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ENERGEY SECTOR ASSISTANCE
STRATEGY AND PROGRAM

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USAID/PAKISTAN'S ENERGY SECTOR ASSISTANCE

STRATEGY AND PROGRAM

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USAID/PAKISTAN'S ENERGY SECTOR ASSISTANCE STRATEGY AND PROGRAM

I. Background

Crude oil and petroleum imports remain a critical factor in Pakistan's balance of payments and budget expenditures. Import volumes increased for both crude oil and petroleum products in 1983/84 compared with 1982/83 and total petroleum import costs represented 23 % of total imports and 46 % of exports. While this is down from the peak year of 1981/82 it is still a substantial drain on reserves, especially in light of the sharp drop-off in worker remittances. Energy is the largest single element in the Sixth Five-year plan expenditures, accounting for over 40 % of the total. The bulk of these expenditures are in the power sector where large investments will be necessary to meet the severe shortfall of electricity (load-shedding in 1985 reached 2000 MW out of a system capacity of about 5000 MW.) The economic and political disruptions from this situation are becoming more severe.

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Pakistan is one of largest oil-importing countries in the developing world, despite its significant natural gas, hydro and probable coal resources. Petroleum accounts for over 38 % of total commercial energy consumption, while natural gas supplies about 41 %, hydro 15 % and coal and nuclear the remainder. This percentage will increase significantly as a consequence of growing dependence on oil as fuel for an accelerated thermal power generation plant construction program. Traditional energy sources continue to play a major role in meeting requirements for cooking and heating and supply an estimated 40 % of total energy consumption. A mix of wood, agricultural residues and dung is consumed that varies according to region and season. Pakistan has very limited forest resources and pressure on wood supplies is extreme. Pakistan wood imports amount to over \$100 million per year. Additional information on the energy sector is provided in the charts and tables attached hereto as Annex B.

With sustained economic growth over most of the past five years, energy growth has averaged over 8 % per year with an average annual population growth of over 3 %. Per capita commercial energy consumption in Pakistan is low relative to other developing countries at comparable income levels and the prospect is for continued steady growth in every demand. Neither natural gas nor electricity supplies have been able to keep up with this growth. The resultant shortages have grown over the past few years to become one if not the most serious and critical socio-political and economic development problems facing the country. The most obvious manifestation of the shortages is widespread power load shedding that often amounts to almost 50 % of the estimated demand, lasts for more than 12 hours a day in many places and begins in December and ends in June. The shortages of both natural gas and electricity will last at least until the end of the century unless drastic measures are taken to overcome them.

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Critical and growing shortages of both electricity and natural gas can be traced to the large imported oil price increases of the nineteen-seventies and attempts by the GOP to adjust and protect the country from them. Faced with the imported oil prices increases, it encouraged the use of then abundant and recently discovered national gas. The cost of producing the gas was low so its price was kept low. The low price for the gas caused the shift of cement, thermal power generation, and other high energy consumption industries to

natural gas; discouraged the development of indigenous coal reserves and hydro-electric potential and inhibited further investment in natural gas while stimulating demand including inefficient use. The primary reaction of the GOP to a slow down in oil and gas investment by the private sector was to turn to its public sector company (OGDC) and increase public investments in oil and gas.

The use of low price national gas for thermal power generation along with indirect government subsidies of the power sector permitted electricity tariffs to be kept low. This discouraged the consideration of higher cost fuels such as coal, delayed the development of higher capital cost and long lead-time hydro-electric plants and generated tolerance of high energy losses in the power transmission and distribution systems. At the same time it accelerated power demand growth and inefficient use of electricity by consumers. The accelerated demand coupled with GOP mandates to make new connections and extend service to rural areas exceeded the managerial, administrative and financial capacities and/or interests of then existing privately owned electric utilities (in Rawalpindi and Multan for example) and caused them to be taken over by WAPDA. The growth of WAPDA in its own service areas plus that caused by taking over the private firms combined to greatly over extend WAPDA's own management and administrative capabilities. The result is that today WAPDA is unable to satisfactorily perform even the water management and power generation/transmission functions for which it was established in 1959.

The GOP has taken a number of important decisions during the past four years that improve the policy environment of the energy sectors and in time, if effectively implemented, will help rationalize the sector's development and help alleviate the shortages of both natural gas and electricity. The decisions referred to in the approximate order they were taken include:

- a. to increase the price of natural gas to 2/3 the border price or import price of fuel oil,
- b. to assess and develop indigenous coal reserves,
- c. to set electricity tariffs high enough to permit self-financing by the power sector of 40 % of its capital expansion costs,
- d. to encourage fuelwood plantations,
- e. to limit the use of natural gas for power generation and require some industries to convert from natural gas to oil or coal,
- f. to induce private sector investments in large scale power generation,
- g. to reorganize the power sector and experiment with private sector participation in power distribution,
- h. to implement a comprehensive national energy conservation program, and
- i. to improve national energy planning.

II. THE CURRENT (1981-1987) ENERGY SECTOR ASSISTANCE PROGRAM

A. Objectives

Since the new economic assistance agreement was negotiated with the GOP in 1981, energy sector assistance has ~~evolved to be number one priority~~ ^{maintained a high} in both the GOP and USAID. The primary objectives of the current program are:

1. elimination of electricity load shedding,
2. elimination of natural gas load shedding,
3. support of GOP and USG balance of payment objectives,
4. private sector participation and investments in the energy sector,
5. increased other donor financing for the energy sector,
6. improved efficiency of energy production, distribution and use, and
7. strengthening of the energy sector's institutional, management and manpower base.

These objectives will also be valid for the new multi-year assistance program that is currently being negotiated for the Post '87 period.

B. Program Strategies

The strategies being followed to achieve each of the objectives:

1. ELIMINATE ELECTRICITY LOAD SHEDDING

- a. improvement of load management including the management of unavoidable load shedding and participation of the private sector in power distribution,
- b. rationalization of electricity demand through the establishment of end-user electricity tariffs based on actual costs and sound economic development criteria plus reasonable returns on investment,
- c. improvement of the operational and thermal efficiency of thermal power plants,
- d. reduction of energy losses in the power transmission and distribution systems and improve end-use efficiency,
- e. improvement of power system planning including the tying of power distribution system expansion and new electric service connection plans and programs to overall power system capacity and capability
- f. the design and initial implementation of a National Co-generation (Industry owned power generation) Program, and
- g. the installation of additional power generation capacity, including large scale plants owned by the private sector.

2. ELIMINATION OF NATURAL GAS LOAD SHEDDING

- a. accelerated implementation of natural gas pricing policies,
- b. improve and use efficiency,
- c. conversion of high energy use industries to indigenous or imported coal,
- d. formal definition of the oil and gas roles of the private sector and public sectors that give responsibility for risk developments investments to the private sector,
- e. accelerated development of low value and other long dormant gas fields, and
- f. private sector and other donor financing of gas exploration, development and infrastructure installation.

3. SUPPORT OF GOP AND USG BALANCE OF PAYMENT OBJECTIVES

- a. increase of the funding of the Energy Commodities and Equipment Program and accelerate procurements under it,
- b. optimization of technical assistance, training and commodity assistance mixes under all energy projects and accelerated project implementation,
- c. maximize the use of local capacity to provide technical and engineering assistance,
- d. development indigenous oil, gas, coal and small scale hydro-electric potential, and
- e. use of imported coal as a less expensive imported fuel than oil.

4. PRIVATE SECTOR PARTICIPATION AND INVESTMENTS IN THE ENERGY SECTOR

- a. substantial private sector participation in the Lakhra Coal Mine and Power Generation Project,
- b. assessment of the potential for private sector owned co-generation and assistance in the design and funding of a co-generation and small privately owned power generation station program,
- c. positive GOP policies and procedural responses to private sector initiatives to install large scale power generation facilities for bulk sale of power to the natural grid. Assistance to include the development of initial requests for proposals for issuance to the private sector, participation in the evaluation of proposals received, and the guidance in the negotiation of resultant contracts,

- d. pilot programs to test contractor operation of thermal power plants and power distribution systems,
 - e. determination of the financial and economic cost of load shedding and the inability to connect new customers on demand,
 - f. study of power sector subsidies and require the elimination of all except inter-sector cross subsidies that support social equity objectives,
 - g. risk sharing participation of the private sector in the development of the Dhodak and other oil and gas field,
 - h. establishment and evaluation the performance of two or three rural electrification cooperatives on a pilot program basis,
 - i. establishment of financial bond markets and the authorization of WAPDA and KESC to offer long-term, interest bearing bonds, as a means of accessing private sector capital,
 - j. a private sector monitored coal briquettes marketing study as a decision document for private sector investment.
5. INCREASE OTHER DONOR FINANCING FOR THE ENERGY SECTOR ACTIVITIES
- a. hold joint energy sector donors' coordination meeting every six months,
 - b. keep other donor's informed of actual and proposed energy projects and activities,
 - c. assist other donors to identify and design projects,
 - d. visit other donor offices when in their headquarters cities and host meetings with their team that visit Pakistan, and
 - e. co-finance projects and activities when desirable to achieve USAID program objectives.
6. PROMOTE AND SUPPORT ENERGY CONSERVATION AND ENERGY PRODUCTION, DISTRIBUTION AND END USE EFFICIENCY
- a. with the World Bank, design and support a National Energy Conservation program for power generation, power transmission and distribution, industry, transportation, buildings and energy equipment design and fabrication,
 - b. together with the World Bank, require the creation of a national energy conservation entity to study and recommend energy conservation policy, lobby for the funding of energy conservation activities, and manage the National Energy Conservation Program,

- c. design and directly or with other donors support a special program to improve the energy efficiency of the countrys 250,000 plus agricultural (irrigation) tubewells, and
- d. provide funds for the importation of energy conservation commodities and equipment.

7. STRENGTHENING OF THE ENERGY SECTOR'S INSTITUTIONAL MANAGEMENT AND MANPOWER BASE

- a. support the reorganization of the entire power sector including the establishment of a separate holding-company type entity to be responsible at the national level for power distribution,
- b. encourage the reduction in size, increases in autonomy and changes in the legal status of area electricity boards,
- c. support the identification of development models (such as American Electric Power Company in the case of WAPDA) and sector organization exchange programs (such as WAPDA has with the TVA and American Electric Power).
- d. support experiments with rural electrification cooperatives, and
- e. support the improvement and modernization of management, administration and operational systems and procedures of the entire power sector and the training of power sector personnel,
- f. support the National Energy Conservation Program including the establishment of a national entity (ENERCON) to manage it,
- g. support the improvement of national energy planning and the establishment of a separate entity (ENERPLAN) to integrate the plans of supply and demand sub-sectors,
- h. strengthen coal exploration and development capabilities of both the private and public sector,
- i. encourage an understanding and rational policy regarding the respective oil and gas roles of the public and private sector that will (safe guard the national interests while minimizing risk investment by the public sector.

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C. Current Projects and Activities

The current energy sector program supports 14 categories of activities:

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|---|---|
| a) institutional reform, | g) coal resource exploration |
| b) training, | and assessment; |
| c) private sector participation and investment, | h) coal mine development, |
| d) power generation, | i) coal briquettes, |
| e) power distribution rehabilitation and expansion, | j) energy efficiency improvement, |
| f) energy planning, | k) renewable energy, |
| | l) oil and gas development, and |
| | m) energy commodity and equipment importation. |

Support is provided for these activities under one or more of the following projects:

1. Power(Rural Electrification) Project (391-0473)
 - Institutional Improvement
 - Power Distribution Training
 - Power Distribution Rehabilitation and Expansion Master Plan
 - Guddu Combined Cycle Power Generation Project

2. Energ Planning and Development Project (391-0478)
 - Energy Analysis and Manpower Development (ENERPLAN)
 - Energy Conservation (ENERCON)
 - Coal Resource Assessment
 - Lakhra Coal Mine and Power Generation Project Feasibility
 - Coal Briquettes Marketing
 - Renewable Energy

3. Forestry Planning and Development Project (391-0481)
 - Institutional and Manpower Development
 - Farm and Energy Forestry Research
 - Field Operational Activities

4. Energy Commodities and Equipment Program (391-0486)
 - Public Sector Host Country Procurement
 - Private Sector Procurement Loans

5. Lakhra Coal Fired Power Generation Project (391-0487)
 - Coal Mine
 - Poser Plant
 - Coal Handling & Transportation

6. Project Design Fund (391-0470)
 - Special Energy Sector Studies
 - and Project Design Activities

D. MAJOR ACCOMPLISHMENTS TO 12/31/85

1. POLICY REFORM IN SUCH AREAS AS: gas and electricity pricing, domestic and imported coal, energy conservation, comprehensive planning, donor agency coordination and institutional reform.
2. ACCEPTANCE OF PRIVATE SECTOR PARTICIPATION IN: power generation and distribution, the development of OGDC oil and gas concessions, large scale coal mining, coal briquetting, energy conservation, and energy commodities and equipment importation.
3. INSTITUTIONAL REFORM: acceptance of the reorganization of the power sector, the modernization of WAPDA's power distribution administrative systems, and the establishment of a national energy conservation entity - ENERCON, a national energy planning entity - ENERPLAN, a Coal Projects Department in WAPDA, and a Power Distribution Training Department in WAPDA.
4. TECHNOLOGY TRANSFER/TRAINING: training is being provided at most levels in almost all energy sub-sectors. Technology transfers include the introduction of automated management information systems, automated wordprocessing, geophysical logging, modern environmental monitoring system, computer aided power distribution design, combined cycle power generation, modern mining technologies, large scale coal fired power generation and modern training methods and techniques. Experience with USAID project design and implementation methods and procedures through involvement in project identification and design and direct USAID contracting is also a valuable technology transfer activity.
5. OTHER DONOR COORDINATION: Development of a joint World Bank, Asian Development Bank, CIDA, British ODA and USAID strategy for Pakistani Energy Sector Development, World Bank endorsement and support of ENERPLAN and ENERCON; USAID (\$52 million)/ADB (\$141 million) Co-financing of the Guddu Combined Cycle Power Generation Project; USAID funded design of a \$100 million plus Thermal Power Plant Rehabilitation expansion of Jamshoro Power Station and the construction of a liquid fuels pipeline for possible World Bank funding; working level agreement with World Bank and ADB staff that they will each help co-financing the multi-billion dollar Power Distribution Rehabilitation and Expansion Program; and close WB-ADB-USAID Coordination of Lakhra Project feasibility studies.

III. The Proposed Post'87 Program

A. Objectives

(The same as those of the current program which are described above.)

B. Strategies

(The same as those for the current program which are described above.)

C. Programs, Projects and Activities to be funded

1. On-going Projects and Activities for which additional funding should be provided under the Post'87 program:

- a. institutional Improvement of WAPDA's Power Distribution Function and Reorganization of the Power Sector.

This activity which is currently being supported under component 1 of Rural Electrification Project 391-0473 includes the bifurcation of WAPDA to establish a new Electric Power Distribution Authority and the reform of most of the power distribution sub-sector's methods and procedures. Anticipated major policy achievements in addition to those inherent in the activities mentioned above are elimination of all but inter-sector subsidies and some degree of participation of the private sector in the management and operation of the power system.

This important institutional improvement activity will extend well into the Post'87 period and will merit continued USAID support. In Annex A, \$5 million in Post'87 Program funds have been earmarked for that purpose.

- b. Power Sector Manpower Development (Training)

Substantial training assistance (\$18.9 million) is being provided to the power distribution sub-sector under component 2 of the Rural Electrification Project and to Power Generation under the Guddu (component 4 of the R.E. project), the Lakhra (component 2b of the Energy Planning and Development Project) and the Development Support Training Projects. At present, USAID is not providing any assistance to power transmission.

The success of the institutional improvement activities described above will depend in large measure on the quantity and quality of training provided across the board to the entire power sector. That is to generation and transmission as well as to distribution. This plus USAID experience to date and the importance of training to the USAID supported Guddu and Lakhra Projects and the up-coming USAID designed and possibly co-financed Power Plant Rehabilitation Project weigh heavy in favor of USAID expanding its power sector manpower development (training) activities to include well planned comprehensive training programs for Generation and Transmission. The term comprehensive means management and administrative training as well as technical training.

It is anticipated at least \$8 million in additional USAID grant funds are needed for power sector training. Of this amount \$6 million could be provided under the on-going R.E. Project and \$2 million under the new Power Generation and Transmission Improvement and Expansion line item. This reflected in Annex A.

c. Power Distribution System Energy Loss Reduction
(Rehabilitation)

USAID is providing approximately \$ 27 million for this economically important energy conservation activity under component 3 of the Rural Electrification Project. During the course of implementing the component, it has been found that a much higher level of funding is needed. During the September 23-26, 1985 meetings with other donors, World Bank and ADB representatives agreed that this program should be expanded and promised to support it with loans of approximately \$100 million each.

USAID has had a leading role in the identification of the need and design of this activity. Given its benefits and total costs USAID should be prepared to continue supporting it under the Post'87 Program. An appropriate Post'87 level might be \$30 million. This is reflected in Annex A.

d. Guddu Combined Cycle Power Generation Project

USAID is the lead donor agency in the transfer of this new, highly efficient technology to Pakistan. The total estimated cost of the project continues to be \$360 million even though these are indication it might be finished below budget. USAID is providing \$52 million for the project under component 4 of the Rural Electrification Project. The ADB is providing \$140.9 million.

Implementation of the five year project is in its third year, and is progressing well. About \$4 millions in additional USAID grant funds might be required to cover the cost of the project engineering and management contract and possibly another \$3 to \$5 million for a training simulator that is still under study. In addition a very senior GOP representative has requested informally that funding not required at this time for component 5 of the R.E. project be used to help finance a second pair of gas turbines at Guddu or some other power generation activity. The Power Plant Rehabilitation Project is now the most likely candidate for the funds. These needs and the request are reflected in Annex A where it is proposed that \$40 millions in currently authorized R.E. project funds be shifted from Component 5 to Component 4.

e. Rural Power Distribution System Expansion (Rural
Electrification)

This is a politically important and consequently high priority activity for the GOP. Even so USAID questions the economic, financial and social validity of the program as long as the country is suffering severe power shortages and load shedding. As a consequence of this concern which existed at the time the project was being designed, a condition precedent of the R.E. Project Authorization and Agreement makes the use of project funds for rural system expansion contingent on satisfactory implementation of WAPDA's program to increase power generation capacity.

The recent tentative Mission decision is to reallocate the funds within the project to other activities as reflected in Annex A. It is reasonable to assume that the GOP will want USAID to maintain its commitment to rural electrification, even if it has to be postponed a few years. This too is reflected in Annex A where \$100 million have been earmarked for rural system expansion under the Post'87 Program.

2. Energy Planning and Development (EP&D) Project (391-0478)

The \$30 million EP&D Project assists the GOP to formulate and implement programs to plan, develop and use Pakistan's indigenous energy resources and increase the efficiency of energy use, under the policy guidance of an inter-ministerial Energy Policy Board chaired by the Minister for Finance and Planning, Mahbubul Haq with Managing Director Sadaqat Hasan Mir of the USAID supported ENERPLAN as Board Secretary. A key feature of this project has been very close coordination with the World Bank and mutual reinforcement of World Bank and USAID policy reform objectives.

a. Energy Planning & Manpower Development (Component 1) of Energy Planning and Development (EP&D) Project 391-0478

At least \$5 million in additional funds will be needed for further special energy studies and activities in the Post '87 period. These needs are reflected in Annex A.

b. Coal Resource Assessment (Component 2a of the EP&D Project)

In September 1985, U.S. Geological Survey (USGS) under a four year agreement will begin to assist the Geological Survey of Pakistan (GSP), (1) explore and assess the total coal reserves of the Lakhra & Sondha-Thatta fields, (2) integrate a National Coal Analytical Laboratory System, (3) improve GSP's Geodata Center, (4) train GSP's staff, (5) procure of drilling, logging & analysis equipment, and (6) develop a National Coal Exploration and Assessment Program. It is expected that upto an additional \$2 million will be required to complete the current program and from \$10 to \$20 million for the National Program being developed. This is reflected in Annex A.

c. Coal Mine and Power Generation (Component 2b) (Design of the 300 MW Lakhra Coal Mine and Power Generation Project)

All feasibility studies are nearing completion for this important and mammoth design effort. A number of factors including the expansion of drilling and logging activities to private sector leases and the contracting of financial planning/packaging services has increased the estimated cost of these activities approximately \$3 million. At present this additional cost is being covered by "borrowing" EP&D project funds that were budgeted for other activities. This increase in costs and the need to replace the "borrowed" funds is reflected in Annex A.

d. Coal Briquettes (Component 2c)

No funding will be required under the Post'87 Program for this activity.

e. Energy Conservation (Component 3a)

Early GOP recognition of the importance of energy conservation lead to the skipping of originally planned pilot energy audit and demonstration activities and the immediate design of a comprehensive natural energy conservation program in close coordination with the World Bank. The initial focus of the program which is now in the final stage of approval in the GOP requires an increase of \$11.4 million in USAID grant funds under the current program and an estimated \$10 million under the Post '87 Program. These needs are reflected in Annex A.

f. Renewable Energy (Component 3b)

No funding will be required for this activity under the Post'87 Program.

3. Energy Commodities and Equipment Import Program (391-0486)

Because of the fast disbursing nature and private as well as public sector focus of this Program, plus its reinforcing commodity role vis a vis the EP&D Project's technical assistance and training activities, it is proposed that up to \$50 million in additional funding will be needed before end of FY 87 and another \$100 million be added into the ECE Program for 1988-92. This is reflected in Annex A.

4. Lakhra Coal Mine and Power Generation (397-0487)

The design of this high priority project under component 2b of the EP&D project is proceeding pretty much on schedule with the PP scheduled to be submitted to AID/W for review and approval in time for the commitment of FY-86 funds. Preappraisal of the project by the World Bank is scheduled to begin in November of this year. The role of the ADB in the project will be discussed during the meetings of Sept. 23-26, 1985 with the ADB and other donors. While it is clear that most of the \$125 million earmarked under the current program will not be required until 1988 or later, it is recommended that the current funding schedule not be changed for the time being. This reflected in Annex A.

2. NEW PROJECTS AND ACTIVITIES PROPOSED FOR FUNDING UNDER THE POST' 87 PROGRAM

a. Power Generation and Transmission Improvement and Expansion

- i. Institutional Improvement
- ii. Training
- iii. Hydro Generation
- iv. Thermal Generation
- v. Transmission

Given the costs and economic and political imperatives to reduce or eliminate power load shedding as soon as possible and USAID's experience and close association with the resolution of problem, it is reasonable for USAID to dedicate a sizeable portion of Post' 87 Program funds to power generation. The need to have a place at the 'power transmission table' dictates that funding for power transmission also be contemplated. This position is supported by recent conversations with senior WAPDA officials.

An important consideration is the manner in which USAID grant funds could be used to fund the soft assistance (consulting services and training) components of projects financed by the multilateral banks and the extent to which institutional and training assistance to the generation and transmission sub-sectors would complement activities already being supported under the Rural Electrification, Guddu, Lakhra, and Development Support Training Projects.

Taking into account the unavoidably high cost of power generation and transmission projects and the number of projects that will be required to overcome Pakistan's power shortage, the \$350 million funding level proposed in Annex 'A' should be considered modest and may prove to be inadequate.

b. Oil and Gas Exploration, Development and Utilization

Assistance to the Oil and Gas subsector under the current program has been limited to the funding of seismic and other commodities and equipment under the ECE program and technical assistance for the evaluation of proposals and the marketing of the Dhodak field. The Ministry of Petroleum and Natural Resources would like additional USAID assistance.

Several officials of the GOP have expressed an interest in substantial institutional reform within its oil and gas sector. Thought is also being given to an expanded role for the private sector. At the same time there is widespread frustration and dissatisfaction within the government and the general public regarding the slow pace of the development of long discovered gas fields such as Dhodak.

USAID should support interests within the GOP to reform the oil and gas sector and to accelerate oil and gas exploration and development. Such support would complement energy planning, energy conservation and power generation activities already being supported by USAID under other projects and open another window for USAID support of private sector initiatives.

A key element of possible institutional improvement activity could be the definition of and support for the respective public and private sector roles in the oil and gas sector on the basis of sound, economic and risk management criteria. In the past year alone, OGDC and its private sector joint venture partners and other lease holders have through increased oil production three fold to over 40,000 barrels per day. At \$26/barrel, this increased production is worth over a quarter of a billion dollars in foreign exchange each year.

One activity that shows considerable promise and bridges the power and oil-gas sub-sector in the accelerated development of several low BTU quality gas fields as fuel sources for gas turbines. A request has just been received from WAPDA to fund feasibility studies for the development of Nandipur and Panjpir fields for this purpose.

The \$50 million funding level proposed in Annex "A" is estimated to be large enough to give USAID an audible voice at the oil and gas policy dialogue table but small enough to give confidence that all the funds could be efficiently used by the sector. In no case would USAID funds be used for field development drilling rigs unless they were for the private sector through appropriate commercial loan mechanisms. A primary use of the leverage derived by the proposed funding level would be the accelerated development of low calorific value gas fields and the tying in of small gas fields to regional or the natural gas pipeline system.

c. Private Sector Energy Finance Facility

A fundamental cornerstone of the GOP's Sixth Five Year Energy Plan is the expansion of private sector role in Pakistan's energy development. This policy has continued to be supported by the GOP in the past 2-1/2 years of that Plan, most recently by the Cabinet's decision in the Summer of 1985 to promote further private sector power generation and co-generation. The Private Sector Window of USAID's ECE Program has been the Mission's first start in the direction of augmenting funds available to the private sector for equipment for energy development. It has become clear, however, that additional funding is needed for loan financing of pre-feasibility studies, feasibility studies, and private sector energy development projects such as coal power generation, industrial coal conversion and co-generation, small hydroelectric power projects, oil and gas exploration, and the manufacture of critical energy equipment or coal products such as briquettes.

In support the GOP's private sector policies in this important area, it is proposed that up to \$ 100 million be made available through one or more appropriate commercial financial institutions (preferably American banks) to finance the foreign exchange costs of such predominant private sector energy projects.

d. Energy Related Environmental Planning and Development

Rational and Purpose: In view of the Sixth Five-Year Plan's emphasis on development of indigenous energy sources such as coal, a program to develop and strengthen Pakistan's institutional capability to assess and mitigate adverse environmental impacts of large scale energy development projects (especially coal) is essential to the long-term success and public acceptance of these projects. The GOP expressly intends to complete the Lakhra Coal Mine

and Power Generation Project during the Seventh Five-year Plan and to simultaneously initiate an expanded program of coal-based power generation utilizing Pakistan's estimated coal reserves of 1.2 billion-tons, which are among the largest in South Asia, and to convert industrial plants such as cement kilns from use of oil and natural gas to coal. Even without coal firing, the uncontrolled emissions of dust from cement kilns in this rapidly growing industry is a major and highly visible source of air pollution in industrial areas. As the manufacturing sector in Pakistan expands, disposal of hazardous wastes will become a critical problem such as is currently being witnessed in industrial nations such as the United States. Pursuit of these and other power and industrial expansion programs, which are very much in line with U.S. foreign assistance objectives for Pakistan, must be accompanied by an appropriate and rational environmental planning strategy, in order to avoid economically deleterious impacts on human settlements, agricultural croplands, and valuable forest resources.

Description: The proposed project, through a combination of technical assistance, commodity support, and institutional and manpower development, would assist Pakistan at a critical stage in the development of its energy sector. The project would provide a long-term expatriate environmental advisor, as well as up to four short-term (one month) expatriate experts per year, who would supply technical assistance as well as carry out short-term in-country training activities. Advanced professional and academic training in environmental sciences, engineering, and management would be provided to two students per year in appropriate U.S. educational institutions. Environmental monitoring and source testing equipment, with ancillary laboratory apparatus and data handling systems would be supplied to enable collection and processing of energy production-related environmental data on existing facilities (Pakistan currently has 12 fossil fuel steam electric power plants) as well as new facilities, either planned or under construction in various parts of the country. The goal of the project would be to develop the necessary infrastructure for designing and implementing a development-oriented strategy for energy-related environmental planning. In addition to building institutional capacity for environmental planning in the energy sector, the proposed project would contribute to and strengthen environmental capabilities in other important development sectors as well, such as water supply, sanitation, public health, environmental hygiene, agriculture, forestry, and manufacturing. A slate of new (albeit small, at least initially) private sector professions would also be created, such as in environmental sciences, engineering, and management. The presence of these elements in academic and professional circles would foster the inclusion of socially responsive environmental planning as a necessary and economically desirable component of Pakistan's total development strategy.

The duration of this activity would be 5 to 6 years and would require about \$10 million in grant funds. The least staff intensive way to design the activity, get funds authorized for it and manage its implementation would be to include it in the up-coming amendment to the Energy Planning and Development Project.