OPPORTUNITIES FOR THE PRIVATE SECTOR
IN POWER GENERATION PROJECTS
IN PAKISTAN

Government of Pakistan
MINISTRY OF WATER AND POWER
(Private Power Cell)



پاکستان کے لیے

TYPICAL PROJECT STAGES

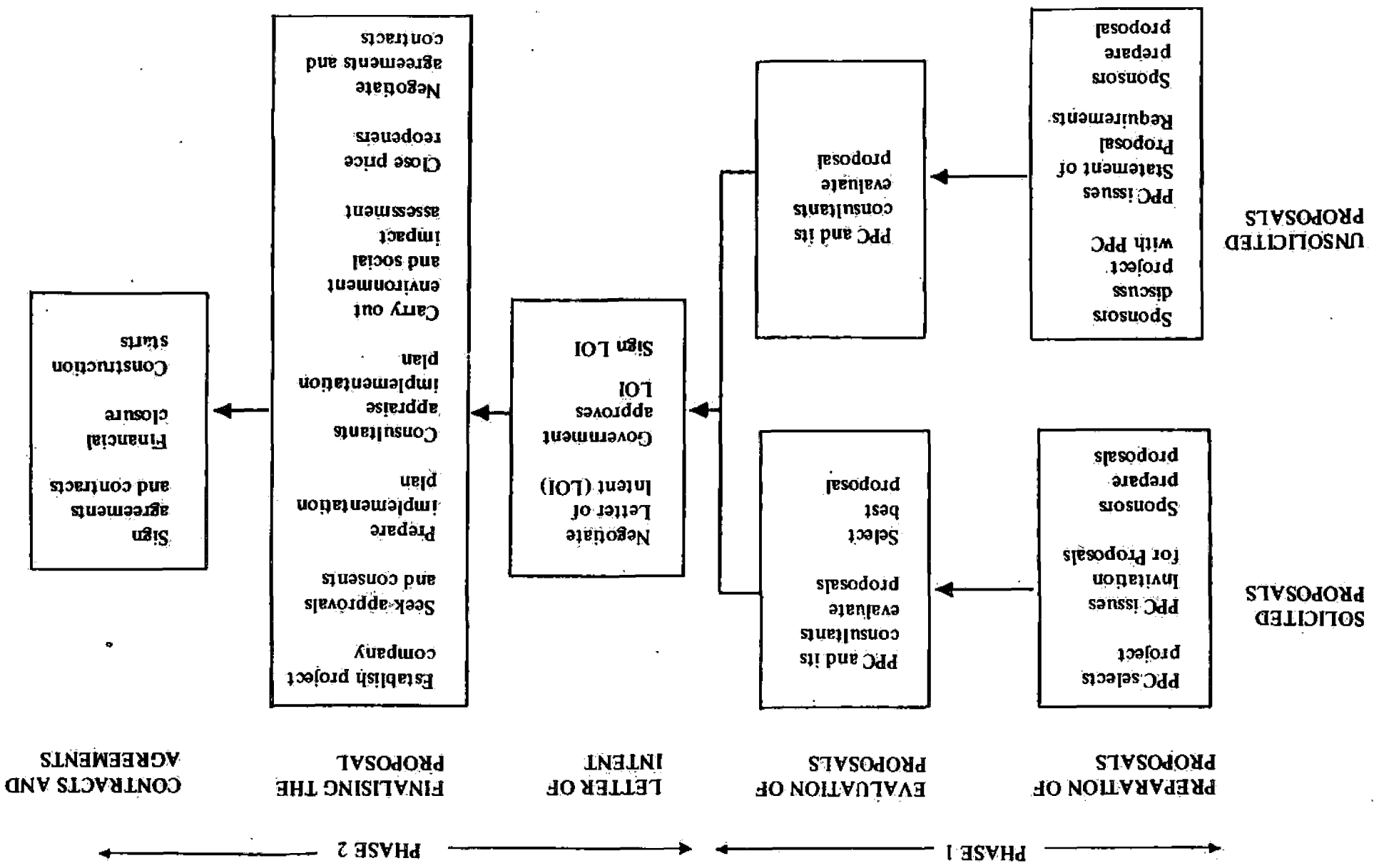


Figure 1

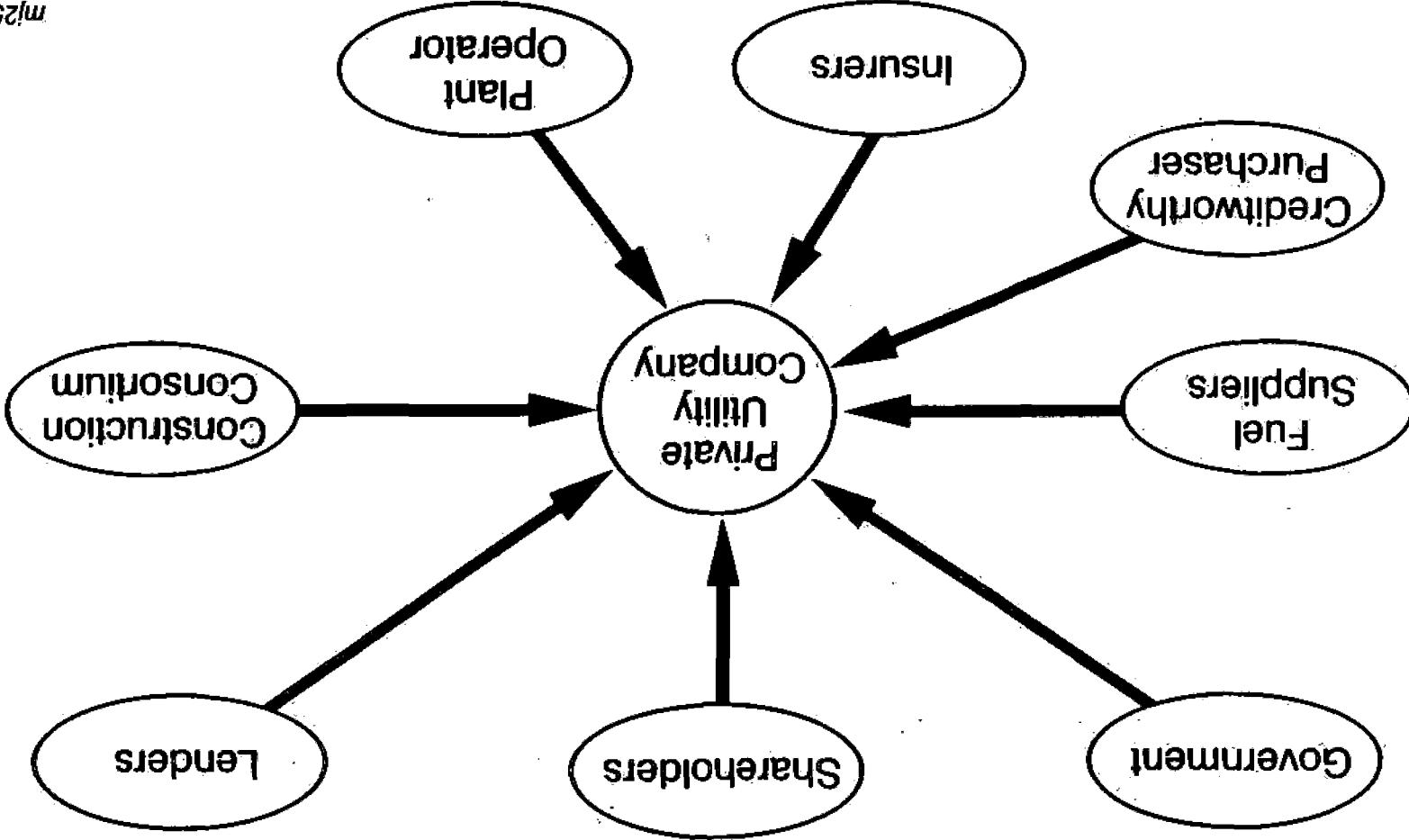
**Build/Operate/Transfer
(BOT)
A New Approach?**

m/259c.01

Total Investment Costs

- Construction
- Startup
- Private company
- Net working capital
- Escalation, interest, financing fees, and insurance

Privatization Structure



Structuring Issues

- Funding sources and issues
- Principles of risk allocation
- Key features of the project agreement

FUNDING SOURCES AND ISSUES

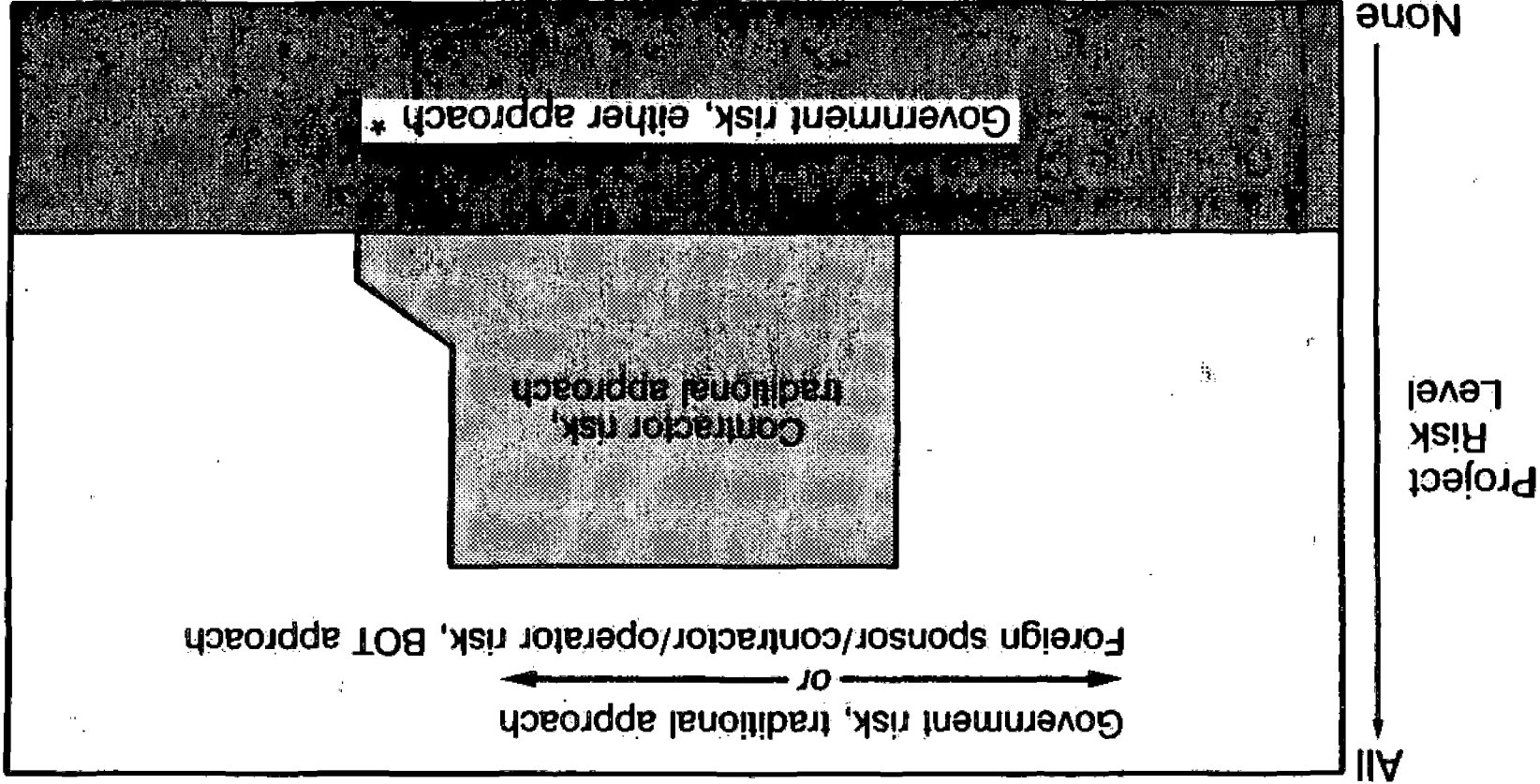
o EQUITY SOURCES

o DEBT/EQUITY RATIO AND TRADEOFFS

o DEBT SOURCES

Traditional vs BOT Approach Developing Country

Project Risk Matrix



MJ300c:01

Project Risk Matrix

Traditional vs BOT Approach

Developing Country

Development ↔ Construction ↔ Operations

- | | | |
|---|---|---|
| <ul style="list-style-type: none"> ● Technical feasibility ● Commercial/financial feasibility ● Project economics ● Permits/authorization * ● Third party intervention ● Political change * | <ul style="list-style-type: none"> ● Schedule ● Cost ● Performance ● Design changes ● Consequential damages * ● Force majeure * ● Foreign exchange * | <ul style="list-style-type: none"> ● Mechanical failure ● Fuel supply escalation ● Operating and maintenance cost escalation ● Market disruption ● Statutory change/civil unrest/strikes ● Acts of God * ● Third party liability * ● Foreign exchange * |
|---|---|---|

Project Purchase Agreement Elements

- Sovereign backstopping
- A term equal to private sector ownership
- A tariff structure to match cash flow requirements
- A bonus penalty incentive
- *Force majeure* protection

Cost Recovery Requirements

- Project is completed on budget and schedule
- Plant operates at/above guaranteed availability
- Fuel consumption is within guaranteed efficiency
- O&M expenses are within agreed levels

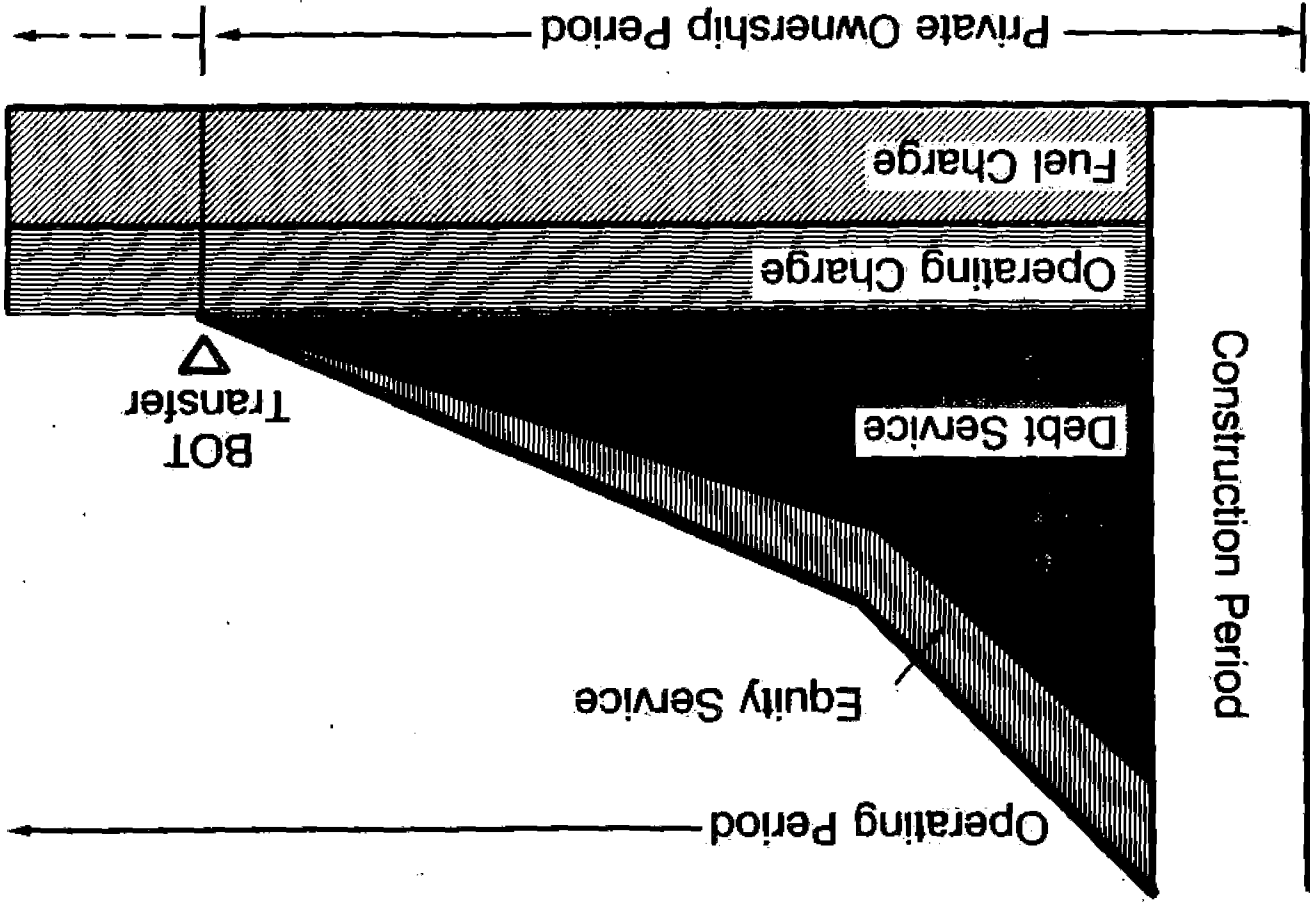
Typical Power Tariff Formula

$$\left[\begin{array}{l} \text{Fuel} \\ \text{Charge} \end{array} \right] + \text{Operating Charge} + \text{Debt Service Charge} + \left[\begin{array}{l} \text{Equity} \\ \text{Service} \\ \text{Charge} \end{array} \right]$$

$$\div \begin{array}{l} \text{KWh at \%} \\ \text{Guaranteed} \\ \text{Availability} \end{array}$$

$$= \begin{array}{l} \text{Tariff per} \\ \text{available} \\ \text{KWh} \end{array}$$

Typical BOT Tariff Structure (in constant $\$/kWh$)



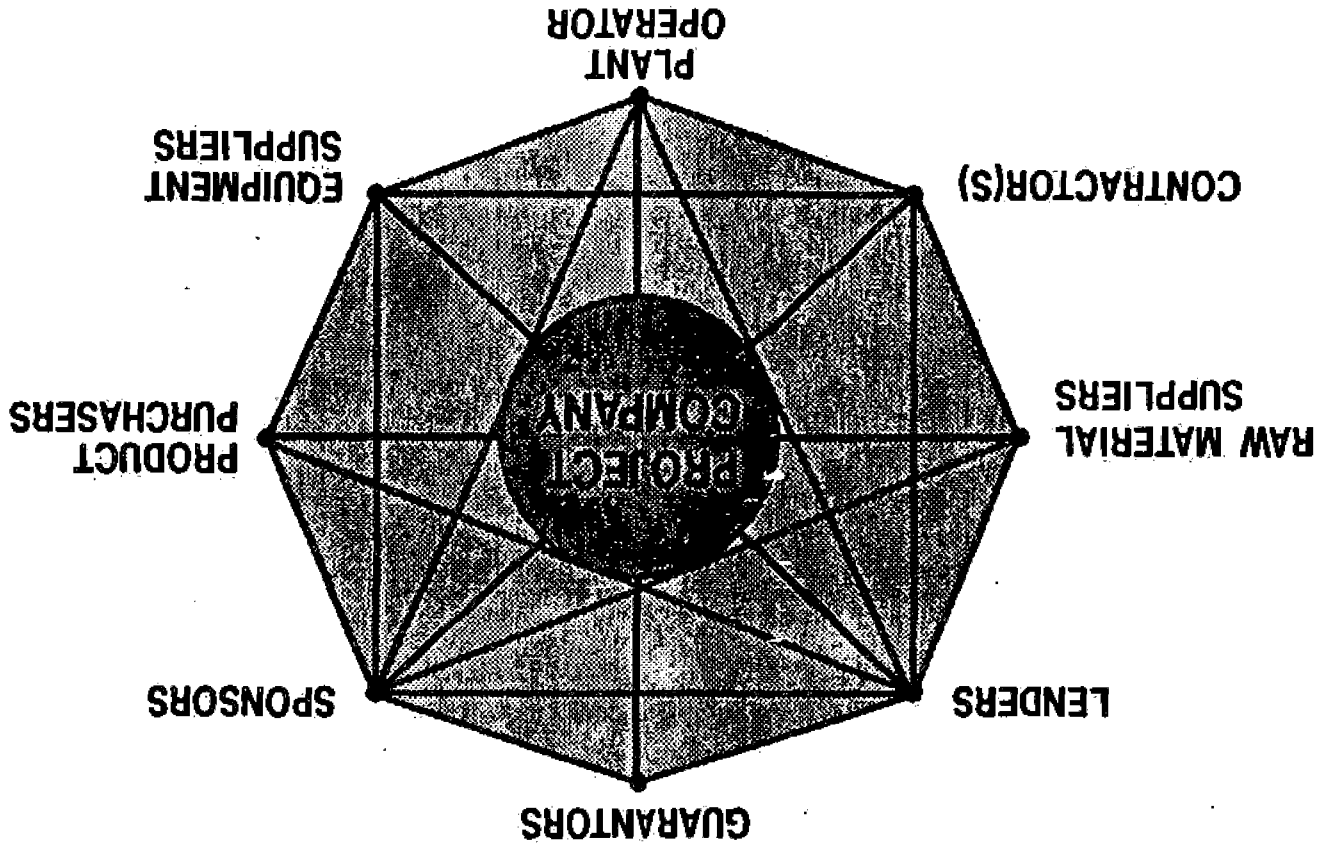
m/259c.09

Coal Supplier Advantages

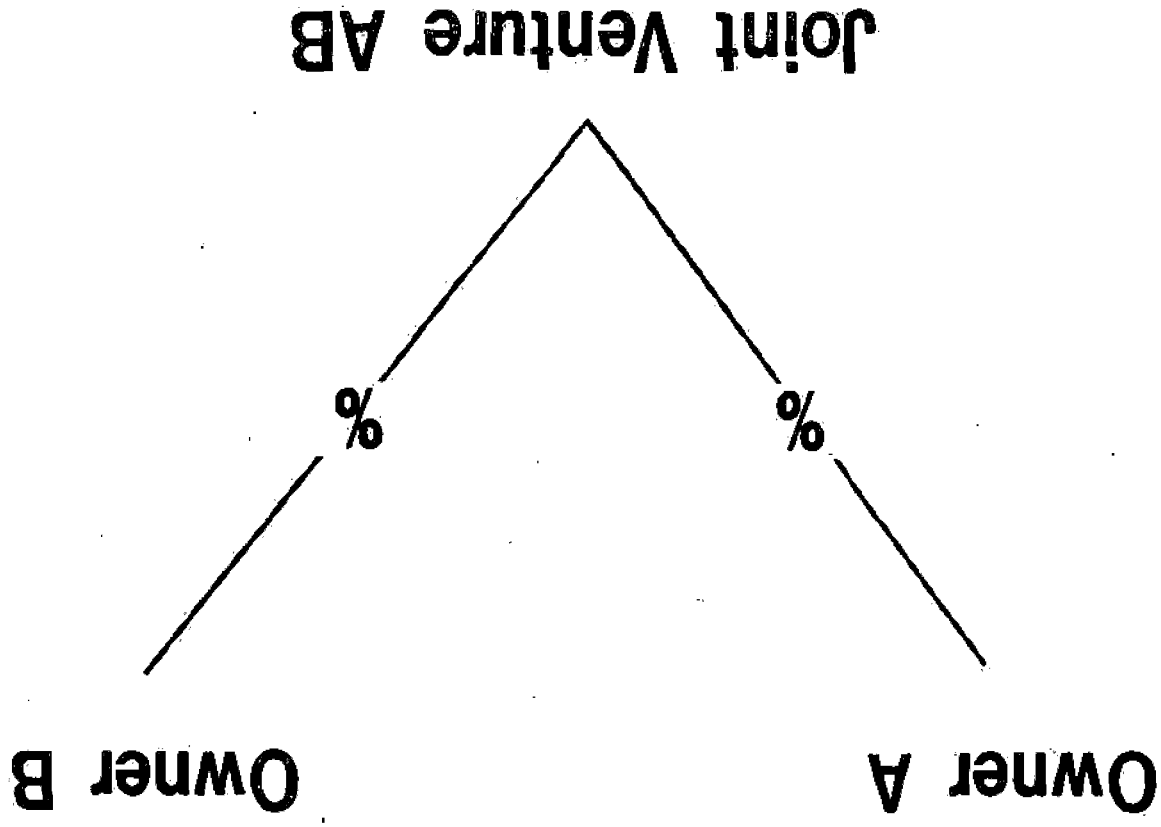
- Long-term coal sale
- Business diversification
- Better understanding of power generation industry
- New contacts and relationships



Privatization And Project Finance



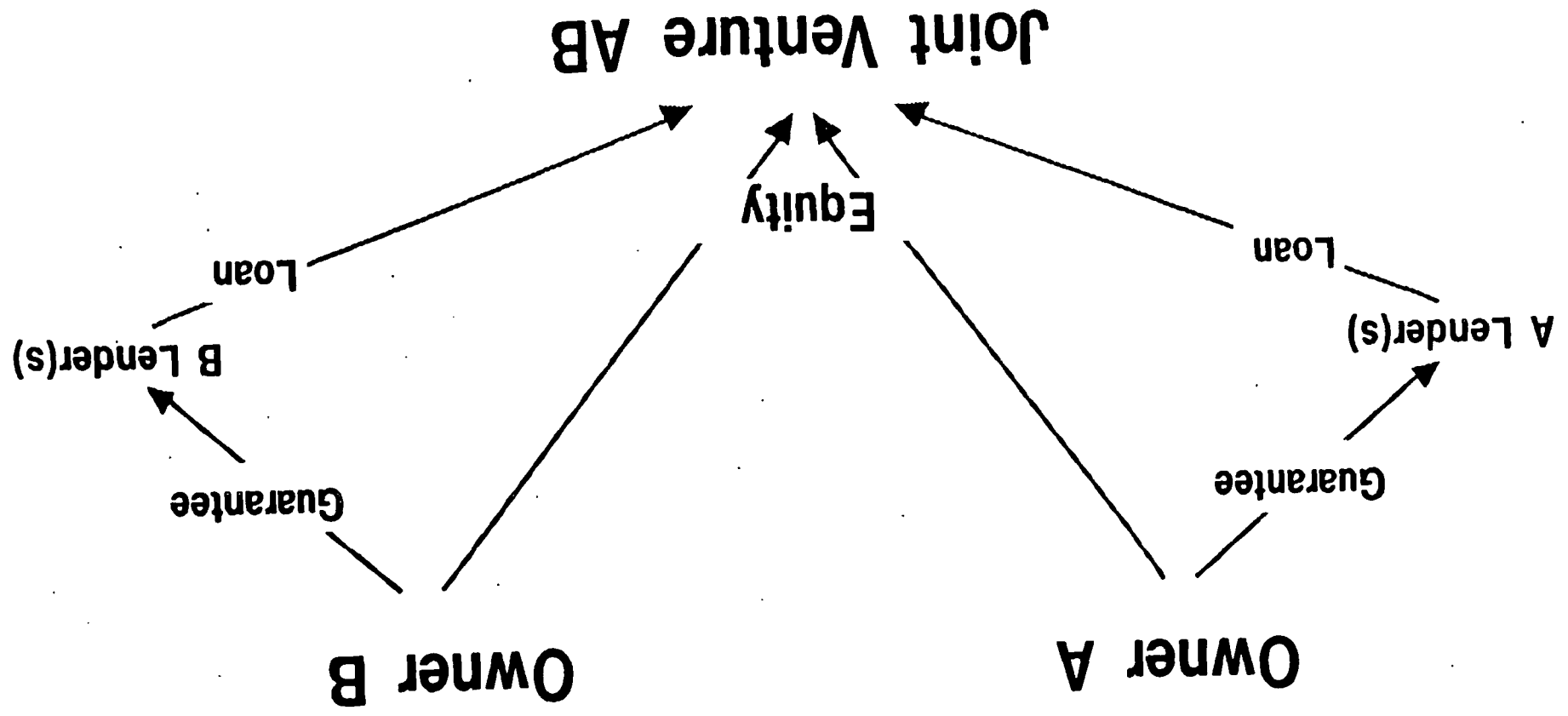
Edward V. Roberts, Jr.
Vice President - Project Finance
The Chase Manhattan Bank, N.A.



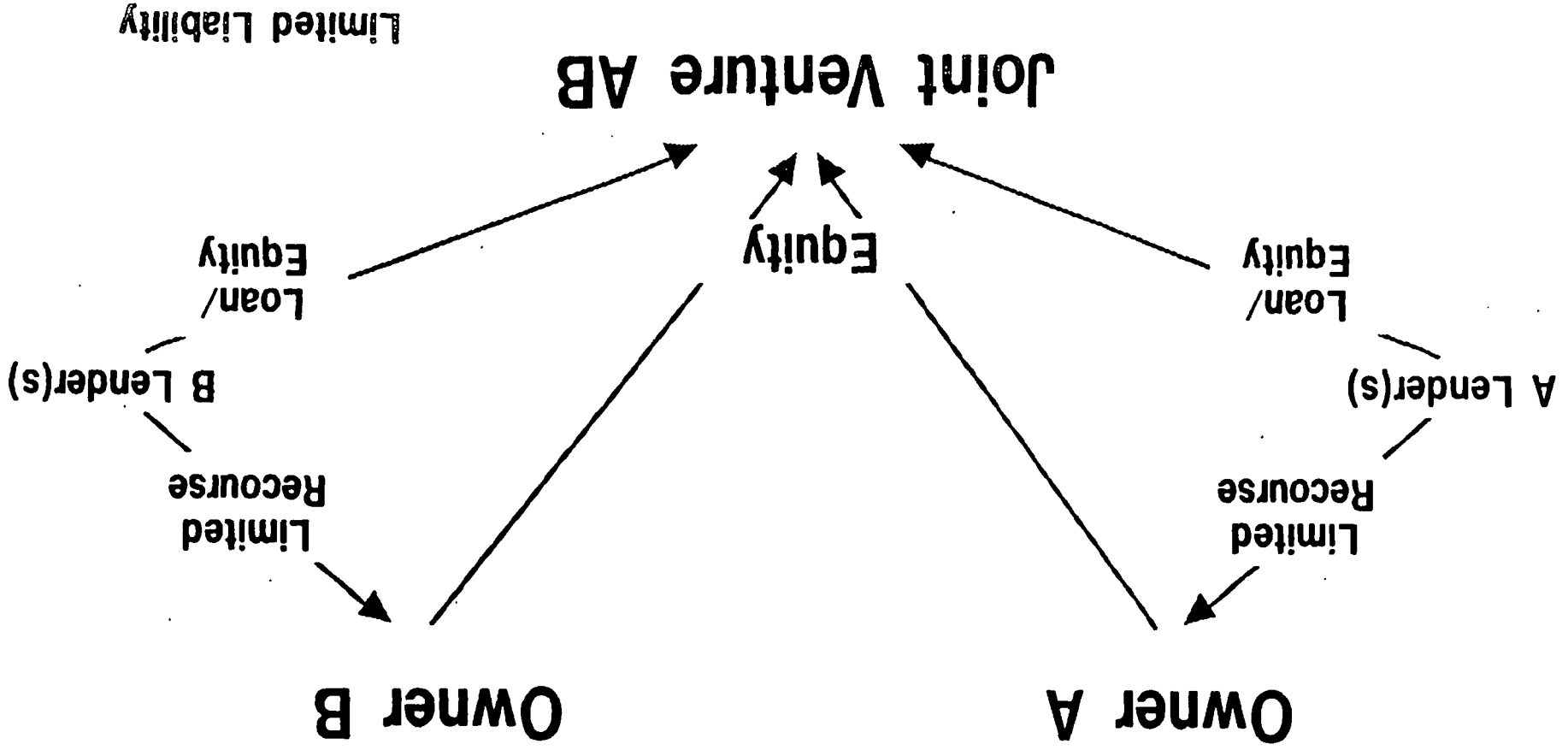
New Venture
Joint Ownership




Joint Ownership Funding: Owner Guaranteed Owners' Liability - 100%



Joint Ownership Funding: Third Party Owners' Liability - Limited



CHASE 
**Limited Liability/Limited Recourse
Project Financing**

- **Cost Sharing**
- **Risk Sharing**
- **Reward Sharing**



Limited Liability/Limited Recourse Project Financing

Critical Ingredients

The Project

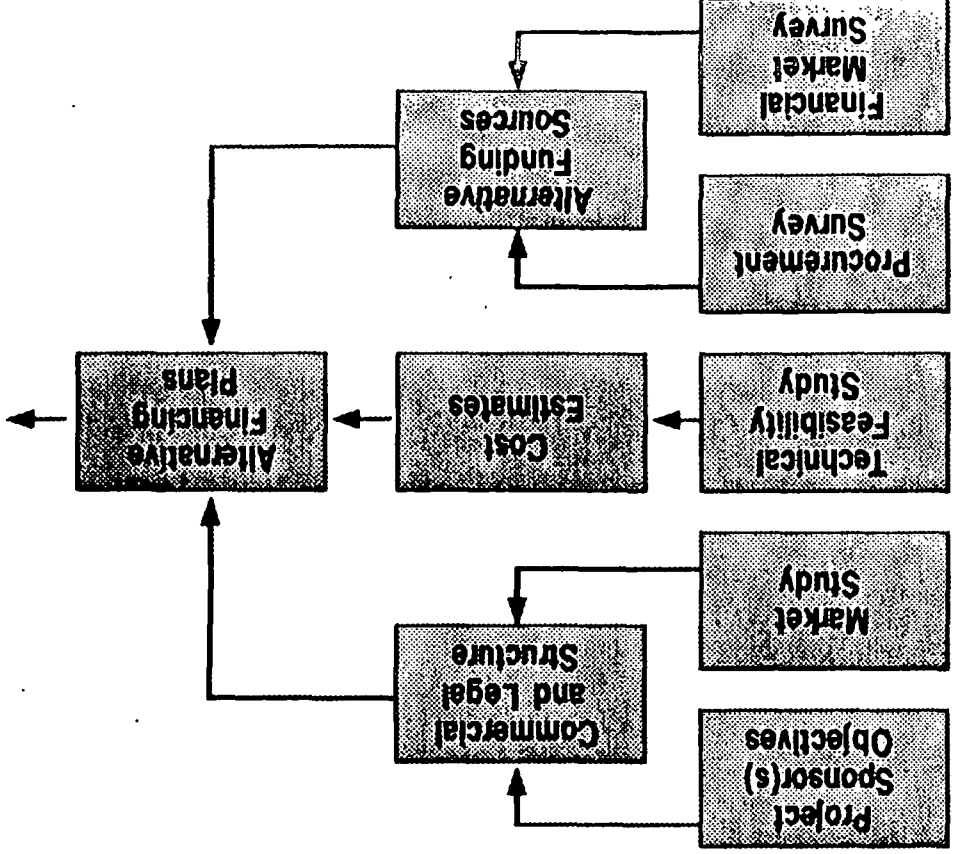
- Compelling Commercial & Economic Viability
- Proven Technology
- Available Technical/Operating Expertise
- Positive/Stable Political Environment
- Consistent Government Approvals

The Sponsors

- Experienced/Creditworthy Sponsorship
- Mutually Interdependent Economic Interests

Limited Liability/Limited Recourse Project Financing Steps

I. Develop Financing Plan



Limited Liability/Limited Recourse Project Financing Steps

II. Analyze, Test and Select Plan

Updated
Information

Financial
Projections
Sensitivity
Analysis
Scenario
Analysis
Preliminary
Negotiations

Financing
Plan

III. Arrange Financing

Final
Estimates

Updated
Financial
Projections
Preliminary
Commitments
Final
Negotiations
and
Commitments

Loan
Agreements





Limited Liability/Limited Recourse Project Financing Steps

I. Develop Financing Plan

- Project Definition
- Project Cost Analysis
- Project Risk Analysis
- Project Risk Allocation
- Project Credit Structure



Limited Liability/Limited Recourse Project Financing Steps

Project Risk Analysis

- Completion Risks
- Operating Risks
- Market Risks
- Political/Regulatory Risks
- Force Majeure Risks



Limited Liability/Limited Recourse Project Financing Steps Project Risk Analysis

Completion Risks-Completion Delays/Cost Overruns

- Environmental (Soil, Weather, etc.) Problems
- Labor Disruptions
- Contractor Solvency/Performance Problems
- Material/Supply Shortages
- Late Equipment Deliveries
- Permitting Difficulties
- Logistical Problems
- Price Escalation
- Design Changes



Limited Liability/Limited Recourse Project Financing Steps

Project Risk Analysis

Operating Risks - Insufficient Cash Flows

- Mechanical Failure
- Labor Disruptions
- Quantity/Quality Supply Problems
- Operating Cost Escalations
- Operator Solvency/Performance Problems
- Energy Shortages



Limited Liability/Limited Recourse Project Financing Steps

Project Risk Allocation

- Probability/Sensitivity Analysis

Project Risks	Probability	Sensitivity
Completion Risks		
Environmental		
Contractor Solvency		
Supply Shortages		
Logistics		
Price Escalation		
Operating Risks		
Mechanical Failure		
Labor Disruptions		
Energy Shortages		
Market Risks		
Price Fluctuations		
Currency Fluctuations		
Tariff Barriers		
Political Risks		
Tax Policy Changes		
Currency Inconvertibility		
Export Regulations		
Force Majeure Risks		



Limited Liability/Limited Recourse Project Financing Steps

Project Risk Allocation

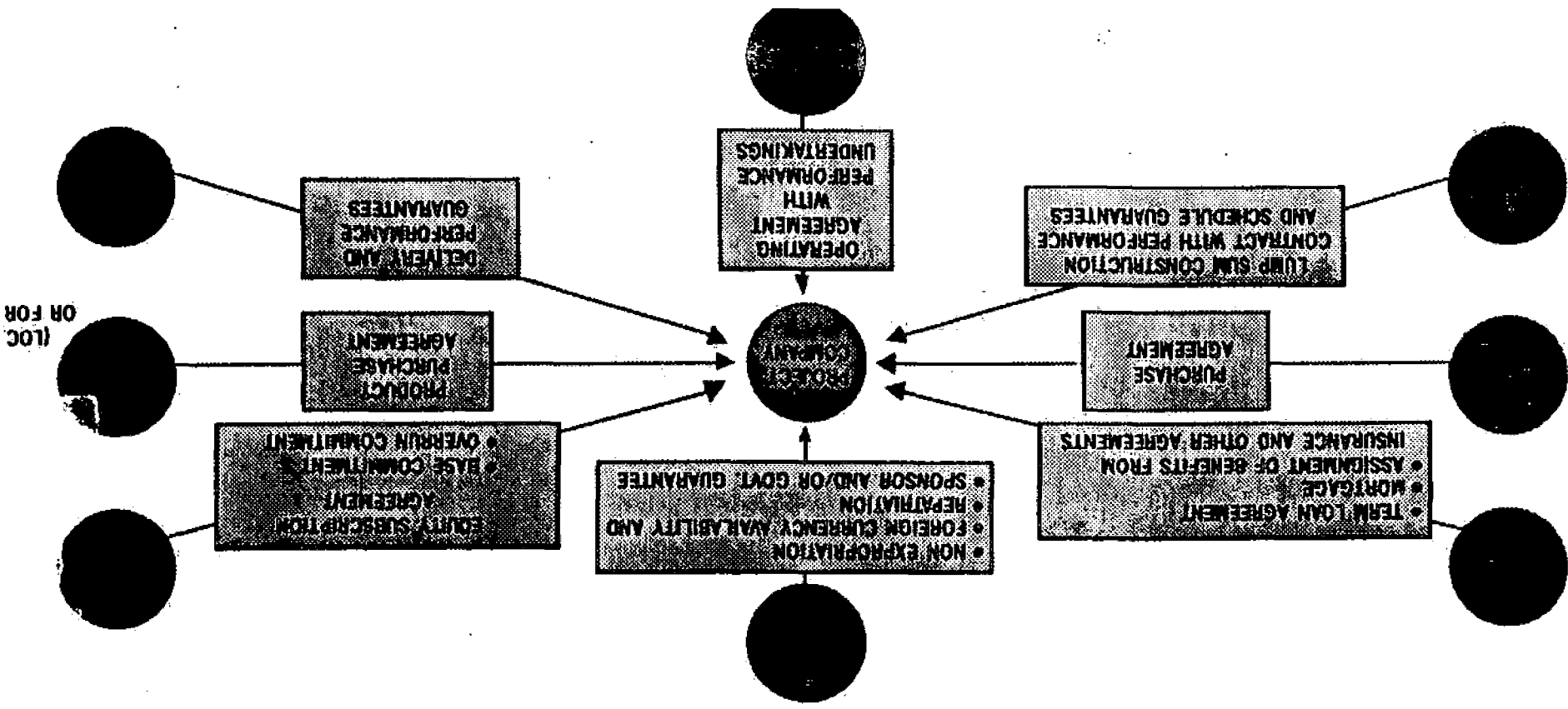
• Allocation

Project Risks	Sponsors	Customers	Lenders	Suppliers	Governments
Completion Risks					
Environmental					
Contractor Solvency					
Supply Shortages					
Logistics					
Price Escalation					
Operating Risks					
Mechanical Failure					
Labor Disruptions					
Energy Shortages					
Market Risks					
Price Fluctuations					
Currency Fluctuations					
Tariff Barriers					
Political Risks					
Tax Policy Changes					
Currency Inconvertibility					
Export Regulations					

Limited Liability/Limited Recourse Project Financing Steps

Project Credit Structure

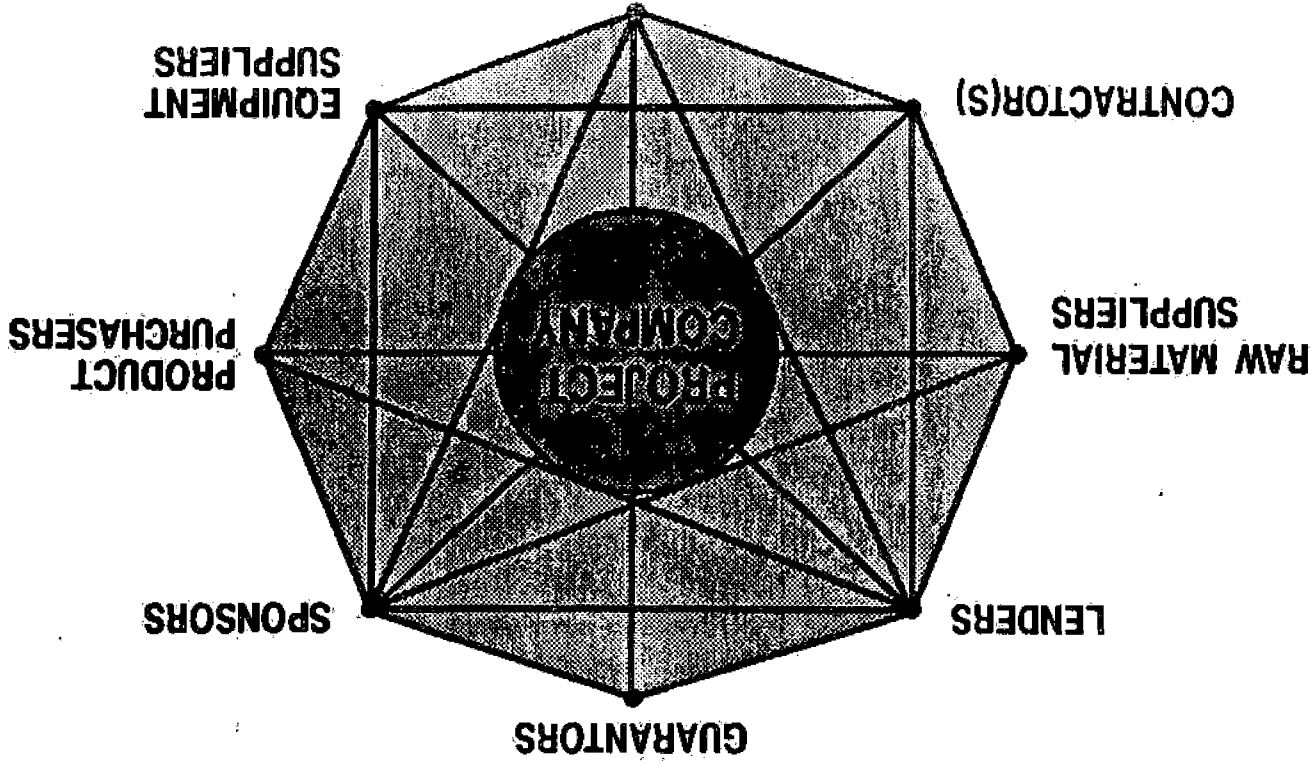
Assembling the Credit Structure



Limited Liability/Limited Recourse Project Financing Steps

Project Credit Structure

Contracts Interdependence





**Limited Liability/Limited Recourse
Project Financing**

WIFMS

General

Assured Return Of & Return On Capital

- **Creditworthy Sponsors**
- **Project Cash Flows**
- **Economically-Interested/Creditworthy
Third Parties**



Limited Liability/Limited Recourse Project Financing

WIFMS

Source Specific

- Commercial Banks
- Bilateral Agencies
- Export Credit
- Overseas Investment Promotion
- Aid
- Multilateral Agencies
- Regional Development Banks
- Multinational Institutions
- Economically-Interested Third Parties
- Contractors
- Equipment/Raw Material Suppliers
- Plant/Facility Operator

WHAT IS OPIC?

- U.S. Government Agency
- Mandate to aid U.S. investors in developing countries
- Offers political risk insurance coverage and loan guarantees
- Backed by full faith and credit of the United States

CHASE



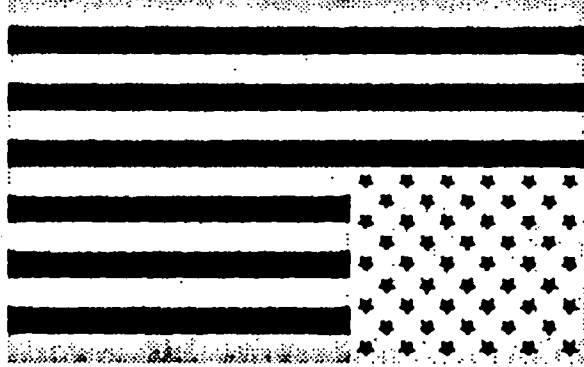
GENERAL ELIGIBILITY REQUIREMENTS

- Eligible investors
- Eligible countries
- Eligible investments



ELIGIBLE INVESTORS

- Citizens of U.S.
- Corporations, partnerships or other associations created under U.S. law and substantially owned by U.S. citizens
- Foreign businesses at least 95% owned by eligible investors



CHASE



ELIGIBLE INVESTMENTS

- New
- Expansion
- Acquisition (including privatization)
- Commercially and financially sound
- Proven record of management



ADDITIONAL CRITERIA

- Beneficial developmental impact
 - Import substitution
 - Export generation
- No negative U.S. economic impact
 - "Run-away" plants
 - Protected industries
- No military
- OECD rules
- Environmental sensitivity
- U.S. equipment sourcing



POLITICAL RISK INSURANCE PROGRAMS

- Equity
- Institutional loans





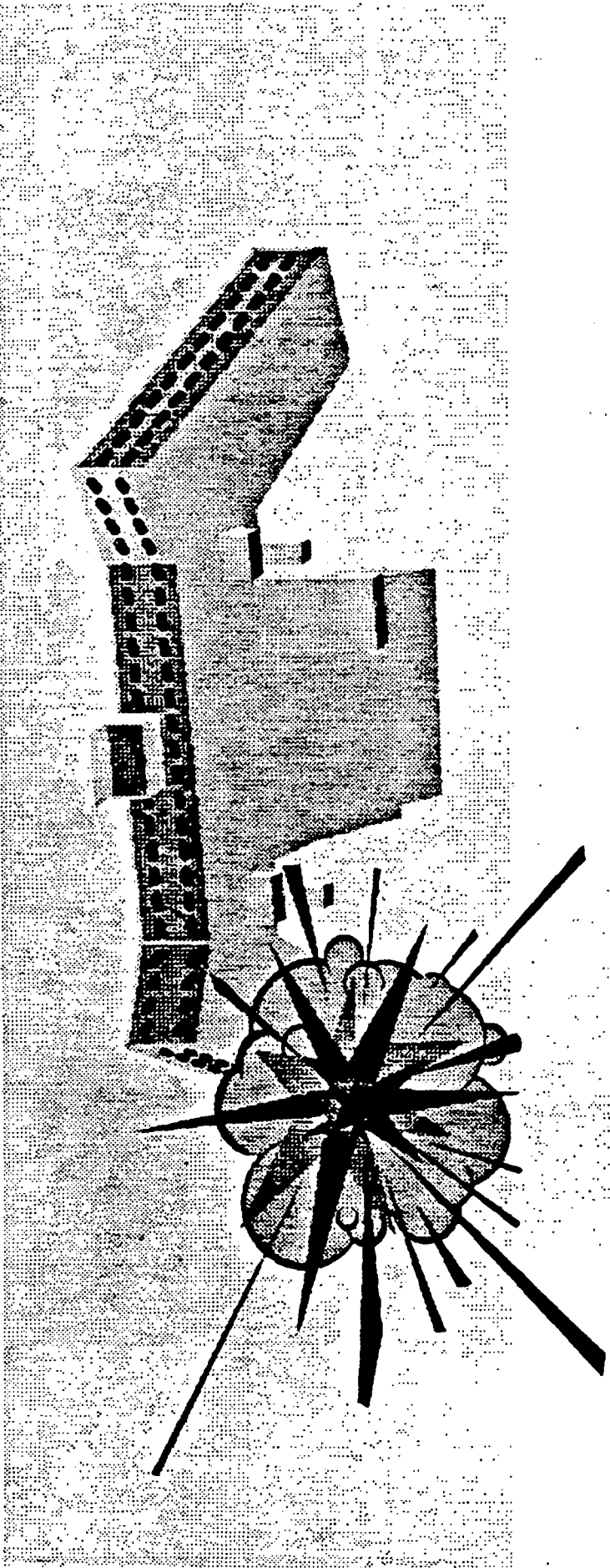
INCONVERTIBILITY

CHASE



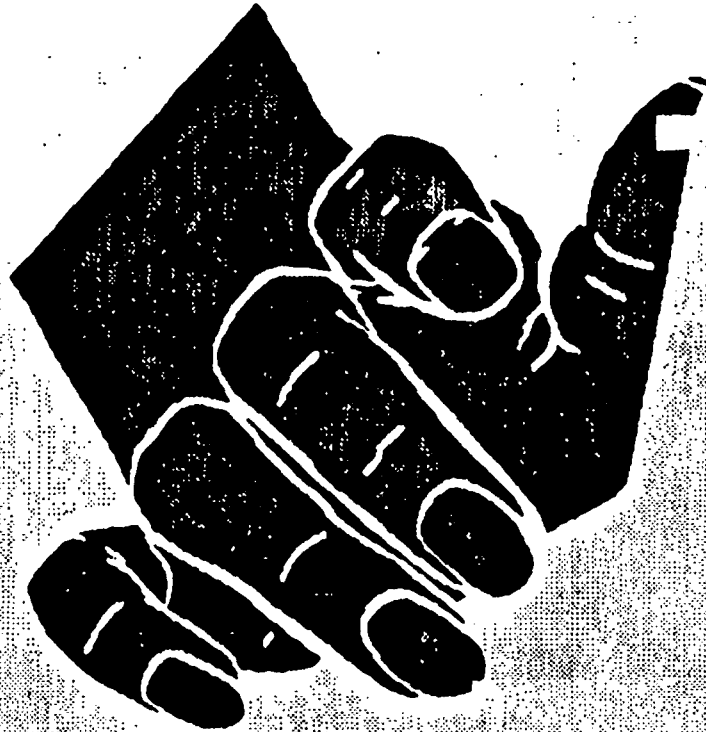


POLITICAL VIOLENCE



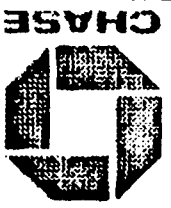


EXPROPRIATION



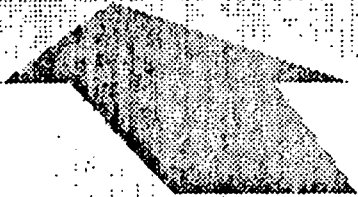
OPIC LOAN GUARANTEE PROGRAM

- Covers 100% principal and interest
- Backed by full faith and credit of the United States
- OPIC participation up to 75% of project costs

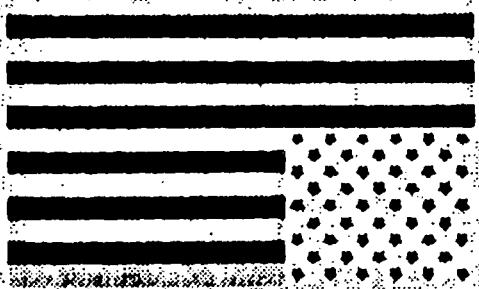


WHO BENEFITS?

Chase Clients



U.S. Investors



Foreign Project Sponsors



CHASE



U.S. INVESTORS

- Off-balance-sheet financing
- Guaranteed financing to offset political and project risk



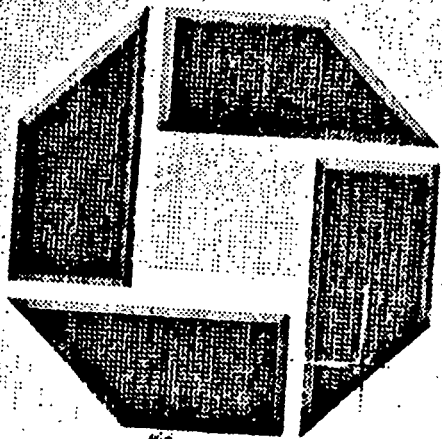
FOREIGN PROJECT SPONSORS

- Floating or fixed-rate funding
- Extended terms
- Improved flexibility
- Dollar-denominated debt financing in difficult markets



Guaranteed Extendible Master-Trust Notes

CHASE

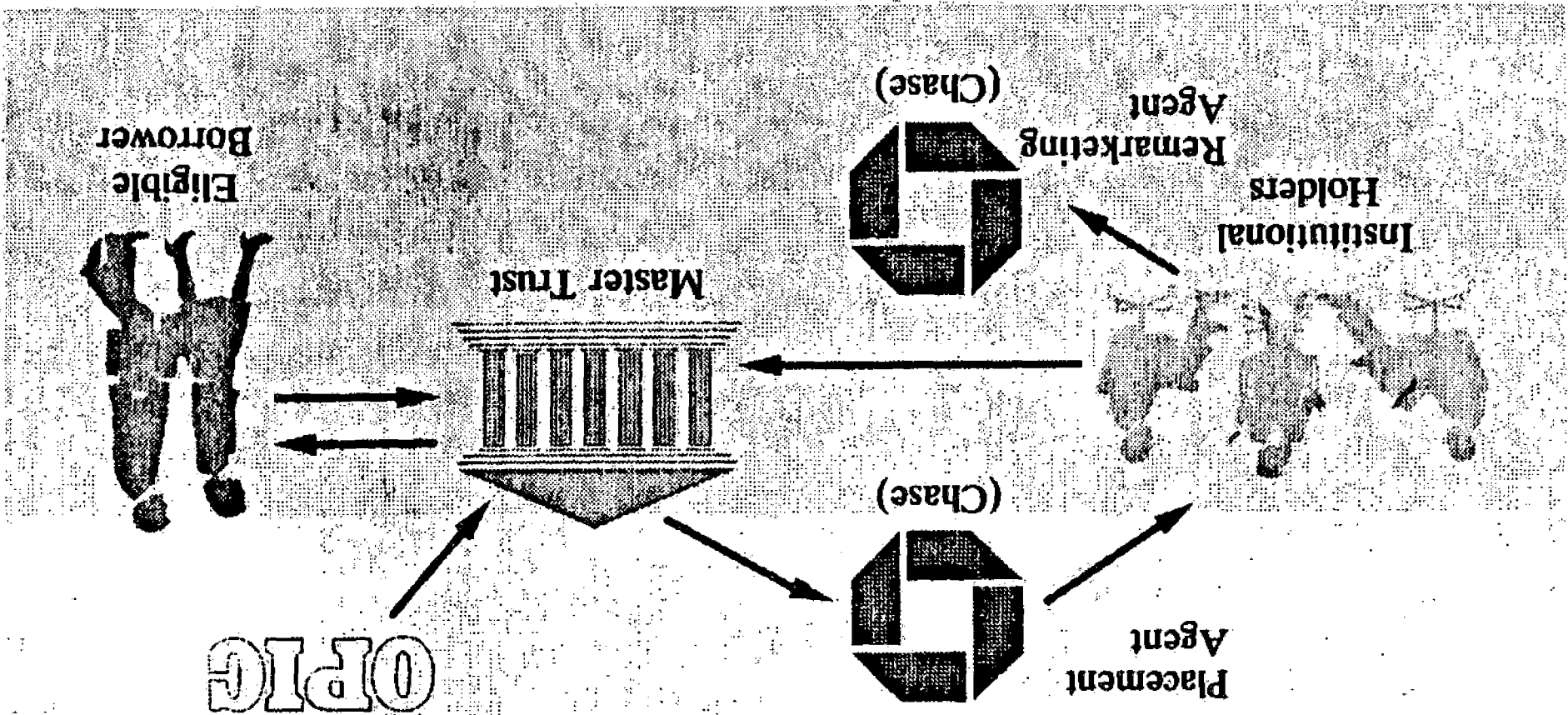


GEMS



OVERVIEW OF GEMS

OPIG



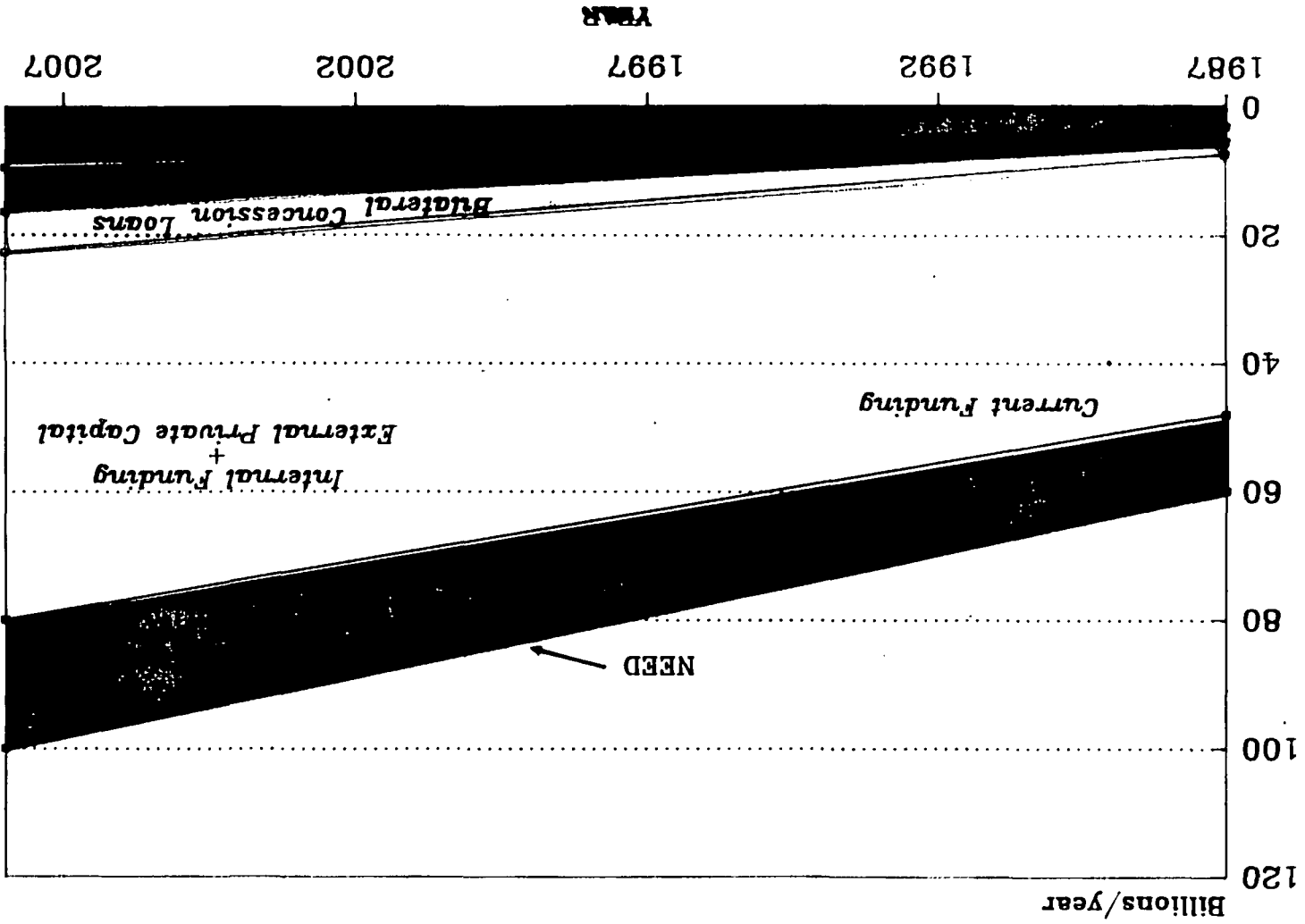
- Flexibility of disbursement & repayment
- Ability to fix a floating exposure throughout the financing period
- Lowest-cost source of institutional funds

To Borrower:

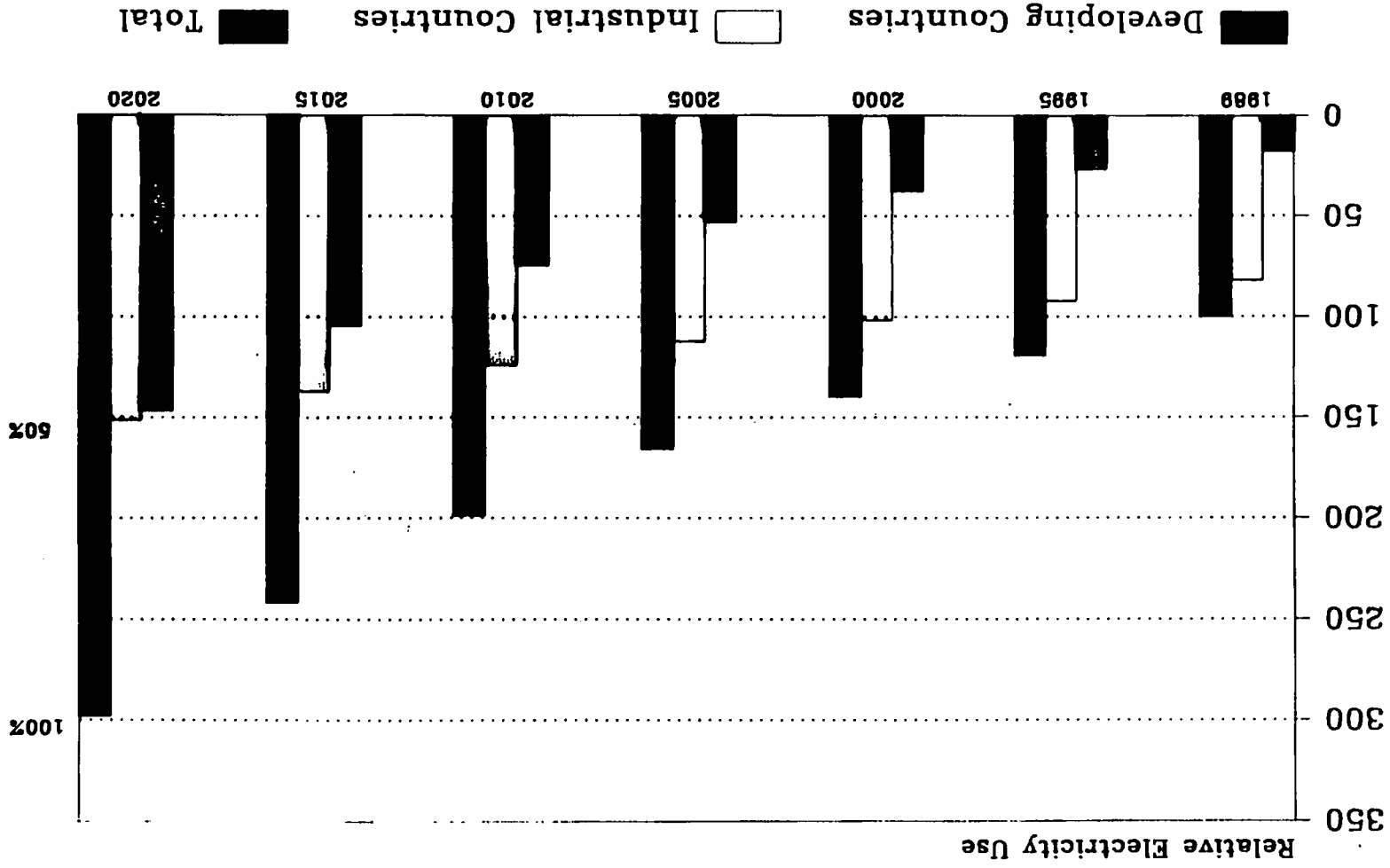
KEY BENEFITS



Sources of Financing Power Supply In Developing Countries



Changing World Use of Electricity



**INVITING CONFIDENCE
FOR
PRIVATE FINANCING
OF
ELECTRIC POWER PROJECTS**

ISSUES IN DEVELOPING COUNTRIES

- o Political and economic stability
- Insurance

- o Trained Managers and Operators

- o Revenue stream

- Price subsidies

- Need for Project

- Contract terms

- . Take or Pay

- . Build-Own-Transfer

- . Build-Own-Operate

- . Turn Key

- . Prime w/ Subcontractors

- o Political and Legislative hurdles

- Private ownership

- . Allowed

- . Encouraged

- Environmental

- Permits and Licenses

- o Expatiation of profits

- Insurance or other guarantees

- o Project control

- Labor

- . Strikes

- . Productivity

- Cost Control

- Schedule Control

PART I - DESIGN REVIEW

PROJECT FINANCING--RISK CONSIDERATIONS

MITIGATION	DEVELOPING NATIONS	INDUSTRIALIZED NATIONS	PROJECT DESIGN
<p>Use proven technology and equipment</p> <p>Critical item redundancy</p> <p>Smaller size units</p> <p>Spare parts</p> <p>Maintainability</p> <p>Use Engineers known to the potential financiers</p>	<p>Proven technology more important</p> <p>Utility grade if possible</p> <p>Difficulty of scheduling when no reserves on system</p> <p>Standards may differ</p>	<p>New technology or product</p> <p>Industrial grade a concern</p> <p>Standard designs and practices</p>	<p>Capability to perform</p> <p>Availability/Reliability</p> <p>Good Engineering Practice</p>
<p>Publish specs and receive bids in expected bidder's language</p> <p>Consider TURN KEY approach</p> <p>Strict pre-approval process</p>	<p>Language translation</p> <p>Very Important</p> <p>May require more flexibility</p>	<p>Much standard language</p> <p>Important</p> <p>Tight to control costs</p>	<p>CONSTRUCTION REVIEW</p> <p>Construction/Installation Specifications</p> <p>Construction management procedures</p> <p>Change Order Procedures</p>
<p>If training required, include with equipment and other vendor req's</p> <p>Inexpensive software available</p> <p>Include in bids</p>	<p>Important for Independent Operators</p> <p>Very Important</p> <p>Important due to long delivery</p>	<p>Important for Independent Operators</p> <p>Frequently ignored</p> <p>Often not an issue</p> <p>Rarely an Issue</p>	<p>PROJECT OPERATIONS</p> <p>Training Program</p> <p>Start-up procedures</p> <p>Maintenance and Preventive Maintenance Program</p> <p>Spare parts Program</p>

	INDUSTRIALIZED NATIONS	DEVELOPING NATIONS	MITIGATION
<p>CONSTRUCTION COST ESTIMATES</p> <p>Methodology and assumptions</p> <p>Completeness</p> <p>Compare to Similar Projects</p> <p>Time delays most concern</p> <ul style="list-style-type: none"> -Environmental -Licensing <p>Need to review:</p> <ul style="list-style-type: none"> -Travel and expenses -Labor productivity -Shipping costs -Potential for delay <p>Review List of Costs</p> <p>Hard due to differing factors</p> <p>Standard equipment and design</p> <p>Pre-assembly at factory</p> <p>Provide Data for other projects</p>	<p>Compare to Similar Projects</p> <p>Review List of Costs</p> <p>Common technique</p>	<p>Similar projects hard to find</p>	<p>Look for other industrial projects</p>
<p>CONSTRUCTION SCHEDULE</p> <p>Milestones & time for</p> <ul style="list-style-type: none"> -design -procurement/delivery -installation -start-up -shakedown and testing 	<p>Compare to similar projects</p>	<p>Look for other industrial projects</p>	<p>Look for other industrial projects</p>
<p>OPERATION & MAINTENANCE</p> <p>Completeness of estimates</p> <p>Reasonableness of estimates</p>	<p>Base on recent projects</p> <p>Data may be limited</p>	<p>Increasing concern?</p>	
<p>PERMITS, LICENSING, ENVIRONMENT</p> <p>Critical to Project Feasibility</p>			

PART II - COMMERCIAL REVIEW

(Typical Consultant Assignments)

PERFORMANCE GUARANTEES (Turn-key)

PERFORMANCE TESTING CRITERIA

LIQUIDATED DAMAGES

TECHNICAL REVIEW OF CONTRACTS

- Engineering/Procurement/Construction
- Operation & Maintenance
- Power Sales
- Thermal energy sales
- Fuel supply
- Water supply
- Waste disposal

ASSIST IN CONTRACT NEGOTIATIONS

REVIEW OF COMMERCIAL EXPERIENCE

- Owners/operators
- Vendors
- Contractors
- Architect Engineers
- Other Principal Participants

REVIEW FUEL SUPPLY

AVOIDED COST PROJECTIONS/PROJECT ALTERNATIVES

PROJECT CASH FLOW ANALYSIS

PROJECT RISK ANALYSIS

R W BECK & ASSOCIATES

30-May