# THE IMPLEMENTATION OF ENERGY POLICY IN PAKISTAN

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This thesis is my own work and all sources used have been acknowledged.

Latif

( ABDUL LATIF )

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## A NOTE ON CONFIDENTIALITY

A substantial amount of the information and data for this thesis was obtained by extensive interviewing and receiving confidential information while undertaking field-work in Pakistan. In order to maximize the effectiveness of interviews, firm assurances had to be given that the identity of the persons who were willing to provide information and materials would not be disclosed. Information received in interviews is referenced by the name of the affiliated institution and the year during which the interview was conducted.

## ABSTRACT

This thesis examines the implementation of energy policy in Pakistan. It analyzes the implementation process by studying the implementation of major policy initiatives and projects during the 1947-88 period. The study demonstrates that the implementation of public policies is not a straight forward administrative action. It is fraught with uncertainties and is affected by numerous problems which are difficult to be fully anticipated at the policy formulation stage. Policies and programs unfold as they are implemented. This is particularly true for Pakistan where public interest is not articulated at the policy formulation stage. The interest groups become active during the implementation stage to safeguard their interests. The policy in fact evolves in the course of implementation implying an ongoing dynamic of policy development, modification, and execution. The implementers also exercise considerable discretion to affect changes in the original policy intents.

The study identifies a number of factors which influenced the implementation of energy policy in Pakistan during the study period. The findings of the study are therefore

illustrative of the dominant paradigms of the policy implementation research. Nevertheless, the present study suggests refinements to the conventional wisdom associated with prominent concepts of the policy implementation literature: refinements inspired by the identification of implications in the context of Pakistan's energy policy as well as the identification of additional factors critical for implementation success in specific situations. The study demonstrates that these factors are of two categories: core factors; and contingent factors. The core factors are universally applicable, while the contingent factors are situation-specific. The core factors identified by the study are: formal policy; project formulation; implementation strategy; institutional structure and procedures; organizational capacity; interorganizational coordination; organizational control and accountability; and the affected interests. The contingent factors recognized by the study are: technology; bureaucratic politics; bureaucratic apathy and resistance to change; political support/ influence; related issues; the timing; personality interplay; international agencies; international politics/events; and bureaucratic corruption. The categorization of factors has an analytic value for implementation analysts and practitioners.

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# CHAPTER I

# INTRODUCTION

## STATEMENT OF THE PROBLEM

This study sets out to analyze through theoretical discussion and case studies the implementation of energy policy in Pakistan. The particular focus is on the identification and analysis of the factors which influenced the implementation of projects and programs in the energy sector during the 1947-88 period, that is, from independence in August 1947 to the end of the Sixth Five Year Plan. A major objective is to provide a better and more reliable basis for understanding the implementation of energy policy in this country. Due to non-availability of detailed implementation data on the Seventh Five Year Plan (1988-93) and beyond, the study period extends to the end of Sixth Five Year Plan. It covers a variety of policy initiatives and projects undertaken during the 1947-88 period to provide an extensive coverage of the problem.

This study of the implementation of energy policy in Pakistan is a pioneering study. The policy implementation process in Pakistan has escaped the proper attention of researchers so far. Even in the western developed world, the study of policy implementation is relatively youthful discipline. In their seminal study, Implementation, Pressman and Wildavsky noted how little attention had been devoted to the implementation process. Their study demonstrates that the policy implementation stage of the public policy process is full of uncertainties and that implementation difficulties can render the best planned policy useless[1]. Since their work appeared in 1973, literature on implementation has expanded exponentially in the developed world, particularly in the United States of America. However, one notes a paucity of rigorous research on the topic in Third World countries. The situation in Pakistan appears to be more depressing, particularly in respect of energy sector, where it is nonexistent. Successive regimes in this country have focused their attention upon what macro policy paths ought to be undertaken, or upon the planning and policy making process in order to find methods of making better policies by more careful alternative assessments. Consequently, the energy sector in Pakistan has received high priority and substantial financial allocations since independence in August 1947. The thrust of Pakistan's energy policy has been from the very beginning to reduce its dependence on the imported energy and the development of energy resources sufficient to sustain its targets of economic growth. Assessment of energy requirements has taken place in the light of development objectives after careful alternative evaluations. Pakistan's first medium term plan "Six-Year Development Programme (1951-57)" allocated (Rs.470 million) about 18 percent of the total development outlay of Rs.2,600 million for the development of fuel and power resources[2].The Six Year Plan was, however, replaced by Pakistan's First Five Year Plan (1955-60) in 1955 when Pakistan embarked upon the path of planned development in a coordinated way. Table-1.1 below depicts the public sector outlays for energy resources development from the First to the Sixth Plan which increased from 12.4 percent of the total public sector outlays during the First Five Year Plan (1955-60) to 38.2 percent during the Sixth Five Year Plan (1983-88). Taking into account the private investment, the overall development outlays for the energy sector have increased from 11.7 percent during 1970-78 to 17.2 percent and 23.1 percent during the Fifth and Sixth plans respectively[3].

The implementation dynamics, however, have rendered the achievement of energy policy goals and targets in this country, over time, increasingly unpredictable and delayed.

## TABLE 1.1

## PUBLIC SECTOR ENERGY DEVELOPMENT OUTLAYS (1955-88)

(Million Rupees)

| Plan* Period | Power | Fuels | Renewables | Total Energy | Total Public Sector Outlay |
|---|---|---|---|---|---|
| First Plan (1955-60) | 575 (11.8) | 32 (0.6) | - (-) | 607 (12.4) | 4863 (100.0) |
| Second Plan (1960-65) | 1165 (11.0) | 128 (1.2) | - (-) | 1293 (12.2) | 10606 (100.0) |
| Third Plan (1965-70) | 1571 (11.9) | 189 (1.4) | - (-) | 1760 (13.3) | 13204 (100.0) |
| Annual Plans (1970-78) | 10880 (14.4) | 2961 (3.9) | - (-) | 13841 (18.3) | 75544 (100.0) |
| Fifth Plan (1978-83) | 28119 (18.4) | 10597 (6.9) | 114 (0.1) | 38830 (25.4) | 152610 (100.0) |
| Sixth Plan (1983-88) | 87400 (28.7) | 27500 (9.0) | 1600 (0.5) | 116500 (38.2) | 305000 (100.0) |

* Outlays outside ADP (Annual Development Programme) financed by private investment are not included. Fifth and Sixth Plan allocations include the entire plan allocations. Figures in parentheses indicate percentage share.
Source: Government of Pakistan, The Sixth Five Year Plan 1983-1988, pp.513 & 516.

The supply of energy has lagged behind demand. The gap between commercial energy requirements and production in Pakistan rose from three million tons of oil equivalent in 1971 to five million in 1980 and surpassed the eight million mark in 1990.[4] The situation has consistently deteriorated over the years. In 1987, the per capita consumption of primary energy in Pakistan was only 207 kg. of oil equivalent which was about 1/35th of the U.S. average.[5] As of June 1986, only about 20 percent of the population had access to electricity.[6] The import bill for petroleum and petroleum products has increased over the years. During 1987-88,it was US $ 988 million against total export earnings of US$ 4454 million.[7]

The process of development entails an expansion in industrial and transport sectors, mechanization of agriculture, urbanization at an accelerated pace, increased use of household electrical gadgets and the shift in consumer demand toward energy-intensive products. The rate of socioeconomic development is, therefore, dependent upon the availability of energy. The widening gap between demand and supply of energy in Pakistan has not only stalled the growth of the national economy, but also has tested the patience of the people to the limits. The power shortfall has become one of the major politico-economic issues of Pakistan since the 1980s. Table 1.2 reflects the gravity of the situation which shows that load-shedding in the country has been increasing since 1981 both in terms of duration and

# TABLE 1.2

## ACTUAL LOAD SHEDDING ON WAPDA POWER SYSTEM

## FROM 1981 TO 1985

| Year | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. | Oct. | Nov. | Dec. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1981** | | | | | | | | | | | | | |
| a. Minimum (MW) | - | - | 8.4 | 200 | 47 | 22 | 29 | 50 | 12 | N.S. | 60 | 210 | - |
| b. Maximum (MW) | - | - | 191.4 | 200 | 246 | 200 | 29 | 477 | 56 | N.S. | 60 | 360 | - |
| c. Days | - | - | 23 | 1 | 6 | 13 | 1 | 14 | 12 | - | 1 | 14 | 85 |
| d. Reason | - | - | P.S. | P.S. | P.S. | P.S. | P.S. | P.S. | P.S. | - | P.S | P.S | - |
| **1982** | | | | | | | | | | | | | |
| a. Minimum (MW) | 100 | 100 | 42 | 100 | 150 | 300 | 400 | N.S. | N.S. | N.S. | 58 | N.S. | - |
| b. Maximum (MW) | 250 | 750 | 750 | 400 | 250 | 400 | 700 | N.S. | N.S. | N.S. | 150 | N.S. | - |
| c. Days | 25 | 21 | 19 | 21 | 5 | 20 | 28 | - | - | - | 14 | - | 153 |
| d. Reason | P.S. | P.S. | P.S. | P.S. | P.S. | P.S. | P.S. | - | - | - | P.S. | - | - |
| **1983** | | | | | | | | | | | | | |
| a. Minimum (MW) | 200 | 54 | 150 | 38.6 | 3.6 | 9 | N.S. | N.S. | N.S. | N.S. | N.S. | N.S. | - |
| b. Maximum (MW) | 1000 | 1000 | 300 | 300 | 25.8 | 9 | N.S. | N.S. | N.S. | N.S. | N.S. | N.S. | - |
| c. Days | 31 | 16 | 25 | 2 | 2 | 1 | - | - | - | - | - | - | 52 |
| d. Reason | P.S. | P.S. | P.S. | P.S. | P.S. | P.S. | P.S. | - | - | - | - | - | - |
| **1984** | | | | | | | | | | | | | |
| a. Minimum (MW) | 150 | 200 | 200 | 200 | 250 | 200 | 19 | 22.2 | 7.5 | 74 | 0.2 | 712.5 | - |
| b. Maximum (MW) | 600 | 600 | 850 | 912 | 1453.3 | 900 | 365 | 188 | 18 | 700 | 74.1 | 1176 | - |
| c. Days | 18 | 28 | 31 | 30 | 31 | 30 | 8 | 16 | 14 | 13 | 8 | 8 | 240 |
| d. Reason | P.S. | P.S. | P.S. | P.S. | P.S. | P.S. | P.S. | P.S.&G.S. | P.S. | P.S. | G.S. | P.S. | - |
| **1985** | | | | | | | | | | | | | |
| a. Minimum (MW) | 374 | 150 | 104 | 700 | | | | | | | | | |
| b. Maximum (MW) | 1298.4 | 560 | 1330 | 1400 | | | | | | | | | |
| c. Days | 31 | 27 | 31 | 30 | | | | | | | | | |
| d. Reason | P.S. | P.S. | P.S. | P.S. | | | | | | | | | |

N.S. Nominal Load-Shedding,
P.S. Power Station Load-Shedding
G.S. Grid Station Load-Shedding

Source: Office of the Chief Engineering Adviser, Ministry of Water and Power, Government of Pakistan, June 1985.

megawatts. It has become a problem to live with the whole year round instead of just during a few winter months.

Due to an ever increasing supply-demand gap, the Government was gripped by a sense of frustration in 1983 when the Minister for Water and Power admitted that load-shedding was a 'tragic necessity'.[8] The impact of the widening gap between demand and supply of power on the socioeconomic life of the country can be described as calamitous.

The Pakistan Times in its editorial on January 31, 1983 commented on the situation as follows:

> WAPDA (Water and Power Development Authority) has at last told the truth we were dreading to hear: electricity has fallen far short of demand and may remain so for quite some time. Load-shedding, borne with patience during the winter months, will have to be continued during most of the summer when heat will test the civilians' power of endurance. The crisis predicted for the last decade of the century is already upon us. According to the latest statement, the present cycle of load-shedding will continue beyond March-April; it will have to be endured up to June which is the peak summer month ... This will be compounded by an increased demand for power[9].

The Khyber Mail reported on 12 June 1984 that 'nearly 200 people were arrested' in Ghazi, a place adjacent to Tarbela Dam (the largest hydroelectric power station in the country), for demonstrating over load-shedding which continued for several days at a stretch.[10] The Pakistan Times reported on 25 June 1986 that as a result of load-shedding in Karachi, people took to the streets and the police had to use tear gas to disperse them. Twenty-four persons were injured .[11]

The Association of Cottage Industry claimed in 1985 that gas and electricity load-shedding had caused the closing down of 7,000 cottage industry units, rendering about 20,000 workers jobless[12]. The Chamber of Commerce and Industry released a report in 1985 which indicated that there had been a 15 percent decline in industrial production since the introduction of gas and electricity load-shedding.[13]

The Pakistan Times, in March 1985, commented:

> The citizen in Lahore, as elsewhere in the country, ... is submitting stoically to six to eight hours of disconnection in a day. This is the third season of hardship ... Most businesses are on the downturn and the disruptions in the industrial sector, especially reliant on heavy machinery that takes hours to warm up, are expected to affect the budget targets and the six percent growth target of the 6th Five Year Plan.[14]

According to a report of the Lahore Chamber of Commerce and Industry, industrial and agricultural sectors in the Punjab and NWFP suffered a loss of Rs. 9 billion during 1983-84 as a result of a decline in production due to load-shedding of electricity[15]. The Pakistan Times reported in 1985 an 'unprecedented drop in the production of 400 up-country steel rerolling mills owing to repeated power supply interruptions'[16]. According to another news report in 1985, cement production in the country dropped by 50,000 tons owing to load-shedding of power between January and April 1985, which caused shortage of cement in the country[17]. According to a survey report, the industrial sector suffered a production loss of 35 to 55 percent during 1983-84 due to load-shedding of gas and electricity[18]. The Pakistan Times in an editorial in May 1985 commented:

> There is no denying the fact that power shortage has badly affected the nation's economy. Over a lakh (100,000) of tube-wells are affected, resulting in serious repercussions in the agriculture sector. The power crisis has almost crippled our business and industry. Reduced industrial output has scuttled exports and foreign exchange earnings are down[19].

On another occasion in 1985, The Pakistan Times observed:

> Last year's switch-offs affected approximately 4,285 industrial units in the province [of Punjab] adversely. These units, which produce 55 percent of

> the country's consumer goods, had to take a capacity cut of 30 percent causing a collective loss of revenue to the tune of Rs. 40 million daily amounting to a total loss of Rs. three billion during the load-shedding six-month period[20].

During 1984-85, the area under wheat crop in Punjab province declined to 5,165,700 hectors, representing a shortfall of 1.6 percent compared to 1983-84. Inadequate canal withdrawals and insufficient working of tube-wells owing to load-shedding of electric power were responsible for this decline. The sown area further suffered as load-shedding continued to stall the operation of tube-wells during the wheat season[21].

The President of Gujranwala Chamber of Commerce and Industry, on 25 January 1985, stated:

> Industrial production and wages of piece rate workers have decreased by 50 percent and production costs have increased by 50 percent as a result of 30 percent power load-shedding[22].

The Federal Minister for Production disclosed in January 1986 that 69 industrial units run by the Ministry of Production would 'suffer a loss of Rs. 140 crores (Rs. 1.4 billion) during 1985-86 due to power load-shedding'[23].The Government admitted in 1988 that the shortages of energy supply had been a 'formidable problem' for the country during the last decade or so[24].

The implementation of energy policy has important implications for making investment decisions. The availability of energy is one major determinant of the rate of capacity expansion or the speed at which economic development projects can be developed. In the absence of a standard or general framework within which the implementation of energy policy can be analyzed, the investors in Pakistan generally base their investment decisions on the projections of energy policy planners and assurances of implementers, who are equally handicapped in this respect. The inability of planners and implementers as well as investors to assess, with a reasonable degree of precision, the realization of energy policy goals and targets has caused wastage of huge amounts of investment. The Chairman of the Water and Power Development Authority (WAPDA), for example, assured the business community in 1981 that there would be "no shortage of power in 1983 and consequently there should be no apprehensions on the part of entrepreneurs whether the required power for the projected undertakings would be available or not"[25]. However, in February 1983, the Chairman of WAPDA (incidentally the same person) announced that a sum of Rs. 10 billion was required annually to stave off the power shortages in the country[26]. The Minister for Planning and Development assured that the Government would spend Rs.105 billion during the 1986-90 period to generate additional 3,500 MW of power by 1990 to end load-shedding in the country[27]. The authors of the Economic Survey, 1985-86, however, believed that 'the power generation crisis is likely to persist even beyond 1990'[28]. A survey released in 1985 pointed out that an investment of over Rs.5 billion was estimated to be lying idle due to non-availability of gas and electricity connections.[29]

The uncertainty about the availability of energy has also impeded foreign investment in this country. The President of Lahore Chamber of Commerce and Industry, who led a trade delegation to South Korea and Japan, on his return stated in a press conference in February 1986 that during talks with concerned Ministers, officials and private entrepreneurs, the delegation had come to the conclusion that they were reluctant to start joint ventures in Pakistan due to the energy crisis here[30].

There is, therefore, a considerable interest in the development of an adequate framework within which the implementation of energy policy can be analyzed. It is important to ask what are the factors which influence the realization of energy policy goals and targets and whether, indeed, there may be more predictability in energy policy implementation than appears at first sight. From this analytical perspective, the thesis aims to extend the existing literature on energy policy implementation by developing a more comprehensive framework within which these problems can be studied. The approach developed focuses on multifarious variables that influence the implementation of energy policy in Pakistan.

## THE DYNAMICS OF POLICY IMPLEMENTATION

Numerous studies have been conducted on the implementation of public policies since the early 1970s and the academic literature about the implementation has expanded considerably. These studies include cases of implementation success or failure in diverse policy sectors. Various approaches have been suggested for the study of policy implementation recognizing multifarious variables or factors considered crucial for implementation success. It would, therefore, be instructive to survey the literature to find out what approach should be applied to study the implementation of energy policy in Pakistan. The following pages analyze the implementation research to choose an appropriate approach for the present study.

The fulfillment of public policies requires that some one do something (or stop doing something) and that the actions have the desired effect. The decisions made in carrying out a policy are referred to as implementation, and the effect on the ultimate target as the impact.[31] Pressman and Wildavsky define implementation 'as a process of interaction between the setting of goals and actions geared to achieve them'[32]. Grindle suggests that 'the task of implementation is to establish a link that allows the goals of public policies to be realized as outcomes of governmental activity'[33]. According to Paul Berman:

> Implementation is the carrying out of an authoritative decision, i.e., a policy choice...Implementation analysis is not about whether a policy's goals are fit and proper, which is a matter of values; nor does it concern itself with how they are chosen, which is a study of policy-making... Implementation analysis is... the study of why authoritative decisions (policies, plans, laws, and the like) do not lead to expected results... it is the study of the conditions under which authoritative decisions do lead to desired results[34].

Mazmanian and Sabatier, who focus their attention primarily on regulatory policies, define "implementation" as follows:

> Implementation is the carrying out of a basic policy decision, usually made in a statute (although also possible through important executive orders or court decisions)... the implementation process normally runs through a number of stages beginning with passage of the basic statute, followed by the policy outputs (decisions) of the implementing agencies, the compliance of target groups..., the actual impacts---both intended and unintended---of those outputs, the perceived impacts of agency decisions, and finally, important revisions (or attempted revisions) in the basic statute[35].

Mazmanian and Sabatier hold that 'the crucial role of implementation analysis is to identify the factors which affect the achievement of statutory objectives throughout this entire process'[36]. They recognize the following three broad categories of factors: '(1) the tractability of the problem(s) being addressed by the statute; (2) the ability of the statute to favorably structure the implementation process; and (3) the net effect of a variety of "political" variables on the balance of support for statutory objectives'[37]. They argue that problems are most tractable if (1) there is a valid theory connecting behavioral change to problem amelioration; the requisite technology exists; and measurement of change in the seriousness of the problem is inexpensive; (2) there is minimal variation in the behavioral practices which cause the problem; (3) the target group constitutes an easily identifiable minority of the population within a political jurisdiction; and (4) the amount of behavioral change is modest. The ability of the statute to structure implementation is most likely to succeed if (1) it incorporates a valid causal theory linking behavioral change to desired impacts; (2) its objectives are precise and clearly ranked; (3) it provides adequate funds to the implementing agencies; (4) the number of veto points in the implementing process is minimized and sanctions/inducements are provided to overcome resistance; (5) the decision rules of the implementing agencies are biased toward the achievement of statutory objectives; (6) implementation is assigned to agencies which support the legislation's objectives and will give the program high priority; and (7) the provisions for outsider participation are similarly biased through liberalized rules of standing and by centralizing oversight in the hands of statutory supporters. According to them, "Political" or non-statutory variables affecting implementation include: (1) socio-economic conditions and technology; (2) media attention to the problem; (3) public support; (4) attitudes and resources of constituency groups; (5) support from sovereigns; and (6) commitment and leadership skill of implementing officials[38].

In a critique, Benny Hjern, however, states that it is inconceivable that 'implementing officials' have an interest in keeping low the 'ability of a statute to structure implementation'. 'Clear and consistent objectives in a statute', assumed to be positively related to the ability to structure and to implementation success, may actually inhibit and hinder the implementing officials from using their 'leadership skills' provided these depend upon relations to resourceful outsiders.[39] The importance of such bilateral monopolistic relations have also been stressed in research on implementation success in environmental policy.[40]

Edwards[41] and Larson[42] identify concrete and operational implementation variables. Communication (transmission, clarity, consistency), resources (staff, information, authority, facilities), dispositions or attitudes of implementers, bureaucratic structure (standard procedures, fragmentation), and complexity are identified by Edwards, whereas, the variables considered important by Larson are policy goals, implementation procedures, complexity, and changes in economic environment.

Martin Rein and Francine Rabinovitz[43] suggest that the implementation process should be examined in relation to three variables: (1) the respect for legal intent; (2) civil servants' concern for instrumental rationality; and (3) the general expectation that concerted action requires consensus both within the implementing agencies and in their external political system. Paul Berman[44] focuses on the latter two variables in his analysis of the implementing stages of federal social programs. He emphasizes the adjustments that programs go through as they wind their way through federal bureaucracies resistant to change and local service delivery organizations which are sensitive to their immediate political environments and to the desires of "street-level" professionals. Implementation factors considered important by him are: clarity of policy goals; number of actors participating; implementers' degree of resistance, ineffectualness, or inefficiency; and degree of control exerted from top.

Bardach[45] provides a somewhat different approach by focusing on the potential obstacles to the marshaling of the multitude of programme elements necessary for the realization of statutory objectives. The unifying metaphor permeating his analysis is that the implementation process should be conceived as a series of games involving the efforts of numerous semiautonomous actors to protect their interests and gain access to programme elements not under their control -- all within the face of considerable uncertainty and the context of general expectations that something will be attempted consistent with the legal mandate.

Donald Van Meter and Carl Van Horn[46] provide a systems model of the implementation process involving the following factors affecting programme performance: (1) policy standards and resources (basically funds); (2) support for those policies in the political environment; (3) economic and social conditions; (4) characteristics of implementing agencies; (5) communication of policy standards and other decisions within and among implementing agencies; (6) incentives to promote compliance with policy decisions; and (7) the policy dispositions of implementing officials.

Nakamura and Smallwood's[47] approach explores the policy process over its entire length, and does not confine itself to the implementation stage. However, these authors focus exclusively on a subset of political factors, and omit intra- and inter-organizational interactions. Implementation variables important to them are: specificity of policy, technical limitations, actors, arenas, organizational structures, bureaucratic norms, resources, motivations, communication networks, and compliance mechanisms. McLaughlin[48] and Radin[49], although they recognize the interaction between policy and implementation, both focus their analysis primarily on the implementation stage and on the relevant bureaucratic actors in that part of the process. McLaughlin considers that institutional context especially organizational climate and motivations of the participants has major impact on policy implementation.

Pressman and Wildavsky[50] and Bardach[51], each basically generalizing from a richly detailed case study, pay equal attention to the policy environment and how the emergence of policy later affects its implementation. Implementation variables highlighted by Pressman and Wildavsky are: multiplicity of participants, perspectives, decision points, intensity of preferences, and resources. An even more complex and systematic concept of implementation is proposed by Majone and Wildavsky[52], Rein and Rabinovitz[53] and Fudge and Barrett[54] who call implementation "evolutionary", "circular", and "interactive and recursive", implying an ongoing dynamic of policy development, modification and execution. It is argued in their writings that policy is not just made and implemented, it is adapted through continuous interaction between those making policy through legislation and those making policy through implementation.

Paul Berman sees two basic implementation strategies that can be pursued: 'programmed' and 'adaptive'. The programmed approach calls for "clarity, precision, comprehensiveness... of the preliminary policy or design specification"[55], and "diagnoses implementation problems as arising from at least three sources: (1) ambiguity in policy goals resulting in or caused by misunderstanding, confusion, or value conflict; (2) participation of too many actors with overlapping authority; and (3) implementers' resistance, ineffectualness, or inefficiency"[56]. The adaptive approach calls for the establishment of a process that allows policy to be adapted according to the unfolding interaction of the policy with its institutional setting, and contemplates that implementation problems arise because of the oversimplification and rigidity of goals, the failure to engage relevant actors in decision-making, and the excessive control of deliverers. Policies and programs 'unfold' as they are implemented. And this unfolding can be a highly contentious, 'political' process, because different entities engaged in implementation can have very different views about not only what a policy is and what it intends to achieve, but also views about how a programme should be implemented and who should act in what particular ways[57]. Stone notes: 'If one looks at case histories of implementation, the pervasiveness of conflict is hard to ignore. Effective implementation is the joint result of a combination of programme features, agency behavior, and target group reactions'[58].

Grindle[59] argues that implementation is an ongoing process of decision making by a variety of actors, the ultimate outcome of which is determined by the content of the programme being pursued and by the interaction of the decision makers within a given politico - administrative context. Implementation is, therefore, visualized as a political and administrative process. The content of policy determines the interests affected, type of benefits, extent of change envisioned, site of decision making, programme implementers and the resources committed. The context of the policy relates to the environment in which administrative action is pursued. Here, the power, interest and strategies of actors involved, institutions and regime characteristics, and the compliance and responsiveness of the public or target groups are crucial. In the words of Grindle:

> What is implemented may thus be the result of political calculus of interests and groups competing for scarce resources, the response of implementing officials and the action of Political elites, all interacting within a given context[60].

Mileti contends that 'variables which cause or have an effect on implementation can be grouped into five categories: (1) the policy system, (2) the community system, (3) the jurisdictional structure, (4) decision maker perception of policy demand pattern,and (5) the legislative decision'[61]. 'Policy System' includes: policy content, goal specificity, the policy source, and the commitment of the source to its policy, exhibited frequently in the form of resources made available to the implementing jurisdiction. 'Community system' refers to (1) the attitudes and resources of target group(s), (2) characteristics of the jurisdiction's population such as social,economic and cultural environment, community values, demand for or against the policy, and (3) collective experience of the jurisdiction's population. 'Jurisdictional Structure' means the configuration of the power and decision making structures in a jurisdiction and its bureaucratic capacity influenced by resources (financial and personnel) and intra and interorganizational relations. Policy demand pattern can either be integrated or fragmented. He argues that policy implementation is likely to be more effective if the pattern is integrated. The perception of demand pattern by the legislative decision makers, which is the result of an interaction between the political pressure and their values, determines the adoption of a policy and the force with which it is implemented. Reasonable policy demand and agreement upon realizable goals are an important condition of policy success. Pertinent issues in a debate (if there is one) over adoption and implementation are often revealed in the media operating in the jurisdiction's area. The legislative decision encompasses the decision to adopt and implement a new policy as well as the goal specificity, the system of implementation, and the administration of policy[62].

Harold Wolman's[63] framework for explaining and understanding program performance identifies two distinct processes: the formulating process; and the carrying out process. According to this framework, each process consists of a number of components. The formulating process consists of (i) problem conceptualization, (ii) theory evaluation and selection, (iii) specification of objectives, (iv) program design, and (v) program structure. The carrying out process consists of (i) resource adequacy, (ii) management and control structure, (iii) bureaucratic rules and regulations, (iv) political effectiveness, and (v) feedback and evaluation. Wolman argues that program success is affected by 'problems or inadequacies in one or more of the components in either the formulating stage or the carrying out stage or both'.

Renate Mayntz[64] holds that public bureaucracies while acting as agents of policy implementation have significant margins for discretionary action in the fulfillment of their tasks. The nature of the tasks and the extent of central control influence the margins of discretion. The tasks assigned to the public agencies provide the basis for their existence, but their actions are largely oriented towards the achievement of organizational goals such as (i) domain extension, (ii) conflict avoidance, (iii) saving energy, and (iv) obtaining resources. As these goals are considered crucial by the public agencies for their survival, they receive priority attention. The output of public bureaucracies is, therefore, dependent not upon the policy input only but largely on the actual behavior of public agencies in the implementation phase. Robert Levine asserts that policy is "implemented by program operators who may or may not be in sympathy with the plans, may or may not have even understood them, but in any case will certainly be governed by their own motives and imperatives, both personal and programmatic"[65]. For successful implementation, Elmore[66] points out, the implementing agencies must learn the new policy, shape it and claim it.

Montjoy and O'Toole[67] argue that an organization's response to external mandates is influenced by: the 'goals' and 'world view' of the 'dominant coalition'; the set of existing routines; and the nature of the mandate. The 'dominant coalition' refer to 'a sizable portion of an organization's membership' who share beliefs and preferences and normally get their way in the direction of organizational activities, while a consistent set of preferences and beliefs about cause and effect relationships exhibited by such a group is termed as the 'goals' and 'world view' respectively. They hold that an organization is somewhat bound by its own goals, world views, and routines so that its ability to respond to a new mandate or to cooperate with another organization may be limited. These limitations may be overcome if the new mandate coincides with the goals, world view, and routines of the organization or if new resources are provided or if the mandate details the required action with sufficient specificity so that sanctions can be invoked. In intra-organizational implementation situations, they recognize four possible combinations based on two characteristics of mandates which determine the expected activity in respect of implementation of a policy. The characteristics they recognize are: (1) specificity of the mandates and (2) the amount of new resources which accompany them. The mandates may be specific or vague as to the expected administrative action and they may or may not provide new resources. These two dimensions yield four possible combinations as given in Figure 1.1 below.

**FIGURE 1.1**

**CHARACTERISTICS OF MANDATES**
**DESCRIPTION OF EXPECTED ACTIVITY**

| Provision of New Resources | Vague | Specific |
|---|---|---|
| Yes | A | B |
| No | C | D |

Adopted From: Montjoy, R.S. and L.J.O'Toole, Jr., op.cit., P.466.

Type A presents a situation when the mandates are vague, but resources are provided. This allows the highest degree of discretion to organizations with established routines, and gives the dominant coalition an opportunity to focus new activities in accordance with its own goals and/or world view. Type B (resources with specific directions) mandates call for agency action in a particular direction. If these mandates do not significantly clash with the value system of the organization, the agency action in the desired direction is the most likely outcome. Type C (vague without resources) mandates are likely to be ignored by the implementing agencies. Type D (specific without resources) mandates force the organizations to rearrange their priorities and thus in the long run help increase their discretion in carrying out the new activities[68].

The literature on organization theory suggests that the public sector is never a fully integrated hierarchy but must rather be seen as a highly differentiated macro-system of organizations, a net work which is more or less hierarchized by virtue of existing vertical lines of communication, but which is basically made up of relatively autonomous elements[69]. Interorganizational implementation situations are, therefore, fraught with added complexity. Montjoy and O'Toole[70] also attempted to develop a predictive theory in interorganizational implementation situations. The implementation factors they highlight are: policy specificity; resources; agency goals; routines; world view; technical requirements of the task; facilitator; perceived risk for implementers; and structure of interdependence. They used Thompson's typology[71] with some modification to explain the effects of the type of interdependence on the implementation of a policy. Three types of interdependence are recognized: pooled, sequential, and reciprocal. Pooled interdependence depicts a situation when the agencies involved are required to provide their contributions without dealing with each other. Sequential interdependence occurs when the output of one unit is the output of another. Reciprocal interdependence refers to the situation when the units involved pose contingencies for each other. He argues that in situations where the inputs of two or more organizations are required to implement a policy, coordination plays a significant role for the successful implementation. The chances of success may be enhanced if coordination problems are conceived and solved keeping in view the type of interdependence relationship. To achieve the requisite cooperation, according to them, three forms of inducements are crucial: authority (cooperation deriving from a sense of duty); common interest (cooperation because each participant values the goal); and exchange (cooperation to receive in return something other than achievement of the goal)[72].

Smith[73] recognizes six stages of the policy cycle: (i) issues and agenda building; (ii) formulating policies and programs; (iii) policy form and content; (iv) policy and program implementation; (v) impacts and evaluation; (vi) policy revision and termination. In developing countries, he argues, interests are not 'articulated' and are hardly 'aggregated' in the agenda building or policy formulation stage of policy cycle. Policies are inflicted upon target groups who are suspicious and reluctant to cooperate with Government authorities. The affected groups and individuals, therefore, articulate their interests during the policy implementation stage. Since public bureaucracies are responsible for policy implementation, they bear the burden of efforts at policy modification to suit the individual or group needs which may subvert the general purposes of the policy being implemented.

Grindle shares this view and states: 'To a much greater extent than in the political systems of the United States and Western Europe, the process of implementing public policies is a focus of political participation and competition in the countries of Asia, Africa and Latin America'[74]. He argues that the policies in the developing countries are seldom the result of demands and pressures from competing interest groups or political parties for various reasons. They may be undeveloped or suppressed by official government policy. The leaders in political and administrative positions consider the participation in policy formulation process as illegitimate or inefficient.

In authoritarian regimes, politics is detested and the opposition is eliminated. The governments, therefore, initiate policies without consultation with interested or affected individuals and groups. Interested and affected groups and individuals become active in the implementing stage when they see an imminent danger to their interests[75].

James Scott holds that a "large proportion of individual demands, and even group demands, in developing nations reach the political system, not before laws are passed, but rather at the enforcement stage"[76]. Myron Weiner states: "Organized groups largely influence the administration rather than the formulation of policy"[77].

In a wide-ranging discussion of administration in the Third World, Riggs, concludes:

> Since the clientele is unable to organize or exercise political influence to modify the rules, its primary strategy involves direct pressure upon the officials concerned with policy implementation, to secure a suspension of the rules or to speed the provision of authorized services[78].

Hoole describes the context of Third World development policies and programs as follows:

> Development activities frequently take place in an unstable and highly political setting. This will result in changing programs and priorities and in

problems in implementing and evaluating development activities. Factors such as high turnover of office-holders and bureaucrats, domestic conflict and strife, an inflationary economy, uncertain funding for the budget, changes in the international economic order, famines, and unemployment may mean that development planning is not meaningful, that development activities are not implemented as planned, that changes are made as the activity is implemented, or that the activity never occurs. Furthermore, many development activities involve substantial changes in the traditional way of life and result in resistance by the population to both the program and its implementation[79].

Peter Bowden[80], after examining thirty articles/books discussing 'implementation' problems in developing countries lists the following most frequently mentioned problems in rank order:

1. Involvement/motivation of the target group;
2. Necessity for institutional or legal change;
3. Coordination and cooperation between contributors;
4. Systems for on-site managing of the project or program;
5. Political will, or political consensus necessary for the support of the program;
6. Monitoring and evaluation leading to reevaluation and redesign of the project or program;
7. Knowledge and attitudes of the target group;
8. Availability of local currency funds.

Another study[81], which documented the results of interviews with officials in three large international assistance agencies, identifies 67 implementation problems under the following seven main headings:

1. Ineffective project planning and preparation;
2. Faulty appraisal and selection processes;
3. Defective project design;
4. Problems in start-up and activation;
5. Inadequate project execution, operation and supervision;
6. Inadequate or ineffective external coordination of project activities; and
7. Deficiencies in diffusion and evaluation of project results and follow-up action.

A study group[82] of Planning and Development Division, Government of Pakistan studied 98 major projects, costing more than Rs.50 million, spreading over a period of five years (1978-83) and found that 73 out of 98 projects experienced delay ranging from 2 to 35 years compared to their original schedule. The group identified 20 most frequently observed causes posing constraints for implementation as mentioned below, out of which first 10 related to defective project formulation. The implementation problems identified by the study group are as follows:

1. Lack of proper surveys/ feasibility studies.

2. Incorrect assumptions.

3. Lack of inter-agency discussions to settle coordination problems beforehand.

4. Underestimation of costs and exaggeration of benefits to show favorable benefit-cost ratio.

5. Wrong locations of the projects under political or other pressures including organizational convenience and preferences.

6. Change in scope made by the executing agencies generally without any reference either to the controlling Ministry or to the central planning agency.

7. Frequent revisions.

8. Preparation of piecemeal schemes by splitting major projects in small schemes with an intention to avoid detailed scrutiny by the central planning authorities.

9. Cost escalation due to inflation and frequent devaluation of currency.

10. Misuse of the system of anticipatory approval. The implementing agencies in Pakistan are permitted in emergency situations, for a limited period, to implement projects in line with overall policy directives without getting approval of the appropriate central planning authority. This provision was misused in a number of cases and the projects were not submitted for approval for a number of years and substantial expenditures continued to be incurred.

11. Shortage of funds/Delay in releases.

12. Shortage of inputs.

13. Delay in signing loan agreements/provision of technical documents.

14. Wrong internal priorities.

15. Non-appointment of full-time project director.

16. Slow progress by contractors contractors lacking requisite expertise and resources.

17. Lack of interorganizational coordination.

18. Disturbed political situation.

19. Natural calamities.

20. Poor management procedures/practices.

## A MODEL OF POLICY IMPLEMENTATION

The foregoing discussion demonstrates that diverse approaches have been suggested for the study of implementation problems. It portrays that there are few hard and fast rules about what makes for successful implementation, and what works in one setting may fail in another. Some believe in 'programmed' approach, while others stress that local factors and characteristics unique to specific implementation contexts have a strong and direct effect on outcomes. Some hold that successful implementation follows a general model of implementation that proceeds sequentially from given policy to project, programme, or "street-level" execution, while others argue that it must unfold in particular settings. Laurence J. O'Toole Jr.[83], after examining more than 300 products covering almost all major fields of policy published in 40 research journals for the past ten years concluded in 1986 as follows:

> One thing that would likely be noticed at the outset is the welter of views concerning the principal components and the operation of the implementation

> process itself. Researchers do not agree on the outlines of a theory of implementation nor even on the variables crucial to implementation success[84].

Existing perspectives on the implementation process itself can be distinguished by how "open" or "closed" the implementation process they envisage is, how simply unidirectional or how complex it is, and how implementation is subsumed in the process linking policy with action. These views are conceptualized under two approaches for the study of implementation problems: the sequential closed approach; and the holistic approach.

The proponents of the sequential "closed" approach, such as Edwards, Larson, Mazmanian and Sabatier, and Van Horn, envisage implementation to proceed sequentially from given policy to project, programme, or 'street-level' execution and they focus on a particular subset of the policy implementation process. They recognize concrete and operational variables with universal application. Many of their analytical variables, of course, relate to the relevant policies and their contexts. But, in spite of the sensitivity displayed by many of them toward politics, policy, and contextual variables, they essentially limit their concern to what happens after policy is articulated in statutes, regulations, or court decisions. In other words, they see implementation as a closed subsystem---a system that transforms given policy inputs into actions that take the form of programme or project outputs. This approach may have pragmatic value in limiting the domain of analysis and enabling clear specification of a few salient variables. However, it runs the risk, as does any circumscribed analysis, of asking the wrong questions and of leaving important factors out of account. The variables which are crucial in one situation, may have little effect in another situation.

The "holistic" approach portrays an "open" and complex view of the implementation process and posits that policy implementation involves far more than a mechanical translation of goals into routine procedures. The proponents of this approach, such as Majone and Wildavsky, Rein and Robinovitz, Fudge and Barrett, Paul Berman, and Grindle, have argued (as discussed in the preceding pages) that implementation is often a contentious, highly political process, executed by fragmented groups of administrators guided by their own goals, world views and routines. Policy is not just made and implemented, it is adapted through continuous interaction between various actors. A variety of factors ranging from the availability of sufficient resources to the structure of inter-governmental relations, from the commitment of officials to the reporting mechanisms within the bureaucracy, from the political leverage of opponents of the policy to accidents of timing, luck and seemingly unrelated events intervene between the statement of policy goals and their actual achievement in the society. The holistic approach does not limit the domain of analysis and recognizes the multiplicity of interactive implementation variables: contextual, organizational, environmental, and perceptual. This conceptualization of the policy implementation process views the transformation of intent into action as a continuous interactive process.

The implementation of energy policy in Pakistan has been studied by adopting the holistic approach. This approach qualifies for selection because the empirical research on the topic is non-existent and the implementation variables are multifarious. The setting is fluid and differentiated exhibiting fundamental ideological cleavages and instability in political and administrative institutions and processes. Elections for political leadership are not held regularly and supremacy of the political sector over the bureaucratic has yet to be established resulting in continued defusion of policy-making and policy implementation roles. Thus, one can not be sure as to the particularity of factors affecting implementation of public policies under such vacillating environment. As such the holistic approach is more appropriate in explaining the complexities of energy policy implementation in Pakistan.

While applying this approach in studying the implementation of energy policy in Pakistan, the policy process will be visualized to begin with the identification of problem(s) or goal(s) providing the impetus for policy development, followed by the formulation of policy which spell out both goals and the means for achieving those goals, translating them into specific programs and carrying out a set of operations that delivers programs to their intended beneficiaries. The factors/variables affecting the implementation of energy policy will be visualized as constituents of the overall environment encompassing policy formation, program specification and field implementation. The policy process will be examined with an open view and not against a particular list of variables. The variables will be identified in the light of continuous interaction between various actors in different situations which may encompass the tractability of the problem, perceptions of the issue-related community of organizations, institutional or individual actors, the clarity of objectives, the program design, the implementation environment, the structures, procedures, norms and resources of implementing agencies, the degree of sustained public support, the attitudes and resources of constituency groups, the ongoing backing of political and bureaucratic sovereigns, and so on.

**THE METHODOLOGY**

This is an empirical study. Apart from the relevant published research work in the books, journals, magazines and newspapers, the sources of information for this study are the official reports and records, memoranda, correspondence and minute papers of the organizations responsible for the formulation and implementation of energy policy in Pakistan. The unpublished information was collected from the organizations though personal contacts. Interviews were also held with a number of officers who must remain anonymous.

The problems faced in collection of data can be imagined from the type of information sources identified above. Research into contemporary administrative issues and policies is fraught with innumerable difficulties. The public servants by training are secretive, cautious, and suspicious. No one likes to be quoted. They are afraid of repercussions, in many cases quite justifiably. To find contacts and then create rapport with them looked like an insurmountable problem initially. Repeated assurances that their names would be kept secret, persistent persuasion, and perseverance, however, paid some dividends. The cooperation received from the organizations varied in degree, which is partly reflected by the space devoted to various energy sub-sectors.

Data for this study were mainly collected during October 1984 - July 1985, when the researcher visited Pakistan for this purpose, and July - December 1990. The data on the implementation of the Sixth Plan were mainly collected during July - December 1990 as the same was not available in 1985. The study covers the implementation of energy policy during the 1947 - 1988 period, that is, from the inception of Pakistan up to the end of the Sixth Five Year Plan (i.e., 30 June 1988). The case study of the Kalabagh Dam project was developed on the basis of information available up to May 1990. The Seventh Five Year Plan was implemented during the 1988-1993 period. Thus, it was not possible to collect any useful implementation data during the data collection phase of this study. The public servants in Pakistan are highly protective in this regard. Hence the study does not go beyond the Sixth Five Year Plan.

Since this thesis is concerned with the implementation of energy policy in Pakistan, the findings and conclusions are, therefore, descriptive of the dynamics of implementation in this sector of the national economy. However, their usefulness to understand policy implementation processes in other sectors is not totally irrelevant, as contextual variables tend to influence the organizational processes and behavior on similar lines.

## ORGANIZATION OF THE STUDY

The study is divided into seven chapters. The present chapter has provided a general introduction to the study and outlines its major parameters. It discusses the dynamics of policy implementation and outlines contextual variables as identified by various research studies to provide conceptual framework for implementation analysis. It also describes the approach adopted for studying the implementation of energy policy in Pakistan.

Chapter II provides an overview of the project approval mechanism and describes the institutional arrangements for the implementation and formulation of energy policy in Pakistan. It analyzes the structure, functions and the roles of organizations responsible for the formulation and implementation of energy policy in Pakistan.

Chapter III provides an overview of energy policy in Pakistan. It traces the evolution of energy policy from 1947, when the country got independence, to the Sixth Five Year Plan, indicates the underlying assumptions expressively noted by the policy makers, and identifies major projects conceived to realize policy goals.

Chapters IV , V and VI analyze the implementation of the energy policy. Chapter IV analyzes the achievement of policy objectives, plan targets, and the implementation of various projects. Major focus is on the power sub-sector. The case studies on 'power commission', 'rural electrification', 'railway electrification', 'power losses', 'nuclear power', and 'National Energy Policy Committee' have been included to elucidate implementation dynamics of energy sector in Pakistan. Chapter V examines the implementation of Kalabagh Dam Project which is considered to be the linchpin of future power system of Pakistan. It highlights the political involvement of people as well as the provincial governments and international organizations in the implementation processes of this project of national importance. This represents a typical case of political polarization in a developing country. Chapter VI examines the implementation of new and renewable sources of energy. The implementation of biogas and solar energy projects in two provinces of Pakistan, namely, the N.W.F.P. and Baluchistan, has been analyzed. This represents a typical case of bureaucratic manipulations to show results with scant regard to the achievement of overall policy objectives.

The concluding chapter (Chapter VII) identifies the factors which influence the implementation of energy policy in Pakistan. This chapter presents a summary of the major findings of the study and considers the implications of these findings for those interested in implementation of public policies, particularly in the energy sector. It concentrates on how the findings of this study can be utilized in similar situations to formulate and implement public policies.

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# CHAPTER II

# INSTITUTIONAL FRAMEWORK FOR POLICY FORMULATION AND IMPLEMENTATION

## INTRODUCTION

The implementation of public policies in Third World countries is typically carried out by the public bureaucracy. In a country like Pakistan, beset with political instability, policy formulation is also substantially left to bureaucratic ingenuity. An understanding of the bureaucratic structures of the implementing organizations has, therefore, special relevance for implementation analysis in Pakistan.

The purpose of this chapter is to provide an overview of the institutional framework of the organizations responsible for the formulation and implementation of energy policy in Pakistan. As policies are translated into programs and projects, an understanding of the project approval mechanism helps one to comprehend the dynamics of policy implementation in the country. The chapter, therefore, begins by providing an outline of the project approval mechanism.

## PROJECT APPROVAL MECHANISM

The National Economic Council (NEC) is the highest policy making body of Pakistan in economic matters. It is headed by the head of the government (Prime Minister or President/Chief Martial Law Administrative, whosoever is in charge) and its members are derived from the federal as well as from the provincial governments. The federal government is represented by cabinet ministers in charge of ministries dealing with finance, economic affairs, commerce, production, industries, communications, railways, education, food, agriculture and cooperatives, health and social welfare, housing, works, labor and manpower, information and broadcasting, local government and rural development, petroleum and natural resources, water and power, Kashmir affairs and northern areas, and the Deputy Chairman of the Planning Commission. The provinces are represented by the chief ministers, finance ministers and the chairmen of the provincial Planning and Development Boards. The NEC can appoint any committees or bodies of experts or any officials and technocrats to assist it in the performance of its functions.[1] The functions of the NEC are as follows:

1. To review the overall economic situation.
2. To formulate plan with respect to financial,

commercial and economic policies and the economic development of Pakistan. In formulating such plans, the Council will be guided by the principles of policy set out in Chapter 2 of Part II of the Constitution.

3. To approve:
    (i) The Five Year Plan.
    (ii) The Annual Development Program.
    (iii) All Federal and Provincial Schemes.
    (iv) All non-Plan schemes.
    (v) Schemes in the Private Sector.

4. To review implementation of development projects and programs during the preceding year, with particular emphasis on major schemes.[2]

The Planning and Development Division of the federal government formulates guidelines for the preparation of development schemes/projects in accordance with the policy principles approved by the NEC. The development schemes/ projects relating to their fields are prepared by the executing agencies in the light of guidelines of the Planning and Development Division. As indicated above, the NEC has the basic responsibility for the approval of all development schemes. However, it has delegated its powers to various federal and provincial authorities for the approval of schemes falling within certain financial limits and subject to certain conditions as indicated in Annexure-I. These limits are periodically revised. The Finance Division and Planning and Development Division of the federal government play the central role for the sanctioning of all development schemes. The agreement of these two is necessary even in cases where the provincial governments and ministries or agencies of the federal government have approval powers.[3]

The Executive Committee of the NEC (ECNEC) is the highest authority for the approval of development schemes/ projects. All development schemes (presently costing more than Rupees 60 million) which are beyond the competence of other authorities or do not have the approval of the Finance and/or Planning and Development divisions, are submitted by the implementing agencies to the Planning and Development Division through their respective Ministries/ Governments for approval by the ECNEC. It is also responsible for the day-to-day business of the NEC. The ECNEC is headed by the federal Minister for Finance and its membership comprises the ministers in charge of planning and development, economic affairs, commerce, communications, food, agriculture and cooperatives, housing, works, industries, production, water and power, petroleum and natural resources, science and technology, information and broadcasting, and secretary of defence from the federal government and the ministers in charge of planning and finance, the chief secretaries and the chairmen of the planning and development boards from the provincial governments.[4]

The Central Development Working Party (CDWP) is responsible for approving the federal schemes costing between Rupees 20 million and 60 million. The Secretary of Planning and Development Division is its convener. Its other members are: the Secretary of Finance Division; the Secretary of the division to which the scheme belongs; and the Chairmen of the Planning and Development Boards from all the provincial governments. The federal ministries are empowered to approve their own development schemes costing below Rupees 20 million. For this purpose, each ministry has a Departmental Development Working Party (DDWP) which is headed by the Secretary of the ministry/division with membership comprising some officers of the division and a representative of the Finance Division.[5]

Each province has a Provincial Development Working Party (PDWP) consisting of Chairman of the Planning and Development Board as Convener, and the Secretary of the Finance Department, and the Secretary of the Department concerned as members. The PDWP has the power to sanction all schemes up to and including Rupees 60 million.[6]

It is apparent from the preceding paragraphs that the bureaucracy is responsible for the preparation and approval of development schemes costing up to and including Rupees 60 millions. The civil servants in the Finance and Planning and Development Divisions also substantially influence the decision making process in the case of larger schemes through their advice to the ministers.

## ENERGY SECTOR ORGANIZATIONS

According to the Constitution of Pakistan, the Federal Government has exclusive responsibility for the exploration, exploitation, development and all the related matters including taxes, prices, etc. in respect of mineral oil, natural gas and the minerals for use in generation of nuclear energy. The other minerals, including coal, are the responsibility of the provincial governments as well. Geological survey is also the federal subject. 'Electricity', is on the concurrent legislative list.[7]

The Federal control in respect of oil, gas and power (including nuclear energy) is reflected institutionally in development policies and in funding. The National Energy Policy Committee (NEPC) is the highest national body which is responsible: (a) to review the progress of implementation of the current energy policies of the Government; and (b) to formulate short term and long term energy policies. The Committee is co-chaired by the Minister for Finance and the Minister for Petroleum and Natural Resources. The Director General, New and Renewable Energy Resources, Ministry of Petroleum and Natural Resources is the Secretary of the NEPC. The membership of the Committee comprises the Chairman of the Pakistan Atomic Energy Commission and the secretaries of six ministries, namely, petroleum and natural resources, water and power, planning and development, industries, production, and agriculture.[8] The Committee is assisted by the technical experts from the Directorate General of the Ministry of Petroleum and Natural Resources, Energy Section of the Planning and Development Division, Pakistan Atomic Energy Commission, Water and Power Development Authority, Oil Companies Advisory Committee, and the gas production companies.[9]

The implementation of Pakistan's energy policy is mainly the responsibility of the Ministry of Petroleum and Natural Resources, the Ministry of Water and Power, and the Pakistan Atomic Energy Commission. A few other agencies make marginal contributions.The Planning and Development Division is involved in the approval and monitoring of all development projects/schemes. The Ministry of Finance is involved at the project approval stage as well as during the implementation stage in matters relating to the provision of finances. Details of the energy sector organizations are presented below.

## MINISTRY OF PETROLEUM AND NATURAL RESOURCES

The Ministry of Petroleum and Natural Resources (P&NR) is responsible for the exploration and development of oil, gas, coal and non-fuel mineral resources. The executive head of the ministry is the Secretary who is a generalist administrator belonging to the Civil Service of Pakistan (CSP). He stays in the ministry on the average for about three years to be replaced by another CSP officer. The professionals working in the ministry are not considered for this coveted appointment. The functions of the ministry are as follows:

a. All matters relating to oil, gas and minerals at the national and international level;

b. Geological Survey of Pakistan;

c. Administration of "Regulation of Mines and Oil fields and Mineral Development (Federal Control) Act, 1948" to the extent applicable to oil and gas including liquefied petroleum gas and the rules made thereunder;

d. Federal agencies and Institutions for promotion of special studies in mineral resources;

e. Administration of Petroleum Products (Development Surcharge) Ordinance, 1961 and the rules made thereunder;

f. Administration of the Natural Gas (Development Surcharge) Ordinance, 1967 and the rules made thereunder;

g. Import, refining, distribution, marketing and pricing of oil;

h. Petroleum concessions, administration of Pakistan Petroleum Production Rules, 1949, import of machinery equipment, etc. for exploration and development of oil and natural gas;

i. Export of gas, liquefied natural gas and liquefied petroleum gas, pricing of natural gas and liquefied petroleum gas;

j. Administration of Marketing of Petroleum Products (Federal Control) Act, 1974 and the rules made thereunder;

k. Undertakings wholly or partly owned by Government in the field of oil, gas and minerals;

l. Energy Policy and development of renewable sources of energy.[10]

The ministry is divided into: technical wing; and non-technical wing. The functions of the ministry relating to the petroleum sector are performed by the technical wing consisting of four technical Directorates-General. The matters relating to the exploration and development of other minerals, including coal, are the responsibility of the non-technical wing. In addition to its usual administrative functions, the coordination relating to development projects of oil, gas and energy sector including coordination for the

World Bank (IBRD) and IMF Review Missions is also the responsibility of the non-technical wing.[11]

The distribution of work amongst the Directorates-General of the technical wing is as follows:[12]

a. Directorate General (Oil): Import of crude oil; Import of products; Supply of indigenous crude; Refining of crude oil; Oil Distribution, Storage, Movement, Marketing and Pricing; Operation of inland freight margin pool; Refineries; Pakistan State Oil Company (PSO) and Pakistan-Arab Refinery Ltd. (PARCO); Development Projects relating to Oil.

b. Directorate General (Petroleum Concessions): Exploration, Development and Operation of oil and gas fields; Monitoring of drilling and production; Agreements, Concessions, Contracts and Leases; Development Projects relating to Petroleum Concessions.

c. Directorate General (Gas): Purification, Transmission and Distribution of gas; Pricing of gas at well-heads and consumption points; Sui Gas Transmission Company; Indus Gas Company Ltd.; Karachi Gas Company Ltd.; Sui Northern Gas Pipeline Ltd.; Production and Distribution of Liquefied Petroleum Gas; Development Projects relating to gas.

d. Directorate General (New and Renewable Energy Resources): Energy Planning; Energy conservation; Renewable energy resources (development, demonstration, research, etc); Energy Statistics (energy analysis and studies); National Energy Policy Committee (NEPC); Development Projects relating to non-conventional energy resources. (This Directorate was initially set up as the Energy Resources Cell in 1974, to act as the counterpart to the UNDP sponsored Energy Resources Survey Project).

The Ministry of Petroleum and Natural Resources controls a number of organizations. Those amongst them which are involved in the energy related activities are discussed below.

**The Oil and Gas Development Corporation (OGDC)**

The Oil and Gas Development Corporation (OGDC) is a fully Government owned company with headquarters at Islamabad. It is responsible for oil and gas exploration and development. It was established in September 1961 with the assistance of USSR as a result of a Government decision to enter directly in oil and gas exploration in the wake of suspension of exploration by the private companies at the end of 1960. The Oil and Gas Development Corporation Ordinance, 1961 states that 'the functions of the Corporation shall generally be to plan, promote, organize and implement programs for the exploration and development of oil and gas resources, and the production, refining and sale of oil and gas, and such other functions as the Central Government may, from time to time, assign to the Corporation.'[13]

The 'general direction and superintendence of the affairs of the Corporation' vests in a Board of Directors consisting of 'not less than three and not more than five Directors', one of whom has to be the representative of the Ministry of Finance. The Board is required by OGDC Ordinance 'to act on commercial considerations having due regard to public interest generally',[14] and is guided by the policy instructions given to it by the Government from time to time. The Ministry of Petroleum and Natural Resources appoints the Directors and amongst them the Chairman of the Board of Directors. The Chairman is the Chief Executive of the Corporation. The Chairman and the Directors are mostly the generalist administrators who are sent there on deputation for about three years term. The staff of the Corporation have slim chances of promotion beyond the position of General Manager which is subordinate to the Director. The General Managers usually have much more professional experience than their bosses. The Corporation has its own fund to which the Federal Government subscribes. It has considerable autonomy in financial matters, but the control is applied through the Finance Director appointed by the government who is basically a generalist and trained not to go beyond rules and regulations.[15]

The OGDC has been expanding over the years and (as of

May 1985) has 3,432 regular employees consisting of 695 officers (including geologists, geophysicists, drillers, engineers, electronic specialists and production engineers) and 2,737 staff. Functionally, the Corporation is divided into following departments: Exploration; Drilling; Procurement; Production; Engineering; Corporate Planning; Technical Services; Finance; and Administration. It has also established an Oil and Gas Training Institute (OGTI) for the training of OGDC professionals in various disciplines.[16]

**Pakistan State Oil Company Limited (PSO)**

The Pakistan State Oil Company Limited (PSO) is an oil marketing public limited company. The Federal Government has a direct holding of 25.51 percent of the shares and the Government financial institutions own 49.60 percent of the shares. The overall supervision of the company rests with the Board of Management constituted by the Ministry of Petroleum and Natural Resources under the Marketing of Petroleum Products (Federal Control) Act 1974. The Chief Executive of the Company is the Managing Director who is appointed by the Ministry of Petroleum and Natural Resources. The PSO was established on 30 December 1976 to increase national participation in the marketing of petroleum products, storage and distribution.[17]

**Pak-Arab Refinery Limited (PARCO)**

The Pak-Arab Refinery Limited (PARCO) is a public limited company and was registered in May 1974. The company is a joint venture between the Government of Pakistan and the Emirate of Abu Dhabi with the Government of Pakistan controlling 60 percent of the equity capital. Under the project, it was planned to lay a 16 inch pipeline from Karachi to Multan (864 km) for oil transportation and construct a refinery at the Multan end of the pipeline. The refinery part of the project was, however, shelved in 1978 'until such time as the additional refining requirements of the country were determined and the geographical economies of the refinery were firmed up'.[18] The pipeline project was completed in March 1981. The PARCO Pipeline System has the capacity to transport petroleum products from Keamari (Karachi) up to a village Gujrat near Multan. PARCO functions primarily as a carrier on behalf of the marketing companies, viz. Pakistan State Oil Company (PSO), Pakistan Burmah Shell (PBS), and Caltex. In emergencies, products from two refineries in Karachi (viz. Pakistan Refinery Limited (PRL) and National Refinery Limited (NRL)) can also be transported through 8 inch spur lines directly into the PARCO pipeline system.[19]

The management of the company vests in a Board of 10 Directors including the Managing Director, who is the Chief Executive of the Company. Six Directors including the Managing Director and Chairman are appointed by the Ministry of Petroleum and Natural Resources. The remaining four are the representatives of the Abu Dhabi National Oil Company.[20]

**Gas Companies**

There are four public limited gas purification and transmission companies which are controlled by the Federal Government through the Ministry of Petroleum and Natural Resources.These companies are as follows: [21]

a. **Sui Gas Transmission Company (SGTC):** The SGTC is responsible for purification and transmission of gas by pipeline from Sui to Karachi and other parts of Sindh in the South.

b. **Sui Northern Gas Pipelines Limited (SNGPL):** The SNGPL is responsible for purification, transmission and distribution of gas from Sui and Meyal fields to the consumers in the provinces of the Punjab and NWFP.

c. **Indus Gas Company Limited (IGC):** The IGC is responsible for gas distribution in Sindh.

d. **Karachi Gas Company Limited (KGC):** The KGC is responsible for distribution of gas and LPG in Sindh and Baluchistan (excluding areas covered by IGC). IGC and KGC are planned to be merged together.

**Geological Survey of Pakistan (GSP)**

The GSP is primarily responsible for collecting and providing geological information about the country. Its main functions include: 'preparation of geological maps; mineral evaluation; tectonic and geological maps based on the field investigation; preparation of reports on deposits of minerals; analysis of rock/minerals/sediments samples; test drilling operations in connection with reported existence of minerals in the country; and interpretation of aeromagnetic survey and follow up ground investigation in the mineralized areas of the country.'[22] Besides, its normal functions, the GSP also undertakes specialized studies such as studies on ground water, engineering geology, seismic hazard problems, etc. at the request of various national developmental agencies. The GSP is staffed by professionals such as geologists, geophysicists, drilling engineers and qualified technicians. It is headed by a Director General who is appointed by the Ministry of Petroleum and Natural Resources. The head office of the GSP is located at Quetta.[23]

**The Hydrocarbon Development Institute of Pakistan (HDIP)**

The Hydrocarbon Development Institute of Pakistan (HDIP) was established in September 1971 with the 'responsibility of researching and suggesting conventional and non-conventional means of increasing the production of hydrocarbons (oil and gas) based on the existing sources, and providing testing facilities for quality control of petroleum products and inter fuel substitutions'.[24]

The main laboratories and facilities of the HDIP have been established in Islamabad and Karachi. Besides, three Petroleum Testing Centres at Quetta, Lahore and Peshawer are operating since 1981. The CNG Refueling Station and CNG Laboratory was established at Karachi in 1982. The HDIP Laboratories provide a wide variety of technical services and testing facilities and can carry out 150 tests in accordance with ASTM and IP methods. The HDIP is headed by a General Manager appointed by the Ministry of Petroleum and Natural Resources.[25]

**Pakistan Mineral Development Corporation (PMDC)**

The Pakistan Mineral Development Corporation (PMDC) is a private limited company established under the Companies Act 1913 and is wholly owned by the Federal Government. It was established in July 1974 for the exploration and exploitation of the mineral wealth of the country. As a part of its mineral development efforts, it has made substantial coal discoveries. The production from its coal mines in 1983-84 was 220,416 tonnes which was about 12 percent of the reported total production in the country.[26]

The management of the Corporation is the responsibility of a Board of Directors comprising nine Directors including the chairman, who is the Chief Executive of the Corporation. Two of the Directors, namely Director (Finance) and Director (Technical), have to be full-time. The remaining six Directors are Ex-officio, consisting of Joint Secretary (P&NR), Joint Secretary (Ministry of Production), Director General of Geological Survey of Pakistan, a representative of the Pakistan Railways, a representative of National Development Finance Corporation, and the Secretary, Department of Industries, Government of the North-West Frontier Province. The Corporation is, therefore, controlled by the generalist CSP officers. The Chairman and the other Directors are appointed by the Ministry of Petroleum and Natural Resources. PMDC is a large organization employing around eight thousand staff including professionals. As of June 1984, it employed 7,619 persons, out of which 4,485 were employed in the coal projects of the Corporation.[27]

## MINISTRY OF WATER AND POWER

The Ministry of Water and Power is responsible for: 'all matters relating to Power and Water Resources, Indus Basin Treaty, 1960, and Indus Basin Works, electricity and electric utilities taken over under Economic Reforms order, 1972'.[28] In respect of Power, the Ministry administers two main Acts, namely, the Electricity Act of 1910 (modified in 1964) and the Water and Power Development Authority (WAPDA) Act of 1958. The policy planning for the development of water and power resources of the country is its main task. Besides, it coordinates the activities of the operational organizations under its control as well as coordinates with other organizations of the energy sector. The organizations under its control submit their plans to it for submission to the Planning and Development Division and the Ministry of Finance.

The executive head of the Ministry is the Secretary who is usually a generalist administrator belonging to the

Civil Service of Pakistan. The other officers of the main stream are also generalists. However, the Office of the Chief Engineering Advisor is the principal advisor of the Ministry in respect of all matters relating to water and power. The main responsibilities of the Office of the Chief Engineering Advisor are as follows:

a. To examine the schemes prepared by the Water and Power Development Authority in the fields of Water and Power and to furnish expert advice to the Ministry;

b. international disputes arising out of the works constructed or likely to be constructed in neighboring countries having repercussions on the economy of Pakistan and vice versa;

c. supply of technical data to and general liaison with international organizations, namely, International Commission on Large Dams and International Commission on Irrigation and Drainage;

d. examination of target of Power requirements on the basis of power surveys to be carried out by Water and Power Development Authority;

e. to provide technical advice on development programs of the Karachi Electric Supply Corporation;

f. rationing of electric energy supplied by the corporation under the Karachi Electricity Control Act, 1952 necessary in view of the high gap between demand and supply and the connected functions under the Electricity Act, namely, the inspection of electrical installations, adjudication of disputes and the licensing of contractors and electricians;

g. to provide expert advice and assistance to the central ministries on the engineering matters referred to it; and

h. to rationalize and uniform the power rates in the four Provinces of Pakistan as the Secretariat of Standing Power Rates Advisory Board.[29]

The Ministry of Water and Power controls the operations of the Water and Power Development Authority (WAPDA) and the Karachi Electric Supply Corporation (KESC). These are the two main organizations responsible for the generation, transmission and distribution of electricity in the country.

**Water and Power Development Authority (WAPDA)**

The Water and Power Development Authority (WAPDA) is a semi-autonomous body under the Ministry of Water and Power. It is responsible for investigation, planning and execution of schemes relating to: 'generation, transmission and distribution of power; irrigation, water supply and drainage; prevention of water logging and reclamation of water logged and saline lands; flood control, inland navigation; and prevention of any ill effects on public health from the operations of the Authority.[30]

The management of WAPDA is the responsibility of a Chairman, who is also the Chief Executive of the Authority, and three members, namely, Member (Power), Member (Water), and Member (Finance). The Member (Power) and Member (Water) also act as Managing Directors, therefore, executive heads of their respective wings. The Chairman and the members of the Authority are appointed by the Federal Government.[31] Of them, the Chairman and Member (Finance) are mostly the generalist administrators belonging to the Civil Service of Pakistan. General Zia broke the tradition and appointed his army colleagues to the post of Chairman during his rule. The Chairman of WAPDA wields tremendous powers and is nominally subordinate to the Ministry of Water and Power.

The Authority has its own fund comprising the loans and grants made by the Federal and provincial governments, foreign aid and loans obtained from the World Bank (IBRD), Asian Development Bank and other international agencies on such terms as determined by the Government, sale of power, and any other sums received.[32] The Sixth Five Year Plan allocation for the WAPDA's power projects amounts to Rs. 61.33 billion which is more than 52 percent of the total allocation of Rs. 116.5 billion for the entire energy sector. The share of WAPDA's power development in the 1987-88 Annual Development Plan of Government of Pakistan is about 28 percent.[33] WAPDA is one of the five biggest employers of manpower in the country. At 30 June, 1988 it employed

153,070 persons.[34]

The installed generating capacity of WAPDA system as on 30 June 1988 is 5,549 MW of which 2,897 is Hydel. WAPDA system accounts for more than 81 percent of the total installed generating capacity (6,794 MW) in the country.[35] WAPDA is responsible for generation, transmission and distribution of electricity for whole of the country except Karachi and some adjoining areas.

**Karachi Electric Supply Corporation Limited (KESC)**

The Karachi Electric Supply Corporation Limited (KESC) is responsible for generation, transmission and distribution of electricity in its licensed area comprising of Karachi and some adjoining areas.

KESC is a Joint Stock Company under the control of the Federal Government. Prior to May 1984, the company operated as a separate entity under the overall control of the Ministry of Water and Power without significant involvement of WAPDA. Under the present arrangements, WAPDA has gained effective control over the KESC management. The management of KESC is now (September, 1985) the responsibility of Pakistan Electric Agency Limited (PEA), a private limited company wholly owned by the Government and under the control of the Ministry of Water and Power. Agency commission is charged to KESC by the Government for managing its affairs. The Managing Agency (PEA) is run by a Board comprising a Chairman and four members. Member Finance WAPDA is the Chairman of PEA. The other members are: Member (Power), WAPDA; Managing Director of KESC who is the Chief Executive; Joint Secretary (Power), Ministry of Water and Power; and Financial Advisor, Ministry of Finance. The overall supervision of the Managing Agency is with the Board of Directors of KESC comprising 12 Directors and a Chairman. Chairman WAPDA is the Chairman of the Board of Directors of KESC. The Managing Director KESC and the Chairman PEA (Member Finance WAPDA) are also the Directors of the Board.[36]

The installed generating capacity of the KESC (all thermal) is 1,108 MW as on 30 June 1988. Besides, the electricity generated by the Karachi Nuclear Power Plant (KANUPP) with the installed capacity of 137 MW is also available to the KESC system.[37]

## PAKISTAN ATOMIC ENERGY COMMISSION (PAEC)

The Pakistan Atomic Energy Commission (PAEC) was set up in 1956 by upgrading the Pakistan Atomic Energy Council which was established in 1955. It is an autonomous organization under the direct control (July 1988) of the Chief Executive of Pakistan. The Commission consists of a Chairman who is the Executive Head of the Commission; four members, namely, Member (Admin), Member (Tech), Member (Finance), and Member (Power); and a Secretary.[38]

The PAEC is responsible for conducting research into and exploiting possibilities of peaceful uses of atomic energy in the country. Its activities include: procurement, supply, manufacture, and disposal of radio-active substances; carrying out surveys of radio-active minerals and their exploitation; and establishment of atomic energy and nuclear research institutes. The Commission's principal objectives are: (a) harnessing of atomic energy by conversion into electric power; and (b) application of radio-isotopes and radiation sources in agriculture, industry and medicine.[39]

The PAEC operates one nuclear power plant, namely, the Karachi Nuclear Power Plant (KANUPP) which became operational in 1972 with the installed generating capacity of 137 MW. The share of nuclear power in the total commercial energy supplies in the country during 1987-88 was only 0.4 percent.[40]

The PAEC has set up a number of research centres to conduct nuclear research for application in industry, agriculture, medicine, etc. at various places in the country. The Pakistan Institute of Nuclear Science and Technology (PINSTECH), Nelore (near Islamabad) is the main research institution set up by the PAEC for carrying out research into nuclear technology with the central research facility Pakistan Research Reactor (PARR) which went critical in December 1965 and attained its full power of 5 MW in June 1966. The reactor is a pool type fueled with 90 percent enriched uranium. The PINSTECH has played a key supportive role in implementation of Pakistan's atomic energy program. Its main contribution includes:

a. Development of potential in research and development especially in subjects related to the programs of Pakistan Atomic Energy Commission;

b. application of fundamental knowledge to technology through applied sciences and engineering;

c. training of scientific and engineering manpower for PAEC and other organizations in the country;

d. promotion of university research through collaborative programs.[41]

## MINISTRY OF PRODUCTION

The Ministry of Production is responsible for the overall supervision and control of the affairs of the State owned industrial enterprises through a number of corporations including **State Petroleum Refining and Petrochemical Corporation (PERAC)**. The management of PERAC is the responsibility of a Board of Directors consisting of a Chairman, three Directors and a Secretary who are appointed by the Ministry of Production. The Corporation is wholly owned by the Federal Government.[42]

PERAC is responsible for managing the affairs of state owned companies engaged in petroleum refining, petrochemical and related activities. It controls four such companies: **National Refinery Ltd.; National Petroleum Ltd.; National Petrocarbon Ltd.**; and **Enar Petrotech Services Ltd.** The National Refinery Ltd. is one of the three refineries operating in the country. Other two refineries, namely, Pakistan Refinery Ltd. and Attock Refinery Ltd. are in the private sector.[43]

## MINISTRY OF SCIENCE AND TECHNOLOGY

The Ministry of Science and Technology is primarily responsible for the Government's policy for science and technology. It controls a number of organizations which are engaged in conducting scientific and applied research which include: (a) **Pakistan Council for Scientific and Industrial Research (PCSIR)**; (b) **Silicon Technology Development Centre**; (c) **National Institute of Electronics**; (d) **National Institute of Power**; (e) **Applied Research Centre for New and Renewable Sources of Energy**; and (f) **Appropriate Technology Development Organization**.The above mentioned organizations have been undertaking research, development and demonstration (R,D&D) activities relating to energy sector.[44]

## MINISTRY OF FOOD, AGRICULTURE AND COOPERATIVES

The **Forestry Section** of the Ministry of Food, Agriculture and Cooperatives headed by the Inspector General of Forests is likely to be involved for the implementation of energy plantation program of the Government.[45]

The field operations in the forestry sector are mainly the responsibility of the provincial Forestry Departments. The energy plantation program was, therefore, envisaged to be implemented through provincial governments. The Sixth Five Year Plan for Baluchistan provided for energy 'plantation' of 3,400 acres at a cost of Rs. 23.8 million.[46] Similar plans were expected to be formulated by other provinces.

## MINISTRY OF PLANNING AND DEVELOPMENT

The Ministry of Planning and Development is the focal point for the planning activities of the nation. The executive head of the ministry is the Secretary who is a generalist administrator. The Ministry is divided into various sections headed by professionals in their respective fields. It plays a major role in the approval and monitoring the implementation of all development schemes/projects. Its main functions include:

a. Preparation of comprehensive national plan for economic and social development of the country;

b. formulation, within the framework of the national plan, of an annual plan and annual development program;

c. examination of development projects and program and their processing to secure decisions of sanctioning authorities;

d. monitoring in conjunction with Federal Ministries and Provincial Governments the implementation of all major development projects and programs, identification of bottlenecks and indication of timely remedial action;

e. evaluation of on-going and completed projects;

f. review and evaluation of the progress achieved in implementation of national plan;

g. identification of regions, sectors and such sectors lacking adequate port-folio of projects and taking steps to stimulate preparation of sound projects in those areas;

h. continuous evaluation of the economic situation and economic policies including examination of such problems as may be referred for Federal or Provincial advice;

i. research in various sectors of the economy to improve the data base and information as well as to provide analytical studies which will help economic decision-making;

j. association with Economic Affairs Division in matters pertaining to external assistance for individual projects from the stage prior to preliminary discussion up to the stage final signing of documents with aid-giving agencies;

k. development of appropriate cost and physical standards so as to avoid waste of resources and permit more effective technical and economic appraisal of projects; and

l. coordination of all work pertaining to a Regional Cooperation for Development (RCD) amongst Iran, Pakistan and Turkey including the Pakistan and Pak-Turkey Economic and Cultural Commissions and Indonesian-Pakistan Economic and Cultural Cooperation (IPECC).[47]

The **Energy Wing** of the Planning and Development

Division is responsible for coordinating energy planning and plays a central role in the formulation, evaluation and review the energy sector programs. It is also responsible for the preparation of an overall demand and supply analysis on quarterly basis in consultation with the Ministries and agencies concerned. The Wing is headed by a Senior Chief.

The Government constituted in 1985 the Energy Review Group with the responsibility to study the bottlenecks in the implementation of Energy Policy and issue directives for their solution, and for the purposes of 'coordination and expedite actions on Energy Projects. Energy Wing provides the Secretariat for the Energy Review Group. The Energy Review Group is headed by the Minister for Planning and Development and its membership included the Secretary and three other senior officers of the Planning and Development Division. Its other membership comprised: the secretaries of economic affairs, finance, water and power, petroleum and natural resources; and the chairmen of WAPDA, KESC, and the OGDC[48]. Moreover, the **Projects Wing** of the Planning and Development Division is responsible for monitoring the implementation of development projects including the energy sector. This Ministry, therefore, plays a substantial role in the implementation of energy policy in Pakistan.

## MINISTRY OF FINANCE

The Ministry of Finance is responsible for sanctioning all financial and capital expenditures of the Government of Pakistan and, therefore, controls the purse of all the ministries and agencies. Energy pricing proposals are submitted to the Ministry of Finance for approval, which has final authority in case of minor decisions. In case of major decisions, the approval is required from the Economic Coordination Committee of the Cabinet, which is also chaired by the Minister for Finance. The Ministry has its representation in almost all the important committees and policy boards of various organizations in the energy sector. It also plays a very important role in the project approval mechanism of the country. The Minister for Finance is the Chairman of the National Energy Policy Committee (NEPC) which is the supreme national body responsible for national energy policy formulation and coordination. By virtue of this, the Ministry of Finance has assumed direct authority in the energy policy matters, although without any responsibility. THe executive head of the Ministry is the Secretary who is a generalist administrator belonging to the Civil Service of Pakistan. All other officers are also the generalist administrators.[49]

## PROVINCIAL GOVERNMENTS' ORGANIZATIONS

The 1973 Constitution of Pakistan (as discussed earlier) gives the provinces the authority to legislate and administer laws and regulations governing the exploration, exploitation and development of all minerals excluding oil, natural gas and nuclear minerals. The execution of the policies pertaining to forestry also falls under the purview of provincial jurisdiction.

In respect of minerals, the typical organizational arrangement at the provincial level consists of a section in the Directorate of Industries and Mineral Development, headed by a senior officer (Additional Director Minerals) under the Director of Industries and Mineral Development. The administration of prospecting licenses and mining leases, collection of revenues (royalties) from mineral produces and rent from licensees and lessees, technical appraisal of mineral prospecting and development plans of licensees and lessees, provision of infrastructure for mineral bearing areas, undertaking of mineral identification studies and all other related matters are the responsibility of this section. The policy guidance is provided by the Provincial Departmental headed who is the Secretary to the

Provincial Government. He is generalist administrator nominally subordinate to a Provincial Minister.[50]

For the enforcement of mining regulations including safety, there exists in each province the Office of the Chief Inspector of Mines under the jurisdiction of the Department of Labor (mostly grouped with some other functional areas), headed by a Minister and below him a Secretary. There is only one public sector coal mining organization owned by a provincial government (Punjab), the rest being in the private sector with the exception of the PMDC which is owned by the Federal Government.[51]

The Sixth Five Year Plan contemplates the NWFP Government to initiate setting up small hydel stations to generate electricity. Agencies in Azad Kashmir and Northern Areas have already been undertaking these activities.[52] The Punjab Government also announced in April 1986 its plan to set up mini hydro electric generation stations on canal falls indicating that investigation into the possibilities of generating electricity through canal waterfalls at an expenditure of Rs. 10.18 lakh (one lakh = 100,000) had already been started.[53] The Ministry in charge for these schemes at the provincial level is the Ministry of

Irrigation and Power.

The provincial governments also have a role in the rural electrification. The lists of the villages to be electrified in a particular year are prepared by the provincial governments in accordance with some general guidelines provided by the Federal Government. WAPDA is required to execute the rural electrification plan in accordance with the lists provided by the provincial governments. The selection of villages in the Punjab and Sindh is made by the Irrigation and Power Departments, whereas in Baluchistan and the NWFP, this is the responsibility of the Planning and Development Departments.[54]

**Punjab Mineral Development Corporation**

The Punjab Mineral Development Corporation (PUNJMIN) is the only coal mining organization owned by a provincial government. PUNJMIN is under the administrative and financial control of the Punjab Government. It was established in 1975 with an objective to promote exploration, development, production and marketing of minerals within the Punjab. PUNJMIN holds two leases for 811 acres and operates only in Punjab. It owns and operates two mines (Padhrar Mine and

Dandot Mine). Total estimated annual coal production during 1983-84 and 1984-85 was 30,000 tonnes and 21,000 tonnes respectively. It has plans to carry out further exploration and development activities in the Dandot area.[55]

## PRIVATE SECTOR OWNERS AND OPERATORS

**The Oil and Gas Sector**. The private sector companies have been playing a significant role in the exploration, development, refining, marketing and distribution of oil and gas in Pakistan. The Ministry of petroleum and Natural Resources is responsible for the framing of rules and regulations to regulate the operations of the private sector. A number of private exploration and development companies are presently operating in the country independently or in joint ventures with OGDC or amongst themselves. These include Pakistani as well as international companies as indicated below:[56]

* The Pakistani exploration and development companies are: **Pakistan Petroleum Limited (PPL)**; and **Pakistan Oilfields Limited.** The Government of Pakistan is minority shareholder in both of these companies. The PPL owns and operates the Sui gas field which is the largest gas field in the country. The Government of Pakistan has no effective role in the management of PPL, whereas it nominates three out of eight Directors on the Board of POL in which the majority shares are owned by a foreign company, namely, Attock Oil

Company Limited.

* **Pak-Stanvac Petroleum Project** is a joint venture between the Government of Pakistan (49%) and **Esso Eastern Inc.** (51%) The project was established in September 1954 with the objective of exploration and production of oil and gas. It discovered Mari Gas field in 1957. ESSO Fertilizer Factory at Dharki utilizes this gas.

* Other oil and gas exploration and development companies presently involved in major operations are: **Union Texas Inc. (Pakistan) USA; Occidental (Pakistan) Inc.; Pak Hunt (USA); Attock Oil Company; Crescent Petroleum Ltd. (USA);** and **Phillips Petroleum Company (USA).** Some more are likely to enter the field.

* Two of the three oil refineries in Pakistan are owned by the private sector. The private owned refineries are: **Pakistan Refinery Limited** at Karachi; and **Attock Refinery Limited** at Morgah near Rawalpindi.

* There are two private companies involved in the marketing of petroleum products (oil); **Pakistan Burmah Shell Limited**, and **Caltex Oil (Pakistan) Limited.**

* The **Oil Companies Advisory Committee** coordinates between marketing and refining companies and the Government in matters relating to planning and forecasting of petroleum requirements, examination of various production programs, and estimation of deficits and disposal of surplus.

* There also exist two private companies for the storage, bottling, marketing and distribution of LPG, which are: **Burshane (Pakistan) Limited**; and **Foundation Gas (FONGAS) Limited.**

* A number of service companies and drilling contractors are also operating in the country.

**The Coal Sector.** A number of private companies are involved in the production of coal in Pakistan. The operations of these companies are regulated by the respective provincial governments. As of February 1985, there are over 242 separate leases and over 200 exploration licenses granted in the three major coal producing provinces of Punjab, Sindh and Baluchistan. The number of lease owners is, however, about 150. The coal is produced by mine owners as well as by private contractors working under fixed seasonal agreements with mine owners.[57] The major private sector coal mining companies are as follows:[58]

a. **H.M. Habibullah Mines Limited;**

b. **National Coal Mines Limited;**

c. **Mehran Coal Mines Limited;**

d. **Baluchistan Coal Company Limited (Gilani Mines);**

e. **Sindh Coal Mines Limited;**

f. **Noor Coal Mines Limited;**

g. **H.M. Iqbal Coal Mines Limited;**

h. **Kazi Faiz Coal Mines;**

i. **Indus Coal Mines Limited;**

j. **Amin B. Limited;** and

k. **Qazi AQ Limited.**

## CONCLUSION

The present chapter has outlined the institutional framework of the organizations responsible for the formulation and implementation of energy policy in Pakistan. A number of organizations are involved in the formulation and implementation of energy policy in Pakistan. Some of the organizations are under the federal control, while others are under the administrative control of the provincial governments. The constitution of Pakistan specifies the jurisdiction of the federal and provincial governments. At the federal level, seven ministries and a commission under the Chief Executive of the country are involved. There are, however, two ministries, namely, the Ministry of Water and Power and the Ministry of Petroleum and Natural Resources, which are mainly responsible for the implementation of the energy policy of the country. The field operations are carried out by a number of autonomous and semi-autonomous bodies under the control of these ministries. The Ministry of Fuel and Natural Resources is responsible for implementing the fuels policy of the Government. The Ministry of Water and Power is responsible for implementing the policies relating to power sub-sector. The Pakistan Atomic Energy Commission is responsible for the implementation of the atomic energy policy.

The Ministry of Planning and Development plays a central role in the preparation of national plans. It also plays an effective role in the approval and the monitoring of implementation of the development projects/schemes. The Ministry of Finance plays a pivotal role in the project approval mechanism and in the provision of finances during the implementation. The Minister for Finance, in his capacity as the Chairman of the National Energy Policy Committee, substantially affects the implementation priorities and processes.

Other ministries and organizations at the federal and provincial levels mentioned in this chapter have a minor contribution to make, and, in terms of their share in the financial allocations, their role is relatively limited.

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# CHAPTER III

## PAKISTAN'S ENERGY POLICY: AN HISTORICAL OVERVIEW

### INTRODUCTION

This chapter traces the evolution of Pakistan's energy policy from 1947 to Sixth Five Year Plan (1983-88) and provides the details of the policies and programs in respect of power, fuels and renewable sources of energy. It outlines the policy objectives and identifies major projects/schemes to achieve them.

Pakistan pursued the planned course of economic development by adopting the medium-term planning process with the launching of its First Five Year Plan for the period starting from 1 July 1955 to 30 June 1960. Each plan envisages various policies in the light of sectoral priorities developed for the realization of its objectives. The evolution of Pakistan's energy policy has, therefore, been traced in this chapter in relation to these Plans. The Fourth Five Year Plan was prepared for its implementation during the July 1970-June 1975 period. However, the outbreak of civil war in the former East Pakistan and consequently its secession rendered the Fourth Five Year Plan irrelevant for the country. Zulfiqar Ali Bhutto took the charge of the left over Pakistan in 1971 and interrupted the process of medium-term planning by taking recourse to the annual development planning process. The five year planning process was reinstated by General Zia ul-Haq in 1978 with the launching of the Fifth Five Year Plan covering 1 July 1978 to 30 June 1983 period. The 1971-78 period, therefore, represents a distinct phase and has been analyzed separately. Similarly, the pre-plan period (i.e., 1947-55) has also been treated a separate phase. The chapter also explains the background which influenced the formulation of energy policy at the time of independence.

The need for a proper energy policy was felt in Pakistan with the onset of world-wide oil price hike in 1973. However, the Fifth Five Year Plan (1978-83) is the first official document issued by the Government of Pakistan in June 1978 which recognizes 'Energy' as a separate sector. Prior to this, there existed solo policies for various energy sub-sectors. An endeavor has been made in this chapter to construct an energy policy depicting the cumulative effect of the solo policies for various policy periods.

## THE BACKGROUND

At the time of independence, Pakistan inherited an extremely underdeveloped commercial energy sector. In fact, the economy of the country was underdeveloped. The country started with an antiquated agriculture and almost a clean slate in the matter of industries. Pakistan's share in the industrial establishments of the British India amounted to 34 factories (less than 4 per cent) employing only 26,400 persons (less than 3 percent) out of 921 factories employing 1,137,150 persons. Although, 20 percent of the total population (according to 1941 census) lived in the areas which constituted Pakistan in 1947.[1] Natural resources had hardly been exploited and the hydroelectric power had yet to be harnessed. Only two small hydroelectric power stations at Renala (commissioned in 1925) and Malakand (commissioned in 1938) with total installed capacity of 10.7 MW existed in the country.[2]

The potential demand for electrical energy in the country was not readily apparent in 1947 due to weak industrial base. In larger municipal areas where it was required for domestic and commercial purposes, public companies or corporations were licensed to generate and distribute electricity. Most of the industries had installed their own generating units to meet their requirements. Lahore, Lyallpur (now Faisalabad) and Kasur in the Punjab were dependent upon the electricity supplies from India.[3] The system of power supply in the country mainly consisted of isolated power stations serving the surrounding areas.

In 1947, total installed generating capacity of the country, including 34 MW captive capacity (owned by private industrial establishments), was 110.4 MW. About 86 percent (65.7 MW) of the installed capacity of the utilities comprised the 'small and inefficient' thermal-electric plants. The remaining 14 percent consisted of 10.7 MW (all in West Pakistan) of hydroelectric capacity.[4] The capacity per capita for the country (including East Pakistan)was a meager 2.85 KW.[5] In 1948, 73 GWH had to be imported from India to meet the requirements of the then West Pakistan (now Pakistan) against the total generation of 141.90 GWH in this part of the country.[6]

The known fossil fuel resources in Pakistan were also negligible at the time of independence. In 1948, total production of petroleum crude and coal was 559,000 U.S. barrels and 244,643 tons respectively.[7] Oil was produced by the Attock Oil Company from four fields, namely, Khaur, Dhulian, Joya Mair and Balkassar at the rate of about 900 barrels per day. Burmah Oil Company was the only other company engaged in oil exploration in Pakistan.[8] Natural gas had yet to be discovered. There was a small oil refinery near Rawalpindi (Attock Oil Refinery) which operated on the indigenous crude. In 1948, it processed less than half a million tons of crude oil which could meet only 10 percent of the needs of the country.[9] Whereas, 360,990 tons of petroleum products had to be imported in the same period to meet the requirements of the then West Pakistan (now Pakistan).[10] The coal mines in the West Punjab and Baluchistan though in operation since 1880, had limited production capacity. Imported coal, in 1948, accounted for 72.4 percent of the consumption in West Pakistan.[11]

The administrative capability of the organizational set up existing at the time of independence for the formulation and implementation of energy policy and programs was minimal. At the Centre, the Ministry of Industries and Natural Resources, was responsible for the matters relating to petroleum and natural resources (including water and power) in addition to its work of industrial development. The Geological Survey of Pakistan (GSP) started functioning under the Ministry of Industries and Natural Resources with the skeleton staff. It was responsible for collecting and providing geological information about the country. Provincial Departments of Irrigation and Power Development were also involved in the development of water and power resources. The development of mineral resources including coal was the responsibility of the Provincial Governments. Besides, a few private companies like Karachi Electric Supply Corporation (est.1913) and Multan Electric Supply Company (est.1922) were engaged in the generation and distribution of electricity. Coal mining, oil production and refining were in the private sector.[12]

## THE PRE-PLAN PERIOD (1947-55)

**The Power Sector**. From the outset, the development of water and power resources has been tackled in an integrated manner in Pakistan. The hydroelectric potential of the country influenced the thinking of the policy planners in this direction. Also, both of these sectors received priority attention due to the perception that agricultural and industrial development was dependent upon the development of water and power resources. Moreover, the electricity supplies from India could not be relied upon for too long.

The problem of water-logging posed an immediate threat for the agricultural development in the Punjab. The work on the Rasul Tube-well Project, which envisaged to reclaim 300,000 acres of water-logged land in the Province, had already commenced in 1944. The installation of 1,860 tube-wells, to be run by electricity, had been planned under this project. The electricity supply for these tube-wells was planned to come from the Rasul Hydroelectric Station being constructed since 1946.[13]

The first assessment of power needs of the country was made in December 1947.[14] In 1948, the Central Engineering Authority was created under the Ministry of Industries and Natural Resources for the purpose of planning and regulating the development of electricity in the country.[15] The Six-Year Development Program (country's first medium term planning endeavor), envisaged to be implemented during 1951-57, allocated about 18 percent (Rs. 470 million) of the total development outlay of Rs. 2,600 million for the development of 'fuel and power' resources. Within this framework, a Two-Year Priority Plan was prepared in 1951 which also included a Two-Year Plan for the installation of 140 MW (all thermal) at the cost of Rs. 135 million at various places. This was in addition to the installation of thermal capacity of 27 MW already sanctioned at a cost of Rs. 25 million. A few canal-falls Hydel schemes were also planned. The Government adopted the policy of nationalization of private electric companies and enhancing its control over their operations. Towards this end, loans amounting to Rs.4.5 million and Rs.3.3 million were sanctioned to the Karachi Electric Supply Corporation and Dacca Electric Development Company respectively. An amount of Rs 18 million was also invested in the shares of the Karachi Electric Supply Corporation.[16]

For the purpose of developing water and power resources, the country was divided into three hydrologic regions: (a) the Humid Region, comprising the whole of East Pakistan; (b) the Indus Basin, comprising the areas drained by the River Indus and its tributaries and adjoining areas; and (c) the Coastal Tributaries and Desert Streams Region, comprising most of Baluchistan province.[17] Table 3.1 gives the details of power development schemes undertaken or in progress during the 1947-55 period.

In 1955, Pakistan's installed generating capacity of 342.4 MW consisted of 142 MW of captive capacity owned by the industrial establishments and 200.4 MW owned by the

## TABLE 3.1

### POWER RESOURCES DEVELOPMENT, 1947-55

Indus Basin

| Name of Scheme | Total estimated cost | Estimated expenditure up to March 1955 | Started in | Status | Power |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |
| | (Million rupees) | | | | (kw) |
| I. MULTIPURPOSE PROJECTS: | 310.4 | 49.0 | ... | ... | ... |
| Warsak scheme | 267.0 | 31.0 | 1949 | In progress | ... |
| Kurram Garhi scheme | 43.4 | 18.3 | 1950 | Do. | ... |
| II POWER: | 515.4 | 223.7 | ... | ... | 83,342 |
| Karachi Electric supply extension | 223.6 | 35.5 | 1950 | In progress | 16,400 |
| Hyderabad thermal system | 45.8 | 0.3 | 1952 | Do. | ... |
| Lyallpur steam (2x4,000 kw) | 8.7 | 5.1 | 1950 | Do. | ... |
| Lyallpur diesel (10,000) | 4.6 | 4.2 | 1954 | Do. | ... |
| Montgomery steam (2x3,000 kw) including transmission and distribution | 16.9 | 11.6 | 1952 | Do. | ... |
| Dargai and Malakand hydroelectric project and extensions | 69.7 | 59.3 | 1949 | Do. | 30,000 |
| Rasul hydel scheme | 93.9 | 74.3 | 1946 | Do. | 22,000 |
| Interlinking NWFP and Punjab grid system | 9.7 | 9.7 | 1952 | Do. | ... |
| Gujranwala-Daska-Sialkot extension | 7.8 | 1.4 | 1952 | Do. | ... |
| Extension of local distribution system in Punjab towns | 5.3 | 5.1 | ... | Do. | ... |
| Abandoned electricity schemes | 7.4 | 7.4 | 1947 | Completed | 6,325 |
| Nationalisation of Sind electrical undertakings | 9.8 | 1.5 | 1947 | In progress | 7,392 |
| Distribution in area between Jhelum and Wah | 3.0 | 0.5 | ... | Do. | ... |
| Misc. power schemes | 9.2 | 7.8 | 1953 | Do. | 1,225 |
| Total for Indus Basin | 825.8 | 273.0 | ... | ... | 83,342 |

The Humid Region

| Name of Scheme | Total estimated cost | Estimated expenditure up to March 1955 | Started in | Status | Power |
|---|---|---|---|---|---|
| I MULTIPURPOSE DEVELOPMENT: | 598.7 | 37.6 | ... | ... | ... |
| Karnafuli | 250.0 | 33.4 | 1952 | In progress | ... |
| Teesta Barrage | 115.7 | 0.1 | 1953 | Do. | ... |
| Ganges Kobadak | 233.0 | 4.1 | 1953 | Do. | ... |
| II POWER: | 73.4 | 15.6 | ... | ... | 11,851 |
| Siddirganj thermal | 39.5 | 7.1 | 1951 | In progress | 5,100 |
| Chittagong thermal | 7.7 | 2.9 | 1953 | Do. | 3,000 |
| Goalpara diesel | 7.8 | 2.3 | 1953 | Do. | ... |
| Chittagong distribution | 2.0 | 0.2 | 1954 | Do. | ... |
| Diesel pool | 1.6 | 1.5 | 1951 | Completed | 3,000 |
| High Voltage distribution | 12.9 | 1.3 | 1951 | In progress | ... |
| 4 Small power supply undertakings | 1.9 | 0.3 | 1950 | Do. | 751 |
| Total for Humid Region | 672.1 | 53.2 | ... | ... | 11,851 |
| GRAND TOTAL | 1497.9 | 326.2 | ... | ... | 95,193 |

Source: The table was compiled from the data in <u>The First Five Year Plan</u>, <u>op.cit.</u>, pp.348, 363.

public utilities, comprising of four hydroelectric power plants (capacity 62.7 MW) and the rest about 90 thermal stations.[18] This trend shows that the Government pursued the policy of installing small thermal plants, perhaps to achieve quick results. The hydroelectric potential of the country remained still largely unexploited, although a modest beginning had been made in this direction.

The policy of installing captive generating capacity by the industrial establishments remained in force during this period. The Government gave preference to the multi-purpose projects which would develop water resources as well as generate hydroelectric power. The policy to have an integrated grid network in the country was initiated during this period. The expansion of distribution system and provision of power at cheap rates also remained the basic components of the Government policy.

**Atomic Energy.** Atomic energy received attention of the Government in 1953 when the 'Atomic Energy Committee' was constituted in the Ministry of Industries. It was assigned the task of making recommendations for: the establishment of an atomic energy agency, exploration of radio-active minerals; and possible use of atomic energy.[19]

In 1954, the American exhibit "Atom for Peace" toured Pakistan, explaining the benefits which could be derived from the nuclear power in the fields of energy, food and medical treatment.[20] The Government of Pakistan, impressed by the potential uses of the atomic energy, set up in 1955 a Council, which was upgraded into a Commission in 1956, with the objective of studying and exploiting the possibilities of the use of the atomic energy. Organizational matters, training of staff and other related issues were the immediate concerns at this stage.[21]

**The Fuels Sector.** The Fuels Policy of the Government during 1947-55 consisted of: increasing the production of oil and coal from the existing fields; and gearing up the oil exploration efforts. The Pakistan Petroleum Production Rules, 1949 were promulgated which made the oil prospecting a subject of the Central Government. These rules also provided for several tax concessions and other incentives to the oil companies to encourage oil and gas exploration and development. Since the country lacked the capital and the resources, the bulk of the investment was expected to come from the private sector, particularly from the international oil companies.[22] The policy of entering into joint ventures with private companies and providing negotiated risk capital in rupees to them was also adopted during this period.[23]

The Government envisaged an increased use of gas in industry and power generation after the discovery of gas in 1952 at Sui in Baluchistan. However, a 'detailed policy on the rate of tapping the gas, the place and purpose of use and the price at which it shall be sold' was non-existent till the end of 1955.[24]

## THE FIRST FIVE YEAR PLAN (1955-60)

The country embarked upon the path of planned development in a coordinated way with the launching of the First Five Year Plan (1955-60). The policies and programs of this Plan were conceived in the light of development experience gained during the 1947-55 period.

**The Power Sector**. The First Five Year Plan gave a high priority to the development of power resources, and allocated an estimated amount of Rs. 1,100 million for power development including multi-purpose projects which amounted to 11.8 percent of the public sector allocation of Rs. 9352 million or 8.7 percent of the total plan allocation of

Rs. 12,652 million.[25] Most of the schemes in the power sector were already in progress by 1955. The Plan received formal approval in April 1957, so the basic strategy for power development remained unchanged. The Planning Board preferred, wherever possible, the multi-purpose projects over single-purpose projects. The need to effectively organize research into water and power development was also recognized and proper attention in this regard was stressed.[26] The classification of the country into three regions, namely, the Humid Region, the Indus Basin, and the Coastal Tributaries and Desert Streams Region, was formally recognized. The Plan envisaged to supply electric power in each region sufficient to overtake essential demands by 1960.[27] Table 3.2 gives the details of the power sector projects, including multipurpose projects having the component of hydroelectric generation, for the Plan period.

The Plan provided for an increased use of gas for power generation, and a number of projects were included in the generation program. An increase of 426 MW (176 MW hydroelectric and 250 MW thermal) in the generating capacity was planned for the Indus Basin region (Table 3.2). Power from Mangla multipurpose project was planned to be available after the plan period. More than 50 percent of the

## TABLE 3.2

POWER RESOURCES DEVELOPMENT, 1955-60

| Name of Scheme | Total estimated cost | Estimated expenditure up to March 1955 | Balance to complete at the end of Plan | Period of Execution: Commencement | Period of Execution: Completion | Expected addition in capacity during 1955-60 (KW) |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I MULTIPURPOSE PROJECTS: | 1,293.4 | 49.3 | 923.0 | ... | ... | 164,000 |
| Mangla Dam | 983.0 | ... | 923.0 | 1955 | In progress | ... |
| Warsak Dam | 267.0 | 31.0 | ... | 1949 | 1960 | 160,000 |
| Kurram Garhi | 43.4 | 18.3 | ... | | | 4,000 |
| II POWER: | 904.9 | 176.7 | 199.1 | ... | ... | 262,650 |
| Karachi electric supply extension (Natural Gas) | 223.6 | 35.5 | 49.0 | 1950 | 1962 | 75,000 |
| Natural gas power station, Multan | 110.0 | ... | ... | 1956 | 1960 | 140,000 |
| Hyderabad thermal system | 45.8 | 0.3 | 17.2 | 1952 | 1961 | ... |
| Sukkur thermal system | 35.8 | ... | 23.6 | 1958 | 1962 | ... |
| Lyallpur steam (6,000 KW) | 6.5 | 0.1 | ... | 1956 | 1958 | 6,000 |
| Lyallpur steam (2x4,000 KW) | 8.8 | 5.1 | ... | 1950 | 1958 | 8,000 |
| Lyallpur diesel (10,000 KW) | 4.6 | 4.2 | ... | 1954 | 1957 | 10,000 |
| Montgomery steam (2x3,000 KW) including transmission and distribution | 16.9 | 11.5 | ... | 1952 | 1957 | 6,000 |
| Gujranwala hydel | 34.0 | 1.2 | 10.5 | 1954 | 1961 | ... |
| Shadiwal hydel | 24.9 | 2.0 | 4.2 | 1954 | 1961 | ... |
| Chichokimallian hydel | 26.2 | 2.3 | ... | 1954 | 1959 | 12,000 |
| West Pakistan high tension grid | 120.0 | ... | 39.6 | 1956 | 1961 | ... |
| Gujranwala-Daska-Sialkot entension | 7.8 | 1.4 | ... | 1952 | 1958 | ... |
| Kurram Garhi transmission | 8.4 | 0.5 | ... | 1956 | 1958 | ... |
| Rasul hydel | 93.9 | 74.3 | ... | 1946 | 1959 | ... |
| Malakand rural extension | 40.4 | 32.3 | ... | 1949 | In progress | ... |
| Nationalisation of Sind electrical undertakings | 9.8 | 1.5 | ... | 1947 | 1960 | ... |
| Small schemes | 87.5 | 4.5 | 55.0 | 1954 | In progress | 5,650 |
| Total (I + II) | 2,198.3 | 226.0 | 1,122.1 | ... | ... | 426,650 |
| **The Humid Region** | | | | | | |
| III MULTIPURPOSE | 483.0 | 37.5 | ... | ... | ... | 90,000 |
| Karnafuli project | 250.0 | 33.4 | ... | 1952 | 1960 | 80,000 |
| Ganges-Kabadak project | 233.0 | 4.1 | 143.4 | 1953 | In progress | 10,000 |
| IV POWER | 127.8 | 14.2 | ... | ... | ... | 78,831 |
| Siddirganj thermal power project | 39.5 | 7.1 | ... | 1951 | 1960 | 42,900 |
| Chittgong thermal power project | 7.7 | 2.9 | ... | 1953 | 1958 | 7,000 |
| Goalpara diesel power project | 7.8 | 2.31 | ... | 1953 | 1957 | 10,000 |
| Goalpara steam power project | 14.0 | ... | ... | 1956 | 1959 | 16,000 |
| Chittagong electric supply extension & improvement of L.T. distribution | 2.0 | 0.2 | ... | 1954 | 1959 | ... |
| Pool of small power plants with total capacity of 1,500 KW | 4.0 | ... | ... | 1957 | 1960 | 1,500 |
| Dacca-Chittagong inter-connection | 18.1 | ... | ... | 1955 | 1960 | ... |
| High Voltage distribution and sub-station | 12.9 | 1.3 | ... | 1951 | 1960 | ... |
| Hardinge Bridge-Goalpara inter-connection | 12.2 | ... | ... | 1957 | 1959 | ... |
| Transmission lines (Comilla Chandpur and Kuligunj-Narsingdi) | 5.5 | ... | ... | 1957 | 1960 | ... |
| Small power supply acquisitions | 2.2 | 0.1 | ... | 1955 | 1959 | 654 |
| Small power supply undertakings | 1.9 | 0.3 | ... | 1950 | 1959 | 777 |
| Total III + IV | 610.8 | 51.7 | ... | ... | ... | 168,831 |
| **Coastal Tributaries and Desert Streams Region** | | | | | | |
| POWER | | | | | | |
| V Quetta thermal power project | 8.0 | ... | 3.0 | 1958 | 1961 | ... |
| Grand Total | 2,817.1 | 277.7 | ... | ... | ... | 595,481 |

Note: Only those multipurpose projects have been included in this table which have the component of hydro-electric generation.

Source: The First Five Year Plan, op.cit., pp.343-383.

additional installed capacity in the Indus Basin was planned to come from the gas-based thermal power stations. In the Coastal Tributaries and Desert Streams Region, only one power project, namely, Coal Fired Steam Station (capacity 5 MW) at Quetta, was planned to commence during the Plan period which was to be completed in 1961.[28]

The policy of nationalization of electrical undertakings remained unchanged. Rural electrification was still in the future. Modest beginning, however, was made in NWFP where rural electrification was initiated in 1949 (Table 2.2). To improve planning and execution of policies and programs relating to water and power, the Plan recommended the establishment of autonomous agencies, each in both wings, at the earliest.[29]

**Atomic Energy.** The atomic energy policy during 1955-60 period consisted of setting up atomic energy centres for research purposes, training of scientists and exploration of radio-active minerals in the country.[30]

**The Fuels Sector.** The policy of attracting private capital, including foreign companies, for the exploration and exploitation of oil, gas and coal continued. Most of the investment was expected to come from the private sector. The Government envisaged no expansion in oil production and refinery capacity. It also had no firm investment plans in respect of oil and gas prospecting due to total dependence on the private sector. The Plan noted:

> It is not possible to foretell exactly how much will be invested in oil and gas prospecting, but our estimate, for the plan period is Rs. 417.5 million, of which Rs. 80.8 million might be public and Rs. 336.7 million private.[31]

The Plan stressed the need for better coordination and improvement in laws and regulations for the development of fuel and mineral resources. In respect of administrative bottlenecks, the Plan noted:

> To obtain good results from private enterprise in fuel and mining operations, the Government needs a clear policy, offering strong incentives for rapid and thorough prospecting, and providing for prompt exploitation of valuable deposits under appropriate safeguards so as to prevent waste or monopolistic practices. Current policy needs improvement. The Central Government regulates the granting, renewal and revocation of prospecting licenses and mining leases, operating and safety conditions, and other aspects of mining. Some of these regulations are out-of-date, and their administration has not always been prompt and effective.
>
> Under present arrangements, information on possible deposits is often not published promptly and fully,

with the result that businessmen do not know what opportunities may exist. The system of "certificate of approval" and "prospecting leases" is cumbersome, and frequently results on the one hand in superficial and wasteful exploitation of known deposits, and on the other hand in leaving promising sites untouched. Private concerns are often faced with uncertainty and long delays in obtaining the necessary permits and licenses to start work. The standards necessary in the public interest should be clearly laid down. The administration of the mining laws is split among several separate departments and this hampers the development of uniform and consistent policies.... We believe that the establishment of a Bureau of Mines is urgently required and should not be delayed.[32]

The Bureau of Mines was envisaged to be responsible:

...for issuing claims, licenses and leases; for collecting and publishing information on all phases of the mining industry; for economic and technical studies and advice; for stimulating and assisting the progress and efficiency of the mining industry; for encouraging the participation of foreign capital in fuel and mineral development; for expediting the import and production of necessary mechanical equipment and spare parts; and for other activities designed to make the best use of the country's fuel and mineral resources for development.[33]

At the beginning of the Plan, the Sui gas was already being delivered, through a transmission line from Sui to Karachi, to a number of users and the average output of Sui gas field by 1956 had reached about 25 million cu. ft. (MCFT) per day.[34] The Government adopted the policy of encouraging the use of gas, particularly in power generation, and other industries. As a result, a number of new industries were being planned which would use gas as fuel and many old ones were being converted to gas burning. It seems that all of this was happening without a clear policy. The Plan, in this respect, noted:

> The policies relating to the gas should be designed to reap the maximum benefit for the country. Hitherto, there has been no definite public policy on the rate of exploiting the gas, its proposed uses and the prices at which it should be made available.[35]

For the purification, transmission and distribution of gas, the Government adopted the policy of private sector involvement through public limited companies controlled by it. The Sui Gas Transmission Company was the first to be established in February 1954. The Karachi Gas Company Limited and the Indus Gas Company Limited, were established in August 1955.[36] The Plan allocated Rs. 214 million for the transmission of gas (Rs. 160 million for West Pakistan and Rs. 54 million for East Pakistan) and Rs. 54 million for gas distribution (all in West Pakistan). Out of the total investment of Rs. 214 million to be made on gas transmission and distribution in West Pakistan, Rs. 90 million (more than 42 percent) were planned to come from the private sector.[37]

The Plan paid particular attention for the development of coal mining in the country which was in a bad shape at that time. The Plan stated that 'a combination of habit, prejudice, and lack of clear-cut national policy'[38] had contributed for the existing state of affairs. The Plan pointed out that large imports of coal were being made, at considerable costs in foreign exchange, to fulfill needs which could have been fulfilled economically by indigenous coal.[39] The Plan allocated Rs. 29.3 million for the development of coal mining, of which Rs. 10 million were expected to come from the private sector. The bulk of the investment (Rs. 19.3 million) was planned to be made by the Pakistan Industrial Development Corporation (PIDC), a public sector corporation, which owned coal mines in the Punjab and Baluchistan.[40] For the development of indigenous coal, the Plan argued:

> The most important consideration here is the very large savings in foreign exchange produced by investing in coal mining. Pakistan is at present importing over one million tons of coal each year valued at over Rs. 75 million. Import prices per ton range from about Rs. 60 for Indian coal up to Rs. 110 for coal shipped from China, (compared to local prices which vary from Rs. 35 to Rs. 70 per ton). We estimate that an investment of approximately 50 rupees is required to produce each additional annual ton of coal (under average conditions). This Rs. 50 is well below the foreign exchange expended on importing one ton of coal, which means that each rupee invested in the coal mining industry will save more than one rupee of foreign exchange each year, or more than 100% of the original investment. This is much better saving than that obtained from investing in most industries, and coal mining should be given high priority by all con-

cerned. It is admitted that the quality of the coals found in the country is not good. The coals cannot be used for coking because they contain much sulphur and ash. The average heating value is about 10,000 BTU per pound, as compared with 12,000 BTU per pound of imported coal. However experience has shown that indigenous coal is satisfactory for use in boiler plants, if suitable firing arrangements are made. The soda-ash plant at Khewra, started in 1937, has always used it without difficulty. Beginning in late 1954, the North Western Railway too has been using it on the Quetta-Zahidan and Quetta-Chaman runs, and is ready to use much more of it.[41]

The Plan, therefore, recommended the adoption of a coal policy that favored the use of indigenous coal, wherever economical. It stressed the need for assisting the coal mining industry to increase the output and improve the quality of the indigenous coal. The import of coal was recommended to be allowed only to meet solid fuel requirements which could not be met from indigenous supplies.[42]

**New and Renewable Sources.** The new and renewable sources of energy also got some attention. The plan provided Rs. 6 million (Rs. 2 million in the public and Rs.4 million in the private sector) for the production of power alcohol in the country. Each sugar plant was recommended to be given an opportunity to install its own power alcohol still, or convert the already existing still to the production of power alcohol. The Power Alcohol Ordinance had already been passed at the time of the launching of the First Five Year

Plan, which, for general consumption, required the mixing of power alcohol, when available, with petrol up to 25 percent.[43]

Firewood also received some consideration of the Plan. It suggested to grow plants by the Forest Department along canals, roadside, and railway tracks in West Pakistan. The possibility of raising trees, especially for firewood, in the upper regions of catchment areas having adequate rainfall was also pointed out. An afforestation program for Lahore Division spread over a period of 20 years to seed about 32,000 acres was approved. About 100,000 acres were planned to be stocked with firewood species in compact plantations and shelter belts along the canals in the Thal area (Punjab) and 300,000 acres in the Kotri, Guddu and Sukkur barrages areas (Sindh) were earmarked for irrigated plantations to be completed in 15 to 20 years. The plan also pointed out the prospects for the development of firewood crops on village waste lands. The plan provided an amount of Rs.29.8 million for 'afforestation and regeneration' for the entire country without specifying the provisions for firewood plantation.[44]

## THE SECOND FIVE YEAR PLAN (1960-65)

**The Power Sector**. The power development strategy of the Second Plan consisted of the installation of thermal capacity based on the use of indigenous fuel (gas), and the addition of hydel capacity due to the completion of schemes already in progress: 12 MW from Gujranwala Hydel Scheme (West Pakistan), and 120 MW from the Karnafuli hydroelectric station (East Pakistan). No new hydroelectric project was included in the plan as major investment in this regard was expected to be made under the Indus Waters Treaty (details in the following pages).

The Plan allocated Rs. 1,140.5 million (Rs. 950.5 million in the public sector, and Rs. 190 million in the private sector), of which Rs. 320 million were to be spent on the schemes already in progress. This constituted about 6 percent of the total estimated Second Plan development outlay of Rs. 19,000 million (Public Sector: Rs. 11,500 million and private sector: Rs. 7,500 million) compared to 8.7 percent allocation in the First Plan.[45]

The plan envisaged the retirement of 142 MW from the existing capacity during the plan period due to obsolescence and uneconomic operations, most of it in the industrial establishments. The industrial captive capacity, which was mostly based on the imported diesel oil and coal, was expected to decrease by 28 percent (from 252 MW in 1960 to 181.5 MW in 1965) during the plan period. The policy of nationalization of electric supply companies, wherever required, remained in force.[46]

The classification of the country into three hydrologic regions for the purpose of developing water and power resources continued. However, some boundary changes were made in West Pakistan. The Karachi area was included in the Coastal Tributaries and Desert Streams Region, although it remained under the jurisdiction of the Karachi Electric Supply Corporation. The rest of the region continued to be served by the West Pakistan WAPDA.[47]

The Second Plan accorded a higher priority to transmission and distribution of existing power than to the generation of additional power, and allocated about 61 percent (Rs. 695.0 million) of the total power development allocation for the transmission and distribution against First Plan allocation of about 23 percent (Rs. 255 million). In West Pakistan, the transmission and distribution program consisted of the completion of five grids along with the secondary transmission and distribution systems: the West Pakistan high-tension grid by connecting Multan and Warsak power stations with the existing grid linking the power stations at Malakand, Dargai, Rasul, Daudkhel, Shahdara, Chichokimallian, Lyallpur (now Faisalabad) and Montgomery (now Sahiwal); separate grids for Hyderabad and Sukkur thermal stations; a grid around Quetta; and the expansion and strengthening of the existing Karachi grid.[48]

**Rural Electrification.** The electrification of about 2,000 villages situated near the power lines was planned. The policy of providing electric power to the consumers at the cheapest possible rates also continued during the Plan period.[49]

**Electrification of Railways.** The idea of electrification of railways in West Pakistan had been floating in the country since 1955. The Second Plan indicated an increased interest on the part of railway authorities who were considering the electrification of the lines where sufficient electric power was likely to be available and where traffic density justified. This was to be established by expert investigations likely to be undertaken during the Second

Plan period.[50]

**Indus Basin Works**. The Indus Waters Treaty was signed in September, 1960 through the mediating efforts of the World Bank which settled the dispute between India and Pakistan over the use of the Punjab rivers. According to the Treaty, India got exclusive rights over the use of three eastern rivers, namely, the Ravi, the Beas and the Sutlej, after 31 March 1970. During the transitional period, Pakistan was required to construct and bring into operation replacement works which would replace the water supplies from the eastern rivers. India was required to pay a part of the costs, while the major portion of the expenditure would be met by some friendly countries through the World Bank. The Indus Basin Replacement Works comprised the construction of two dams, over the River Jhelum and River Indus; eight interlink canals; five barrages; one gated syphon; and remodeling of three existing link canals, two existing headworks and some existing irrigation canal systems affected by the new construction. The West Pakistan WAPDA was entrusted the responsibility to execute the work. The two dams, namely, Mangla Dam over the River Jhelum and Tarbela Dam over the River Indus were also expected to provide large quantities of hydroelectric power (Mangla:

1,000 MW and Tarbela: 2,100 MW).[51] Work on Mangla Dam was expected to start during the Second Plan period. Hopes were pinned on these two projects to alleviate the power shortages in West Pakistan.

**Atomic Energy.** The atomic energy program consisted of mainly training of scientists and engineers, exploration of radio-active minerals and the establishment of research institutions. The Plan allocated Rs. 45.5 million for the following specific purposes:

1. continuance of the program of training of nuclear scientists and engineers;
2. intensive training over extended periods of selected scientists and engineers of outstanding ability and merit;
3. exploration for radio-active minerals in Pakistan;
4. establishment of an Institute of Nuclear Research and Reactor Technology with a swimming pool research reactor (1 MW-5 MW) at the headquarters of the Atomic Energy Commission;
5. establishment of a nuclear accelerator of 10-15 MW in East Pakistan; and
6. establishment of a suitable number of medical and agricultural centres in the country using isotope techniques.[52]

**The Fuels Sector.** The Second Plan allocated an amount of Rs. 974 million for the fuels sector including the

Department of Geological Survey of Pakistan. This was about 5 percent of the total Second Plan development outlay, against 7 percent of the First Plan development outlay. The contribution of private sector was expected to be Rs.698 million (about 72%).[53]

The development of gas received higher priority. Wide spread distribution of natural gas in both the provinces was planned to substitute fuel oil, coal, kerosene and firewood. The Plan stressed the expansion of gas utilization in all sectors, including residential and commercial. Fertilizer plants were also planned to use natural gas both as a feed-stock and as a fuel. An amount of Rs. 351 million was allocated for the transmission and distribution of gas, most of which (Rs. 313 million) was to be contributed by the private sector. Oil and gas prospecting and development got an allocation of Rs. 320 million (Rs. 80 million in the public sector and Rs. 240 million in the private sector). Coal got an allocation of Rs. 100 million (Rs. 70 million in the semi-public sector and Rs. 30 million in the private sector). The policy to strengthen the Geological Survey of Pakistan continued, and Rs. 20 million (Rs. 7.6 million in the First Plan) were allocated for this purpose.[54]

The oil refining capacity was planned to be expanded in the country and Rs. 155 million were allocated in the Second Plan to set up a new refinery at Karachi in the private sector. It was expected to come into operation by 1963 with a capacity to refine approximately 1.5 million tons of imported crude oil per annum. For the modernization of the existing refinery at Morgah, an amount of Rs. 10 million was also allocated.[55] The establishment of two more refineries in the Private Sector, one at Karachi and the other at Chittongong, was sanctioned during the Plan period.

The policy of total dependence on the private sector for oil and gas exploration and exploitation underwent change during the Second Plan period. By 1961, the interest of the private companies for the oil and gas exploration in Pakistan waned as they did not succeed in making any significant oil and gas discovery. Consequently, they drastically reduced their exploratory efforts; some of then eventually closed down operations. It was at this juncture that the government decided to enter directly the field of exploration and established the Oil and Gas Development Corporation (OGDC) in 1961 for this purpose with the assistance of Soviet Union[56]

**Firewood.** The need to put a certain proportion of the newly irrigated areas in West Pakistan under forests, particularly for firewood production was stressed in the Plan. This program included the afforestation of 110,000 acres of irrigated land during the Plan period. The plantation of trees along approximately 2,00 miles of roads and canals in West Pakistan was also planned.[57]

## THE THIRD FIVE YEAR PLAN (1965-70)

The Third Five Year Plan discontinued the classification of the country into three hydrologic regions for the purposes of water and power development. Instead, it adopted a development strategy based on the provincial lines i.e. East Pakistan and West Pakistan. The Plan allocated Rs. 3,449.80 million for power development: Rs.1,432 million for East Pakistan; Rs. 1687.80 million for West Pakistan; and Rs. 330 million for Central Government Program. This was about 6.6 percent of the total Third Plan development outlay of Rs. 52,000 million (Rs. 30,000 million in the public sector, and Rs. 22,000 million in the private sector). In addition, an amount of Rs. 280 million (Rs. 30 million in East Pakistan and Rs. 250 million in West Pakistan) was expected to come from the private sector. Moreover, the installation of Mangla Hydro Station was outside the Plan framework as it was being constructed under the aegis of Indus Basin Development Fund. A sum of Rs. 1,296 million (Rs.620 million in East Pakistan and Rs. 676 million in West Pakistan) was allocated for the fuels development program. The included Rs. 650 million in the private sector. An amount of Rs.276 million was allocated for strengthening the operations of the Oil and Gas Development Corporation (OGDC). Allocation for fuels sector amounted to about 2.5 percent of the total Plan outlays.[58]

In September 1965, Pakistan was attacked by India and the resources had to be diverted to meet this national emergency. Moreover, Pakistan's foreign assistance was suspended and the meeting of the Aid-to-Pakistan Consortium was postponed. Consequently, the actual expenditure on development programs during 1965-66 was about 21 percent less than planned. Under the circumstances, Pakistan was forced to have a fresh look at the public sector development program. In December 1966, the Government approved the revised sectoral allocations, priorities and phasing, although the overall size of the Plan remained unaffected. As a result of this reallocation, the power sector allocation in the public sector was increased to Rs. 3,848.35 million

(Rs. 1,550 million in East Pakistan, Rs. 1,925.75 in West Pakistan and Rs. 373.60 for Central Government Program), but that of fuels sector was decreased to Rs. 532.62 million.[59]

**The Power Sector.** The main objective of the Third Plan was the provision of sufficient supply of low-priced electric power to the consumer. The power generation strategy aimed at increasing the hydroelectric and steam (gas-based) capacity; and decreasing the diesel capacity. Hydroelectric and steam capacities were planned to increase by 127 percent and 134 percent respectively. The diesel capacity was planned to decrease by 35 percent. Nuclear power capacity of 202 MW (132 MW in West Pakistan) was also planned to come on-stream by 1970. The industrial captive capacity was planned to decrease by 21 percent (from 290 MW in 1965 to 230 MW in 1970) during the Plan period. Overall, the installed capacity was planned to increase from 1,435 MW in 1965 to 2,888 MW in 1970. The Hydel and Steam capacities of the public utilities were planned to increase from 348 MW and 686 MW in 1965 to 788 MW and 1,597 MW in 1970 respectively.[60]

In West Pakistan, the Plan emphasized the strengthening of the existing grid systems in the Northern and Southern zones. The integration of Hyderabad and Sukkur networks and their interconnection with Karachi and the Northern grids was planned. The rehabilitation and improvement of the distribution system was also planned.

**Rural Electrification.** The pace of rural electrification was planned to be enhanced. The Plan provided for the electrification of additional 4.000 villages by 1970.[61]

**Electrification of Railways.** Based on the studies conducted during the Second Plan period, the Third Plan recommended the introduction of electric traction on the Khanewal-Lahore (178miles) and Lahore-Rawalpindi (179 miles) sections with the objective of handling the increased traffic and reducing the foreign exchange component of the railway's operating costs. The work on Khanewal-Lahore section was to be completed during the Third Plan period.[62]

**Atomic Energy.** Two reactors (Karachi: 137 MW and Rooppur: 70 MW) with the total capacity of 202 MW were planned to be established during the Plan period.[63] The nuclear power reactor at Karachi was considered to be 'a first step in meeting the growing power requirements of the country.[64]

**The Fuels Sector**. The Plan adopted the policy of increased reliance on gas, both as a fuel and as a feed-stock for petrochemical industries and nitrogenous fertilizer. The need to encourage the use of indigenous coal was also stressed. The utilization of gas as fuel was not to be encouraged wherever coal could conveniently be provided.[65]

Most of the capital for the oil and gas prospecting, gas transmission and distribution, and the development of coal and peat resources was planned to be provided by the private sector. Table 3.3 indicates the public sector revised allocation of Rs.532.62 million for the various activities in the fuels sector. As mentioned earlier, an additional amount of Rs.560 million was envisaged to come from the private sector.

The oil refining remained in the private sector and an expansion of 3.6 million tons (from 2.6 million tons in 1964 to 6.2 million tons in 1970) was planned to be implemented by establishing two new refineries, namely, National Refinery Ltd., Karachi and Eastern Refinery, Chittagong.[66]

**TABLE 3.3**
**THIRD PLAN (1965-70)**
**PUBLIC SECTOR ALLOCATION FOR FUELS**
**(Million Rupees)**

| | Name of Sub-Sector | PAKISTAN |
|---|---|---|
| 1. | Geological Survey | 70.50 |
| 2. | Oil and Gas Development Corporation | 250.00 |
| 3. | Oil and Gas Prospecting | 36.00 |
| 4. | Gas Transmission and Distribution | 80.00 |
| 5. | Coal and Peat | 96.12 |
| | Total | 532.62 |

Source: Revised Phasing, Sectoral Priorities and Allocation of the Third Five Year Plan (1965-70), March 1967, p.21.

## THE ANNUAL PLAN PERIOD (1970-78)

The Fourth Five Year Plan (1970-75) was sanctioned during the turbulent times in the history of Pakistan. The movement against President Muhammad Ayub Khan had forced him to resign and the country was experiencing another Martial Law under General M. Yahya Khan. Subsequent events resulted in the secession of East Pakistan in December 1971. The priorities, allocations, strategy, and objectives of the Fourth Plan, therefore, became irrelevant in the changed circumstances.

No coordinated development programmes were issued during the 1970-72 period. Work on the old schemes slowed down due to the paucity of funds. New schemes were being sanctioned on a piece-meal basis. The G.D.P. growth rate during 1970-71 and 1971-72 reduced to 1.6 percent and 1.7 percent respectively against a sustained growth averaging 6.3 percent per annum in West Pakistan during the sixties. The commodity component of G.D.P., in fact, registered a decline in the two-year period. Pubic sector development outlay during 1970-71 decreased to about Rs. 3,000 million against the original Fourth Plan allocation for West Pakistan of Rs. 3,240 million which was further reduced to Rs. 2,620 million during 1971-72. Private sector investment also declined from Rs. 3,100 million in 1969-70 to Rs. 2,200 in 1971-72. The implementation of even the reduced development programmes was not possible without a sizable recourse to deficit financing.[67] Under the circumstances, the medium-term planning (Five Year Plan) was shelved. Instead, the PPP Government resorted to the process of Annual Development Plans which continued until 1978.

As such the policies and programmes in the energy sector could not remain unaffected. The progress on all major power sector programmes was behind schedule. No additions to the installed capacity were made during 1970-72 period. Power losses in the WAPDA system were on the increase; the losses (excluding consumption in auxiliaries) increased from 27.75 percent in 1969-70 to 29.34 percent in 1971-72. In January 1972, the government tried to increase supply of electric power by restoring canal hydel stations which were closed due to defence requirements and by taking such emergency steps like activating all captive industrial generation. Moreover, Electricity Control Order, 1972 was promulgated banning the use of electricity for neon sign advertisements, external lights of show rooms and outside lights of cinemas and hotels, staggering of holidays by indústrial consumers and regulation of tube-well loads.[68]

Similar conditions prevailed in the fuels sector. The production of crude oil decreased from about 3.5 million barrels in 1969-70 to about 3.3 million barrels in 1971-72. The production of gas continued to increase, but as a result of damage to the purification plant at Sui gas fields, the supplies of gas to the major thermal power stations were made at reduced levels for quite some time. The production of coal decreased from about 1.33 million metric tons in 1971 to 1.29 million metric tons in 1972.[69] Government's direct activities in the oil and gas exploration remained at very low levels. Financial support to the fuels sector development programmes remained insignificant; public sector expenditure on fuels sector development programmes during 1971-72 amounted to about Rs. 50 million (about 0.002 percent of the overall development programme).[70]

The Annual Plan, 1972-73 was issued in October 1972 which was the first in the series. This system remained in force until 1978 when the Fifth Five Year Plan (1978-83) was launched. As these Plans were designed 'to provide a more flexible response to the urgent and more pressing problems of the nation',[71] the policies and priorities kept changing. Table 3.4 below depicts public sector ADP allocations during 1972-78 period.

The salient features of the energy policy during 1972-78 were as follows:

1. Intensive exploration of indigenous resources of fuel.

2. Development of existing and new oil and gas fields.

3. Maximum use of hydro energy.

4. Increase of nuclear power generation to reduce imports of energy.

5. Maximum use of coal resources.

6. Judicious use of gas, giving priority to fertilizer use.[72]

**TABLE 3.4**

**PUBLIC SECTOR ADP ALLOCATIONS DURING 1972-78**

| | 1972-73 | 1973-74 | 1974-75 | 1975-76 | 1976-77 | 1977-78 |
|---|---|---|---|---|---|---|
| Power | 753.2 | 1001.85 | 1302.37 | 2072.204 | 2520.830 | 3174.411 |
| Fuels | 77.5 | 155.30 | 382.79 | 824.127 | 789.000 | 492.5 |
| Total (Energy) | 830.7 (20.01) | 1157.15 (23.29) | 1685.16 (19.17) | 2896.34 (21.67) | 3309.830 (18.80) | 3666.911 (19.73) |
| Total Gross | 4150.5 (100) | 4967.13 (100) | 8788.38 | 13365.466 | 17496.172 (100) | 18584.5 (100) |

Source: * Government of Pakistan, Planning Commission, Annual Plan 1973-74,pp.10,111,113.

*______,Annual Plan 1974-75,p.16.
*______,Annual Plan 1976-77, p.15.
*______,Working Papers for the Development Programme 1977-78, Islamabad, pp. 5&96

**The Power Sector**. From 1972-73 onwards, the power sector programmes, particularly the generation and transmission schemes, received priority attention. The policy to expand the hydroelectric capacity and gas-based thermal power capacity continued during 1970-78 period. Total installed capacity on 30 June 1978 was 3,510 MW including 230

MW of captive capacity in the private sector. Out of this capacity, 1,567 MW was hydroelectric compared to 667 MW in 1969-70. The use of coal for thermal power generation was reduced to the minimal. In 1977-78, gas accounted for 96.8 percent of the fuel consumed for power generation.[73]

The power sector policies, during 1970-78 period, were conceived in the light of yearly assessment of problems and prospects and responded to the felt needs. For example, Annual Plan 1972-73, *inter alia*, suggested:

a. Removal of transmission/transformation bottlenecks for maximum utilization of existing generation;

b. installation of capacitors for improving power factor and reduction of losses; and

c. maximum utilization of existing equipment by preventive maintenance and keeping the equipment in top condition.[74]

Annual Plan 1974-75 adopted the following strategy and objectives:

a. Augmenting generating capacity from 2445 MW to 2720 MW by completing Lyallpur Gas turbine station (200 MW), Quetta extension 25 MW, Kotri and Karachi gas turbines stations of 50 MW and 100 MW respectively.

b. Use of alternate fuels at the thermal power stations, besides natural gas.

c. Synchronizing completion of Lyallpur Gas turbine station with SNGPL Project (3-A) to augment gas supply by 26 MMCFT.

d. Installation of diesel stations at Tehsil headquarters in Azad Kashmir.

e. Augmenting grid station capacity by 1400 MVA.

f. Extension of high voltage transmission lines 66KV and above by 1200 miles.

g. Removal of transmission line bottlenecks for optimum utilization of hydel power from Mangla and absorption of full output from Guddu.

h. Accelerating the progress of 220 KV Tarbela-Wah Transmission lines to synchronize with Tarbela Development.

i. Procurement of distribution equipment from aboard has become necessary due to world wide shortage of raw materials, which places a constraint on domestic production.

j. Improvement in efficiency of transmission and distribution and reduction in losses.

k. Reorganization of WAPDA with decentralization and creation of Area Boards.

l. Providing 1.4 lakhs additional service connections (1.0 lakhs by WAPDA, 0.4 lakhs by KESC and REPCO).

m. Electrification of 1000 villages.

n. To meet the fuel shortage at Shahdara power station, it is planned to switch over two of its turbines on LPG, which are presently burning HSD, already a deficit product. LPG is much cheaper and cleaner fuel. The turbines could be easily transformed to burn this fuel with slight modifications. This will result in considerable savings in foreign exchange through lesser import of HSD.

o. The second 220 KV transmission line from Mangla to Kalashah Kaku for Mangla units 5 to 8 is scheduled for commissioning in January 1975, WAPDA has therefore, no alternative but to make use of the existing 220 KV lines from Mangla during the summer of 1974-75 with six units in operation at Mangla. Ways and means should be found to make optimum utilization of Mangla power without over loading the transformers on the 220 KV line.

p. According to the recent schedules of commissioning, the first double circuit of 220 KV Tarbela-Wah Transmission line is expected in December, 1975, i.e. one month behind the scheduled commissioning of Tarbela Units 1 and 2. The situation therefore demands serious efforts to accelerate progress of this project during 1974-75.

q. Constant watch is required on the progress of SNGPL's project 3-A and Lyallpur gas turbines stations project. At present both are scheduled for completion in January, 1975.[75]

The power losses further increased and service deteriorated during 1974-75. Annual Plan 1975-76, therefore, stressed to take effective steps to control power losses.[76]

Special programmes were initiated during the 1970-78 period to provide electric power to the underdeveloped areas. WAPDA initiated the Guddu-Sibbi-Quetta transmission project in order to link Quetta with the national grid and provide electricity to Baluchistan areas. To electrify the isolated towns of Baluchistan, the policy of installing small diesel stations was adopted. Besides, installation of small hydel stations in northern areas and Azad Kashmir along with extension of necessary distribution facilities was also undertaken. Village electrification continued at a slow pace.

The policy of nationalization of electric supply undertakings continued. Under the Economic Reforms order, 1972, the government took over the management of all the private sector electric supply public utilities in January 1974.[77]

**Atomic Energy.** Significant developments took place in Pakistan's nuclear energy policy during 1970-78 period. The (aborted) Fourth Five Year Plan 1970-75 provided for the construction of the nuclear power station (200 MW capacity) at Rooppur in East Pakistan besides making the Karachi Nuclear Power Plant operational. In addition, it provided for initiating work to establish a fuel reprocessing plant and to determine the feasibility of a dual-purpose nuclear reactor, for desalination of sea-water and power generation, in West Pakistan.[78]

It was announced in May 1972 that Pakistan had drawn firm plans to set up second nuclear power plant in the north with a 500 MW capacity and that studies were also being carried out to set up a dual-purpose nuclear desalination plant for Karachi area with a capacity of 400 MW and the desalination of 100 million gallons of sea water per day. On 11 May, 1972, Radio Pakistan also reported that 'Pakistan with its large deposits of uranium planned to set-up two atomic reactors'.[79] Annual Plan 1972-73 allocated Rs. 48.70 million for the atomic energy development programme. The Plan envisaged the completion of new laboratories at the Pakistan Institute of Science and Technology (PINSTECH) near Islamabad.[80] The Central research facility of PINSTECH, namely, Pakistan Research Reactor (PAAR) had gone 'critical' in December, 1965 and attained its full power of 5MW in June, 1966.[81] The 1972-73 Plan also provided for the import of plant and machinery for Uranium exploration in D.G. Khan district. In June 1973, a plan to set up a heavy water production plant with an output capacity of 13 tonnes of heavy water per annum was announced.[82] In July, 1973 the Chairman of the Pakistan Atomic Energy Commission disclosed more details regarding the planned setting up of the second nuclear power plant with installed capacity of 900 MW instead of 500 MW initially announced and stated that the plant would be completed within two-and-half years time.[83]

On the basis of IAEA assessment, Pakistan made public its 25 year nuclear power generation programme on 27 December, 1973. The Chairman of the Pakistan Atomic Energy Commission announced on television that Pakistan would establish 15 new nuclear power stations in the next 25 years. He stated that the first nuclear power station of 900 MW capacity would be completed by 1975 near Kundian, in Chashma Baghage area of Punjab. He also disclosed that Pakistan had discovered an "abundant quantity" of Uranium which would not only be sufficient for Pakistan's requirements but it could also be exported.[84]

India conducted its nuclear explosion on 18 May, 1974. This caused a serious blow to the Pakistan's efforts to overcome its energy shortages by developing nuclear power. The Indian explosion created suspiciicion and mistrust amongst the nuclear technology exporting countries who announced severe restrictions for the transfer of nuclear technology. The nuclear power programme of Pakistan was, therefore, revised. This revision also considered the second assessment of the IAEA confirming Pakistan's future nuclear power needs.[85] Under the revised schedule, the second nuclear power plant of 600 MW capacity at Chashma (original planned capacity of this reactor was 500 MW which was changed to 900 MW in the first revision) was planned to be completed by 1980. The third plant (dual-purpose plant to generate 400 MW electricity and 100 million gallons of fresh water by desalination of seawater) at Karachi was envisaged to be completed by early 1980s. After 1985, the programme envisaged the construction of a nuclear power plant almost every year till the end of the century.[86]

Pakistan's nuclear program, detailed in the Annual Plan 1974-75 consisted of (a) nuclear power development, (b) research and application of nuclear technology in the field of medical, physical and biosciences, (c) exploration of radio active minerals, and (d) manpower training. Annual Plan 1974-75 provided for a separate scheme, namely, 'Nuclear Power Generation Training Project' in order to meet the future requirements to implement the nuclear Power generation program. Allocations were also made in the 1974-75 Plan for setting up Chashma Nuclear Power Plant.[87] The subsequent Annual Plans continued to provide for the implementation of the above mentioned schemes.

**The Fuels Sector.** The coal remained neglected during 1970-78. Allocations for coal development during this period continued to be negligible. Coal got nothing in some of the Annual Development Plans. The production of coal declined from about 1.33 million metric tons in 1971 to 1.25 million metric tons in 1977-78, touching the 1.05 million metric tons mark in 1975-76. The share of coal in the total energy consumption declined from 8.3 percent in 1971-72 to 5.5

percent in 1977-78. Coal continued to be replaced by gas and petroleum products in the absence of any comprehensive coal development plan dealing with its production, transportation and utilization. The brick-kiln industry remained the only major consumer of coal; its share increased from 75 percent of total coal consumption in 1971 to about 94 percent in 1977-78.[88]

The policy of expansion of gas utilization continued. Gas prices were particularly kept low to encourage its consumption. The production of gas, including associated gas, increased from 124,786 MMCFT in 1971-72 to 199,067 MMCFT in 1977-78. The share of gas, excluding feed-stock, in the energy supplies increased from 35.6 percent in 1971-72 to 37.6 percent in 1977-78.[89]

Pakistan continued to import large quantities of crude oil and petroleum products during the 1970-78 period. Production of crude oil decreased from 3,007,815 US barrels in 1971-72 to 2,443,345 US barrels in 1974-75, increased to 3,743,020 US barrels in 1976-77 and again decreased to 3,539,370 US barrels in 1977-78. The increase in crude oil production in 1976-77 was mainly due to the doubling of production at Meyal Oil Field, which also declined in the following year.[90]

In respect of oil and gas exploration, the policy to invest in the private oil companies' efforts instead of making direct investment by the public sector continued during 1970-78 period. Government signed a number of joint venture agreements with private as well as foreign countries' public sector companies. The OGDC was also allowed to enter into joint venture agreements and make use of the contract drilling.

After the oil price hike in 1973, the government announced to step up its efforts in the exploration and development of oil and gas. The Minister for Petroleum and Natural Resources announced at the beginning of 1974 that the government was 'making all out effort' to accelerate oil exploration by stepping up the activities of the Oil and Gas Corporation and by promoting foreign participation in this field. He also disclosed that a seven year "Master Plan" involving investments of about $250 million in oil development was approved by the government and would be put into movement in 1974. He further mentioned that "liberal terms" were being offered to the foreign exploration companies and the negotiations with foreign countries for joint ventures were also underway.[91] In 1975, the government allowed the well-head price of oil in all new concession agreements to rise to world levels. To attract foreign investment and accelerate exploration and development, the following additional incentives were announced in 1976:

a. Companies were permitted to remit annual net profits after providing for deductions allowed under the Income Tax Act.

b. Initial participation by Government in exploration was restricted to payment in rupees. The extent of participation was made subject to arrangement between GOP (Government of Pakistan) and the concessionaire.

c. Mining lease for a proven field was to be granted for an initial term of twenty years with provision for four renewals of four years each.

d. Facility was extended for export of foreign company's crude oil share after meeting internal requirements based on prorated figures of production as compared to other producing companies.

e. Rate of royalty fixed at 12-1/2% of well-head value throughout the term of the agreement without any allowance for the revision with increase in production. Royalty was to form part of the sum of payments to the Government and taxes on income with the provision that it would not be more than 50% nor less than 50%.

f. Oil Companies were given the facility to inspect all data in respect of relinquished areas in the Ministry of Petroleum, free of cost.

g. Import of material and equipment required for exploration and drilling prior to commercial discovery was allowed to be imported free of customs duty and sales tax. After commercial discovery, the rate of custom duty and sales tax was fixed at 5-1/4% adalorem for a negotiated period.

h. Foreign nationals employed by oil companies or its contractors were not to be charged income tax for a period of 3 years from the date of their arrival in Pakistan.[92]

The above mentioned incentives were provided legal cover through Regulation of Mines and Oil-field and Mineral Development (Government Control) Amendment Act, 1976. Subsequently, it was also decided to freeze the provisions of the Income Tax Act at the time of the agreements.[93] The government also tried to strengthen the state-owned OGDC. The financial allocations for the OGDC significantly increased towards the end of 1970-78 period; allocations increased from Rs. 58.3 million in 1972-73 to Rs. 450 million in 1977-78.[94] The support to the Geological Survey of Pakistan continued at a low level.

In March 1977, the Ministry of Fuel, Power and Natural Resources was bifurcated into the Ministry of Water and Power, and the Ministry of Petroleum and Natural Resources. The Government also established the Petroleum Commission of Pakistan 'with the objectives of integrated energy policy formulation, project implementation and the regulation of the petroleum industry'.[95] The charter of the Petroleum Commission was to: supervise exploration activities of the state-owned Oil and Gas Development

Corporation and foreign companies; and oversee the domestic marketing of oil products.[96]

Prior to the Economic Reforms Order 1972, oil refining was in the private sector. On January 16, 1972, the government took over the management of the only refinery, (National Refinery Limited at Karachi) owned by Pakistani private sector. It was reported in January, 1974 that Pakistan signed a protocol with Abu Dhabi to build a refinery at Multan with a capacity of 40,000 barrels per day and a pipeline from Karachi to Multan (800 kilometers).[97] In July 1974, after acquiring the majority shares in the capital of National Refinery Limited (NRL), the government transferred its management to a newly established State Petroleum Refining and Petrochemical Corporation Limited.[98] Subsequently, the capacity of the National Refinery at Karachi was also decided to be raised from 531,000 tons per year to 2.1 million tons per year by May 1976.[99] By 1977-78, the refining capacity of all three refineries was raised to 5.13 million tons per annum.[100] The output of these refineries, however, did not match with the consumption pattern in the country. The deficit products which had to be imported increased from 418,655 metric tons in 1971-72 to 1,098,978 metric tons in 1977-78 showing an increase of 262 percent during this period. On the other hand, surplus production of furnace oil and naphtha had to be exported 'at a real low price'.[101] The policies to remove this imbalance in the refinery production and consumption pattern remained non-existent.

**Energy Tariff**. The policy of keeping the gas prices at low levels continued. The gas price for industrial users was kept very low, whereas domestic and commercial users were charged at higher levels. The gas price for general industrial users was increased five times during 1970-78 and was brought closer to the price paid by the domestic users, although the industrial users were charged at reduced rates after a certain consumption level. On the other hand, the domestic consumers were charged at higher rates after a certain consumption level. The commercial users were charged at higher rates. Table 3.5 below shows the changes in gas price for various consumers made on different occasions during 1970-78. Gas price for power, cement and fertilizer industries varied from plant to plant (therefore, not possible to give average price) and was based on two part tariff; a fixed charge and commodity charge per MCFT. They were charged at rates even lower than the general industrial users.

TABLE 3.5

GAS PRICES, 1969-76
(Rs. Per MCFT)

| | General Industries | Commercial | Domestic |
|---|---|---|---|
| 28-6-1969 | 3.25/3.05 | 6.04 | 6.40 |
| 11-8-1973 | 3.73/3.53 | 6.88 | 6.40 |
| 08-6-1974 | 5.60/5.30 | 10.00 | 6.40 |
| 01-7-1974 | 5.60/5.30 | 10.32 | 6.40 |
| 01-2-1975 | 7.46/7.06 | 13.76 | 9.60 |
| 29-3-1976 | 9.32/8.82 | 17.20 | 9.60(For first MCFT 12.00(All over one MCFT) |

Source: Energy Data Book, op.cit., p.136.

After the oil price increases in the international market, the government adopted the policy of gradually increasing the prices of petroleum products to bring them at the international level. The price of Kerosene oil and High Speed Diesel (HSD) were kept low. The price of kerosene was increased thrice during 1970-78 from Rs. 2.00 per gallon to Rs. 4.00 per gallon. The price of HSD was increased on six occasions from Rs. 3.00 per gallon to Rs. 6.35 per gallon. The price of MS was increased on nine occasions from Rs. 4.81 per gallon to Rs. 12.70 per gallon. The price of HOBC was enhanced also on nine occasions from Rs. 5.45 per gallon to 15.40 per gallon. The price of Furnace Oil increased in different stages from Rs. 240 per ton to Rs. 600 per ton.[102]

The coal price for brick kilns fluctuated between Rs. 60 per ton and Rs. 150 per ton during 1970-74. The prices almost doubled during 1974-75 ranging between Rs. 210 per ton and Rs. 376 per ton and continued to fluctuate in this range until 1977-78.[103]

The policy in respect of electricity tariffs also underwent substantial change during 1970-78. Until March 1976, tariffs used to be lower on increased consumption in the domestic sector. This was revised on March 24, 1976, when higher tariffs were fixed for the electricity to be consumed beyond a certain level. The tariffs for domestic users were kept low. The tube-well tariffs were kept at the lowest level. The tariffs for industrial users, which were lower than that of the domestic (household) users until February 1975, were gradually increased to higher levels. Office and Commercial users continued to be charged at higher rates. While the tariffs applied to the domestic and general users remained relatively stable, other tariffs were enhanced more frequently.[104]

## THE FIFTH FIVE YEAR PLAN (1978-83)

The Fifth Five Year Plan adopted an integrated energy development strategy. The salient features of the Fifth Plan strategy were as follows:

a. Maximum priority to hydel generation and commissioning of on-going hydroelectric projects;

b. to economize fuel consumption by transmitting bulk power from Tarbela to the southern part of the country over extra high voltage transmission lines;

c. intensive exploration for indigenous resources of fossil fuel;

d. quick development of discovered and proven oil and gas fields;

e. expansion of gas consumption for industrial use; and

f. maximum use of coal resources.[105]

The public sector energy development program was allocated Rs. 33,522 million (23 percent of the public sector development outlay); Rs. 27,932 million for the power sector programs and Rs. 5,590 million for the fuel sector programs.[106] Table 3.6 indicates the physical targets envisaged to be achieved by the end of the Fifth Plan.

**The Power Sector**. The power sector strategy of the Plan was to:

a. Increase per capita generation of electricity by 42%, from 167 KWH in 1977-78 to 237 KWH in 1982-83;

b. increase total installed capacity from 3,510 MW to 5,765 MW by 1982-83;

c. give maximum priority to the hydel generation and commissioning of on-going hydroelectric projects;

d. economize fuel consumption by transmitting bulk power from Tarbela to the southern part of the country over extra high voltage transmission lines;

e. improve the secondary transmission and distribution facilities to reduce system losses and extend power facilities to the maximum number of consumers;

f. accelerate village electrification; and

g. place the power corporations on a sound financial footing so that at least 30 percent of the expansion program is financed through self-generation of resources.[107]

The policy of nationalization of electric supply undertakings continued. On the directive of the Government, WAPDA took over various private electric supply companies operating in the country along with their physical assets and employees in May 1981. Subsequently, the Government paid compensation to these companies. WAPDA also gained increased control over the affairs of the KESC during the Fifth Plan period. The Chairman of WAPDA was made ex-officio Chairman of the Board of Directors of the KESC.

**TABLE 3.6**

**FIFTH PLAN ENERGY SECTOR PHYSICAL TARGETS**

| | | |
|---|---|---|
| A. | POWER | |
| 1. | Total Installed capacity (addition) | 2255 M.W. |
| | Public utilities | 2090 M.W. |
| | Hydel | 1330 M.W. |
| | Thermal | 760 M.W. |
| | Nuclear | - |
| | Private Captive Capacity | 165 M.W. |
| 2. | No. of consumers (addition) | 165,000 per annum |
| 3. | Villages electrified (addition) | 5,000 |
| B. | FUELS | |
| 1. | Crude oil production | 36.8 thousand barrels per day |
| 2. | Drilling of wells | 70 |
| | OGDC | 50 |
| | Private companies | 20 |
| 3. | Gas production | Average gas supply to increase from 496 MMCFT in 1977-78 to 856 MMCFT in 1982-83 |
| 4. | No. of gas consumers (addition) | 0.5 million |
| 5. | Coal production | 1.7 million tons. |

Source: The Fifth Five Year Plan, pp.98-99, 112.

**Rural Electrification.** The strategy in respect of rural electrification consisted of increasing the number of rural electrical consumers, which was only about 10 to 15 percent of the electrified villages, instead of increasing only the number of electrified villages. The target for electrification of an additional number of 5,000 villages was also fixed.[108]

**Atomic Energy.** The Fifth Plan continued the Atomic Energy Policy evolved during the past twenty years. The Plan provided for the completion of reprocessing plant and the continuation of work on the Chashma Nuclear Power Project, besides a number of research and training programs.

**<u>The Fuels Sector</u>.** The fuels policy envisaged to achieve the following five objectives:

a. Large resources would be allocated to exploration and development of new oil and gas fields with the emphasis in the public sector on quick development of discovered or proven fields.

b. In view of recent gas discoveries, freer expansion of gas consumption in modification of earlier policy of conserving gas for industrial use. The use of gas for power generation would be limited due to large availability of hydroelectric power. Expansion of LPG would also be encouraged.

c. To accommodate the anticipated larger availability of indigenous crude oil, the plans for refining of crude oil would be reviewed.

d. Strengthening of arrangements for transport and storage of oil.

e. Continuation of limited efforts for development of coal uses and for research and demonstration of unconventional sources of energy.[109]

In respect of oil, the Plan adopted the following objectives:

a. Accelerate development of known oil fields, i.e. Toot, Meyal and Dhodak, with a view to reducing the oil import bill.

b. Continue to explore the additional oil fields through OGDC and also international oil companies by providing incentives.

c. Encourage reduction in consumption of middle distillates, i.e. kerosene and HSD.

d. Operate the refineries based on imported crude oil at optimum capacity consistent with foreign exchange economies.

e. Provide additional refining capacity to process the indigenous crude oil production.

f. Provide adequate transportation capacities for POL movement to and from south.

g. Develop adequate storages up country to meet the requirements.[110]

The policies and regulations for foreign companies regarding oil and gas exploration and development, however, remained unaltered. The Plan envisaged oil and gas exploration activities at a low level; with only 3-4 exploratory wells per annum by the private companies, and only 4 exploratory wells per annum by the OGDC.[111]

The National Energy Policy Committee (NEPC) was set up in 1980 for keeping the energy policy under constant review which held its first meeting on 27 November, 1980. The NEPC issued policy directives from time to time during the Fifth Plan period. The policy of 'freer expansion of gas consumption' adopted by the Fifth Plan was changed by the NEPC as the impact of the liberalization of gas consumption was soon realized. The NEPC, in its first meeting, decided that the Sugar and other industries having furnaces with dual firing system should consider to 'switch over to fuel oil instead of gas, particularly during winter months'. It was also decided that the Ministry of Petroleum and Natural Resources should consider 'not to give natural gas to brick kiln industry.[112] Similar directives were repeatedly issued by the NEPC in its subsequent meetings for the substitution of gas by other fuels due to continued increase in demand which outpaced the supply.

**Energy Tariff.** The Fifth Plan pointed out the existing distortions in the pricing of energy and envisaged to remedy the same. Gas prices were increased during the Fifth Plan period on two occasions for domestic sector and on three occasions for commercial and industrial sectors. The price structure also underwent a structural change from that of encouraging the gas consumption to that of economizing it. Table 3.7 indicates the gas price movements for various sectors during the period.

**TABLE 3.7**

**GAS PRICES, 1978-83**

Rs. Per MCFT

| | Industry | Commercial | Domestic |
|---|---|---|---|
| 23-6-1978 | 9.32/ 8.82 | 17.2 | 12.00/ 9.60 |
| 26-6-1979 | 10.96/10.48 | 18.85 | 12.00/ 9.63 |
| 11-1-1982 | 13.00 | 22.00 | 14.00/21.00 |
| 9-1-1983 | 16.34 | 25.34 | No change |

Source: Energy Year Book, 1983, op.cit., p.53.

The price of petroleum products was increased on various occasions. The price of kerosene was decreased once, but again increased to the previous level in three months time. The price of kerosene increased from Rs. 1 per litre on 1 January, 1979 to Rs. 2.75 per litre on 9 January, 1983. The price of HSD was gradually increased on five occasions from Rs. 1.56 per litre to Rs. 4.00 per litre. The price of HOBC was also increased on five occasions from Rs. 3.60 per litre on 29 June 1978 to Rs. 7.30 per litre. The price of Gasoline (regular) was increased on six occasions from Rs. 3

per litre to Rs. 6 per litre. The price of furnace oil was increased on five occasions from Rs. 590 per ton to Rs. 1,720 per ton. The price of coal varied between Rs. 375 per ton and Rs. 678 per ton.[113]

The policy in respect of electricity tariff also changed. WAPDA introduced the system of adding fuel surcharge in tariff since July 1978 whenever price of fuels was increased. The domestic consumers, however, were exempted. This system was already being followed by the KESC.

## THE SIXTH FIVE YEAR PLAN (1983-88)

The Sixth Five Year Plan assigned highest priority to the energy sector. The Plan allocated Rs. 116.5 billion for the energy sector development programs; Rs. 87.4 billion for power sector including Rs. 9 billion for the PAEC programs; Rs. 27.5 billion for fuels; and Rs. 1.6 billion for energy planning, research, conservation and renewables. The energy sector allocation amounted to 38.2 percent of Sixth Plan public sector development outlays against the 25.3 percent of the Fifth Plan revised allocations. As a percentage of overall development outlay, the energy sector allocation increased from 17.2 percent in the Fifth Plan to 23.1 percent in the Sixth Plan.[114] Table 3.8 gives details of the physical targets of the Sixth Plan for the energy sector.

The Sixth Plan set the following 'basic objectives' of the national energy policy:

a. To ensure adjustments for realizing growth targets of the Sixth Plan in an energy efficient manner;

b. to arrange inter-fuel adjustments with the objective of minimizing import-dependence within the Plan period;

c. to prepare the ground for growing self-reliance in energy during the Seventh Plan and beyond;

d. to develop indigenous resources of energy, intensify the search for yet undiscovered resources, develop nuclear and renewable energy resources and to acquire full command on technology relating to energy substitutes;

e. to ensure coverage of the entire rural population residing in compact villages by rural electrification;

f. to develop mechanisms for greater participation of the private sector in meeting the energy requirements of the nation;

g. to ensure proper institutionalization of long term energy planning, monitoring and evaluation;

h. to rationalize energy prices.[115]

The Plan provided for greater participation of the private sector in the energy sector and envisaged an investment of Rs. 15.7 billion to come from the private

## TABLE 3.8

## SIXTH PLAN ENERGY SECTOR PHYSICAL TARGETS

| | |
|---|---|
| **A. POWER** | |
| 1. Energy generation | 31,723 Million Kwh |
| a) WAPDA | 26,323 Million Kwh |
| b) KESC | 5,400 Million Kwh |
| 2. Installed capacity addition | 3,795 M.W. |
| a) WAPDA | 2,895 M.W. |
| b) KESC | 900 M.W. |
| 3. No. of consumers (addition) | 3,152,550 |
| a) WAPDA | 2,900,000 |
| b) KESC | 252,550 |
| 4. Villages electrified (including others) | 20,000 |
| **B. FUELS** | |
| 1. Crude oil production (yearly average0 | 21,00 thousand barrels per day |
| 2. Gas consumption | 439,460 MMCFT |
| 3. Coal production | 5.4 million tons/annum |
| 4. Drilling of wells | 250 |
| a) OGDC | 96 |
| b) Joint Ventures | 25 |
| c) Private | 129 |
| 5. LPG Production | 200,970 tons |
| 6. Refining capacity | 8 million tons/annum |
| 7. Gas consumers (new addition) | 110,000 per annum |

Source: The Sixth Five Year Plan, pp.223-258.

sector. Besides, it was decided to encourage the private sector to participate in power generation, particularly coal based, with guaranteed purchases by the KESC or WAPDA allowing a reasonable rate of return.[116]

The Plan placed special emphasis on the conservation of energy. It suggested to take steps like setting up a National Energy Conservation Unit, institutionalizing a system of energy surveys and audits, training of experts, arranging institutionalized financing for the conservation of energy, demonstration and dissemination of information, and setting up of efficiency standards. It also recommended the following measures:

a. Closure of shops earlier in the evening and consideration of adopting day-light saving time;

b. introduction of a system of 5 day week with longer working hours as well as staggered holidays and shifting times in industrial estates and industrial areas;

c. encouraging industries to close for plant maintenance during the critical energy supply period of December to May;

d. investigating more energy efficient means of bulk transportation such as the use of pipe lines and the inland waterways;

e. carrying out energy audits which will be made mandatory for major sectors of energy consumption in due course;

f. availability of funds at relatively easier terms for energy conservation and efficiency improvement programs;

g. preventing wasteful or ostentatious energy use through the price mechanism, particularly for decorative purposes or for advertisements;

h. introduction of an energy management legislation after ensuring that the people have been made adequately aware of the necessity of energy conservation and improvement in efficiency and have access to adequate service and appropriate energy information for this purpose.[117]

**The Power Sector**. Within the energy sector, the Sixth Plan assigned highest priority to the power sector which got more than 75 percent of the total energy sector allocation. Out of the total of Rs. 87.4 billion power sector allocation, power generation, including nuclear power, was provided more than 60 percent (Rs. 52.6 billion). The power sector allocation increased to about 28.7 percent of total public sector development outlay compared to the 18.4 percent during the Fifth Plan and 14.4 percent during the Annual Plan period.[118]

For power generation, the Sixth Plan placed more emphasis on (oil-based) thermal power additions. It envisaged to increase the installed capacity of the public utilities (i.e., WAPDA and KESC) from 4,809 MW in 1982-83 to 8,604 MW in 1987-88. The additional capacity of 3,795 MW would comprise 630 MW hydel, 2,440 MW steam and 725 MW gas turbines. **Chashma Nuclear Power** with the installed capacity of 900 MW was envisaged to come on-stream after the Sixth Plan period in February 1991. Table 3.9 compares the installed capacity at the beginning and at the end of the Sixth Plan period.

**TABLE 3.9**

**INSTALLED CAPACITY SIXTH PLAN TARGET**
**(Public Utilities Only)**

| | 1982-83 | | 1987-88 | |
|---|---|---|---|---|
| | M.W. | % | MW | % |
| Hydel | 2,547 | 53.0 | 3,177 | 36.9 |
| Steam | 1,436 | 30.0 | 3,876 | 45.1 |
| Gas Turbine | 689 | 14.2 | 1,414 | 16.4 |
| Nuclear | 137 | 2.8 | 137 | 1.6 |
| Total | 4,809 | 100.0 | 8,604 | 100.0 |

Source: The Sixth Five Year Plan, p.238.

**Rural Electrification.** The Sixth Plan envisaged to accelerate the pace of rural electrification. Rural electrification strategy mainly consisted of expanding the national grid to the rural areas, although solar energy and small hydel plants were also decided to be established in remote areas. As regards distribution of power, the Sixth

Plan placed greater emphasis on the agricultural and industrial consumers. It envisaged not only to clear the backlog of the industrial and agricultural connections but also meet all future requirements.

**The Fuels Sector.** The fuels sector got much better allocation compared to the previous years. It improved to about 9 percent of the public sector development outlay compared to 6.9 percent during the Fifth Plan and 3.9 percent during the Annual-Plan period. The renewables also got better attention which got 0.5 percent of the public sector development outlay compared to 0.1 percent during the Fifth Plan. For the first time, energy plantation was given some attention and Rs. 600 million were provided for this purpose.

In respect of oil and gas exploration, the Sixth Plan continued the policy of attracting private investment. Besides, it also envisaged the public sector to gear up its efforts. The financial allocations (Rs. 19 billion) for the OGDC were increased considerably. The Sixth Plan fixed a target of 250 wells; 96 by OGDC, 25 by joint ventures, and 129 by the private companies. This amounted to an average of 50 wells per annum against the Fifth Plan average of 16.4

wells per annum.

In order to accelerate the oil and gas exploration, the concession rules were amended in 1985. Under the new rules, the terms of the new concessions were reduced to three years from the previous 8-12 years and the drilling was required to start within 18-24 months.[119] New formula for gas producer price for linking the price of all non-associated gas to the international price of fuel oil was also announced. The new price to be paid to the producer for the pipeline quality gas would equal 66% of the international price of the fuel oil at the main consumption centres, adjusted for the transmission cost from the gas field and subtracting a negotiated percentage discount. The new formula would be applied to concessions signed on or after 30 September, 1985.[120]

The Sixth Plan placed greater emphasis on the development and utilization of coal, although it continued to be treated as a mineral. The Plan discussed the policies and programs in respect of coal in the chapter on Minerals. To streamline the policies relating to coal, the Plan recommended to setup a National Coal Authority (NCA) with the following principal functions:

- Assessment of the quantity and quality of coal reserves and formulation of National Exploration Program;

- Investigation and assessment of economic potential of coal and formulation of projects of coal based industry preferably close to the coal mine heads;

- Coordination and supervision of coal utilization feasibility studies e.g. manufacturing and marketing of smokeless coal briquettes and fuel substitutions;

- To act as clearing house of ideas and provide advisory and consultative services for the processing of leases and concessions, in consultation with provincial governments for the public and private domestic/foreign joint ventures;

- NCA assistance to the Government in establishing the appropriate structure and mechanism for mining finance especially the financing of the private sector.[121]

The Plan envisaged to take the following measures for the exploration, development, production and utilization of coal:

- Upgrading reserves from inferred/indicated to proven status through appropriate investigation;

- development of coal infrastructure, marketing and utilization;

- encouraging mining ventures on cooperative base;

- introducing fiscal incentives;

- applying dual firing systems in heat processing units;

- establishing small thermal energy plants near coal mines (with participation of WAPDA and KESC, as well as provincial Governments), on joint venture or equity basis;

- carrying out feasibility studies of gasification of Lakhra coal for medium/low Btu gas;

- introducing the unit-train concept at railways for moving coal from the mines to the centralized delivery points;

- investigating the feasibility of water transportation on the Indus river especially between Kalabagh and Sukkur;

- adopting pricing policies in relation to competing fuels on a more rational basis to encourage increased coal development and use; and

- setting up smokeless briquette plants of economic sizes based on major coal fields as a substitute for kerosene oil.[122]

**Renewable Energy Sources.** The Plan allocated Rs.1.6 billion for research, energy planning and development of the renewable energy sources. Energy plantation received special attention and this project received an allocation of Rs.612 million. Bio-gas development project envisaged the establishment of 3,000 family size bio-gas units per year during the six plan period. It was also planned to harness solar energy and a program of Research and Development and Demonstration of solar energy was included in the plan. The plan also allocated funds for the development of other renewable sources of energy such as wind energy, garbage power, ethanol production for sugarcane and small hydels.[123]

**Energy Tariff.** The price distortions in the energy sector had continued during the Fifth Plan. Natural gas remained the cheapest fuel in the country. Table 3.10 gives the comparison between the prices of various fuels for 1982-83. The Sixth Plan undertook to rationalize the energy prices in the country.

**TABLE 3.10**

**RELATIVE ENERGY PRICES, 1982-83**

**(Rs./Million BTU)**

| Energy | Agricultural | Industrial | Transport | Residential | Commercial & Industrial |
|---|---|---|---|---|---|
| Natural Gas | - | 16.67 | - | 14.29 | 25.86 |
| Coal | - | 33.69 | 33.69 | 30.73 | - |
| Kerosene | - | - | - | 80.43 | - |
| LPG | - | - | - | 63.34 | - |
| HSD | 116.69 | 116.69 | 116.69 | - | - |
| LDO | 79.35 | 79.35 | 79.35 | - | - |
| MS | - | - | 188.15 | - | - |
| FO | - | 41.50 | 41.50 | - | - |
| Electricity | 67.39 | 184.59* | 99.62 | 108.41 | 292.99 |
| JP-1 | - | - | 146.09 | - | - |
| HOBC | - | - | 230.04 | - | - |
| Fuel Wood | - | - | - | 48.0 | - |

* Exclusive of the fuel surcharge.

Source: Government of Pakistan, Planning Commission, Report of the Working Group on Development and Conservation of Energy Resources, March 1983, p.116.

## CONCLUSION

The energy sector has received high priority attention from successive Governments in Pakistan since 1947 when the country came into being. The areas which constituted Pakistan at the time of independence were industrially underdeveloped. The country also inherited an antiquated agricultural sector. The energy requirements of the country were not much. In spite of this, about 90 per cent of the requirements were met by the imported fuels. Some of the areas were dependent on electric supplies from India. The institutional framework for planning and executing energy policy had also to be reorganized. The policy planners, therefore, assigned high priority to the energy sector as they considered the provision of energy at low rates a prerequisite for industrial development and modernization of agriculture.

From the very outset, the cherished goal of the energy policy has been to reduce dependence on imports. The initial response of the government was to increase the production of oil and coal from the existing fields and to gear up the exploration efforts to discover new fields. The Pakistan Petroleum Production Rules were framed in 1949 to regulate and facilitate the exploration and exploitation of oil and gas in the country. The natural gas was discovered in 1952 at Sui, Baluchistan, but it took some time to formulate gas utilization policy. In the power sector, the initial response was to construct small thermal plants and small canal fall hydel stations to achieve quick results. The industrial establishments were encouraged to install generating units to meet their individual electric power needs. For the purpose of planning and regulating the development of electricity, Central Engineering Authority was created in 1948 under the Federal Ministry of Industries and Natural Resources. The policy for nationalization of electric undertakings was adopted from the very beginning.

Pakistan embarked upon planned economic development in a coordinated way with the launching of the First Five Year Plan (1955-60). However, the Fifth Five Year Plan (1978-83) is the first official document of the Government of Pakistan which treated energy a separate sector of the economy. Prior to this, energy related policies and programs were outlined separately without establishing intra-sectoral linkages.

In the fuels sector, the policy to reduce dependence on the imported fuel by gearing up exploration and exploitation efforts in the country has been adopted by successive regimes. It gained real impetus, however, after the onset of oil price like in 1973. Initially, the Government pursued the policy of total dependence on the private companies in the field of oil and gas exploration and exploitation. By 1961, as a result of diminishing interest of the private companies in the exploratory work, the Government of Pakistan established the Oil and Gas Development Corporation (OGDC) in the public sector to directly undertake exploration and exploitation of oil and gas in the country. The Government also adopted the policy of entering into joint ventures with other companies. The oil crisis of 1973, forced the Government to review the priorities in the energy sector and it was at this stage that concerted efforts were made to reorganize and strengthen the OGDC. Since mid 1970s, the OGDC has received high priority attention of the Government. The efforts are afoot as of June, 1988 to achieve financial self-sufficiency for the corporation and run it on commercial lines. The private sector companies have also shown increased interest in the exploration work as a result of revision of rules and regulations in 1976 and 1985 providing for attractive incentives.

The policy in respect of gas utilization has provided for encouraging the consumption of gas in all the sectors. This policy led to indiscriminate use of gas and created problems forcing the Government to resort to gas load-shedding during 1980s. The purification, transmission and distribution of gas has remained in the public sector, but handled by public limited companies under the control of the Government. The production and utilization of coal has suffered as a result of gas utilization policy. Although, successive plans have emphasized the development and utilization of coal resources.

Until 1974, all three oil refineries were in the private sector, when one of them, namely, National Refinery Limited located at Karachi, was nationalized. The Government also enhanced its participation in marketing, storage and distribution of petroleum by nationalizing the Pakistani oil marketing companies under the Marketing of Petroleum Products Federal Control Act, 1974. The Pakistan State Oil Company Limited (PSO) was established in 1976 by integrating the nationalized companies to carry out these functions. The foreign-owned oil marketing companies, however, were allowed to continue their operations.

The new and renewable sources of energy, such as small hydels, bio-gas, solar energy, wind energy, firewood and power alcohol, have received belated attention of the Government. The first Plan mentioned the production of power alcohol and rules were also framed for its utilization. Firewood/energy plantation has received some attention in energy plans, but without separate allocation of funds except the Sixth Plan. Bio-gas and solar energy received attention in the Fifth and Sixth Plans. Prior to this, no financial allocations were made for their development.

In the power sector, the policy relating to generating capacity mix has varied. In the initial few years, small thermal plants and small hydel stations were planned. Development of hydel potential was taken up in the Second and the Third Plans. A great headway was made after the signing of the Indus Basin Treaty which provided for the construction of Mangla and Tarbela Hydel Stations. After the discovery of natural gas in 1952, the policy to increase gas based ed thermal power capacity has also been pursued. As a result of shortage of gas during 1980s, this policy was changed and the use of gas for power generation was discouraged. The Sixth Plan placed more emphasis on oil based thermal additions. The reliance on the private captive capacity decreased after the Second Plan period.

The policy of nationalization of electrical undertakings, has been pursued since independence with the result that as of June 1988 no private company is involved in power generation and distribution. The Seventh Five Year Plan (1988-93), however, has provided for private sector participation in coal-based thermal power generation. The rural electrification has been pursued vigorously since mid 1970s.

The Government has followed its policy of peaceful use of atomic energy since 1954. Various atomic energy centres are operating in the country. The first nuclear power plant with installed capacity of 137 MW started its operations at Karachi in 1972. The Government announced its nuclear power generation program in 1973 which provided for the establishment of 15 nuclear power stations in 25 years. Under this program, the first nuclear power station of 900 MW capacity was planned to be completed by 1975 at Chashma in the Punjab. Nuclear power generation policy of the Government has not undergone any change.

In respect of energy tariff, the policy has been to provide gas and electricity at low rates. Lately, some adjustments have been affected in the tariff structure so as to discourage wasteful consumption. Until March 1976, the electricity tariffs for domestic consumers decreased with the increase in consumption. Similarly, the gas tariffs also encouraged consumption until 1982 when changes were made which provided for higher rates beyond a certain level of consumption. The Government has adopted the policy of charging the economic price in recent years causing upward movements in energy prices. Since the advent of the Fifth Five Year Plan, the Government has pursued the policy to place the public sector corporations, namely, WAPDA, KESC and OGDC, on a sound financial footing so that at least 30 per cent of the expansion program is financed through self-generation of resources. The conservation of energy has received some attention from 1978 onwards and the Fifth and Sixth Five Year Plans suggested some policy measures in this regard.

## NOTES

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5. Pakistan 1955-56 (Karachi: Pakistan Publications 1956), p.135.

6. Energy Data Book, op.cit., p.106.

7. Ibid., pp.84, 102.

8. Shahid Ahmed (Director, Ministry of Petroleum and Natural Resources), Role of Private Sector in Petroleum Exploration and Development in Pakistan. (Unpublished internal paper of the Ministry of Petroleum and Natural Resources, Islamabad), February 1985, p.1.

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10. Energy Data Book, op.cit., p.94.

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13. The First Five Year Plan, op.cit., pp.363-364.

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15. Pakistan 1955-56, op.cit., pp.135-136.

16. Pakistan 1953-54, (Karachi: Pakistan Publications), pp.79-81.

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20. Shirin Tahir Kheli, "Pakistan's Nuclear Option and U.S. Policy", *Orbis*, Vol. 22, No. 2, (Summer 1978), p.358.

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22. "Oil Exploration Since 1866", *Pakistan Economist*, September 1981, pp.17-18; *Energy Data Book*, *op.cit.*, p.5.

23. Shahid Ahmed, *op.cit.*, p.2.

24. *The First Five Year Plan*, *op.cit.*, p.467.

25. Ibid., pp.43, 15.

26. *Pakistan 1957-58* (Karachi: Pakistan Publications), p.46.

27. *The First Five Year Plan*, *op.cit.*, pp.11, 327.

28. *Ibid.*, pp.368-372 and 381.

29. *Ibid.*, pp.333-334.

30. *Twenty Years of Pakistan*, *op.cit.*, pp.437-439.

31. *Ibid.*, *The First Five Year Plan*, *op.cit.*, p.389.

32. *Ibid.* p.387.

33. *Ibid.*

34. *Ibid.* p.389.

35. *Ibid.*

36. Energy Data Book, op.cit., pp.57-59.

37. The First Five Year Plan, op.cit., pp.432, 434, 467.

38. Ibid., p.390.

39. Ibid.

40. Ibid., p.391.

41. Ibid., p.390.

42. Ibid.

43. Ibid., p.460.

44. Ibid., pp.257-259.

45. The Second Five Year Plan, op.cit., pp.13, 211. The Plan does not give an estimation of the proportionate expenditure on power development incurred on the multipurpose projects. As most of such projects were near completion, it is believed that expenditure was negligible.

46. Ibid., pp.211-214.

47. Ibid., p.193.

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53. Ibid., pp.265-276, 244, 262.

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101. *Energy Year Book 1979*, *op.cit*., pp.11-12.

102. *Energy Data Book*, *op.cit*., pp.134-135.

103. *Ibid*., p.137.

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# CHAPTER IV

# IMPLEMENTATION OF ENERGY POLICY

## INTRODUCTION

This chapter examines the implementation of energy policy in Pakistan. It analyses the achievement of policy objectives and the factors which have influenced the implementation process. Multifarious variables have been identified. The chapter includes case studies on "growth of installed capacity and power generation", "transmission system", "thermal power", "hydroelectric power", "nuclear power", "rural electrification", "railway electrification", "power system losses", "power commission", "oil and gas exploration and exploitation", "coal policy" and "National Energy Policy Committee" which highlight the multiplicity and complexity of these variables. In view of the enormity of the problem, the analysis has been restricted to major policy initiatives pursued during the 1947-88 period. The chapter discusses the implementation issues relating to two sectors, namely, the power sector and the fuels sector. The case studies are devoted to special policy initiatives undertaken during the 1947-88 period.

## THE POWER SECTOR

The implementation of energy policy relating to the power sector during the 1947-88 period was mainly the responsibility of the public sector. The Ministry of Water and Power of the Federal Government implements the energy policy relating to hydroelectricity and thermal power through two field organizations under its control, namely, the Water and Power Development Authority (WAPDA) and the Karachi Electric Supply Corporation (KESC). The nuclear power policy is the responsibility of the Atomic Energy Commission of Pakistan which is under the direct control of the Chief Executive of the country.

WAPDA has developed to be the most powerful organization in the power sector. It was established in 1958 as a result of the recommendation by the First Five Year Plan. In pursuance of Government policy of nationalization of electrical undertakings, WAPDA had assumed the monopolistic control of the power sector by 1985 when it took over the management of the KESC (Ch. II). The Chairman of WAPDA is usually the confidant of the Chief Executive of the country and wields tremendous powers.

## The growth of installed capacity and power generation

At the time of independence in 1947, Pakistan's total installed capacity (excluding former East Pakistan), including industrial captive capacity, was a meager 88.4 MW. As of 30 June 1988, the installed capacity of the public utilities alone was 6,820.7 MW. Table 4.1 indicates the progress of installed capacity by source during various Plan periods. Sizable increases had also been made in power generation during the 1947-88 period. The generation by the public utilities increased from 117.90 GWH in 1948 to 33,091 GWH in 1988. Per capita generation by the public utilities increased from less than 4 KWH in 1948 to 318.7 KWH in 1988. Table 4.2 indicates the progress of power generation in the country since independence. Table 4.3 compares the expansion in generating capacity with that of the power generated by source at the beginning and the end of each Plan period.

It is evident from Table 4.3 that additions made in the thermal capacity during the First and Second Plan periods were more than double the additions made in the hydel capacity; thermal capacity expanded by 535.2 MW against the expansion of 207 MW of hydel capacity. At the end of the Second Plan (1960-65), the hydel capacity accounted for 29.6

## TABLE 4.1

**PROGRESS OF INSTALLED CAPACITY BY SOURCE OF GENERATION**

(M.W.)

| Year | Hydel | Public Utilities Thermal | Nuclear | Total | Captive Industrial (Thermal) | Total |
|---|---|---|---|---|---|---|
| 1947 | 10.7 (15.6) | 58.1 (84.4) | - | 68.8 (100.0) | 19.6 | 88.4 |
| 1955 | 62.7 (37.3) | 105.5 (62.7) | - | 168.2 (100.0) | 100.0 | 268.2 |
| 1960 | 250.7 (45.6) | 299.6 (54.4) | - | 550.3 (100.0) | 180.0 | 738.3 |
| 1965 | 269.7 (29.6) | 640.7 (70.4) | - | 910.4 (100.0) | 185.0 | 1,095.4 |
| 1970 | 667.8 (38.3) | 1,075.6 (61.7) | - | 1,743.4 (100.0) | 180.0 | 1,923.4 |
| 1978 | 1,567.2 (46.7) | 1,648.8 (49.2) | 137.0 (4.1) | 2,253.0 (100.0) | 230.0 | 3,583.0 |
| 1983 | 2,547.2 (52.7) | 2,153.3 (44.5) | 137.0 (2.8) | 4,837.5 (100.0) | 298.7* | 5,136.2 |
| 1988 | 2,898.2 (42.5) | 3,785.5 (55.5) | 137.0 (2.6) | 6820.7 (100.0) | N.A. | N.A. |

* Captive Industrial capacity seems to be under-reported by the Energy Year Book 1983. According to the Ministry of Water and Power, the captive capacity at the end of 1982-83 was about 430 MW.

**Notes:**

(a) Figures in parenthesis indicate percentage share.

(b) Figures for the former East Pakistan are excluded. Total installed capacity of public utilities in East Pakistan progressed as under:

1947 - 7.6 MW
1955 - 32.2 MW
1960 - 108.7 MW
1965 - 205.7 MW
1970 - 550.0 MW

Source: (a) Twenty Years of Pakistan, op.cit., p.240.
(b) The Fourth Five Year Plan, op.cit., p.429.

(c) The 1947 figures indicate the capacity existing at the time of independence. The others are the end of financial year figures i.e. 30 June from 1960 onwards and 30 March for 1955.

(d) To present data as accurately as possible Strenuous efforts have gone into the construction of Table 4.1 The data reported in a host of documents issued by different agencies of Government of Pakistan vary due to various reasons including variation in the reporting time, difference in the classification or coverage, or misreporting or carelessness. Variation in figures for a particular year in the same document on different pages is not an uncommon occurrence. For example, WAPDA Annual Report 1983-84, on pages 13 and 91 gives the Installed Generation Capacity of the WAPDA System for 1982-83 to be 3,954 MW. But on page 89 in the same report, the Installed Generating Capacity for the same year (i.e. 1982-83) is 3,988.53 MW. The figures given in the above table have, therefore, been cross-checked before including them in the table. Figures in Table 9 are slightly different from this table due to variation in reporting time.

**Sources:**

(i) For 1947 figures:
(a) Twenty Years of Pakistan, op.cit., pp.232 and 240.
(b) The First Five Year Plan, op.cit., p.346.

(ii) For 1955 and 1960 figures:
(a) The Second Five Year Plan, op.cit., pp.198-199 and 212-214.

(iii) For 1965 and 1970 figures:
(a) Twenty Years of Pakistan, op.cit., pp.240.
(b) The Fourth Five Year Plan, op.cit., p.424.

(iv) For 1978 figures:
(a) Energy Year Book 1979, op.cit., p.57.
(b) The Fifth Five Year Plan, op.cit., p.183.

(v) For 1983 figures:
(a) Energy Year Book 1983, op.cit., pp.56-58.
(b) Energy Year Book 1984, op.cit., pp.65-66.
(c) WAPDA Annual Report, 1984, pp.6 & 89.
(d) KESC 72nd Annual Report, December 1984, p.14.

(vi) For 1988 figures:
(a) Energy Year Book 1989, pp. 52-53

## TABLE 4.2

**HISTORICAL GROWTH OF INSTALLED CAPACITY AND GENERATION OF ELECTRICITY IN PAKISTAN (PUBLIC UTILITIES)**

| Year (1) | Installed Capacity (M.W.) (2) | Annual Increase in Capacity (M.W.) (3) | Energy Generated (GWh) (4) | Annual Increase in Generation (GWh) (5) | Population (millions) (6) | KWh per Capita (7) | Annual Increase in KWh per capita (8) |
|---|---|---|---|---|---|---|---|
| 1947 | 68.8 | - | - | - | - | - | - |
| 1948 | 68.61 | (-)0.19 | 117.90 | - | 31.6 | 3.7 | - |
| 1949 | 73.65 | 5.04 (7.3) | 150.85 | 32.95 (27.9) | 32.4 | 4.7 | 1 (27.0) |
| 1950 | 86.45 | 12.8 (17.4) | 156.10 | 5.25 (3.48) | 33.4 | 4.7 | |
| 1951 | 105.66 | 19.21 (22.2) | 206.13 | 50.03 (32.0) | 34.4 | 6.0 | 1.3 (27.6) |
| 1952 | 130.04 | 24.38 (23.1) | 281.90 | 75.77 (36.8) | 35.5 | 7.9 | 1.9 (31.6) |
| 1953 | 143.68 | 13.64 (10.5) | 384.80 | 102.9 (36.5) | 36.6 | 10.5 | 2.6 (32.9) |
| 1954 | 163.60 | 19.92 (13.9) | 468.96 | 84.16 (21.9) | 37.7 | 12.4 | 1.9 (18.1) |
| 1955 | 168.12 | 4.52 (2.8) | 593.59 | 124.63 (26.6) | 38.8 | 15.3 | 2.9 (23.4) |
| 1956 | 206.70 | 38.58 (22.9) | 725.59 | 132.60 (22.2) | 40.0 | 18.1 | 2.8 (18.3) |
| 1957 | 216.08 | 9.38 (9.5) | 830.19 | 104.6 (14.4) | 41.3 | 20.1 | 2.0 (11.0) |
| 1958 | 228.40 | 12.32 (5.7) | 1,066.00 | 235.81 (28.4) | 42.5 | 25.1 | 5.0 (24.8) |
| 1959 | 241.10 | 12.7 (5.6) | 1,126.00 | 60.0 (5.6) | 43.9 | 25.6 | 0.5 (2.0) |
| 1960 | 493.32 | 252.22 (104.6) | 1,047.00 | (-)79.0 (-)(7.0) | 45.2 | 23.2 | (-)2.4 (-)(9.4) |
| 1961 | 521.88 | 28.56 (5.8) | 1,298.00 | 251.0 (24.0) | 46.9 | 27.7 | 4.5 (19.4) |
| 1962 | 584.88 | 63.0 (12.1) | 1,692.00 | 394.0 (30.3) | 48.3 | 35.0 | 7.3 (26.3) |
| 1963 | 725.88 | 141.0 (24.1) | 2,117.00 | 425.0 (25.1) | 49.7 | 42.6 | 7.6 (21.7) |
| 1964 | 742.50 | 16.62 (2.3) | 2,712.00 | 595.0 (28.1) | 51.1 | 53.1 | 10.5 (24.6) |
| 1965 | 898.75 | 156.25 (21.0) | 3,176.00 | 464.0 (17.1) | 52.6 | 60.4 | 7.3 (13.7) |
| 1966 | 947.95 | 49.2 (5.5) | 3,698.00 | 522.0 (16.4) | 54.0 | 68.5 | 8.1 (13.4) |
| 1967 | 1,310.95 | 363.0 (38.3) | 3,925.00 | 227.0 (6.1) | 55.7 | 70.5 | 2.0 (2.9) |
| 1968 | 1,410.95 | 100.0 (7.6) | 4,672.00 | 752.0 (19.2) | 57.3 | 81.6 | 11.1 (15.7) |
| 1969 | 1,469.95 | 59.0 (9.2) | 5,518.00 | 841.0 (18.0) | 58.9 | 93.7 | 12.1 (14.8) |
| 1970 | 1,724.95 | 255.0 (17.3) | 6,380.00 | 862.0 (15.6) | 60.6 | 105.3 | 11.6 (12.3) |
| 1971 | 1,719.55 | (-)5.4 (-)(0.3) | 7,202.00 | 822.0 (12.9) | 62.4 | 115.4 | 10.1 (9.6) |
| 1972 | 1,862.25 | 142.7 (8.3) | 7,572.00 | 370.0 (5.1) | 64.9 | 116.7 | 1.3 (1.1) |
| 1973* | 1,871.75 | 9.5 (0.5) | 8,377.00 | 805.0 (10.6) | 66.8 | 125.4 | 8.7 (7.4) |
| 1974 | 2,071.75 | 200.0 (16.7) | 9,064.00 | 687.0 (8.2) | 68.8 | 131.7 | 6.3 (5.0) |
| 1975 | 2,430.40 | 358.65 (17.3) | 9,941.00 | 877.0 (9.7) | 70.9 | 140.2 | 8.5 (6.4) |
| 1976 | 2,527.73 | 97.33 (4.0) | 10,319.00 | 378.0 (3.8) | 73.0 | 141.4 | 1.2 (0.8) |
| 1977 | 3,333.48 | 805.75 (31.9) | 10,877.00 | 558.0 (5.4) | 75.2 | 144.6 | 3.2 (2.2) |
| 1978 | 3,353.03 | 19.55 (0.6) | 12,375.00 | 1,498.0 (13.8) | 77.4 | 159.9 | 15.3 (10.6) |
| 1979 | 3,353.03 | - | 14,174.00 | 1,799.0 (14.5) | 79.8 | 177.6 | 17.7 (11.0) |
| 1980 | 3518.03 | 165.0 (4.9) | 14,974.00 | 800.0 (5.6) | 82.1 | 182.4 | 4.8 (2.7) |
| 1981 | 4,105.03 | 587.0 (16.7) | 16,062.00 | 1,088.0 (7.3) | 84.6 | 189.9 | 7.5 (4.1) |
| 1982 | 4,205.03 | 100.0 (2.4) | 17,688.00 | 1,626.0 (10.1) | 87.1 | 203.1 | 13.2 (6.9) |
| 1983 | 4,798.55 | 593.52 (14.1) | 19,697.00 | 2,009.0 (11.4) | 89.7 | 219.6 | 16.5 (8.1) |
| 1984 | 5,010.13 | 211.58 (4.4) | 21,873.00 | 2,176.0 (11.0) | 91.9 | 238.0 | 18.4 (8.3) |
| 1988 | 6,820.65 | — | 33,091.00 | — | 103.8 | 318.7 | — |

* Installed Capacity figures for 1973 corrected by subtracting 100 MW and hydel capacity from that was reported by the Energy Year Book, 1979 after comparing with WAPDA Power System Statistics, op.cit., p.4, as the hydel capacity did not increase during 1972-73.

**Source:** For installed capacity and energy generation figures:

(i) Energy Data Book, op.cit., pp.79 & 106.

(ii) Energy Year Book 1979, op.cit., pp.57 & 62.

(iii) Energy Year Book 1988, pp.74-75 & 80.

For population figures:

(iv) International Atomic Energy Agency, Nuclear Power Planning Study for Pakistan, Vienna, 1975, p.28.

(v) World Bank, Pakistan: Recent Economic Developments, Report No. 4906-Pak, February 24, 1984, p.59.

(vi) Economic Survey 1987-88, op.cit., Statistical Annexure, p. 1.

# TABLE 4.3

## PROGRESS OF POWER GENERATION AND INSTALLED CAPACITY OF PUBLIC UTILITIES

| Year | Installed Capacity (MW) | | | | | | | | Energy Produced (GWH) | | | | | | | | Generation per capita |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hydel | | Thermal | | Nuclear | | Total | | Hydel | | Thermal | | Nuclear | | Total | | |
| | I.C. | Inc. | I.C. | Inc. | I.C. | Inc. | I.C. | Inc. | E.P. | Inc. | E.P. | Inc. | E.F. | Inc. | E.P. | Inc. | |
| 1947 | 10.7 | - | 58.1 | - | - | - | 68.8 | - | 23.53 | - | 94.37 | - | - | - | 117.90 | - | 3.7 |
| | (15.6) | - | (84.4) | - | - | - | (100) | - | (20) | - | (80) | - | - | - | (100) | - | - |
| 1955 | 62.7 | 52.0 | 105.5 | 47.4 | - | - | 168.2 | 99.4 | 307.36 | 283.83 | 286.23 | 191.86 | - | - | 593.59 | 475.69 | 15.3 |
| | (37.3) | (48.6) | (62.7) | (82) | - | - | (100) | (144) | (52) | (1206) | (48) | (203) | - | - | (100) | (403) | - |
| 1960 | 250.7 | 188.0 | 299.6 | 194.1 | - | - | 550.3 | 382.1 | 507 | 199.6 | 540 | 253.8 | - | - | 1,047 | 453.41 | 23.2 |
| | (45.6) | (300) | (54.4) | (184) | - | - | (100) | (227) | (48) | (65) | (52) | (89) | - | - | (100) | (80) | |
| 1965 | 269.7 | 19.0 | 640.7 | 341.1 | - | - | 910.4 | 260.1 | 1,362 | 855 | 1,814 | 1,274 | - | - | 3,176 | 2,129 | 60.4 |
| | (29.6) | (8) | (70.4) | (114) | - | - | (100) | (65) | (43) | (169) | (57) | (236) | - | - | (100) | (203) | |
| 1970 | 667.8 | 398.1 | 1,075.6 | 434.9 | - | - | 1,743.4 | 833.0 | 2,915 | 1,553 | 3,405 | 1,651 | - | - | 5,3809 | 3,204 | 105.3 |
| | (38.3) | (148) | (61.7) | (68) | - | - | (100) | (91) | (96) | (114) | (54) | (91) | - | - | (100) | (101) | |
| 1978 | 1,567.2 | 899.4 | 1,648.8 | 573.2 | 137 | 137 | 3,353.0 | 1,609.6 | 7,442 | 4,527 | 4,702 | 1,237 | 231 | - | 12,375 | 5,995 | 159.9 |
| | (46.7) | (135) | (49.2) | (53) | (4.1) | - | (100) | (92) | (60) | (155) | (38) | (36) | (2) | - | (100) | (94) | |
| 1983 | 2,547.2 | 980.0 | 2,153.3 | 504.3 | 137 | - | 4,837.5 | 1,484.5 | 11,365 | 3,923 | 8,104 | 3,402 | 228 | .3 | 19,697 | 7,322 | 219.6 |
| | (52.7) | (83) | (44.5) | (31) | (2.8) | - | (100) | (44) | (58) | (53) | (41) | (72) | (1) | (-1) | (100) | (59) | |
| 1988 | 2,898.2 | 351.0 | 3785.5 | 1,632.2 | 137 | - | 6,820.7 | 1,983.2 | 16,690 | 5,325 | 16,147 | 8,043 | 254 | 26 | 33,091 | 13394 | 318.7 |
| | (42.5) | - | (55.5) | (20) | (2.0) | | (100) | (9) | (53) | (8) | (45) | (29) | (2) | (52) | (100) | (17) | |

I.C. : Installed Capacity
E.P. : Energy Produced
Inc. : Increase

**Notes:** (a) Figures in the parentheses indicate percentage.
(b) Figures for Energy Produced given for 1947 represent energy produced during 1948.

**Source:** (A) For 'Installed Capacity' figures: All sources for Table 4.1
(B) For 'Energy Produced' figures: All sources for Table 4.2
(C) For population figures: All sources for Table 4.2

percent of the total capacity against the thermal capacity share of 70.4 percent. During the next 18 years (1965-83), the hydel capacity expanded at a much faster rate due to the completion of Mangla and Tarbela dams. Between 1965 and 1983, hydel capacity increased by 2,277.5 MW against an expansion of 1,512.6 MW of thermal capacity, increasing the share of the former to 46.7 percent in 1978 and to 52.7 percent in 1983. During the Sixth Plan (1983-88), thermal capacity expanded by 1,632 MW against an expansion of 351 MW of hydel capacity, thereby decreasing the share of hydel capacity in the country. Pakistan has only one nuclear power plant with installed capacity of 137 MW which became operational in 1972. As no additions could be made in the nuclear capacity afterwards, its share has decreased from 7.4 percent in 1972 to 2.0 percent in 1988. The industrial captive capacity expanded at a much slower rate compared to that of the public utilities during the 1947-88 period. In 1947, the captive capacity amounted to 22.1 percent of the total capacity. Its share decreased to 5.8 percent in 1983.

Pakistan has developed its hydroelectric capacity in integration with the development of water resources. The policy to conceive, develop and implement multi-purpose projects, which would provide irrigation water as well as hydroelectricity, was pursued during the study period. As a result three dams, namely, Warsak, Mangla and Tarbela, were constructed which developed huge storages of water for irrigation purposes. Hydroelectricity generation facilities were integrated into the projects in such a way that the water released for the irrigation purposes would be processed to generate electricity. The policy gave priority to the irrigation requirements in the use of water.

The percentage of the energy produced by different sources (thermal, hydel, nuclear) has varied in Pakistan without any regard to the percentage share of the respective installed capacity which is evident from Table 4.3.[1] The generation of hydroelectricity is dependent on the seasonal flow of rivers (which varies in response to weather conditions; rainfall, snowfall, snow-melt, etc. in the catchment areas) and irrigation requirements (which vary considerably during a year depending upon rainfall and cropping pattern). Thermal generation has suffered due to almost complete dependence on gas and the neglect of coal and furnace oil for power generation. The burning of garbage and other wastes in big cities to generate electricity still remains to be tried in Pakistan, although such plants have been operating in Europe for many years. Due to manifold increase in demand, load-shedding of gas has been increasingly resorted to, particularly in winter months, since early 1970s and power sector has mostly been amongst the first to bear the pinch. Nuclear generation has suffered due to the denial of nuclear technology to Pakistan by those having monopolistic control over it.

The performance of the government in implementing the planned additions in installed capacity deteriorated during the 1965-88 period. It failed to achieve the Plan targets since the advent of the Third Five Year Plan (1965-70). The expansion in the installed capacity during a particular Plan has remained substantially lower than the targets. Table 4.4 indicates the performance during various Plan periods. Table 4.5 indicates delays in the Commissioning of some important projects.

The Third Five Year Plan envisaged to augment the existing capacity by 1,197.7 MW, but only 833 MW were added during the Plan period, representing a shortfall of 30.5 percent (364.7 MW). The shortfall was on account of delay in the commissioning of the 137 MW KANUPP and the failure to bring on line a further addition of 237.8 MW of thermal capacity. The target for the hydel capacity was, however,

## TABLE 4.4

IMPLEMENTATION OF THE PLANNED ADDITIONS IN THE INSTALLED GENERATING CAPACITY OF PUBLIC UTILITIES

(MW)

| Period | Targets | | | | Achievements | | | | - Shortfall/Excess* + | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Hydel | Thermal | Nuclear | Total | Hydel | Thermal | Nuclear | Total | Hydel | Thermal | Nuclear | Total |
| 1947-55 | | | | | 52.0 | 47.4 | | 99.4 | | | | |
| 1st Plan (1955-60) | 176.0 | 203.2 | | 379.2 | 188.0 | 194.1 | | 382.1 | +12.0 (+6.8) | -9.1 (-4.5) | | +2.9 (+0.8) |
| 2nd Plan (1960-65) | 12.0 | 312.0 | | 324.0 | 19.0 | 341.0 | | 360.1 | +7.0 (+58.3) | +29.1 (+9.3) | | +36.1 (+11.1) |
| 3rd Plan (1965-70) | 400.0 | 672.7 | 125.0 | 1,197.7 | 398.1 | 434.9 | | 833.0 | -1.9 (-0.5) | -237.8 (-35.4) | -125.0 (-100.0) | -364.7 (-30.5) |
| 4th Plan (Abortive) (1970-75) | 750.0 | 382.1 | 125.0 | 1,257.1 | | | | | | | | |
| Annual Plan Period (1970-78) | | | | | 899.4 | 573.2 | 137.0** | 1,609.6 | | | | |
| 5th Plan (1978-83) | 1,330.0 | 760.0 | | 2,090.0 | 980.0 | 535.0 | | 1,515.0 | -350.0 (-26.3) | -225.0 (-29.6) | | -575.0 (-27.5) |
| 6th Plan (1983-88) | 630.0 | 3,165.0 | | 3,795.0 | | | | 2,018 | | | | -1,777 (-47) |

* Figures in the parentheses indicate percentage shortfall/excess.
** The capacity of KANUPP was raised to 137 MW instead of 125 MW.

Notes: (a) Figures for the former East Pakistan are excluded, which are as under:
1947-55 - 24.6
1955-60 - 76.5
1960-65 - 97.0
1965-70 - 344.3
Source: See, Table 7, Note (b).

(b) Targets for additions in the installed capacity are derived from the Plans. The targets and achievements set for the first Four Plans take into account the likely retirements of the installed capacity during respective Plan periods, while the 5th and the 6th Plan targets and achievements do not take into account likely retirements. The achievements in Table 14 are calculated from the data presented in Table 7 and take into account the retirment of generating capacity during the respective Plan periods except for the 5th and 6th Plans. Table 7 figures indicate actual installed capacity at the end of each Plan period. These figures differ from those given in The Sixth Five Year Plan (p.529). The figures indicating additions in the generating capacity during various Plan periods given in the Sixth Five Year Plan also differ from those given in the Second Five Year Plan and the Fourth Five Year Plan for the respective Plan periods. The authors of the Sixth Five Year Plan have not given any reasons or explanations for the discrepancies.

(c) During the 1970-78 period, the targets were revised on an annual basis which cannot be compared on an overall basis. Delays in the implementation of projects, however, did occur which are discussed in the text.

Source: (i) The Sixth Five Year Plan, op.cit., p.238.

(ii) Government of Pakistan, Finance Division, Economic Adviser's wing, Economic Survey 1985-86, May 1986, Islamabad, p.84.

(iii) All the Sources for Table 7.

## TABLE 4.5

COMMISSIONING DELAYS FOR SOME IMPORTANT PROJECTS

DURING 1960-85

| Name of Project (1) | | Original Planned Commissioning Date (2) | Date of Commissioning (3) | Delay (Months) 4 |
|---|---|---|---|---|
| Warsak (Hydel) | | | | |
| Units 1-4 | (160 MW) | 1960 | 1960 | - |
| Units 5-6 | ( 80 MW) | June 1979 | March 1981 | 27 |
| Mangla (Hydel) | | | | |
| Units 1-4 | (400 MW) | 1968-1970 | 1967-1969 | - |
| Unit 5 | (100 MW) | March 1971 | December 1973 | 33 |
| Unit 6 | (100 MW) | June 1971 | March 1974 | 33 |
| Unit 7 | (100 MW) | June 1973 | June 1981 | 96 |
| Unit 8 | (100 MW) | June 1974 | June 1981 | 84 |
| Unit 9 | (100 MW) | December 1986 | *September 1989 | - |
| Unit 10 | (100 MW) | December 1986 | *September 1989 | - |
| Tarbela (Hydel) | | | | |
| Units 1-2 | (350 MW) | June 1975 | May 1977 | 23 |
| Unit 3 | (175 MW) | March 1977 | June 1977 | 3 |
| Unit 4 | (175 MW) | May 1977 | July 1977 | 2 |
| Unit 5 | (175 MW) | June 1979 | August 1982 | 38 |
| Unit 6 | (175 MW) | June 1979 | October 1982 | 28 |
| Unit 7 | (175 MW) | January 1980 | October 1982 | 33 |
| Unit 8 | (175 MW) | January 1980 | December 1982 | 35 |
| Unit 9 | (175 MW) | February 1983 | ** | 36 |
| Unit 10 | (175 MW) | May 1983 | ** | 30 |
| Guddu (Thermal) | | | | |
| Unit 1 | (110 MW) | September 1972 | March 1974 | 18 |
| Unit 2 | (110 MW) | November 1972 | October 1974 | 23 |
| Unit 3 | (210 MW) | December 1973 | December 1980 | 84 |
| Faisalabad (Gas Turbine) | (200 MW) | September 1974 | November 1975 | 14 |
| Lakhra (Thermal-Coal Based) 1 | | 1979-80 | ***December 1992 | 150 |
| KANUPP (Nuclear) | (137 MW) | June 1970 | November 1972 | 29 |
| Korangi Thermal | (125 MW) | September 1974 | September 1972 | 36 |
| Gas Turbine, Korangi | (100 MW) | December 1975 | April 1979 | 52 |
| Thermal Power Station, Pipri | | | | |
| Unit 1 | (210 MW) | December 1981 | November 1983 | 23 |
| Unit 2 | (210 MW) | December 1983 | September 1984 | 9 |
| Gas Turbine, SITE | (125 MW) | June 1978 | December 1979 | 18 |

* Estimated Date Source (ix) below.

** Not commissioned until June 1985. Expected to be commissioned during 1985-86.

*** Revised schedule, source (ix) below.

Source: (i) The First Five Year Plan (1955-60), op.cit., p.368.

(ii) The Third Five Year Plan (1965-70), op.cit., p.357

(iii) The Fourth Five Year Plan (1970-75), op.cit., p.424

(iv) Annual Plan 1972-73, op.cit., pp.88-92.

(v) Annual Plan 1975-76, op.cit., pp.224-228.

(vi) The Fifth Five Year Plan (1978-83), op.cit., pp.185-186.

(vii) Pakistan Economic Survey, 1975-76, op.cit., p.74.

(viii) The Pakistan Times, Rawalpindi, January, 1981.

(ix) Information provided by the Office of the Chief Engineering Adviser, Ministry of Water and Power, Islamabad, 16 July, 1985.

(x) WAPDA Power System Statistics (Ninth Issue), op.cit., pp.1-2.

(xi) KESC, Annual Report 1973, pp.(iii) & 14.

(xii) KESC, Annual Report 1976, pp.8-9.

(xiii) KESC, Annual Report 1977, p.6.

(xiv) KESC, Annual Report 1978, pp.5-6.

(xv) KESC, Annual Report 1980, p.5.

(xvi) KESC, Annual Report 1984, p.6.

achieved. The target for the Third Five Year Plan was met in 1974, i.e., after four years. Similarly, the target of the (abortive) Fourth Five Year Plan was met in 1977 i.e. two years behind schedule.

The Third Five Year Plan had just been launched (July 1965) when India attacked (September 1965) the country. All the resources, therefore, had to be diverted to meet this national emergency. Moreover, the United States of America suspended its aid to Pakistan as a consequence of the war. The paucity of resources, therefore, thwarted the achievement of the Third Plan targets.

During the 1970-78 period, the mid-term planning was replaced by short-term annual planning, and the targets were revised on an annual basis. Due to delays and slippages in the implementation of various projects, the Plans were altered and the commissioning dates of the delayed projects were adjusted forward. During the 1970-72 period, no additions in the installed capacity were made, except trial operation of the 137 MW KANUPP. The shortfall, therefore, was 100 percent. The KANUPP was commissioned in November 1972. During 1972-73, the installed capacity increased only by 9.5 MW against the target of 220 MW, excluding 137 MW of

KANUPP. The shortfall during the 1973-74 was of the order of 110 MW or 20.6 percent. Mangla units 5 & 6 (100 MW each) which were originally scheduled to be commissioned in March and June 1971 were commissioned in December 1973 and March 1974 respectively. Guddu unit 1 (110 MW thermal) which was originally scheduled to be commissioned in September 1972 was commissioned in March 1974. Guddu unit 2 (110 MW thermal) which was originally scheduled to be commissioned in November 1972, was commissioned in October 1974. Annual Plan 1974-75 envisaged to augment the installed capacity by 375 MW, without taking into account 110 MW of Guddu unit 2 which was expected to be commissioned during the 1973-74 Plan period, but only 125 MW were added during this year representing a shortfall of 250 MW or 66.6 percent. During 1975-76, only 100 MW of new capacity were added by completing a delayed project, carried over from the previous year. No other capacity additions were planned during 1975-76. Annual Plan 1976-77 envisaged to add 700 MW of hydel capacity during the Plan period by commissioning the Tarbela units 1&2 and 3&4 in December, 1976 and May, 1977 respectively. Originally, Tarbela units 1&2 were scheduled to be commissioned in June 1975. During the 1976-77 period, Tarbela units 1-3 were commissioned, representing a shortfall of 175 MW or 25 percent of the target. During 1977-78, Tarbela unit 4 (175 MW hydel) and 125 MW extension in Korangi Thermal Power Station were commissioned. No other additions were scheduled to be made during 1977-78. In all, the installed capacity increased by 1,610 MW during the 1970-78 period.

The events, including a war with India, which led to the secession of the erstwhile East Pakistan in 1971 had a major effect on the development efforts of Pakistan during the early 1970s. Each sector of the economy felt the pinch of resource constraints. The organizational degeneration of WAPDA also contributed to the implementation failures which is evident from various stories carried by the national press. NAWA-I-WAQAT, for example, published a report on Tarbela Dam on 10 October 1985. The following extract from the report is illuminating:

> Many calamities struck the Dam during its construction. Due to the dishonesty of high-level Pakistani officers, important structures of the Dam, namely, intake tunnels were seriously damaged. The present writer remembers quite well the words of the then Prime Minister uttered by him at the lawn of Tarbela Guest House No. 1, while it was drizzling, when he was requested by the high-level officers of WAPDA to visit the site for inspection. He said in rage, "Have you people left anything behind which I should inspect!" ... Although, the then Prime Minister [Bhutto] declared at Tarbela that defective material had been used for the construction of the tunnels and that severe action would be taken against the officers who had betrayed the nation to become rich overnight ... yet those who earned crores of rupees through unfair means during the construction of

Tarbela Dam are living with the same pump and show. They still own the big houses in big cities of the country which were built not only by using the material meant for Tarbela Dam but also employing the people being paid from Tarbela Fund.[2]

The Fifth Five Year Plan envisaged to augment the installed capacity by 2,090 MW (1,330 MW hydel and 760 MWH thermal), but only 1,515 MW were brought on stream (980 MW hydel and 535 MW thermal). The shortfall, therefore, amounted to 575 MW or 27.5 percent of the Plan target. An installed capacity of 2,018 MW was commissioned during the Sixth Plan period against the Plan target of 3,795 MW. This represents a shortfall of 1,777 MW or 47 percent.

## The Transmission System

At the time of independence in 1947, Pakistan inherited isolated systems existing in larger municipalities where a number of public and private companies and corporations were licensed to generate and supply electricity mainly to domestic and commercial consumers. Most of the industries had their own captive capacity to meet their requirements. It was recognized that the supply of cheaper and dependable electric power was essential for increasing the pace of industrial and agricultural development. Pakistan's substantial hydroelectric potential offered the possibility of generating hydroelectricity at low costs. The exploitation of hydroelectric potential, therefore, received a high priority from the very beginning. The discovery of natural gas in large quantities at Sui in 1952, followed by more gas discoveries in the 1950s opened up the possibility for the country to generate thermal power at low costs by utilizing indigenous gas. Consequently, a number of gas based thermal power stations were commissioned in central and southern areas, where most of the load centres were situated. As the entire hydroelectric potential, except a few canal falls, was situated in the north and all the gas discoveries were situated in the southern areas, the optimum utilization of the indigenous power resources could not be possible without developing an integrated national grid system that would allow maximum utilization of hydroelectric capability.

Hydroelectric capability in Pakistan fluctuates with wide variations in the maximum and the minimum capability not only in different years but also in a year. Because the hydroelectric development in this country has taken place mainly as a part of multipurpose development, the use of water for irrigation has been given absolute priority over the use for power generation. The irrigation requirements vary in a year in accordance with the cropping seasons as well as rainfall at proper times during a year. Besides, hydroelectric generation is affected by the seasonal variation of flows in the rivers and the levels of hydro storages which are dependent upon the vagaries of weather such as rainfall, snowfall and snow-melt in the catchment areas. The development of an integrated national grid was,therefore, considered essential by the experts to synchronize the operation of the thermal power stations with the capability of the hydel power stations. The development of the transmission system was also needed to be synchronized with the expansion in the installed capacity and the power requirements of the load centres.

The power system in Pakistan has progressed to an integrated national grid from the following isolated 5 regional grids:

a. The Northern Grid System - covering the provinces of Punjab and NWFP and containing all the hydro electric capacity of the country in addition to thermal power stations;

b. The Upper Sindh Grid System (Sukkur) - covering Sukkur and the surrounding region;

c. The Lower Sindh Grid System (Hyderabad) - covering Hyderabad and surrounding areas;

d. Quetta Grid System - covering Quetta and the surrounding areas in the province of Baluchistan;

e. KESC System - encompassing the city of Karachi and parts of Thatta District in the province of Sindh, and District Lasbela of the Baluchistan province.

The first 4 systems are controlled by the WAPDA, while the last system is under the jurisdiction of the Karachi Electric Supply Corporation (KESC). The WAPDA System has been operating as an integrated system since 1975-76. The KESC System was linked to the Lower Sindh Grid during the Third Plan period (1965-70). At 30 June 1984, out of 111,901 kilometers of transmission network, only 2,589 kilometers of these lines could carry power at 220 KV or above and about 82 percent of them (91,258 KM) were energized at 11 KV only.[3]

The power system in Pakistan has suffered due to delays in the completion of transmission facilities. The length of transmission lines and load carried at relatively low voltage levels have contributed, to a considerable extent, to the high system losses in this country. Overloading of the system has also contributed to frequent power breakdowns. The implementation of transmission schemes has suffered from the very beginning. During the 1947-55 period, the implementation was only 35 percent. In this regard, the First Five Year Plan noted: 'Very little progress was made on schemes for the transmission and distribution of supplies. These were estimated to cost Rs. 60 million, of which only Rs. 21 million were spent by March 1955'.[4] The progress of the transmission system during the First (1955-60) and the Second (1960-65) plan periods remained satisfactory in as much as the transmission facilities more or less matched with the expansion in the installed capacity. The total length of transmission and distribution lines (11 KV and above) increased from 1,395 miles [2,245 KM] in 1955 to 4,400 miles [7,080 KM] in 1960 and to 13,500 miles [21,722 KM] in 1965.[5] Almost all the transmission schemes were implemented without significant delays. The Third Five Year Plan described the situation regarding the transmission facilities as under:

> At the present time, the 132 KV grid generally has sufficient capacity to supply existing loads. At several primary and secondary grid load centres, however, demand will soon reach the capacity of both lines and substations and in particular, substation transformers.[6]

The situation started to deteriorate from the Third Plan. During the Third Plan period, delays in the implementation of the transmission program deprived the country of the benefits which could be obtained from the expansion in the installed capacity. For example, the transmission lines associated with Mangla Dam units 1-4 comprising 220 KV double circuit line from Mangla to Kala Shah Kaku (166 KM), single circuit 220 KV line on double circuit towers from Kala Shah Kaku to Kot Lakhpat (42 KM) and 220 KV double circuit line from Kala Shah Kaku to Faisalabad (144 KM) were scheduled to be completed in November 1968,[7] but due to delays these lines could only be completed in March 1970, March 1971 and June 1971 respectively.[8] The energizing of the 220 KV Mangla-Kala Shah Kaku second circuit and the 220 KV double circuit between Kala Shah Kaku and Faisalabad, however, was not possible before 1972-73 due to the delayed installation of protection gear required for the purpose.[9] The power system also suffered during the Third Plan due to the shortage in number of grid stations and under capacity of transformers.[10]

The Third Five Year Plan envisaged 'the integration of the Hyderabad and Sukkur networks and connection to the new plant [at Guddu] and possibly interconnection of this network with Karachi to the south and through Rahim Yar Khan to the north'.[11] However, different zonal systems in Pakistan were interconnected not before 1975-76 i.e. six years after the Third Plan target.[12]

The failure to synchronize the extension in the transmission facilities with the expansion in the installed capacity continued to plague the power system in the country during the Annual-Plan period. The second 220 KV Mangla-Kala Shah Kaku double circuit transmission line, which was associated with the Mangla units 5 and 6 was completed in September 1975, whereas Mangla units 5 and 6 were commissioned in December 1973 and March 1974 respectively. The task of optimum utilization of Mangla power without over-loading the transformers on the existing 220 KV line, therefore, kept the WAPDA authorities quite busy until the new 220 KV line was completed in September, 1975. Another 220 KV line associated with the expansion in the installed capacity at Mangla (namely, Mangla-Wah transmission line) was further delayed and was completed in September 1976. Second circuit of Kala Shah Kaku--Kot Lakhpat, which was also associated with the Mangla project, was completed and energized in January 1979. Another 220 KV Tarbela-Mardan (68 KM) line was delayed for about two years and was commissioned in January 1983 instead of 1981.[13]

The completion of two important transmission lines, namely, 220 KV Tarbela-Wah (67 KM) and 500 KV Tarbela-Faisalabad (331 KM) was to be synchronized with the commissioning of Tarbela units 1-2 and 3-4 respectively. Tarbela units 1-2 were commissioned in May 1977, whereas 220 KV Tarbela-Wah transmission line was completed in October, 1976. Tarbela units 3-4 were commissioned in June and July 1977 respectively whereas 500 KV Tarbela-Faisalabad line was completed in September 1979.[14]

The Fifth Five Year Plan gave the following schedule for the completion of 500 KV transmission line between Faisalabad and Karachi via Multan, Guddu and Jamshoro :[15]

**Phase I**

| | |
|---|---|
| a. 500 KV Multan-Guddu (to be operated on 220 KV) | 1979-80 |
| b. 500 KV Multan-Faisalabad (to be operated on 220 KV) | 1980-81 |

**Phase II**

| | |
|---|---|
| c. 500 KV Guddu-Hyderabad (Jamshoro) (to be operated on 220 KV) | 1981-82 |

**Phase III**

| | |
|---|---|
| d. Completion of line to Karachi and conversion to 500 KV | 1982-83 |

The first phase of the above project comprising the 519 kilometers of 500 KV Faisalabad-Guddu transmission line was completed on schedule and commissioned on 220 KV with a 220 KV substation at Multan in March 1981. The completion of the remaining phases was, however, delayed. Phase II comprising the 438 kilometers 500 KV Guddu--Jamshoro transmission line along with 220 KV sub-stations at Dadu and Jamshoro was completed in February 1984; Guddu-Dadu section along with 220 KV sub-station at Dadu was commissioned in August, 1983 and Dadu-Jamshoro section along with 220 KV sub-station at Jamshoro was commissioned in February, 1984. The 220 KV Jamshoro-Karachi double circuit transmission line was completed by December 1984. The upgrading of 220 KV sub-stations at Multan, Guddu, Dadu, Jamshoro to 500 KV and extension of existing 500 KV Gatti (Faisalabad) sub-station required for energizing at 500 KV was delayed and the project was completed in July 1987.[16]

The work on almost all the primary 220 KV and 500 KV transmission lines scheduled to be commissioned during the Sixth Plan period (1983-88) was delayed. For example, second 500 KV Tarbela-Faisalabad transmission line, originally scheduled to be completed in 1983, was completed in 1985. Similarly, 220 KV double circuit Faisalabad-Sahiwal (94 KM) line was scheduled to be commissioned in 1983, but was completed in July 1987. Another 220 KV double circuit Mardan-Peshawer (56 KM) transmission line was scheduled to be commissioned in 1984-85, but in 1988 WAPDA expected to complete it by January 1991.[17]

A study indicated that 'lack of coordination and cooperation' between various Government agencies (both Federal and Provincial) was prominently observed in the case of "500 KV Faisalabad--Multan--Guddu--Karachi Transmission Line, which caused delays in the completion of work. The work on this project also suffered as a result of "delay in signing foreign credits, and availability of technical documents and equipments".[18]

Various portions of the transmission system suffered from low voltage and high losses. The installation of static capacitors could substantially mitigate these problems. Interviews with the officials in the Ministry of Water and Power during April-May 1985 revealed that the installation of the capacitors was being delayed since 1976. The WAPDA officials disclosed that the line staff was highly allergic to the capacitors who had a mistaken notion that frequent breakdowns on the lines were caused by capacitors. They had therefore disconnected the capacitors and subsequently the capacitors had disappeared. WAPDA Annual Report, 1983-84 envisaged to complete this project by December 1984 which was further delayed and was completed in 1985.[19]

For the augmentation of its secondary transmission system, WAPDA initiated the implementation of Third WAPDA Power Project in 1980-81. The project envisaged the construction of 219 grid stations (including new ones, augmentation and extension of existing sub-stations) adding a transformation capacity of 4,800 MVA and 4,598 Kilometers of 220/132/66 KV double and single circuit transmission lines by 1983. The project was completed in December 1987, after a delay of four years.[20]

Interviews with the officials of WAPDA revealed that the internal priorities of WAPDA were not adjusted on rational grounds. The rapport of the persons in charge of various projects with the higher authorities of WAPDA considerably influenced the provision of resources. There was also a general lack of coordination between various departments. WAPDA organization had outgrown its system of coordination.[21] The Fourth Plan stressed the need to effect organizational improvements to overcome the coordination and priority setting problems. The Plan stated:

> Serious doubts have been expressed on the ability of WAPDA to shoulder the responsibility of retail distribution of power along with the construction of major power and irrigation facilities. Consideration, therefore, should be given to the bifurcation of the power wing from WAPDA or at least the separation of retail distribution and its handing over to an autonomous power corporation.[22]

However, the WAPDA authorities did not respond to such moves positively as it would have caused a contraction in their domain. Rather they acted very swiftly to take over the management of all private electrical undertakings and by 1985 they had brought the only other public sector organization, the KESC, under WAPDA's effective control. It was confided by informed sources that WAPDA was agreeable to the development of generating facilities by other organizations, but was not prepared to hand over the distribution of electricity. WAPDA staff would strongly oppose any such move.[23]

## THERMAL POWER

The thermal power generation system was supposed to fill-in a gap in the power system of Pakistan, but the fuel mix policy for thermal generation pursued by various governments in Pakistan during the 1970s denied the country of this option. Most of the thermal additions in the installed capacity made in Pakistan since late 1950s had been gas-based. As a result, the consumption of gas by the power sector increased from 2,922 MMCFT in 1956-57 to 42,344 MMCFT in 1969-70 to 60,328 MMCFT in 1977-78 and 84,743 MMCFT in 1980-81. The consumption of gas had to be decreased, mainly due to non-availability, to 74,294 MMCFT in 1982-83 which again increased to 88,906 MMCFT in 1984-85. In 1978-79, gas (in terms of heat units) accounted for 98 percent of the total fuel consumed for thermal power generation. The percentage share of gas had fluctuated, depending upon its availability, mostly between 80 percent and 98 percent during the 1964-82 period, after which it had been decreasing; gas accounting for 69.4 percent in 1982-83 and 65.4 percent in 1987-88.[24]

The demand for gas had been increasing in the country at a tremendous rate. Its demand for more productive uses multiplied over the years resulting in the reduction of gas supplies to some users, like cement, sugar and power. Load-shedding of gas had increasingly been resorted to in the country with varying intensity since early 1970s. Consequently, the alternative use of oil in the gas-based thermal power stations, due to non-availability of gas, had been affecting their capability adversely. In crisis situations, due to bad planning, instances of power stations running short of oil supply were also a common occurrence.[25]

Table 4.6 indicates the fuel consumption mix for thermal power generation in Pakistan. It is evident from Table 4.6 that the utilization of coal for power generation

## TABLE 4.6
## FUEL CONSUMPTION MIX FOR THERMAL POWER GENERATION

(PERCENTAGE SHARE)

| Year Ending 30 June | Fuel Oil | Diesel Oil | Coal | Gas | Total |
|---|---|---|---|---|---|
| 1965 | 1.8 | 2.3 | 10.3 | 85.6 | 100 |
| 1966 | 7.1 | 1.6 | 7.8 | 83.5 | 100 |
| 1967 | 7.5 | 2.0 | 8.0 | 82.5 | 100 |
| 1968 | 0.6 | 0.3 | 8.9 | 90.2 | 100 |
| 1969 | 0.2 | 0.2 | 7.5 | 92.1 | 100 |
| 1970 | 4.4 | 1.2 | 5.6 | 88.8 | 100 |
| 1971 | 5.4 | 0.2 | 5.3 | 89.1 | 100 |
| 1972 | 7.5 | 1.4 | 3.9 | 87.2 | 100 |
| 1973 | 5.4 | 1.3 | 2.3 | 90.9 | 100 |
| 1974 | 10.7 | 4.1 | 1.8 | 83.4 | 100 |
| 1975 | 14.4 | 5.5 | 1.3 | 78.8 | 100 |
| 1976 | 7.5 | 4.2 | 1.5 | 87.0 | 100 |
| 1977 | 7.0 | 3.1 | 1.4 | 88.5 | 100 |
| 1978 | 1.4 | 1.0 | 0.8 | 96.8 | 100 |
| 1979 | 0.2 | 0.9 | 0.9 | 98.0 | 100 |
| 1980 | 1.7 | 0.9 | 0.4 | 97.0 | 100 |
| 1981 | 6.9 | 1.5 | 0.6 | 91.0 | 100 |
| 1982 | 11.36 | 8.02 | 0.03 | 80.59 | 100 |
| 1983 | 16.65 | 13.37 | 0.58 | 69.40 | 100 |
| 1984 | 20.6 | 8.6 | 0.4 | 70.4 | 100 |
| 1985 | 25.0 | 6.0 | 0.5 | 68.5 | 100 |
| 1988 | 22.7 | 11.7 | 0.2 | 65.4 | 100 |

Source: (i) Energy Data Book, op.cit., p.110.

(ii) Energy Year Book 1979, op.cit., p.64.

(iii) Energy Year Book 1985, op.cit., p.83.

( vi) Energy Year Book 1989, op.cit., p.59

remained completely ignored; its percentage share continued to decrease reaching the lowest 0.03 percent in 1981-82. Its share in 1988 was 0.2 per cent.

Another striking feature in respect of the fuel consumption mix during the study period was the neglect of domestically produced furnace oil. Although furnace oil was a surplus product until 1983-84, and was shipped out at a 'real low' prices, its utilization for power generation declined. The percentage share of furnace/fuel oil in the fuel consumption mix for power generation amounted to 0.2 percent in 1968-69 as well as in 1978-79. During the 1964-81 period its share at times increased not because of a policy shift, but because of the forced increase in its utilization due to load-shedding of gas. The share of furnace oil had been increasing toward the end of the study period. Incidentally, the price of the furnace oil had also been picking up in the world market in these years.

The consumption of petroleum products by the power sector on an annual basis since 1964-65 is given in Table 4.7. For comparison purposes, the export and import of furnace oil is also indicated on an annual basis for the same period. It is obvious from Table 4.7 that the quantity

## TABLE 4.7
### CONSUMPTION OF PETROLEUM PRODUCTS FOR THERMAL POWER GENERATION

(Metric Tons)

| Year Ending at 30 June | Consumption of Petroleum Products | | | | Export of F.O. | Import of F.O. |
|---|---|---|---|---|---|---|
| | Total | H.S.D. | L.D.O. | F.O. | | |
| 1965 | 26,109 | | | | 415,306 | 0 |
| 1966 | 74,438 | | | | 325,718 | 0 |
| 1967 | 78,047 | | | | 300,172 | 0 |
| 1968 | 6,238 | | | | 431,875 | 6 |
| 1969 | 3,606 | | | | 583,835 | 0 |
| 1970 | 63,351 | | | | 429,786 | 0 |
| 1971 | 65,665 | | | | 287,399 | 0 |
| 1972 | 99,597 | 13,637 | 1,657 | 84,303 | 456,416 | 0 |
| 1973 | 77,088 | 12,021 | 1,949 | 63,118 | 511,675 | 0 |
| 1974 | 202,974 | 52,659 | 994 | 149,197 | 455,450 | 0 |
| 1975 | 308,419 | 79,764 | 2,259 | 226,396 | 154,463 | 20,187 |
| 1976 | 156,851 | 52,997 | 1,742 | 102,112 | 207,621 | 0 |
| 1977 | 162,450 | 46,330 | 1,001 | 115,119 | 133,769 | 0 |
| 1978 | 34,936 | 13,693 | 501 | 20,742 | 570,829 | 0 |
| 1979 | 15,521 | 12,882 | 282 | 50,919 | 458,903 | 0 |
| 1980 | 50,490 | 15,999 | 219 | 34,272 | 788,626 | 0 |
| 1981 | 182,972 | 29,973 | 155 | 152,844 | 606,269 | 0 |
| 1982 | 442,063 | 176,729 | 364 | 264,970 | 756,161 | 0 |
| 1983 | 754,177 | 324,415 | 1,255 | 428,507 | 182,606 | 0 |
| 1984 | 766,274 | 214,980 | 1,906 | 549,388 | 74,062 | 227,530 |
| 1985 | 944,468 | 174,471 | 164 | 769,833 | 0 | 417,007 |

Notes: Export figures up to and including 1976 includes bunkering and overseas sector consumption. Figures indicating total consumption for 1974 includes 24 tons of Motor Spirit and 100 tons of Superior Kerosene.

Source: (i) Energy Data Book, op.cit., pp.116 & 121.

(ii) Energy Year Book 1979, op.cit., pp.30-41.

(iii) Energy Year Book 1985, op.cit., pp.29-35 & 39.

(iv) Energy Year Book 1985, op.cit., pp.33-38, 44.

of furnace oil available for export had remained dependent upon the quantity utilized for power generation. Greater use of furnace oil for power generation could have been possible during the last two decades of the study period. Table 4.7 also shows erratic increases (as in the case of furnace oil) in the use of High Speed Diesel (HSD) for power generation. HSD had always remained on the import list of Pakistan. Valuable foreign exchange could be saved by implementing rational fuel mix policy for power generation.

The operational efficiency of the power system in Pakistan became a cause of concern by 1970. The Fourth Five Year Plan noted that complaints about the poor quality of service not only persisted but increased during the Third Plan period[26] and considered it imperative to improve the efficiency of WAPDA by creating proper balance between generation and marketing facilities, reducing power losses and employing better operating and maintenance techniques.[27] Annual Plan 1975-76 noted:

> The operational efficiency of WAPDA continues to cause concern because of spiral increase in power losses, mounting arrears in consumer bills and poor quality of service with consequent deterioration in financial performance ... The financial performance of WAPDA has steadily deteriorated over the years in spite of the tariff increase allowed from time to time to compensate for the increase in fuel costs and general establishment expenses. The increase in

> operating income through increased generation and tariff increases has been offset by increase in losses and larger increase in operating expenses. ... As a result, self-financing was nil and estimated return on net assets-in-operation which are valued at more than Rs. 6,000 million sagged to 1% in 1974-75 from 4.2% in 1973-74.[28]

In spite of the alarms raised on various occasions, the operational efficiency remained poor. Thermal efficiency in electricity generation remained low, system losses (including losses in transmission and distribution, and losses due to consumption in the power station auxiliaries) continued to be high and the financial performance remained poor.

The level of thermal efficiency in thermal power generation for the WAPDA system, had been stagnating at around 25.2 percent - 26.7 percent during 1973-83 period which was inefficient compared with the performance in some other countries where thermal efficiency levels greater than 30 percent had been achieved. Thermal efficiency in Korea, for example, had been improved from 22.6 percent with 367 MW capacity and 1,773 GWH generation in 1961 to 36.8 percent with 13,115 MW capacity and 46,850 GWH generation in 1983. Japan achieved the thermal efficiency level of 36.50 percent in 1981 (Table 4.8).

The situation in respect of self-financing improved as a result of mainly tariff increases and some reduction in the system losses during 1982-83, when it amounted to Rs. 2,100 million compared with Rs. 158 million during 1977-78. The rate of return increased from 8.9 percent in 1977-78 to 17.7 percent in 1981-82 (Table 4.9). During 1983-84, WAPDA was able to contribute about 68 percent of its three-year average capital expenditure on power development from its internal sources.[29]

**TABLE 4.8**

**THERMAL EFFICIENCY IN THERMAL GENERATION (PAKISTAN, KOREA, JAPAN)**

Percent

| Period | Country | | |
|---|---|---|---|
| | *Pakistan | Korea | Japan |
| 1969-71 | - | 30.70 | - |
| 1973-74 | 25.20 | - | - |
| 1972-76 | - | 33.69 | - |
| 1978-79 | 25.20 | - | - |
| 1977-81 | - | 35.05 | - |
| 1981 | - | 36.39 | 36.50 |
| 1982-83 | 26.67 | - | - |
| 1983 | - | 36.80 | - |

*Includes the thermal efficiency of the WAPDA system only.

Source: (i) *WAPDA Power System Statistics*, *op. cit.*, 1985; and Information supplied by WAPDA, July 1985.
(ii) Korea Electric Power Corporation, *Statistics of Electricity*, 1984.

The stimulus to improve the financial performance of the public utilities came mainly from outside. International lending agencies particularly the World Bank and Asian Development Bank included financial covenants in loan documents requiring the executing agencies to maintain tariffs at levels sufficient to cover operating expenses, debt amortization and to finance an agreed upon percentage of capital expenditures. Asian Development Bank, for example, included a financial covenant in its loan documents in 1972 requiring the KESC to finance 25 percent of capital expenditure from its internal resources. The KESC was also required to implement tariff increases by 31 January 1973.[30] Similarly, the World Bank as a condition for its loan for Third WAPDA Project required WAPDA to finance 40 percent of its investment in a given year calculated as the average of two preceding years and the year under consideration. The World Bank, during the negotiations for a loan for Fourth WAPDA Project made the Government of Pakistan to agree to a new formula (to be introduced starting from 1987-88) for calculating the 40 percent internal cash generation, whereby the investment for a given year would be calculated by averaging the investment in the year under consideration, the preceding year and the next year. In a communication, the World Bank required the Government of Pakistan to agree with it by November 30, 1984 on annual tariff increases needed to achieve the 40 percent cash generation by WAPDA according to

TABLE 4.9

WAPDA'S FINANCIAL POSITION
(1977-83)

| Year | Revenue Realization (Million Rupees) | Self-financing (Million Rupees) | Return on Assets (Percentage) |
|---|---|---|---|
| 1977-78 | 2,040 | 158 | 8.9 |
| 1978-79 | 2,709 | 647 | 11.8 |
| 1979-80 | 3,941 | 1,528 | 17.8 |
| 1980-81 | 4,641 | 1,759 | 16.1 |
| 1981-82 | 5,948 | 1,955 | 17.7 |

Source: WAPDA- In Brief, op. cit., p. 10.

new formula. In the same communication, the Bank noted that due to the 'backward rather than forward looking formula' for calculating internal cash generation, WAPDA had contributed only 50 percent of originally targeted investments from its internal resources.[31]

It is apparent from the foregoing discussion that WAPDA procedures and practices did not force the authorities to pursue an optimum fuel mix policy. Uneconomic organizational practices, therefore, caused heavy losses to the national exchequer. It is also obvious that WAPDA authorities did not have an effective coordination with the oil refineries in the country which would have enabled them to effectively utilize the surplus furnace oil. The operational efficiency also suffered due to inefficient practices and resistance to change. The WAPDA authorities even tried to play with figures rather than effecting a real improvement.

## HYDROELECTRIC POWER

Wide spread load-shedding of electricity over extended periods since the 1970s, bringing the electricity supply system to a crisis situation, demonstrated the short-comings of lopsided expansion of hydel capacity in Pakistan. The hydro storage on which the electricity supply system of Pakistan was based had a systematic built-in flaw. The system was entirely dependent upon the vagaries of weather. If there was a plenty of rain in the country and/or snow fall and snow-melting in the mountains, all at appropriate times, then the hydro storages would be full, making it possible to release sufficient amounts of water for irrigation and power generation. On the other hand, if rains failed and/or there were insufficient snow-fall or late snow melting, causing a drop in the hydro storage, then there would be a serious problem. There would not be enough water for irrigation and power generation. The demand for water would, however, be maximum due to the drought conditions. This would require the tube-wells to run on full capacity which in turn would require more electricity as most of the tubewells in agricultural sector were run on electricity. If the water level in the reservoirs was low, even the rains in the countryside would cause reduction in hydro generation. In this case, less water would be required for irrigation purposes requiring less water to be released from the dams. In view of low levels in the reservoirs, water had to be saved to meet future needs. Without a sufficient thermal and Nuclear capacity to compensate for the temporary loss of hydel capacity in such circumstances, the supply system was bound to fail.

WAPDA had been increasingly blaming 'the shortages of water in hydro storages and drought conditions' for power shortages since early 1970s. For example, Annual Plan for 1972-73 states:

> The unprecedented drought in the Winter of 1971-72 directly affected the capability of the existing plants. Meager river flows as well as thin snow packs in the mountains greatly reduced the capability of the hydel power stations at Mangla and Warsak.[32]

Annual Plan 1974-75, inter alia, blamed the reduction in water releases from Mangla from the end of December, 1973 up to January 1974 and shut down of small hydel stations due to canal closures for the shortfall in generation.[33] The Plan further added:

River flows in early summer have been abnormally low. It is expected that river flow will improve as snow melting increases. A continuance of abnormally low flow would have serious repercussions on power supply.'[34]

According to WAPDA, the 'abnormally low water flows' and the 'persistence of drought conditions' were again the culprits in 1974-75.[35]

The situation continued to deteriorate during the past 1980s and the load-shedding routine remained uninterrupted. The reasons given by the WAPDA for an ever-increasing load-shedding also remained unchanged: canal closures and/or unfavorable weather conditions; drought, slow snow-melting, etc. causing drop in the reservoir levels in hydro storages. In March 1985, WAPDA announced that the generating capability of its system had been reduced to '50 percent' leading to load-shedding for 'extended period in domestic, industrial and rural sectors'. It was stated that load-shedding was 'mainly due to the fall in the levels of Mangla and Tarbela Dams' reducing the capability of Mangla to 60 MW against the installed capacity of 800 MW and that of Tarbela to 424 MW against the installed capacity of 1,575 MW. The inflow in Kabul river had decreased to the level that it was good only to produce 40 MW at Warsak against the installed capacity of 240 MW. The spokesman of

WAPDA said that small hydel stations on canal falls were also affected due to water shortages and were producing at less than 40 percent of their capacity. The hydel capacity was falling every day due to a drop in reservoir levels, it was further stated.[36]

In April 1985, The Pakistan Times, stated:

> We all know that at present the National Grid carries only half the power needed by us. Unfortunately, even this half is curtailed to another half owing to the paucity of water in the hydel power reservoirs. WAPDA's daily TV appeal addressed to the citizens says the crisis is brought about by factors outside the Authority's control: the snow on high mountains is not melting fast enough and is not expected to melt at the required rate till June.[37]

In January 1986, The Pakistan Times reported that the worst load-shedding of the current winter (eight hours a day in urban and 10 hours a day in rural areas requiring the industry to close one shift daily and the tube-wells used for irrigation purposes to operate a maximum of 12 hours a day) was resorted to by the WAPDA ' due to over 50 percent fall in power generation of its system following the closure of canals'.[38]

It is evident from the preceding paragraphs that the WAPDA authorities pursued a hydroelectric policy during the study period which had serious implications on the power system of Pakistan. The WAPDA bureaucracy found it convenient and far more prestigious to build huge dams enabling them to make substantial additions in the installed capacity rather than implementing thermal additions to achieve a balanced growth. The implementation of a defective policy, therefore, made it impossible for WAPDA to realize the cherished goal of providing sufficient and uninterrupted power supply to the people of Pakistan.

**NUCLEAR POWER**

Pakistan made a modest beginning in the field of nuclear power in 1953 by establishing an 'Atomic Energy Committee' in the Ministry of Industries to make recommendations for the establishment of an atomic energy agency, exploration of radio-active minerals and possible use of atomic energy. In 1954, the American exhibit "Atom for Peace" toured Pakistan to explain the benefits which could be derived from the nuclear power in the fields of energy, food and medical treatment. Consequently, the Government of Pakistan started taking more interest and set up in 1955 a Council, which was upgraded into a Commission in 1956, to step up its activities in the field of nuclear power. Until

1970, the country had trained a sufficient number of scientists and engineers who set up a number of atomic energy centres and an Institute of Nuclear Research and Reactor Technology with a swimming pool research reactor at Islamabad. Attention was also paid to the exploration and exploitation of radio-active minerals. A nuclear power plant with a capacity of 137 MW was also established in Karachi which started production in 1972.

Significant developments took place in Pakistan's nuclear energy policy under Zulfiqar Ali Bhutto. He had a dream and passion to make Pakistan the Atomic Power. He took keen and persistent interest in boosting Pakistan's nuclear energy program in various capacities while he was Minister for Fuel, Power and Natural Resources, Minister for Foreign Affairs, Minister in charge for Atomic Energy, Chief Martial Law Administrator and Prime Minister. He considered it to be 'vital for Pakistan to give the greatest possible attention to nuclear technology'.[39] He was particularly perturbed by the Indian plans in this regard and believed that India was 'determined to proceed with her plans to detonate a nuclear bomb'[40] and argued: 'If Pakistan restricts or suspends her nuclear program, it would not only enable India to blackmail Pakistan with her nuclear advantage, but would impose a crippling limitation on the development of Pakistan's science and technology.[41] Even as Minister, he tried to persuade President Muhammad Ayub Khan to build fuel reprocessing plant, but without success.[42] Now that he got full power, he decided to translate his dreams into reality without any further delay.

On 20 January 1972, just one month after his coming into power, he called a meeting of Pakistan's eminent scientists from all over the world and put before them his desire to make Pakistan an Atomic Power as soon as possible. It is said that in this meeting Dr. I. H. Usmani, Chairman, Pakistan Atomic Energy Commission and some senior scientists like Dr. Abdul Salam, President's Advisor for Science, not only opposed the idea of making Pakistan an atomic power but also considered it impossible. But he did not want to listen 'no'. He announced the replacement of Dr. I. H. Usmani as Chairman of the PAEC by Munir Ahmed Khan.[43] It is at this stage that Pakistan's atomic energy program took a turn and expanded in scope to include defence uses.

The Pakistan Atomic Energy Commission, however, already had expansion plans for power generation and other uses. The (aborted) Fourth Five Year Plan 1970-75 provided for the construction of the nuclear power station (200 MW capacity) at Rooppur in East Pakistan besides making the Karachi Nuclear Power Plant operational. In addition, it provided for the initiation of work for establishing a fuel reprocessing plant and determining the feasibility of a dual - purpose nuclear reactor, for desalination of sea-water and power generation, in West Pakistan.[44]

Under the new Chairman of the Pakistan Atomic Energy Commission, Pakistan's nuclear program received greater impetus. It was announced that Pakistan had drawn up firm plans to set up second nuclear power plant in the north with a 500 MW capacity and that studies were also being carried out to set up a dual-purpose nuclear desalination plant for Karachi area with a capacity of 400 MW and the desalination of 100 million gallons of sea water per day. On 11 May, 1972, Radio Pakistan reported that 'Pakistan with its large deposits of uranium planned to set-up two atomic reactors'.[45].In June 1973, a plan to set up a heavy water production plant with an output capacity of 13 tonnes of heavy water per annum was announced.[46] In July, 1973 the Chairman of the Pakistan Atomic Energy Commission disclosed more details regarding the planned setting up of the second nuclear power plant with installed capacity of 900 MW instead of 500 MW initially announced and stated that the plant would be completed within two-and-half years time.[47]

In November 1972, a team of experts from the International Atomic Energy Agency (IAEA) paid a visit to Pakistan to assess Pakistan's future electric power requirements and the role of nuclear power in meeting them.[48] On the basis of IAEA assessment, Pakistan made public its 25 year nuclear power generation program on 27 December, 1973. The Chairman of the Pakistan Atomic Energy Commission announced on television that Pakistan would establish 15 new nuclear power stations in the next 25 years. He stated that the first nuclear power station of 900 MW capacity would be completed by 1975 near Kundian, in Chashma Baghage area of Punjab. He also disclosed that Pakistan had discovered an "abundant quantity" of Uranium which would not only be sufficient for Pakistan's requirements but it could also be exported.[49]

India conducted its nuclear explosion on 18 May, 1974. This caused a serious blow to the Pakistan's efforts to overcome its energy shortages by developing nuclear power. Indian explosion created suspicion and mistrust amongst the nuclear technology exporting countries who announced severe restrictions for the transfer of nuclear technology. The nuclear power program of Pakistan was, therefore, revised which also considered the second assessment of the IAEA confirming Pakistan's future nuclear power needs.[50] Under the revised schedule, the second nuclear power plant of 600 MW capacity at Chashma (original planned capacity of this reactor was 500 MW which was changed to 900 MW in the first revision) was planned to be completed by 1980. The third plant (dual-purpose plant to generate 400 MW electricity and 100 million gallons of fresh water by desalination of seawater) at Karachi was envisaged to be completed by early 1980s. After 1985, the program envisaged the construction of a nuclear power plant almost every year till the end of the century.[51]

The nuclear power generation and development in Pakistan suffered a set back as a result of international politics after India detonated her nuclear device in May 1974. Maximum power generation in a year by the Karachi Nuclear Power Plant (KANUPP) with installed capacity of 137 MW could not go beyond 610 GWH which was achieved during 1975-76. As a result of Indian explosion, the Canadian Government unilaterally repudiated in December 1976 its contracts for the provision of technical assistance and the supply of materials (including fuel) and spare parts for the KANUPP. This caused sharp decline in the KANUPP's output leading to complete shut down in 1979. Energy produced by the KANUPP during 1979-80 amounted to 2 GWH only. The plant restarted its operations with indigenous efforts after remaining closed for more than one year and produced 150 GWH of energy during 1980-81. Its generation was 254 GWH in 1987-88 which was still much below the performance level achieved during 1975-76. Since 1980-81, the KANUPP is being operated without any outside help in respect of maintenance, spares and supplies including nuclear fuel (which is produced locally from the natural uranium mined in the country).[52]

Pakistan's Nuclear Power Development Program became a subject of intense international political activity since May 1974 when India joined the 'nuclear club' by detonating a nuclear device. At that time, Pakistan was busy to line up finances and suppliers for the construction of 900 MW Nuclear Power Plant at Chashma. Pakistan had announced its Nuclear Power Development Program in 1973 which provided for the establishment of 15 nuclear power stations in 25 years. The plan was prepared in the wake of oil price hike which imposed a crushing burden on Pakistan's economy. The objective of the Plan was to decrease dependence upon the imported fossil fuels to meet its rapidly rising energy needs. The Chashma Nuclear Power Plant Project also included a reprocessing plant to produce nuclear fuel for its requirements. At the time of Indian explosion, Pakistan was negotiating with France for the supply of reprocessing plant. Pakistan argued that the reprocessing facility was essential because the success of its Plan was dependent upon the uninterrupted supply of enriched uranium which could not be ensured by depending on one or two foreign powers whose reliability as suppliers was seriously in doubt.[53]

Charles K. Ebinger has cited Zalmay Khalilzad to support their shared view that Pakistan's Nuclear power program was an after effect of the May 1974 Indian nuclear detonation. Obviously, this is not correct. Pakistan's plan for setting up more nuclear reactors including reprocessing facility, had been made public before May 1974. Zalmay Khalilzad ignored the announcement by the Chairman of Pakistan's Atomic Energy Commission made on 27 December, 1973 disclosing Pakistan's nuclear power generation program. He has gave July 1974, the time falling after the May 1974 Indian explosion, as the time when Pakistan announced her program of nuclear power generation. For his purposes, it was necessary to ignore the date falling before the Indian explosion as it would have made it difficult for him to imply that it was an after-effect of the Indian explosion. Charles K. Ebinger's assertion that budgetary allocations for Chashma Nuclear Project 'were not made until after the Indian nuclear detonation' is also untenable. Annual Development Plan, 1974-75 was published in July 1974. The approval for the inclusion of development projects and financial allocations were obviously made much before its publication. The Indian explosion took place on 18 May, 1974. By that time, the Annual Plan had already been sent to the press for printing. The decision to make financial allocations for the Chashma project was not therefore an after effect of Indian explosion.[54]

The United States of America and other members of the 'nuclear club' became suspicious about Pakistan's intentions against the backdrop of Indian explosion and the traditional animosity between India and Pakistan. Their doubts were reinforced by the disclosures of the authors of The Islamic Bomb[55] and other writers as well as the announcements by Pakistan that it had acquired the capability to enrich uranium. The Chairman of Pakistan Atomic Energy Commission, for example, announced in September 1980 that Pakistan had acquired the capability of producing nuclear fuel. Also, Dr. Khan who supervised the project announced in February 1984 that "Pakistan had broken the western monopoly in the technique of enriching uranium"[56].

Successive regimes in Pakistan since 1973, had the full support of the people of Pakistan to implement the nuclear power development program. A perceptive analyst wrote in 1987 as follows:

> An outstanding feature of the recent three-day debate on foreign policy was the endorsement by the joint session of the National Assembly and the Senate of Pakistan's peaceful nuclear program. The nation thus stands united behind the program for peaceful uses of nuclear energy to augment its energy supply which is falling short of the galloping demand.[57]

However, an intense political activity at the international level kept Pakistan down in this regard. The intensity of the efforts in this regard can be adjudged from the chronology of events given in Chart 4.1[58], leading to the cancellation of the agreement between Pakistan and France for the provision of reprocessing plant.

## CHART 4.1

## NUCLEAR PLANT DEAL: CHRONOLOGY OF EVENTS

**March 1973:**

Negotiations begin between Pakistan and France for the sale of a nuclear power plant for Pakistan.

**October 18, 1974:**

An agreement is signed between the French firm Saint-Gobain Techniques Nouvelles (SGN) and Pakistan Atomic Energy Commission for the design and construction of a $60 million reprocessing plant at Chashma.

**Autumn 1974:**

The US convenes a secret meeting of the nuclear suppliers group (set up by the Nixon Administration after the Indian nuclear explosion) to decide on a uniform set of nuclear export standards.

**February 1976:**

The International Atomic Energy Agency (IAEA), France and Pakistan sign a tripartite agreement embodying approved international safeguards for the sale of the nuclear power plant, Pakistan consented to submit the Chashma plant to international controls, including regular inspection by IAEA officials.

**February 1976:**

The US delegate at the IAEA Board of Governors voted in favor of the tripartite agreement when it came before the IAEA Board.

**February 23, 1976:**

Fred Ikle, Director of US Arms Control and Disarmament Agency, tells a Senate Sub-committee that there is no economic justification for Pakistan's desire to acquire a reprocessing plant and that the US is discouraging Islamabad from proceeding further.

**February 26, 1976:**

While visiting Ottawa, Prime Minister Zulfikar Ali Bhutto, rebutted lkle's view and declared that it was for Pakistan alone to determine its economic justification.

**March 18, 1976:**

Agreement signed between Pakistan and France for construction of a nuclear power plant at Chashma.Soon after, Canada which had supplied the Karachi Nuclear Power Plant (KANUPP) terminates all shipment of fuel supplies for this reactor. The U.S. applauds the action.

**June 1976:**

While Washington exerts pressure on Paris and Islamabad to cancel the nuclear deal, the U.S. Congress adopts an amendment to the Foreign Aid Appropriations Bill. Called the Symington Amendment, named after its author, Democrat Senator, Stuart Symington, this prohibits all economic and military assistance to any country acquiring enrichment or reprocessing technology.

**August 9, 1976:**

President Gerald Ford dispatches Secretary of State Henry Kissinger to Pakistan to persuade Islamabad to drop the project. Here Dr. Kissinger is reported to have offered to Mr. Bhutto's government 110 Corsair A-7 jet fighters as a quid pro quo if it gave up the French nuclear plant. Dr. Kissinger is also reported to have warned Bhutto that the American Administration "would make a horrible example of you" if he went ahead with the nuclear program.

**August 1976:**

From Pakistan, Kissinger goes to France, where he urges Prime Minister Jacques Chirac to unilaterally cancel the deal with Pakistan. But Chirac refuses to submit to US pressure saying France will honor its commitments and contracts. Chirac says the deal is "an agreement between Pakistan and France and not subject to third party interference".

**August 1976:**

Chirac resigns after disagreements with President Giscard d' Estaing.

**September 1976:**

Dr. Kissinger meets President Giscard d' Estaing who in the same month imposes direct control over nuclear exports through the establishment of the Council of Foreign Nuclear Policy.

**October 1976:**

President Giscard visits the US and on his return announces a new nuclear export procedure.

**December 1976:**

The French Council for Nuclear Foreign Policy issues a statement announcing that it is discontinuing further exports of reprocessing technology abroad. But the statement makes clear that contracts already signed would go ahead, including the one with Pakistan.

**January 1977:**

Jimmy Carter becomes US President and expresses his commitment to stop nuclear proliferation.

**February 1977:**

The Carter Administration begins talks on the nuclear plant issue with French officials. The new French Prime Minister Raymond Barre says France would continue the agreement with Pakistan, "unless Pakistan does not wish to continue with it". But France also begins to offer alternate technology ("coprocessing") and announces delay in shipment of key components for the plant.

**March 1977:**

Bhutto holds general elections which are followed by an opposition campaign of mass agitation to protest ballot rigging.

**April 28, 1977:**

Bhutto tells the National Assembly that a "foreign hand" is out to destabilize his government. He alleges a massive international conspiracy against Pakistan. "The blood hounds are after my blood", he charges, because of his determination to press ahead with the nuclear reprocessing deal with France.

**April 29, 1977:**

A State Department spokesman expresses "disquiet" over Bhutto's allegations.

**June 1977:**

France begins to delay performance of the contract, while adding fresh conditions in order to provoke Pakistan into revoking the agreement.

**June 3, 1977:**

U.S. withdraws offer of A7s to Pakistan.

**June 10, 1977:**

Prime Minister Bhutto reaffirms Pakistan's decision to go ahead with the French deal.

**June 25, 1977:**

A Foreign Office spokesman in Islamabad criticizes US and Indian attempts to pressurize France over the sale of the nuclear power plant to Pakistan.

**June 28, 1977:**

Indian Prime Minister denies reports of pressurizing France over Chashma deal.

**July 5, 1977:**

Military coup d'etat brings General Zia ul-Haq to power.

**July 14, 1977:**

General Zia tells a press conference that he will go ahead with French deal.

**July 26, 1977:**

President Carter reiterates the hope that France will stop the sale of the plant to Pakistan.

**July 29, 1977:**

Joseph Nye, US anti-proliferation official visits Pakistan. Says the position of the two countries on the French plant remains "as divergent as before."

**August 1977:**

France suspends deliveries for the plant reportedly after the US provided the French with intelligence information alleged to reveal Pakistan's "intentions".

**September 1, 1977:**

At a press conference, General Zia reiterates he will not abandon the nuclear plant deal.

**September 1977:**

Pakistan's new foreign minister, Agha Shahi visits France, to urge the French to stop delaying, and is reported to have been assured that France would honor the deal.

**September 1977:**

The US cuts off military and economic assistance to Pakistan because of its insistence on the nuclear deal with France.

**November 1977:**

The French government assumes control of SGN by becoming the majority share holder.

**January 1978:**

President Carter visits France. Agha Shahi says the French are dragging their feet over the Chashma project.

**June 1978:**

President Giscard d'Estaing tells a press conference that his government would go ahead with the contract. But a day later, the Council on Foreign Nuclear Policy decides to revoke the contract.

**July 1978:**

President Giscard sends Andre Jacomet (Secretary of the Council on Nuclear Policy) to Islamabad with a letter to tell General Zia of France's decision to suspend the contract. But, by way of a face saver, France offers to renegotiate the deal with the proposal of an alternate nonproliferating but as yet undeveloped technology. General Zia is reported to have told Jacomet: "You are breaking a contract".

**August 24, 1978:**

Islamabad announces French cancellation of the agreement with Pakistan.

**October 1978:**

US restores military and economic aid to Pakistan.

The nuclear supplier's club, led by the United States, therefore, successfully dissuaded all suppliers (as of June 1990) from bidding for the tenders for the Chashma Nuclear Power Plant, in spite of Pakistan Government's repeated invitation for bids. Pakistan admitted her failure to enlist support of foreign countries for the construction of Chashma Nuclear Power Plant in April 1985 when Minister for Finance announced : "There has been no success so far in enlisting support of foreign countries for Chashma Nuclear Power Project"[59], although the Fifth Plan had provided for the completion of reprocessing plant and the continuation of work on the Chashma Nuclear Power Project, envisaged to come on-stream in February 1991.

The nuclear power development policy could not be implemented due to non-availability of technology. The access to the technology was blocked by those who controlled it. Pakistan's peaceful nuclear power development program suffered due to international suspicion that Pakistan was pursuing a uranium enrichment program which would enable it to develop nuclear weapons. Although Pakistan repeatedly denied the reports that it possessed nuclear devices, but it refused to open up all of its nuclear facilities for international inspection due mainly to security considerations.

Moreover, Pakistan announced its successes in the field of uranium enrichment which not only strengthened the suspicions but also indicated a diversion of substantial resources for this purpose. All these developments affected the implementation of nuclear power policy adversely.

## THE POWER SYSTEM LOSSES

Excessive energy losses plagued the power system in Pakistan since 1960s. The situation in the WAPDA System became particularly distressing. During 1976-77, the losses in the WAPDA system touched an all-time high peak of 37.58 percent of the energy generated. At 30 June 1988, the losses amounted to 24.59 percent. Table 4.10 indicates the nature and extent of system losses in the WAPDA system on an annual basis from 1960 onwards. It is evident from Table 4.10 that although the percentage share of the system losses to the gross generation decreased from 1976-77 onwards, the losses in terms of GWH significantly increased.

Power system losses can be classified into: technical losses; and non-technical losses. Non-technical losses consist of pilferage of electricity, administrative errors in metering and billing, "fudging" of various statistical

## TABLE 4.10

WAPDA ENERGY GENERATED, SOLD, CONSUMED IN AUXILIARIES AND SYSTEM LOSSES

| Year | Units Generated (Gwh) | Consumption in Auxiliaries of the Power Station Total (Gwh) | Consumption in Auxiliaries of the Power Station % (3/2x100) | Units sent out (Gwh)(2-3) | Units Sold (Gwh) | System Losses Total (5-6) | System Losses % (7/5x100) | System Losses and Consumption in Auxiliaries Total (Gwh)(2-6) | System Losses and Consumption in Auxiliaries % (9/2x100) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1959-60 | 781 | 40 | 5.12 | 741 | 603 | 138 | 18.62 | 178 | 22.79 |
| 1960-61 | 987 | 36 | 3.65 | 951 | 746 | 205 | 21.56 | 241 | 24.42 |
| 1961-62 | 1,284 | 45 | 3.50 | 1,239 | 929 | 310 | 25.02 | 355 | 27.65 |
| 1962-63 | 1,680 | 51 | 3.04 | 1,629 | 1,224 | 405 | 24.86 | 456 | 27.14 |
| 1963-64 | 2,111 | 90 | 4.26 | 2,021 | 1,561 | 460 | 22.76 | 550 | 26.05 |
| 1964-65 | 2,465 | 125 | 5.07 | 2,340 | 1,822 | 518 | 22.14 | 643 | 26.09 |
| 1965-66 | 2,909 | 156 | 5.36 | 2,753 | 2,089 | 664 | 24.12 | 820 | 28.19 |
| 1966-67 | 3,016 | 169 | 5.60 | 2,847 | 2,097 | 750 | 26.34 | 919 | 30.47 |
| 1967-68 | 3,648 | 186 | 5.10 | 3,462 | 2,486 | 976 | 28.19 | 1,162 | 31.85 |
| 1968-69 | 4,371 | 157 | 3.59 | 4,214 | 2,939 | 1,275 | 30.26 | 1,432 | 32.76 |
| 1969-70 | 5,162 | 179 | 3.47 | 4,983 | 3,600 | 1,383 | 27.75 | 1,562 | 30.26 |
| 1970-71 | 5,740 | 219 | 3.82 | 5,521 | 3,966 | 1,555 | 28.17 | 1,774 | 30.91 |
| 1971-72 | 6,029 | 174 | 2.89 | 5,855 | 4,137 | 1,718 | 29.34 | 1,892 | 31.38 |
| 1972-73 | 6,836 | 183 | 2.68 | 6,653 | 4,599 | 2,054 | 30.87 | 2,237 | 32.72 |
| 1973-74 | 7,179 | 218 | 3.04 | 6,961 | 4,742 | 2,219 | 31.88 | 2,437 | 33.95 |
| 1974-75 | 8,041 | 184 | 2.29 | 7,857 | 5,212 | 2,645 | 33.66 | 2,829 | 35.18 |
| 1975-76 | 8,276 | 222 | 2.68 | 8,054 | 5,315 | 2,739 | 34.01 | 2,961 | 35.78 |
| 1976-77 | 8,734 | 258 | 2.95 | 8,476 | 5,452 | 3,024 | 35.68 | 3,282 | 37.58 |
| 1977-78 | 10,089 | 221 | 2.19 | 9,868 | 6,490 | 3,378 | 34.23 | 3,599 | 35.67 |
| 1978-79 | 10,609 | 203 | 1.91 | 10,396 | 6,981 | 3,415 | 32.85 | 3,618 | 34.14 |
| 1979-80 | 12,124 | 269 | 2.22 | 11,855 | 8,160 | 3,695 | 31.17 | 3,964 | 32.69 |
| 1980-81 | 13,206 | 344 | 2.60 | 12,862 | 9,068 | 3,794 | 29.50 | 4,138 | 31.33 |
| 1981-82 | 14,768 | 390 | 2.64 | 14,378 | 10,288 | 4,090 | 28.45 | 4,480 | 30.34 |
| 1982-83 | 16,492 | 399 | 2.42 | 16,093 | 11,587 | 4,506 | 28.00 | 4,905 | 29.74 |
| 1983-84 | 18,052 | 400 | 2.21 | 17,652 | 12,762 | 4,890 | 27.70 | 5,290 | 29.30 |

Source: WAPDA Power System Statistics, *op.cit.*, p.30.

returns and defective meters. Non-technical losses, in a healthy system, should be reduced to zero. Technical losses, however, can never be reduced to zero, because when electricity flows it always generates some heat and thereby losses occur. In a power system, technical losses are caused whenever power is transmitted between two points due to the resistance of the lines, transformation of voltage in transformers, isolators, connectors and other electrical equipment. Since these losses cannot be eliminated, the sound engineering practice is to keep these losses at an economically acceptable level. According to World Bank estimates, economic loss level for transmission can be as low as 3 percent and that for distribution it can be as low as 5 percent. Technical losses in a healthy distribution system should never exceed 10 percent of gross generation.[60] In \Pakistan, both the technical as well as non-technical losses were far more than acceptable limits. Non-technical losses, particularly in the WAPDA system, were exorbitant and were estimated to be at least one-third of total distribution losses. Table 4.11 indicates the percentage share of various categories of losses in the WAPDA system on an yearly basis from 1976-77 to 1987-88.

WAPDA's estimates for pilferage for the years between

**TABLE 4.11**

NATURE OF WAPDA POWER SYSTEM LOSSES

| Year | Total Generation (M.KWH) | Auxiliaries % Losses | Transmission % Losses | Units Sold (M.KWH) | % Distribution Losses | % Losses on Gross Generation |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1976-77 | 8,734 | 3.0 | 12.3 | 5,452 | 22.3 | 37.6 |
| 1977-78 | 10,089 | 2.2 | 12.2 | 6,489 | 21.3 | 35.7 |
| 1978-79 | 10,599 | 1.9 | 12.2 | 6,980 | 20.1 | 34.1 |
| 1979-80 | 12,124 | 2.2 | 11.0 | 8,159 | 19.5 | 32.7 |
| 1980-81 | 13,206 | 2.6 | 10.7 | 9,067 | 18.1 | 31.3 |
| 1981-82 | 14,767 | 2.6 | 9.2 | 10,288 | 18.5 | 30.3 |
| 1982-83 | 16,492 | 2.5 | 9.5 | 11,586 | 17.7 | 29.7 |
| 1983-84 | 18,052 | 2.2 | 9.9 | 12,761 | 17.2 | 29.3 |
| 1987-88 | 27,451 | 1.6 | 8.5 | 20,702 | 14.5 | 24.6 |

Source: WAPDA Power System Statistics, relevant years.

1979-80 and 1983-84 ranged between 5 to 6 percent of the gross generation, and for previous years an increase of 1/2 percent per annum was to be added. The Federal Inspection Team, however, estimated that during 1978-79 the pilferage amounted to an average of 8.55 percent of gross generation with the financial loss of Rs. 240 million in that year. The possibility of theft of energy with the connivance of WAPDA staff could not be ruled out. The failure of WAPDA to implement measures suggested by various agencies from time to time including Federal Inspection team in 1980 to segregate theft from transmission and distribution losses and fix responsibility indicates the possible involvement of WAPDA officialdom. The installation of meters on the distribution transformers and interconnected feeders to measure energy input to consumers so as to segregate distribution line loss from the theft of electricity suggested by the Federal Inspection Team was agreed to by WAPDA only in April 1983, and by July 1985, the progress in this regard was nil. Although, the expenses for the installation of energy meters on distribution transformers would have been Rs. 150 million according to WAPDA's own calculations against Rs. 240 million of WAPDA's accepted figure of loss of revenue due to theft during 1978-79.[61]

Social, political and economic factors contributed to the increase in the incidence of theft with or without the connivance of WAPDA staff. It was well-known where the theft took place and who were the culprits. For example, according to a report:

> ... the theft is wide spread either in Katchi Abadis, slums and the congested streets and high-income districts like Gulberg and Garden Town. The consumers in tribal areas, Afghan refugee camps and Baluchistan simply do not believe in paying any dues to the Government. In Khyber Agency, losses are 55.8 percent ... In Bannu and North Wazirstan, the figures are 37.7 percent and 52.68 percent respectively ... The highest feeder losses are in Gulberg and Garden Town in Lahore ... there is considerable temptation to steal, particularly by the prestigious private hospitals and clinics, and restaurants who are reluctant to pay the proper dues which might cause incidence of high income-tax also ... Maximum tempering is done with MDI meters and highly ingenious methods are used in order to circumvent time mechanism of recording ...[62]

Measures to segregate non-technical losses and theft from the technical losses were also suggested on various occasions in the past, even prior to the recommendations of the Federal Inspection Team referred to above. Annual Plan 1975-76, for example, suggested:

a. All 11 KV feeders should be metered accurately to register the units sent out. The meters should be properly protected from tempering by WAPDA staff.

b. Sub-divisions should be demarcated on feeder-wise basis and SDO's and Executive Engineers should be given full authority for detection of stealing.

c. Every SDO in charge of a feeder should maintain a rise and fall register of energy bills to determine the extent of stealing by calculating the technical losses of the average load the feeder carried monthly.

d. The SDO should submit every month his report on the rise and fall of revenue as against the energy sent out to Divisional Engineer and the Divisional Engineers every quarter to Superintending Engineers who should be made responsible for rooting out this malpractice in their circles.[63]

In spite of all the remedies and measures suggested to WAPDA from time to time to root out theft of energy, improvements of any significance could not take place. The reluctance of WAPDA authorities to fix responsibility was indicative of the possible involvement of its officialdom and widespread corruption in the organization. However, they were also afraid of taking action against the powerful sections of the society.

The measures taken by WAPDA, as of June 1985, to check pilferage mainly included the installation of anti-theft boxes (ATBs) and checking by special surveillance teams. Feeder-wise checking had been introduced from 1984-85. As of 30 June 1984, a total number of 4,277 ATBs had been installed on industrial connections receiving power above 70 KW representing a coverage of 88 percent in this category of consumers. About 4 percent of commercial consumers had ATB's. Besides, a total number of 178,847 ATBs had been installed on small industrial, tube-well and general connections by 30 June 1984 representing about 4 percent coverage.[64] The reliability of the above figures was questioned by certain quarters. It was reported that many ATBs had not been sealed properly. A large number of them were reported to have no lids or not latched properly or the prize bonds had not been pasted. Such ATBs, therefore, served no purpose.[65]

Inadequate and defective distribution system in the country caused excessive technical losses. More than admissible length of 11 KV feeders, inadequate conductor sizes and voltage levels and in many cases improper conductors (for example, if proper conductor is not available in the stores, the linemen would often strung G.I. wire which is technically criminal), undersized distribution transformers, low power factor and poor workmanship and sub-standard electrical equipment, were the main causes for excessive technical losses. In suburban areas and "Katchi-abadis", unauthorized long distribution lines had been strung on spliced wood and branches. Physical replacement of these lines was not difficult, but administrative procedures were tedious and the field staff were reluctant to report such cases for fear of action against them. They would rather approach the unauthorized users for whatever gains they could squeeze from them. Strenuous efforts were required to solve these problems. The Distribution Wing of WAPDA had been suffering due to long neglect, although it employed more than 50 percent of the WAPDA employees. The distribution system, therefore, needed greater attention and resources than what it got for many years.[66]

The number of consumers in the WAPDA system increased from 59,000 in 1947 to 311,596 at 30 June 1960 and to 5,779,623 at 30 June, 1988. In the KESC system, the number of consumers increased from 98,056 at 31 December 1960 to 879,287 at 30 June 1988. Table 4.12 shows the number of consumers in both the systems at the end of various Plan periods from 1960 onwards. Consumption of electricity per capita (excluding captive capacity generation of the industry) in the country increased from 3.6 KWH in 1948 to 318.7 KWH in 1988. Table 4.13 indicates the consumption of electricity per capita (public utilities only) during the terminal years of various Plan periods.

## TABLE 4.12

## NUMBER OF ELECTRICITY CONSUMERS IN PAKISTAN

| Year | WAPDA | KESC | PAKISTAN |
|---|---|---|---|
| 1947 | 59,000 | - | * |
| 1960 | 311,596 | 98,056 | * |
| 1965 | 687,866 | 162,747 | * |
| 1970 | 1,174,625 | 225,486 | * |
| 1978 | 2,280,441 | 415,936 | * |
| 1983 | 3,901,436 | 635,000 | 4,536,436 |
| 1988 | 5,779,623 | 879,287 | 6,658,910 |

* Figures for WAPDA indicate the number of consumers at 30 June, whereas the figures for KESC indicate the number of consumers at 31 December. The total for Pakistan is, therefore, not given. The figures for the years 1983 and 1988 indicate the number of consumers at 30 June for both the systems.

Source: (i) WAPDA Power System Statistics, October 1990 pp.38 - 87.
(ii) KESC Power System Statistics (1983), p.26.
(iii) KESC 71st Annual Report (1983), op.cit., p.5.
(iv) KESC 72 Annual Report (1983), op.cit., p.5.

In spite of the manifold growth in the distribution system, an ever increasing demand for more power and new connections always kept the system under pressure. Besides, being at the tail end of the power system, the distribution system invariably suffered due to drastic ADP (Annual Development Plan) cuts. As a result of inadequate finances as well as attention, the distribution system deteriorated over the years. The system had been developed haphazardly without proper planning and ignoring the design requirements of a technically sound system. In many parts of the system, the

## TABLE 4.13

## CONSUMPTION OF ELECTRICITY PER CAPITA (PUBLIC UTILITIES)

| Year | Total Consumption (GWh) | Consumption per Capita (KWh) |
|---|---|---|
| 1948 | 112.7 | 3.6 |
| 1955 | 475.6 | 12.2 |
| 1960 | 875.4 | 19.4 |
| 1965 | 2,437.8 | 46.3 |
| 1970 | 4,622.7 | 76.3 |
| 1978 | 8,372.0 | 108.2 |
| 1983 | 14,150.0 | 157.7 |
| 1988 | 25,075.0 | 241.5 |

Source: For consumption figures:
(i) Energy Data Book, op.cit., pp.126-127.
(ii) Energy Year Book 1983, op.cit., p.64.
(iii) Energy Year Book 1989, op.cit., p.64.

lines had been extended without any design criteria and some of the 11 KV feeders were more than 150 KM long. Moreover, the conductors were too small for the load carried and the transformers were overloaded in many areas. In many portions of the system, the equipment was as much as 50 years old. Renovation was highly neglected. Firstly, meager funds were allocated for this purpose. Secondly, even those funds were not fully utilized for lack of incentives. Consequently, the system suffered from high power losses and low voltage. The rehabilitation program, including the installation of static capacitors where needed, suffered in the WAPDA system due to the neglect of the distribution sector over a long time also because, according to a highly placed WAPDA official, it had no 'glamour' attached to it.[67]

The First Five Year Plan pointed out that the implementation of the transmission and distribution schemes during the 1947-55 period was about 30 percent.[54] The Second Plan accorded a higher priority to transmission and distribution and provided for the construction of 9,100 miles (14,642 KM) of transmission and distribution lines of 11 KV and above compared to 3,050 miles (4,907 KM) during the First Plan period.[55] Although, these targets were achieved during the Second Plan period, the distribution system continued to deteriorate. The Third Plan stated that the 'distribution system in many areas is old and inadequate for present load', and described the situation to be 'not satisfactory'. The need to continue the rehabilitation and extension program at an accelerated pace was stressed. A backlog of 80,000 pending applications for new connections only in the Northern Grid (Punjab and NWFP) of WAPDA was reported. The target for the construction of 11,000 miles (17,699 km) of 11 KV and above transmission and distribution lines was fixed.[70] In spite of an increased stress of the Third Plan for the rehabilitation and improvement of the distribution system, the situation further deteriorated during the Third Plan period. The Fourth Five Year Plan considered the 'inadequacy of the distribution system particularly the shortage of grid stations, longer than permissible lengths of feeder circuits and under capacity of distribution mains and transformers' responsible to a large extent for 'poor quality of service and increase in system losses'. A large percentage of 'the abnormally high system losses' was considered to occur in the distribution system. The incidence of 'widespread theft of energy by meter tampering, wrong reading etc.' was also highlighted by the Fourth Plan.[71] The Fourth Plan urged the WAPDA authorities to improve the distribution system and the operational efficiency. The Plan underlined the strategy as follows:

> Greater emphasis will be placed on improving the operating efficiency of the public utilities, particularly that of the Water and Power Development Authority. Efficiency can be introduced by creating proper balance between generation and marketing facilities, reducing power losses (recorded as high as 32% of total generation) and employing better operating and maintenance techniques (the failure at the Multan Power Station was due to inefficient operation and poor maintenance). The Plan attempts to achieve a balance between generation and marketing facilities through higher allocations to distribution than in the previous plans. WAPDA on the other hand will have to take concerted action to reduce the losses in the system and to evolve better operating and maintenance techniques and to improve its distribution system. Emphasis will be placed on creating more grid stations with shorter feeder circuits, renovating existing distribution mains

through replacement of transformers and installation of shunt capacitors and feeder voltage regulators to stabilize voltage to consumers. These works will have to be undertaken simultaneously with extension works to give new connections for spreading the social benefits.[72]

However, the neglect of the distribution system continued and the system losses continued to increase unabated until 1976-77 when the system losses in the WAPDA system reached a peak of 37.58 percent of the energy generated. Although, WAPDA claimed that the 'process of reduction of power loss started in right earnest in 1977',[73] the distribution system could not be improved to a respectable level by 1988.

The problem of system losses also got attention of the international organizations. In 1980, a World Bank report stated that the length of the transmission and distribution lines and loads carried at relatively low voltage levels had contributed to the high system losses. The problem, according to this report, had been further aggravated by theft and bad metering.[74] In 1983, the IED Consultants' report described the situation as follows:

> In many parts of the distribution system the conductors are too small for the load carried, transformers are overloaded, and the system suffers from high losses and low voltage. A modest program for rehabilitating the distribution system is underway. Appar-

ently the above programme is not financed adequately to allow the system to be greatly improved in the near future.[75]

In 1985, the World Bank asked WAPDA to reduce its overall system losses which were 29.3 percent in 1983-84 to 23 percent within the next three years as a precondition of a loan for the Fourth Power Project of WAPDA. It was reported by a highly placed officer of WAPDA that the WAPDA authorities had provided arguments attempting to prove that three years was too short a period to achieve this target.[76] Asian Development Bank expected the transmission and distribution losses stabilizing below 11.0 percent in the KESC system as a result of the implementation of a Power Project financed by it. Project Performance Audit Report of the Bank was very critical of the KESC's performance in this regard as the losses had increased to 23 percent instead of stabilizing below 11.0 percent after the completion of the project.[77]

The pattern of electricity consumption also underwent substantial changes over the years which added to the enormity of the problem. The share of the industrial sector consistently declined, whereas the percentage share of the agricultural sector in the total consumption of electricity continued to increase during the Second, Third and the

Annual-Plan periods and decreased during the Fifth and Sixth Plan periods. The consumption by the domestic sector began to increase considerably during the Annual-Plan period (1970-78). This trend continued during the Fifth and the Sixth Plan periods. Table 4.14 indicates the consumption by different categories of consumers, from 1960 onwards, during the terminal years of various plan periods. During the Fifth Plan period, the number of domestic consumers increased by about 1.50 million against the target of 0.7 million. But the number of industrial and agricultural consumers increased by about 27,000 and 24,000 against the Plan target of 55,000 and 70,000 respectively.[78]

Shifts in the consumption pattern of electricity are indicative of the socioeconomic and political developments which took place in the country during the study period. People's revolt against Ayub regime was mainly the result of the failure of the government to spread the benefits of economic development to the disadvantaged sections of the society. Under the Bhutto Government, efforts were made to extend the facilities to as many people as possible. With the increase of home remittances from abroad by Pakistani workers who mostly belonged to the poorer sections of the society (45 percent of them were unskilled and another 41

## TABLE 4.14

PATTERN OF ELECTRICITY CONSUMPTION IN PAKISTAN

(GWH)

| Year | Category of Consumers | | | | | Total |
|---|---|---|---|---|---|---|
| | Domestic | Commercial | Industrial | Agricultural | Others* | |
| ** 1959-60 | 195.212 (23.3) | - | 518.818 (59.3) | 67.180 (7.7) | 94.193 (10.7) | 875.403 (100) |
| 1964-65 | 331.178 (13.6) | 128.924 (5.3) | 1,276.368 (52.3) | 424.210 (17.4) | 277.174 (11.4) | 2,437.854 (100) |
| 1969-70 | 568.825 (12.3) | 301.682 (6.5) | 2,304.984 (49.9) | 956.140 (20.7) | 491.058 (10.6) | 4,622.689 (100) |
| 1977-78 | 1,705.780 (20.4) | 733.290 (8.8) | 3,402.580 (40.6) | 1,760.500 (21.0) | 769.930 (9.2) | 8,372.080 (100) |
| 1982-83 | 3,752 (26.5) | 1,049 (7.4) | 5,572 (39.4) | 2,559 (18.1) | 1,218 (8.6) | 14,150 (100) |
| 1983-88 | 7,900 (31.5) | 1,868 (7.4) | 8,973 (35.8) | 4,415 (17.6) | 1,919 (7.7) | 25,075 (100) |

* Includes, public lighting, bulk supply, traction etc.

** Includes consumption by the commercial sector.

Note: Figures on parentheses indicate percentage.

Source: (i) Energy Data Book, op.cit., p.127.

(ii) Energy Year Book 1983, op.cit., p.64.

(iii) Energy Year Book 1989 op.cit., p.62

percent were semi-skilled labor) raised the standard of living of their dependents in Pakistan. This was followed by an unprecedented increase in the housing construction. The number of household electric appliances and other gadgets also multiplied over the years (no one would return from overseas without a number of these items). The pace of rural electrification also increased during the later part of the Annual Plan period. All these factors caused the consumption in the domestic sector to increase at a faster rate as compared to the industrial sector. Commercial activities also picked up during the 1970s and the consumption in this sector also increased at a faster rate. These developments put the distribution system under tremendous pressure. However, matching resources were not provided to upgrade the distribution system. The WAPDA bureaucracy did not adopt a rational system of deciding internal priorities.

The Sixth Five Year Plan envisaged the system losses to go down by 2 percent each year during the Plan period to bring the losses down to 19 percent of the total generation.[79] However, the losses at the end of the Sixth Plan period amounted to 24.6 percent. Had the losses been reduced to the 19 percent level envisaged by the Sixth Plan, which was still higher than the optimum economic level, enormous gains would have accrued to the nation. The country could have financed at least one big project every year from 1960 onwards out of the additional income earned by the sale of energy which had been going down the drain. Immeasurable additional benefit as a result of adequate and dependable electric supplies would have been a bonus for a better house keeping. During 1983-84, 19 percent losses in the WAPDA system compared to actual losses of 29.30 percent would have enabled WAPDA to sell additional units amounting to 1,860 GWH and increase its income by approximately Rs. 989 million which was (at 1983-84 price) equivalent to the Rupee component of the total estimated capital cost of Tarbela units 9 & 10 with an installed capacity of 350 MW.[80]

**RAILWAY ELECTRIFICATION**

In order to modernize the railway system and to save valuable foreign exchange on account of imported fuel oil, electrification of Pakistan Railway was considered in early 1960s. The Khanewal-Lahore section, a distance of 290 KM, mostly single track and heavily overloaded was first selected for 25 KW,AC, single phase electrification. It was also considered that if electrification of this section proved successful, it could be extended to Lahore-Rawalpindi (293

KM) section as well. The electrification work on Khanewal-Lahore section was completed in December 1970 at a cost of Rs. 142 million.[81] The Third Plan also recommended the electrification of Lahore-Rawalpindi section after the Plan period.[82] The Fourth Five Year Plan recommended to conduct studies for the electrification of other important sections such as Karachi-Kotri and Lahore-Rawalpindi.[83] A comprehensive study on the energy use in the transport system sponsored by the National Transport Research Centre recommended the electrification of the main track between Karachi and Rawalpindi. The study, on the basis of field data, concluded that the specific energy consumption in the case of electric traction was 'considerably lower than that under the best petroleum fuel, HSD'.[84] The Fifth Five Year Plan envisaged the extension of electric traction from Khanewal to Samasatta. The Plan stated:

> A provision of Rs. 160.00 million has been made in the Fifth Plan for extension of electric traction from Khanewal to Samasatta. This would ensure better utilization of the existing 29 Electric Locomotives in use on Lahore-Khanewal section.[85]

The Working Group report on the development and conservation of energy resources for the Sixth Five Year Plan also recommended for the acceleration of electrification of the railways.[86] The Sixth Five Year Plan is silent about the fate of the above project. Instead, the Plan envisaged[87] the introduction of electric traction on a small section between Sukkur and Quetta (Abegum--Kolpur). The under-utilization of the existing Electric Locomotives, therefore, continues unabated. As of 30 June 1988, no extensions had been made in the electric traction.

Since the electrification of Khanewal-Lahore section in 1970, no electrification project was implemented. Notwithstanding the fact that the system was working satisfactorily and the targets set forth had long since been achieved. Besides affecting savings in running time, the project had since paid its capital cost. The railway staff had also gained technical knowledge and experience and was fully capable to undertake similar projects.[88]

Numerous causes account for 'no progress' in the railway electrification. The financial constraints, paucity of foreign exchange and the rising costs of equipment contributed to readjust priorities in the Railways Ministry. The funds earmarked for the electrification projects were utilized elsewhere. The priorities were not set in the ministry on rational grounds. The inter-departmental rivalries in the Railways Ministry had a major effect on the implementation of this project. The mechanical engineers felt an imminent threat to their supremacy in the ministry who feared that the implementation of these projects would give material advantage to the electrical engineers. The purchase and supply staff who were making millions from the purchase of oil took it a challenge to their survival. The bureaucratic interest groups, therefore, made all out efforts to shelf the railway electrification scheme.[89]

The reluctance of WAPDA in giving clearance for new electrification projects was another factor. This was generally attributed to the prevalent shortage of power in the country. However, the situation was not as bad at the primary source because the railway required power at 132 KV. The demand of electric power for electrification projects was very small as compared to that of local industry. Railway's working was round the clock but mostly the freight trains run during the night hours. The Railway's peak demand was, therefore, during the off-peak hours of WAPDA which would rather improve the overall load factor of WAPDA generation. Coordination with WAPDA at appropriate level could have solved this problem, but the basic stimulus which would have come from the railway bureaucracy remained absent.[90]

## RURAL ELECTRIFICATION

Until 1970, rural electrification in Pakistan was considered a 'social service' to be provided to some lucky villages. The Fourth (abortive) Five Year Plan (1970-75) stated:

> The rural electrification programme has been adopted in conjunction with Tube-well electrification largely as a social service. Since it cannot be regarded as a paying commercial proposition, care has been taken to see that this programme does not impose excessive financial handicaps on the power industry. According only 1,000 villages are planned to be electrified during the Fourth Plan period.[91]

More than half a century was required to electrify 45,122 villages and an equal number of small settlements in Pakistan at the rate adopted in the Fourth Plan. The downfall of Ayub regime and the subsequent developments caused a change in government's policy. Consequently, a higher priority was started to be given for the uplift of rural areas where about 72 percent of the population lived. The rural electrification programme gained momentum from 1972-73 onwards and the number of villages electrified in the WAPDA system (WAPDA is the main agency responsible for rural electrification) increased from 2,553 at 30 June 1972 to 7,609 at 30 June 1978. In the KESC system, 199 villages and goths (small settlements) were electrified during 1972-78 period against a total of only 125 during the previous 25 years. As of 30 June 1988, according to the figures given by WAPDA 27,691 villages had been electrified in the country. Table 4.15 indicates the progress of village electrification in the WAPDA System at the end of various plan periods in each province. It is evident from Table 4.15 that only about 61 percent of the total villages were electrified at the end of June 1988. The position of the NWFP

**TABLE 4.15**

**PROVINCE WISE VILLAGE ELECTRIFICATION**

| Province | Total No. of villages | Number of Villages Electrified at 30 June | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1960 | 1965 | 1970 | 1978 | 1983 | 1988 |
| Punjab* | 25,489 | 277 | 879 | 1,136 | 3,552 | 7,735 | 13,373 |
| NWFP** | 7,717 | 625 | 919 | 1,043 | 2,294 | 4,018 | 6,963 |
| Sindh | 5,847 | 2 | 55 | 200 | 1,607 | 3,065 | 5,756 |
| Baluchistan | 6,069 | - | 5 | 10 | 156 | 421 | 1,599 |
| TOTAL | 45,122 | 904 | 1858 | 2,389 | 7,609 | 15,239 | 27,691 |

* Includes Islamabad.
** Includes Federally Administered Tribal Areas (FATA).

Source:(i) WAPDA Power System Statistics, October, 1990 p.57.
(ii) Energy Year Book, 1989, p.65.

and Sindh in respect of village electrification was better where the percentage of electrified villages was 90 and 98 respectively. In the Punjab and Baluchistan the percentage of such villages was 52 and 26 respectively.

The Planning Commission of Pakistan, however, did not accept WAPDA figures. According to 7th Five Year Plan only 16,525 villages or 33.7 percent were electrified by 30 June, 1988.[92] The Planning Commission used the definition of the village as adopted by Population Census 1981, whereas WAPDA authorities changed the definition to exaggerate the figures to show impressive progress in respect of rural electrification project. It had also been reported that WAPDA figures included 25 per cent of "paper connection", and were inflated by resorting to double counting.[93]

The numbers of beneficiaries in the electrified villages were even more depressing. On an overall basis, only about 25 percent of the population in the electrified villages had electricity connections. According to WAPDA's own criteria in respect of rural consumers, a village was considered electrified if 15 percent of the population were provided electricity connections. In some cases, even this requirement was not fulfilled.[94] Majority of the rural people even in the electrified villages, therefore, had no access to electricity. Even if 25 percent of the population in the electrified villages were considered to have access to electricity, for a country as a whole it would translate to be less than 11 percent of the rural population.

The tube-well electrification program in the rural areas had always received high priority. The number of electrified tube-wells increased to 136,860 in the WAPDA System at the end of June 1988. About 600 agricultural tube-wells were also electrified in the KESC system.[95] The back-log of tube-well connections, however, had increased over the years. At 30 June 1984, the number of pending applications for tube-well connections in the WAPDA system was 3,642. Besides, it was estimated that approximately 100,000 tube-wells operate on diesel engines.[96] Had these tube-wells been electrified, valuable foreign exchange could have been saved. The tube-well electrification programme of the Sixth Five Year Plan envisaged to provide 40,000 new tube-well connections in the WAPDA system during the Plan period.[97] WAPDA could, however, electrify only 22,470 tube-wells during the plan period. The Sixth Plan target in respect of village electrification was to electrify 20,000 villages[98] As only 10,127 villages were electrified during the plan period, the shortfall was, therefore, about 50 percent.

The rural electrification policy pursued in Pakistan during the study period did not address the question of poor coverage of the population in the electrified villages. The targets were set in terms of number of villages to be electrified and the progress of the agencies concerned was measured primarily in terms of meeting those targets. This approach not only caused under-utilization of the capital for rural electrification, but also deprived the majority of the population of its benefits. Also, low sales and high transmission and distribution losses were the inevitable consequences which the public utilities had to live with as a result of pursuing this policy. Besides, it had not been possible to decrease the consumption of kerosene oil in the rural areas. A full 75 percent of the rural population suffered due to this lopsided policy. Appropriate credit arrangements for the less affluent sections of the rural population were necessary to achieve better results. Even the possibilities of providing grants to the poorest of the rural population to meet internal electrification charges would have been considered. One possible source for this purpose could be the Zakat Fund.[99] Without appropriate credit facilities and grant mechanism, it is unlikely that the rural poor will have access to electricity.

The implementation of rural electrification suffered due to the wrong assumptions on which the policy was based. It was assumed that once a village was connected to the national grid, its entire population would be benefited. The implementing agency was interested only in numbers. In their enthusiasm to show results, the officials resorted to such practices as "paper connections" and modification of criteria by changing definition of the village. This also indicates the prevalence of defective management and control procedures and practices to monitor the performance of the implementing agency. Misreporting could not be pointed out for several years.

## THE POWER COMMISSION OF PAKISTAN

The Government of Pakistan established a Commission, namely, Power Commission of Pakistan, in May 1961 with the objective to make wide range recommendations for the development and utilization of electric power in the country. The Commission was headed by a very senior official of the Government of Pakistan with a membership consisting of equally senior officials including specialists. The secretariat of the commission was located in the Atomic Energy Commission of Pakistan (PAEC). The Power Commission submitted its report to the Government in August, 1963. Subsequently, the Government appointed an officials' committee again headed by a very senior officer and drawing its membership from the relevant organizations with the objective to submit a report to the Government on the recommendations of the Commission. This committee submitted its report to the Government in March 1964, recommending *inter alia* to get comments on the Report from the relevant agencies. At this juncture, Government also decided to shift the Secretariat of the Power Commission from the PAEC to the Ministry of Water and Power.[100]

The Ministry of Water and Power got agency comments from relevant organizations of Provincial and Federal Governments in due course. In the meantime, the Government decided to restore original provinces of the country by the breakup of one unit in western Pakistan. Fresh reports were, therefore, called from all the Provincial Governments which were received in the Ministry in due course.

Nothing happened until 1973 when someone in the

Ministry of Water and Power thought of generating some work out of this otherwise dust clad reports. By that time, the country had lost one of its wings and the former East Pakistan had become Bangladesh , an independent country. It was argued that after the secession of the erstwhile East Pakistan, new reports/comments from the provincial governments and other relevant agencies were necessary as the entire scenario had changed. The Office of the Chief Engineering Advisor in the Ministry of Water and Power was entrusted the responsibility to coordinate. Fresh comments were received from all the relevant quarters by August 1973 which were placed in the relevant files and the officials concerned were advised to wait for further instructions.[101]

In 1982, President of Pakistan issued a directive to the Federal Inspection Commission (FIC) to form a Cell for the study of Reports of Commissions/Committees appointed by the Government from time to time.[102] The FIC, therefore, asked the Ministry of Water and Power about the fate of the Power Commission's Report. The Ministry passed on this responsibility to the Chief Engineering Advisor's Office. Strenuous efforts were made to dig out the Report and the comments of various agencies on the implementability of the conclusions and recommendations of the Report. After lengthy deliberations and discussions by experts in the Ministry of Water and Power spread over three years, it was finally advised by the Chief Engineering Advisor in April 1985 that the recommendations of the Commission had become irrelevant and it would not be desirable to pursue them further. The desirability of appointing a new Commission for the purpose was, however, recommended to be studied.[103]

The case of Power Commission demonstrates the capability of the bureaucracy to resist change or reform efforts likely to affect their preeminence. In the absence of a system to fix responsibility, such delays and inactions rampant in the implementation of energy policy are unlikely to be curbed.

**THE FUELS SECTOR**

The Ministry of Petroleum and Natural Resources is responsible for the implementation of energy policy relating to the fuels sector. Major investments in this sector were envisaged to come from the private sector. The bureaucracy of the Ministry was required to regulate the activities of the private companies. In the absence of effective political leadership, the bureaucracy's main concern remained to effectively control the operations of the private sector. There was no incentive for the bureaucrats to liberalize the procedures.

**The oil and gas exploration and exploitation**

The oil and gas exploration and exploitation policy of the Government suffered as a result of bureaucratic apathy and red-tapism. Until 1973, there was no urgency to accelerate the oil and gas exploration and exploitation efforts. Natural gas was discovered in 1952, but the gas utilization policy remained the victim of adhocism. The trend had been to expand its consumption in all the sectors. The oil production deteriorated or remained static till the beginning of the Sixth Five Year Plan (1983-88). The policy had been to depend on the private sector investment in this field. The public sector investment remained low. The private sector performance was dependent among other things on the incentives and facilities made available by the Government. The Government response in this field remained poor. The Pakistan Petroleum (Production) Rules, 1949 remained unaltered until 1976. Second revision in the rules was affected in 1986 providing for attractive incentives to the private investors. The bureaucracy has been very slow to respond positively and most of its policies had been restrictive. It was during the Bhutto regime (1970-77) that the powers of the bureaucracy which discouraged investment were curtailed. Inaction and delay, however, continued to infest the bureaucracy. Pakistan Oilfields Limited complained that its case for rationalization of crude price remained pending with the Government for years and it was not until 1986 that the price for this oldest indigenous oil/gas producer was rationalized.[104]

The Bhutto Government brought in Shehzad Sadiq, a technical expert, to appoint him as Secretary of the Ministry of Petroleum and Natural Resources. Under the Junejo Government, another expert of international standing, Dr. Asad, was appointed Minister of State. These two appointments account for bringing about major changes in the system. It was only possible when the politicians were effectively controlling the national affairs.

The Petroleum Sector suffered due to the lack of technical competence at the top management level. According to a report of the World Bank, "institutional inadequacies in the energy sector (insufficient managerial and technical skills) and poor policies (especially in the area of pricing) have posed a serious obstacle to efficient energy sector development".[105] Pakistan even needed to hire international qualified and experienced advisors to assist the Directorate General (Petroleum Concessions) of the Ministry of Petroleum and Natural Resources with concession negotiations.[106] Bhutto and Junejo, both tried to utilize the services of Pakistani nationals with such an expertise in the persons of Shehzad Sadiq and Dr. Asad, but the bureaucracy got rid of them in a short time.

The general criticism of OGDC's top management had been that the directors as per practice were deputed from the Government services who neither had any interest or stake in the affairs of the Corporation nor possessed relevant qualifications or experience. Moreover, they were transferred out of OGDC after completion of their tenure ranging up to a maximum of three years. As long as civil servants continue to be deputed as directors, this pattern will continue because of the peculiar nature of career planning of the civil servants. Hence, there is a need to have directors nominated from industry or corporate sector having a broader base and experience of business environment in general and of oil industry in particular. They can even be drawn from the ranks of professionals working in OGDC.[107]

## The Coal Policy

The development of indigenous coal industry also suffered during the 1947-88 period. In the initial years, the coal production suffered due to the conversion of railway locomotives from coal to oil burning and the switch over to oil in a number of industries by 1953 in an effort to replace the imported coal without a clear-cut national coal policy and without making appreciable investments for the development of indigenous coal industry.[108] During the 1947-55 period, the coal industry also suffered due to procedural delays and in some cases as a result of the 'non issue of licenses for import of equipment'.[109] The First Five Year Plan observed in this connection that the import licenses for the mining equipment were 'granted only for small amounts and after much delay, making it extremely difficult for mining companies to obtain essential equipment, supplies, spare parts, and replacements'. This happened due to defective laws and regulations and the exercise of controls over mining by several departments.[110] The First Five Year Plan outlined impressive policy objectives in respect of coal, but nothing happened. The coal remained ignored till Sixth Five Year Plan which emphasized the development and utilization of coal resources. The targets of the Sixth

Plan could not be met due to non-enforcement of measures enunciated in the Sixth Plan. National Coal Authority was planned to be established during the Sixth Plan period. No progress was achieved in this regard due to non-settlement of inter-provincial problems.

The Secretary, Mineral Coordination Board, Ministry of Petroleum and Natural Resources was of the view that the domestic coal had a very strong case to get maximum possible share in energy supplies on the ground of lower investment/ growth rate coefficient and of much larger employment potential it provided in comparison with oil and gas. The utilization of coal in power generation, cement manufacturing and process heat was justified on economic grounds. But, coal mining industry in Pakistan required extensive restructuring before any reliance could be placed on it for sustained large supplies at competitive prices. Federal Government in view of national importance of coal in the future energy supplies needed to play a leading role in this matter.[111] However, in bureaucratic terms, the Secretary of the Mineral Coordination Board did not have a status high enough in the Ministry for its views to receive priority attention from the Government.[112] Reforms in the coal industry required maximum encouragement to the private sector which implied curtailment of bureaucratic controls. However, bureaucracy in Pakistan was not appreciative of these ideas during the study period. Therefore, nothing happened to break the inertia.

## THE NATIONAL ENERGY POLICY COMMITTEE (NEPC)

In multi-actor policy implementation situations, the importance of coordination for an effective and timely accomplishment of intended objectives cannot be over-emphasized. The technical departments involved in the implementation of energy projects were often in conflict, and the decisions were constantly postponed or selectively implemented during the study period. The underlying causes of lack of progress in formulating and implementing a development strategy for energy sector included ecological, social, political, economic as well as organizational and managerial. Furthermore a well-defined operational strategy for energy development and utilization was missing. While targets were set in different plans for different activities, projects were not planned in a way that would ensure achievement of national objectives. The absence of a well thought-out mechanism for coordination between various energy producing agencies and energy consuming agencies hindered the implementation of energy policies in a systematic way. The creation of NEPC at the national level was envisaged to surmount the coordination problems. The present case throws light on the bureaucratic politicking to protect agency domains.

The National Energy Policy Committee (NEPC) is the highest national body, co-chaired by the Minister for Finance and the Minister for Petroleum and Natural Resources, to formulate and review the implementation of energy policies of the Government. The NEPC was established on 25 May 1980 as a result of President Zia ul-Haq's interest (incidentally raised by reading an article written by Brian Locke of the Financial Times on India's energy plans regarding coal and cow-dung utilization).

The President sent a directive in 1979 to the then Finance Minister Ghulam Ishaq Khan, who happened to be a confidant of the President, to set up 'a committee to undertake a detailed review of the energy situation in Pakistan'.[113] On the submission by the Finance Minister, the President approved the composition and terms of reference of NEPC on 25 May 1980. The Committee was to be headed by the Minister for Finance or in his absence by the Minister for

Petroleum and Natural Resources. The Secretaries of the ministries of Petroleum and Natural Resources, Water and Power, Planning and Development, Agriculture, Industries, and Production and the Chairman of Pakistan Atomic Energy Commission were appointed as members. The Secretariat of the Committee was to be the Directorate General of Energy Resources in the Ministry of Petroleum and Natural Resources with the Director General Energy Resources as Secretary of the Committee. [Director General (Energy Resources) was later on renamed as Director General (New and Renewable Energy Resources)]. The terms of reference of the Committee were: (a) to review the progress of implementation of the current energy policies of the Government; and (b) to formulate short term and long term energy policies.[114]

A technical committee, namely, Technical Advisory Committee was also established to assist the NEPC at the working level. This committee was to be headed by the Director General, Energy Resources. The other members were: Chief, Energy Section, Planning and Development Division; Chief Engineer, Pakistan Atomic Energy Commission; Secretary, Oil Companies Advisory Committee; Director Planning, WAPDA; a senior representative from Gas Production Companies. The Director (Energy Planning) in DGER was appointed as Secretary of the technical committee.[115]

The terms of reference of the Technical Advisory Committee were as follows:[116]

a. To assess the energy requirements (present and future) of the national economy;

b. to assess the energy resources of the country;

c. to establish the supply and demand balance of energy for the national economy;

d. to make recommendations for a national energy policy;

e. conservation of energy resources in the national interest;

f. to prepare short and long term plans to meet the energy requirements of the country; and

g. to recommend a pricing and taxation pattern which would best serve the interest of the national energy policy.

The idea of establishing an energy committee at the national level was familiar to the Pakistani bureaucracy at least since 1968 when the Government of Pakistan constituted a National Energy Policy Advisory Committee (NEPAC) with Secretary of the Ministry of Industries and Natural Resources as its Chairman and the Secretaries of some other ministries as its members. The NEPAC in its first meeting decided to conduct a comprehensive energy survey in the country. As the things used to be moving at a slow pace during those days, it was only in 1974 when a firm of consultants (Acres International) was contracted for this work. The cost of this survey was financed by the UNDP. As a result of this survey, a new organization, namely, the Directorate of Energy Resources (now Directorate General, New and Renewable Energy Resources), which was initially set up in 1974 as Energy Resources Cell, also came into being. This new organization acted as the counterpart agency to the above mentioned survey project sponsored by the UNDP. The National Energy Policy Advisory Committee held its second meeting in June 1978 after a recess of 10 years, although it was reconstituted in 1975 after upgrading and expanding its membership, with the Minister for Petroleum and Natural Resources as its chairman, and Secretaries of the various Divisions concerned including the Secretary of Planning Division at the Federal level and Chiefs of the Provincial Development Boards as its members. The Technical Advisory Committee also existed prior to the establishment of NEPC in 1980 which was assisting the then Energy Resources Directorate to assess the long term energy forecast being developed by a Pakistani consultant organization in collaboration with the Energy Resources Directorate.[117]

The national energy policy body after a name change from NEPAC to NEPC, which gave it a more prestigious look, held its first meeting on 27 November 1980 (i.e. six months after its face-lifting). In all, it has held seven meetings; the latest was held on 29 February 1984. Table 4.16 below exhibits the calendar of meetings. All these meetings were effectively chaired by the then Finance Minister, Ghulam Ishaq Khan.

**TABLE 4.16**

**CALENDER OF NEPC MEETINGS**

| No. | Date |
|---|---|
| First Meeting | 27 November 1980 |
| Second Meeting | 22 April 1981 |
| Third Meeting | 22 October 1981 |
| Fourth Meeting | 11 March 1982 |
| Fifth Meeting | 17 January 1983 |
| Sixth Meeting | Not Available |
| Seventh Meeting | 29 February 1984 |

Source: Information supplied by the Ministry for Petroleum and Natural Resources, June 1985.

After the departure of Ghulam Ishaq Khan as Finance Minister, no meeting of the NEPC was held (as of June 1988) due to bureaucratic in-fighting. The Committee, even during its four years of active life, frequently debated three basic issues: the location and role of its Secretariat; the membership; and the periodicity of meetings.

The location and the role of the NEPC Secretariat was the thorniest of the issues. The control of the Secretariat with effective role to play had a strategic importance in the bureaucratic power game of inter-departmental committees, as the controlling organization could effectively increase its power vis-a-vis other competitors by virtue of having access to more information and by controlling the agenda. At least, four of the member organizations would consider themselves to be eligible to be vested with the responsibility of housing the Secretariat with effective powers: Planning and Development Division by virtue of its having access to the information and also being a national body for formulating the development plans, including the energy sector; Ministry of Water and Power being controller of power sector claiming the largest share of investment in the energy sector; Ministry of Petroleum and Natural Resources, being the controlling Ministry of Directorate General of Energy Resources and traditionally involved in the coordination of energy policy matters; and the Directorate General of Energy Resources being the present Secretariat approved by the President as a result of which its position and prestige vis-a-vis its controlling ministry (Ministry of Petroleum and Natural Resources) and other Directorates-General of Ministry of Petroleum and Natural Resources was greatly enhanced. Under the circumstances, it did not have to wait too long for a challenger. In the second meeting, it was suggested that in future the working paper for NEPC Committee might be prepared by the Planning Division, to which the 'Chairman disagreed' and 'directed' that the Ministries/Directors concerned 'should prepare position papers relating to their field of activities and submit them to the NEPC Secretariat for further necessary action'.[118] The Planning Division, however, scored on another point in the same meeting. In view of the inability of the Ministry of Petroleum and Natural Resources to achieve a '20% cut in imports of deficit products' in spite of an Executive Committee of the National Economic Council (ECNEC) directive, the Planning Division was empowered to act as Convener for the meeting of a sub-committee decided to be constituted with representatives from Ministry of Production, Ministry of Petroleum and Natural Resources, and Planning Division to look into this problem.[119] In response to the observation made by the Chairman in the third meeting that 'the NEPC working paper was deficient in terms of making policy recommendations and full progress made on implementation of the decisions taken in the last meeting',[120] the Secretary of the NEPC stated that the deficiency was 'mainly due to the non-availability of information requested from ministries concerned on implementation of the decisions of the NEPC, which was not provided to the Secretariat in spite of reminders'.[121] On this, the 'Chairman gave a clear ruling that NEPC was the highest powered Committee on the subject of Energy in the Government of Pakistan and that it had been established under the directive of the President of Pakistan thus no information was to be withheld from this Committee or shadow reported to the Secretariat of the Committee'.[122] The facts pointed out by the Chairman in this ruling were, however, not new to the participants of the Committee, although not liked by many. The issue regarding the location of the NEPC Secretariat took a new turn when the NEPC Chairman, in its fifth meeting, 'remarked that under the proposed revision of the rules of business, the coordination of energy policy vested in the Ministry of Petroleum and Natural Resources and as such it was considered appropriate that the Secretariat of NEPC might also be formally placed under the Ministry.'[123]

It was also decided that the 'agenda, working papers and the minutes would in future be routed from the NEPC Secretariat to the Chairman through the Secretary, Petroleum and Natural Resources.'[124] Prior to this, the Secretary NEPC was not required to rout papers through the Secretary, Petroleum and Natural Resources, although as Director General Energy Resources, he was subordinate to the Secretary. The location of the NEPC Secretariat was again challenged in the seventh meeting held on 29 February 1984. The following extract from the minutes of this meeting is illuminating:

> .... On the question of location of the Secretariat, different views were expressed. It was pointed out that at the time of bifurcation of the Ministry of Fuel, Power and Natural Resources (NR), most of the staff was allotted to the Ministry of Water and Power and only nucleus staff was given to the Ministry of Petroleum and NR. A suggestion was, therefore, made that the Ministry of Water and Power which was equally concerned with the energy problems but was better staffed to handle the work, could be entrusted with the Secretariat functions of the Committee. The Ministry of Petroleum and Natural Resources, it was pointed out, was so thinly staffed that it could not spare any officer from the Ministry to handle the job. Under the existing arrangement, the Secretariat of the NEPC was located in a Directorate of the Technical Wing of the Ministry. The DG (ER) is the Secretary of NEPC and is expected to work directly under the Chairman. [In spite of the Chairman's directive to the Secretary in the Fifth Meeting to route all papers through the Secretary of the Ministry of Petroleum and Natural Resources!] This was not a proper and satisfactory arrangement as a ministerial body was being serviced by an attached department which under the rules was meant for the execution of the policy and not for its formulation.
>
> The consensus, however, was that the Secretariat duties were rightly entrusted by the President to the

Ministry of Petroleum and Natural Resources and these should remain with that Ministry. The work should, however, be handled in the main Ministry and proper staff assistance should be provided to them if their existing staff was inadequate to handle this work properly. Secretary Finance agreed to allow a post of Deputy Secretary and two Section Officers with complimentary staff to handle this work.[125]

In the seventh meeting, the Directorate General (New and Renewable Energy Resources) was at last effectively relieved of the Secretariat responsibilities. Subsequently, a Deputy Secretary was recruited to 'handle' the 'work', but who, being a lower level officer compared to the Director General, was not sure (as of May 1985) regarding his position as the Secretary of the NEPC. The situation was further confused by an Office Order signed by the Secretary regarding the distribution of work amongst the Directorates General of the Technical Wing of the Ministry of Petroleum and Natural Resources. This Office Order assigned the NEPC work to the Director General (New and Renewable Energy Resources), but mentioned the Deputy Secretary as Deputy Secretary (NEPC). The Director General, however, still considered himself the Secretary of the NEPC.[126]

If the energy bureaucracy in Pakistan had to accept the supremacy of the NEPC in matters of energy policy formulation and implementation, then the membership of such a prestigious committee was very important. The Minutes of the first meeting indicate that 'Secretary Cabinet could not attend the meeting'.[127] This is a surprise, because the Secretary of Cabinet Division, according to the original composition of the NEPC was not the member of the Committee. Perhaps, the then Secretary Cabinet was a latter addition to the list. However, his attendance has not been reported in any of the subsequent meetings, nor his absence is mentioned. The then Deputy Chairman of the Planning Commission started attending the NEPC meetings from the fourth meeting onwards. The Minutes are silent about his membership status, although he effectively participated in the discussions as well as in decision-making. At this stage, three organizations, namely, Ministry of Finance, Ministry of Petroleum and Natural Resources, and the Planning and Development Division (of course assisted by their respective Secretaries and senior staff) were represented at the Ministerial level, and, therefore, better placed to put forward their points of view. The representation of the Pakistan Atomic Energy Commission was also at the highest level, i.e. by its Chairman who was directly responsible to the President. Under the circumstances, the Secretaries/Officials of remaining Ministries on the NEPC, particularly those with some stake in the energy matters and more importantly with some power, could not be expected to allow the continuation of this state of affairs, and the inclusion of more ministers in the Committee was inevitable. The announcement to this effect was made one day before the seventh meeting of the NEPC, and the membership of the NEPC was increased to include the Minister for Water and Power, the Minister for Food and Agriculture, the Minister for Planning and Development, and the Minister of State for Petroleum and Natural Resources.[128] This decision effectively transformed an Official's Committee to a Ministerial Committee, relieving the high powered officials of the energy bureaucracy to concentrate undisturbed on their respective departments in their own way.

In respect of the periodicity of meetings, the NEPC decided in its first meeting to 'meet every quarter',[129] but its Chairman was still telling the members in its seventh meeting that 'the committee had not been meeting regularly for one reason or the other',[130] and was trying to convince them of the necessity to 'meet more regularly, at least once a quarter'.[131] Table 4.16 indicates the dates of various meetings. It had been meeting between 1980 and 1984 generally after a gap of six months, except the fifth meeting which was held after a gap of 10 months. The date of sixth meeting is not available. It remains to be seen when the advice of the Chairman rendered in the seventh and which became the decision of the NEPC would stimulate a positive response. No one knew as of July 1985 when the eighth meeting of the NEPC would be held.

## CONCLUSION

This chapter has analyzed the implementation of energy policy in relation to the achievement of major policy objectives pursued by successive governments in Pakistan during 1947-88 period. The factors which influenced the implementation process have been identified. The obstacles have been particularly high-lighted. The implementation problems range from lack of resources and objective administrative practices and procedures to negative bureaucratic behavior like bureaucratic apathy and resistance to change, inter- and intra-organizational coordination, political interference, to the absence of established and accepted procedures for articulation of public interest, bureaucratic in-fighting and to the international pressures.

**Formal Policy**. The formal policy is the starting point for the implementation. Browne and Wildavsky[132] consider the 'validity of theory of causality' and 'clarity of objectives and priorities' crucial for effective implementation. Goodwin and Moen[133] hold that 'sound technical theory' is essential for implementation success. Alexander[134], Berman[135], Baum[136], and Ingram and Mann[137] also highlight the importance of these variables. In the context of Pakistan's energy policy, these variables influenced the implementation process substantially. The hydroelectric power projects were developed in conjunction with the development of hydel storages giving priority to the irrigation needs in the use of water over power generation. This required the development of an optimum mix for capacity increases in the hydroelectric, thermal and nuclear power generation on the basis of objective realities such as weather conditions, access to technology, geopolitical environment and future requirements. An imbalance in capacity increases in the thermal, hydroelectric and nuclear power generation put the power system of Pakistan under tremendous pressure and affected the implementation of all projects due to frequent priority changes in response to crises. The fuel use policy for thermal power generation created implementation problems in the face of erratic gas-use policy. The nuclear power policy implementation suffered due to wrong assumptions about technology transfer and development, geopolitical environment and the technical competency of the implementers. A policy shift in the use of nuclear power for defence purposes had severe implications for the implementation of nuclear power generation projects. The impact of this link was not fully appreciated by the policy planners. Similarly, defective policies relating to oil and gas exploration and exploitation, rural electrification and the development of coal resources hindered the realization of objectives and targets in these areas.

**Institutional Structure and Procedures.** The foregoing pages have demonstrated that the structure and procedures of the implementing agencies considerably affected the achievement of energy policy goals in Pakistan. The implementation of distribution and transmission schemes was affected as a result of low internal priority, lack of internal coordination, lack of effective supervision, inefficient procedures and practices and lack of incentives for the implementing officials. Many of the power system breakdowns were caused by poor maintenance practices. Misreporting in the case of rural electrification and power losses could not be checked due to an ineffective supervision. In Pakistan, the low level of thermal efficiency in thermal generation and poor quality of service were mainly caused by an ineffective supervision and inefficient operating techniques and procedures. The fuels sector progress was dependent upon the modification of regulating procedures and the provision of appropriate incentives. Institutional inadequacies in the energy sector had been a serious obstacle to efficient energy sector development. This was particularly observed in the fuels sector where the top management generally lacked the technical competence. The practice of appointing generalist administrators on the managing bodies proved detrimental to the development of energy resources in Pakistan.

The implementation analysts have underscored the importance of the structure and procedures of the implementing organizations. Nakamura and Smallwood[138] hold that 'organizational structures' and 'bureaucratic norms' have considerable effect on the implementation. Ross's[139] 'personal and institutional dispositions of actors', Scheirer's[140] 'decision and control processes, routines, work group norms and incentives' Weimer's[141] 'civil service system' and Edwards's[142] 'bureaucratic structure' all influence the implementation of public policies. In the developed countries, the existence of relatively better organizational structures and systems preclude the preeminence of these variables. In the case of Pakistan's energy sector, these variables had a dominant role to play and affected the implementation process considerably.

The energy sector organizations were also found lacking in evolving an intraorganizational coordination and rational internal priority setting system. This was particularly noticed in WAPDA where the power system suffered due to neglect of distribution and transmission schemes as well as their non-synchronization with the power generation schemes. Railway electrification also suffered due to wrong internal priority setting. The progress on the railway electrification was halted due to wrong departmental priorities manipulated by the powerful bureaucratic groups. Montjoy and O'Toole[143] argue that the dominant coalition in an organization exhibits a consistent set of preferences and beliefs which determines the goals and the world view of the organization. To limit their discretion, the sovereigns must specify the policy directives and provide resources specifically for those directives.

**Interorganizational Coordination.** O'Toole and Montjoy[144] outline the coordination problems which may arise in interorganizational implementation situations. Other writers such as Ackermann and Steinmann[145], Pressman and

Wildavsky[146], and Baum[147] also underline the importance of effective coordination for implementation success. In the case of Pakistan's energy policy, coordination was found terribly lacking. Attempts to affect coordination amongst the energy sector organizations met with scant success. The case of NEPC exhibited a typical example of domain extension and bureaucratic infighting with which the Pakistani bureaucracy was infested. Sapolsky[148] holds that 'skill at bureaucratic politics' pays in such situations. In Pakistan's case , it degenerated into personal empire building at the cost of negating national policy objectives. Other examples of implementation failures due to lack of coordination were the 'railway electrification', the transmission schemes, the fuel mix policy for thermal power generation, and the coal policy.

**Technology.** The availability of requisite technology played a crucial role in the implementation of energy policy in Pakistan. Lack of progress in the implementation of the nuclear power policy was mainly due to the non-availability of technology. The transfer of sensitive technology at the international level is generally conditional. The refusal of Pakistan to accept certain conditions considered by her to be detrimental to national interests proved fatal for the implementation of nuclear power policy. Some of the projects of WAPDA such as Mangla and Tarbela dams and 500-KV transmission lines also suffered delays due to delayed availability of technical documents and equipments. Slow progress in the oil and gas exploration and exploitation efforts was also attributed to the restricted availability of the latest technology.

The case studies relating to the developed countries do not particularly highlihgt the availability of technology as posing constraints in the implementation of policies. However, some researchers have discussed related problems such as 'technical requirements of the task'[149], 'technical limitations'[150], and 'task technology'[151]. In the case of Pakistan's energy policy implementation, this was found to be a formidable one.

**Bureaucratic Apathy and Resistance to Change.** The rationalization of rules and regulations in the fuels sector could not take place due to bureaucratic apathy. The changes in rules could be affected only in 1976 and 1985 when the sovereigns took keen interest and the generalist administrators were placed under an effective control of specialist departmental heads. The case of 'Power Commission of

Pakistan' exhibits the capacity and tactics of the bureaucracy to resist change. Other cases include the opposition of WAPDA officials to install capacitors and segregate the technical losses from non-technical losses, and resorting to misreporting and resisting to provide certain information to the higher authorities. WAPDA also resisted to entertain suggestions to limit its role in the distribution of electricity.

**International Agencies.** The international aid agencies were found to influence the implementation of energy policy in Pakistan considerably. Almost all the big projects were financed by foreign aid. The progress of these projects was dependent upon the timely releases of foreign exchange by these agencies. In Pakistan, the stimulus for reforms and improvements in the energy sector largely came from these agencies. In this context, their role was found to be positive. These agencies also monitored the progress of the projects for which they had provided finances, which this kept the implementing organizations a bit more vigilant about the project implementation.

**International Politics/Events.** International politics influenced the implementation of energy policy in Pakistan significantly. Pakistan's failure to implement its nuclear power policy was due to the impact of international politics which determined its position in the world. It demonstrated that even with the total commitment by the Government in a developing country, the national ambitions were hard to achieve. The Indian nuclear explosion had a devastating effect on the implementation of Pakistan's nuclear program. The political consequences of two wars with India brought for Pakistan the stoppage of aid by the US which affected the implementation of energy policy in a big way. The targets of the Third and Fourth five year plans had to be curtailed substantially. Pakistan's refusal to abandon its nuclear program also resulted into stoppage of foreign aid by the US for many years which had its adverse effects on the implementation of energy projects.

**Political Influence/Support.** The powerful sections of the society exerted political pressure on the WAPDA officials for the provision of electric connections. In many cases, the distribution lines had to be extended beyond design capacity. This subjected the system to excessive overloading resulting in frequent breakdowns and excessive power losses. Political influence was also used to get illegal connections and unauthorized power lines. The officials were afraid of taking any action against them. Smith[152], Grindle[153], Scott[154], Weiner[155], and Riggs[156] have pointed out this phenomenon in the context of Third World countries. The Pakistani case provided further evidence to support their contentions.

The electrification of rural areas had an extensive political commitment and support since the early 1970s. However, the program was poorly defined by the sovereigns. The WAPDA authorities designed the program in such a way that would highlight their performance without taking into account the program benefits in real terms. They even resorted to false reporting in an attempt to prove that action was being taken and results were being achieved to satisfy the political or martial law leadership. In this case, political support without clear objectives proved detrimental to the achievement of policy objectives.

**Bureaucratic Corruption.** The energy bureaucracy was found to be infested with corruption. This was even recognized in the official documents of the Government of Pakistan. The nation suffered on two counts: it was deprived of revenues; and it was defrauded by the embezzlement of development funds. The implementation of energy policy in

Pakistan was very adversely affected due to corruption in the rank and file of the implementing organizations.

To sum up, Chapter IV has highlighted a number of factors which influenced the implementation of energy policy in Pakistan. The factors include: formal policy; institutional structure and procedures; interorganizational coordination; technology; bureaucratic apathy and resistance to change; international agencies; international politics and events; political influence; and bureaucratic corruption. The chapter has also demonstrated that the policy implementation is a very dynamic process. The original policy intents underwent continuous transformation through interaction between the relevant parties and affected interests. The policy in fact evolved in the course of implementation implying an ongoing dynamic of policy development, modification, and execution. The chapter therefore also demonstrates the appropriateness of the holistic approach to study the implementation of Pakistan's energy policy.

## NOTES

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| | |
|---|---|
| Total capital cost | Rs. 1,830 million |
| Foreign exchange component | Rs. 830 million |
| Rupee component | Rs. 1,000 million |

Source: *WAPDA Power System Statistics*, *op.cit*., p.65.

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# CHAPTER V

# IMPLEMENTATION OF KALABAGH DAM PROJECT

## INTRODUCTION

This chapter examines the implementation of an important national hydroelectric project. Its implementation has been focus of attention of the people of Pakistan since 1985. The fate of the project is still undecided, although lot of investment has already been made.

## PROJECT FEATURES

Kalabagh Dam is a multi-purpose project considered by WAPDA the linchpin of future power system of Pakistan. It is planned to be located 120 miles downstream of Tarbela and 12 miles upstream of Kalabagh town on the river Indus. Total cost of the Project (June 1987 price) is estimated to be Rs.90.20 billion. Annual benefits are estimated at Rs.17.40 billion with an internal economic rate of return (IER) of 16.8 per cent. Annual energy generated at Kalabagh is estimated to be equivalent to 20 million barrels of oil. Expenditure incurred up to June 1989 is Rs. 1,023.177 million. The dam will have significant impact on the environment due to the submergence of 134,500 acres of land along with built up property affecting 83,000 persons. Out of the affected area, 99500 acres (74%) is uncultivable land while 35,000 acres is cultivable and 3,500 acres is irrigated land.[1] Table 5.1 describes the salient features of the project.

The main objectives of the project are:[2]

a. Generation of large amounts of hydroelectric power near major load centres;

b. Provision of additional storage and regulation on the Indus;

c. Increase the energy output of the existing Tarbela scheme by conjunctive operation of Tarbela and Kalabagh reservoirs;

d. Compensation for the storage lost due to the silting up of existing reservoirs in the system; and

e. Regulation and control of the flood peaks of the Indus.

The project feasibility and viability have been confirmed on the basis of numerous investigations, surveys and technical studies by national and international agencies spreading over a period of more than three decades. The consulting firms include Tipton and Hill, Chas T. Main, World Bank, Harza (USA), Associated Consulting Engineers

## TABLE 5.1

## KALABAGH DAM FEATURES

| | |
|---|---|
| Indus river at site | |
| Catchment area | 110,500 sq. ml. |
| Maximum recorded flood | 1,200,000 cfs |
| Average flow | 123,000 cfs |
| Reservoir | |
| Total storage | 7.9 MAF |
| Usable storage | 6.1 MAF |
| Maximum retention level | 915 ft SPD |
| Minimum retention level | 825 ft SPD |
| Dam | |
| Crest elevation | 940 ft SPD |
| Maximum height (above river) | 260 ft |
| Total length | 11,000 ft |
| Total fill volume | 60 m cu yds |
| Spillways | |
| Overflow spillway capacity | 1,070,000 cfs |
| Orifice spillway capacity | 980,000 cfs |
| Power facilities | |
| Penstocks | 12 No. x 36 ft |
| Power house | Indoor type |
| Installed capacity | 2,400 MW initial<br>3,600 MW final |
| Turbines | Francis type |
| Turbine design head | 170 ft. |

Source: WAPDA Annual Report 1988-89 p.37.

(ACE), Binnie & Partners (UK), Preece Cardew & Rider (UK) and National Engineering Services of Pakistan (NESPAK) and various other study groups. Table 5.2 below indicates the main studies/reports. On the basis of various feasibility and viability studies, the financing of the project was agreed to by the World Bank and other international agencies including foreign governments.

**TABLE 5.2**

**KALABAGH DAM PROJECT STUDIES/REPORTS**

| Study/Report | Agency | Year |
|---|---|---|
| Preliminary Feasibility Report | Tipton & Hill | 1953 |
| Preliminary Feasibility Report | Chas T. Main | 1966 |
| Study of Water and Power Resources of West Pakistan | World Bank Study Group | 1967 |
| Feasibility Report | Wapda/Harza | 1972 |
| Feasibility Report | ACE | 1975 |
| Review of Feasibility Report | Board of Consultants | 1975 |
| Appraisal Report | World Bank | 1980 |
| Detailed Designs | *Kalabagh Consultants | 1986 |
| Design Refinements and Tender Documents | Kalabagh Consultants | 1987 |

* M/s Kalabagh Consultants is a consortium of consulting firms comprising Binnie & Partners (UK), Preece Cardew and Rider (UK), Harza (USA), Associated Consulting Engineers (ACE) and NESPAK (Pakistan).

Source: WAPDA Annual Report 1988-89, p.34

The decision to construct Kalabagh Dam was taken in 1953 and it figured first on priority after the completion of Mangla Dam. The priority was, however, changed in favor of Tarbela Dam in 1959. The initial Cabinet approval to the project was given in 1975. A sub-committee consisting of the Minister for Finance, Ghulam Ishaq Khan, the Minister for Planning, Dr. Mahboobul Haq and the Secretary, Ministry of Water and Power reviewed the project in detail and recommended for the approval of the Cabinet in December, 1983.[3] The project was included in the Sixth Five Year Plan and the power station Kalabagh-1 with generating capacity of 880 MW was planned to be completed in September, 1993.[4]

**PRIORITY CHANGE**

The project ran into trouble at the preparatory stage in 1959 and could not come out unscarred. Its priority was changed in favor of Tarbela Dam which was initially planned to be constructed after the completion of Kalabagh Dam. The chain of events started as a result of an agitation caused by a small dam, Namal, in District Mianwali, the district where Kalabagh Dam had to be constructed. Due to Namal Dam, the surrounding villages were affected with water-logging and salinity. The people raised hue and cry and approached the higher authorities to rid them of this menace. The matter had yet to be resolved to their satisfaction when they came to know about the siting of a huge dam nearby to which they reacted bitterly. They approached Nawab of Kalabagh, Malik Amir Muhammad Khan, the then Governor of West Pakistan, who hailed from the same area, for help. They pleaded that siting of Kalabagh Dam in the area would aggravate the water-logging and salinity problem and requested to shift the dam site. Malik Amir Muhammad Khan pressurized the WAPDA authorities to shift the site of the Dam about 12 miles upstream from the original place. This necessitated further studies and investigations before the project could be launched.[5]

Besides, it has been reported that President Muhammad Ayub Khan desired to build Tarbela Dam before Kalabagh Dam to muster political support in his home province, the NWFP. The Chairman of WAPDA who incidentally belonged to the same province readily obliged the President by submitting a report recommending change of priority in favor of Tarbela Dam contrary to the expert advice. The shifting of the site provided him the pretext for the recommendation. According to the original plan, work on Tarbela Dam Project was to be initiated in 1975 after the completion of Kalabagh Dam. The new decision was a bolt from the blue for the operational level technocrats of WAPDA. The site for Tarbela Dam was selected in a hurry without detailed feasibility studies and technical reports. The decision to advance the construction of Tarbela Dam delayed the Kalabagh Dam project for several years.[6]

Initial funding for Tarbela Dam was also arranged deceptively. In 1959, the Mangla Dam was in the take-off stage. The World Bank had approved an aid of 500 million dollars for this project. To begin with, 150 million dollars were granted. However, President Muhammad Ayub Khan asked the World Bank to increase the initial grant to 250 million dollars. It is believed that the request for increase was made with a motive. The President wanted to start work on Tarbela Dam but the World Bank was not agreeing to Finance this Project. He intended to utilize the additional grant to start work on Tarbela Dam. To satisfy an inquisitive technocrat who advocated the construction of Kalabagh Dam before Tarbela Dam, the President argued that the construction of Kalabagh Dam was assured as the World Bank had already committed to finance it. He thought that if the work on Tarbela Dam were started, the World Bank would have no option but to help finish the project.[7]

## POLITICS OF IMPLEMENTATION

The implementation of the project sailed smoothly until its impact was known to the people. The residents of Nowshera area in the NWFP were terrified when in July 1985 they came to know that their homes and hearths were going to be submerged. The news was broke to them by the WAPDA employees who were marking various places in the area which would be submerged in the Dam. This invoked a strong reaction in the affected people. They launched strong protests in July 1985 against their displacement as a result of the siting of the Dam[8]. Incidentally, the political activity was also picking up in the country at that time as a result of the decision of the Martial Law regime of General Ziaul Haq to allow limited political freedom. General elections on non-party basis had just been concluded in February 1985. The Kalabagh Project, thus, became focus of attention of all politicians as a live issue to gain political preeminence. Some technocrats also joined who pointed out design defects due to which the town of Nowshera faced the flood danger. The protest against the construction of Kalabagh Dam launched by the affected people in the NWFP,therefore, triggered nation-wide controversy.

The politicians of Sindh joined the protest with their own ends in view. They alleged that the construction of the Dam would affect the water supply in the river Indus adversely. It was also apprehended that it would further enhance the role of the Punjab to regulate water supply in the river Indus. The opportunity was,therefore, seized by the advocates of greater provincial autonomy to exploit the sentiments of the Sindhis against "Punjab domination". The politicians of Baluchistan also showed their apprehensions against "Punjab domination" and accompanied difficulties in protecting the rights of smaller provinces. This invoked a strong reaction in the Punjab and the Punjabis, irrespective of their political affiliations, pressed for expeditious implementation of the project. All the four provinces of Pakistan, therefore, put forward quite divergent positions on the issue. The political parties, thus, became actively involved in the whole affair and many allied issues like division of Indus water amongst the provinces, role of the Punjab Government in the regulation and control of the Indus water, distribution of income from the proceeds of hydroelectricity generated at Kalabagh, etc. were raised and became the centre of public debate. The members of the Parliament also took the matter to their respective Houses.

To pacify the opposition to the Dam, the Government issued the details of the project highlighting the benefits which would accrue to the nation by its completion. The Federal Minister for Water and Power, Mir Zafarullah Khan Jamali, in response to questions raised in the Senate, stated that the apprehensions of some of the Honorable Members against the Dam were unfounded. The project was declared viable and feasible by experts of international repute on the basis of numerous studies. He further stated that Nowshera town would be shielded against flood danger by protective works around it. In order to allay the misgivings that the dam had adverse effects only on the NWFP, the Minister gave province-wise break up of the land to be inundated. He pointed out that 37 per cent of the land to be inundated belonged to the NWFP and the remaining 63 per cent to the Punjab. He expected the project to be completed by 1994.[9]

The Government also appointed Foreign Experts to study the technical details of the project. After an in-depth study and analysis for ten days, the Experts declared the project to be feasible. The WAPDA authorities declared in a press release that the work on the project could be started as soon as they would get go-ahead signal from the Government and would invite international firms for registration. It was further stated that issuance of tenders, their acceptance and the grant of permission to the construction companies could be finalized by 1987, if the Government resisted public pressure to delay the project.[10]

The Federal Minister for Planning and Finance, Dr. Mahboobul Haq, at a luncheon hosted by Lahore Chamber of Commerce and Industry on 27 July 1985, accused the opponents of the Dam guilty of exaggerating its adverse impact. He reiterated Government's commitment to complete it on time.[11] However,the Government could not withstand the public pressure. It was reported in August 1985 that work on the site had to be stopped, although, huge amounts had already been spent on the development of infrastructure and other facilities like residential colonies, laboratories, airport and roads. It was stated that the work had already been delayed by two years. Further delay was expected if the Federal Government did not act promptly.[12]

The opposition to the Dam was spearheaded by the Red-Shirt Leader, Khan Abdul Ghaffar Khan and the National Democratic Party headed by his son Khan Abdul Wali Khan. In spite of his old age, Khan Abdul Ghaffar Khan toured the entire Peshawer District and addressed at seven public meetings organized for registering protest against Kalabagh Dam Project. In addition, design defects were also pointed out due to which the town of Nowshera faced the flood danger. Lt. General Fazle Haq, the then Governor of the NWFP, followed suit. He wanted to demonstrate to President General Zia ul-Haq that he could not be dispensed with easily. He was feeling insecure as a result of general elections. During the elections, he won the confidence of the former Chairman WAPDA, Engr. Shah Nawaz Khan and appointed him as his advisor. Engr. Shah Nawaz Khan issued a statement to the press endorsing the apprehensions of the people about the Dam. The Federal Government tried to convince the Governor and provided all technical details but without success. On the behest of Prime Minister Muhammad Khan Junejo, the Minister for Planning and Finance, Dr. Mahboobul Haq, even offered to sanction industries for the NWFP. The Governor dubbed it to be a 'lollipop'. Subsequently, he was relieved from the post of Governor, but the Government of the NWFP continued to follow the line as a matter of political expediency. General Zia ul-Haq, who was very upset with the Kalabagh affair, complained bitterly that the whole fiasco was created by "my former colleague, Fazle Haq".[13]

The NWFP Chief Minister, Arbab Muhammad Jahangir Khan, addressing a public meeting on 30 September, 1985 said that the construction of Kalabagh Dam was likely to affect a great chunk of fertile land of Peshawer valley besides rendering 2 lakh (200,000) people homeless. He said that instead of the Kalabagh Dam project, there were many other projects, for example, Basha Dam, which unequivocally qualified for consideration. A similar statement on the Kalabagh Dam was released to the press on 30 September, 1985 by Senator Shirin Dil Khan from the NWFP. He stressed that Provincial Government's observations must be given serious consideration and an alternative site for Kalabagh Dam was the only solution. He said that the area was already waterlogged and the dam would aggravate the problem. He regretted that Kalabagh Dam was under consideration for the past 10 years, while 30 years had passed in the process of its investigation but nothing was made public about the project. He not only expressed apprehensions about the flood danger as a result of the dam but also worried about settlement of the would-be-displaced people.[14]

On 2 October 1985, five adjournment motions were sought to be moved in the National Assembly to discuss the Kalabagh Dam issue. In response, the Federal Minister for

Water and Power (Mir Zafarullah Khan Jamali) made a long statement in the National Assembly giving details about the project. He assured the House that the construction of the project would start in 1986-87 after obtaining final approval of the Federal Cabinet which would consider the view point of the provincial governments as well as the implications of the project. He informed that he had asked Chairman WAPDA to arrange a comprehensive briefing within two - three weeks for the members (concerned) of the Federal Cabinet and Chief Ministers of Punjab and NWFP. The Federal Minister for Interior, Muhammad Aslam Khattak, who belonged to NWFP, also participated in the discussion. He emphasized that the site should be chosen and decided after consultation with provincial governments concerned. He said that alternative sites should also he considered and a committee be set up to examine all aspects of the project.[15]

The daily Nawa-i-Waqat rendered a long editorial on 7 October 1985 censuring the opponents of the Dam. It was regretted that not only Khan Abdul Ghaffar Khan and his followers were against it, but also the members of the NWFP Provincial Assembly belonging to Jamaat-i-Islami termed the project as a conspiracy against the province which aimed at destroying the NWFP. The editorial emphasized the need for the implementation of such a vital project without further delay.[16] By that time, the people of the NWFP, irrespective of their political affiliations, had rallied behind their leaders in their opposition to the Dam. The Provincial Assembly unanimously passed a resolution saying 'no' to the Kalabagh Dam Project.[17]

The NWFP Governor, Lt. General Fazle Haq, while talking to the newsmen on 8 October 1985, expressed the hope that the issue would be settled amicably. He said that the final decision of the construction of Kalabagh Dam at the proposed site would be made by the Federal Cabinet. He disclosed that the issue was discussed in the Federal Cabinet meeting held in September 1984 and a sub-committee was formed to look into its positive and negative aspects. But the meetings of the sub-committee could not be held due to the referendum and the general elections.[18]

On 11 October 1985, the Federal Minister for Water and Power, Mir Zafarullah Khan Jamali, announced that all the doubts about the construction of the Dam at the proposed site would be removed in the Cabinet meeting which would be attended by the Chief Ministers of all four provinces. He emphasized that the project was of national importance which would benefit the entire country. He assured that the displaced persons would be rehabilitated and compensation would be given to them, besides cultivable land.[19]

The controversy set in commotion in the World Bank also. A high level delegation led by Wolfgang Sieback, Co-Financing Coordinator, South Asia Program Department, paid a visit to Pakistan and held talks on 22 October 1985 with the Federal Minister for Finance and Planning, Dr. Mahboobul Haq, about the technical and economic aspects of the Kalabagh Dam Project. In this connection, the latest analysis of the World Bank about the preparatory work, financing program, etc. came under detailed review. Stressing the importance of the project in the economy of the country, the Federal Minister expressed his conviction that the question of would-be-affectees would be resolved amicably to the entire satisfaction of the provinces concerned before the launching of the project.[20]

The Federal Government, in the face of mounting opposition, announced on 27 October 1985, that some design changes would be affected to satisfy the objections raised by the NWFP so as to safeguard the interests of the province. Dr. Mahboobul Haq informed that he had a meeting with the Chief Minister of the NWFP, Arbab Jahangir Khan and would meet him again to discuss the matter. He further informed that the Chairman of WAPDA, Lt. General G.S. Butt would go to Peshawer the following day to have discussions with the Government of NWFP and its experts.[21]

The Minister for Water and Power had to reassure the nation on 12 November 1985, that any decision regarding the Kalabagh Dam Project would be taken by the Government with only national interests in view. This assurance was given in response to five adjournment motions sought to be moved in the National Assembly to discuss the Kalabagh Dam Project. He informed the House that the importance of the project to the national economy, the rehabilitation of the affected people and the distress it might cause to population in various areas were some of the aspects which were being discussed at appropriate level. The movers had divergent views on the issue. For example, Malik Abdur Rauf from NWFP said that the project was causing a lot of concern in the NWFP because of its effects on the people of three districts who would be displaced. Sher Afgan from punjab highlighted the benefits of the project and pointed out that statements issued recently on the project by various responsible persons in the provincial governments had created misunderstanding and apprehensions among people of different provinces. He was of the view that the confusion being created in this regard would jeopardize the project as it might encourage reluctance on the part of the World Bank to provide funds.[22]

On 13 November 1985, a high level meeting was held in Peshawer under the Chairmanship of Prime Minister, Muhammad Khan Junejo to solve the tangle. The meeting was attended by the Governor and Chief Minister of the NWFP and the Federal Ministers for Water and Power, Finance and Planning, and Kashmir Affairs and Northern Areas, Deputy Chairman of Planning Commission and high ranking officers of the Federal and Provincial Governments. WAPDA and the Government of NWFP presented their view points in the meeting. The Government of NWFP, however, was not satisfied with the assurances of WAPDA and threatened to resign if the implementation of the project took place without their approval. It was, therefore, decided that the project would be further reviewed. The Prime Minister announced that a sub-committee of the Federal Cabinet would review the project in the light of the submissions made by the Government of NWFP and WAPDA. The Federal Cabinet would make the final decision after considering the report of the sub-committee. He declared that the Government would not take any step which would go against any province.[23]

To pressurize the Government, Khan Abdul Ghaffar Khan reiterated his opposition to the dam and declared, in a public meeting held in Charsada one day prior to the high-level meeting, that Kalabagh Dam could only be constructed on the dead bodies of Pakhtoons. He urged the Government to review the project.[24]

On 14 November 1985, two adjournment motions on Kalabagh Dam were sought to be moved in the Senate. The movers underlined the concern being expressed in NWFP over the site and designed height of the dam. They said that large population of Nowshera and Mardan would be affected by the project and the cultivated area likely to be submerged exceeded that of being irrigated in the province through the project. The Federal Minister for Water and Power responded that the question of Kalabagh Dam Project was being deliberated at the highest level and all its aspects were being reviewed. The Cabinet would take a decision only after taking into account various factors connected with the issue. He referred to the meeting held in Peshawer on

3 November 1985 to solve the problem. He also informed that he himself had a meeting with the Governor of NWFP on 28 October 1985. He disclosed that there was an agreement on a number of things while some had yet to be thrashed out. He pointed out that the issue had been discussed in the National Assembly as also the Senate on at least six occasions during last six months. He assured the House that Government would not take any decision that might undermine interests of any province.[25]

The opposition to the dam continued in spite of these assurances. A former President of Pakistan Muslim League and sitting Senator, Mohsin Siddiqui also joined the chorus. He said that the construction of Kalabagh Dam at the proposed site would cause incalculable losses to the NWFP. He supported the construction of Basha Dam instead of Kalabagh Dam and advised the Government not to trample the rights of the smaller provinces.[26]

In a public meeting on 19 November 1985, Khan Abdul Wali Khan (President, National Democratic Party), threatened to bomb the Dam in case it was constructed against the wishes of the people of the NWFP.[27]

The mounting opposition in the NWFP to the construction of Kalabagh Dam at the proposed site also created commotion in the Punjab. The people of Punjab irrespective of their political affiliations supported the construction of Kalabagh Dam at the proposed site without further delay. Three adjournment motions were sought to be moved in the Punjab Provincial Assembly to discuss the implications of the controversy on Kalabagh Dam. All the members emphasized the need to complete the project at the proposed site on time. It was pointed out that the dam was crucial for the economy of the Punjab and the country. Rana Phool Muhammad proposed that the Punjab Assembly should pass a resolution to impress upon the Federal Government not to delay the construction of the Dam. All the members of the Assembly who spoke on the motion endorsed his proposal.[28]

A number of articles also appeared in the National Press analyzing the positive and negative impact of the Dam. The experts analyzed the design and technical details of the project. Dr. Mubashir Hasan, an engineer of established repute and an expert on Dams, who was Federal Minister for Finance in the Bhutto Cabinet and Secretary General of Pakistan Peoples Party, discussed at length the design of the Dam in a press conference. He pointed out some basic design defects and argued that those should be removed to save valuable land and property of the people and also to economize on the cost of the project. He said that Nowshera town and the surrounding area was amenable to flood danger only if the water level of the Dam rose to 995 ft. above the sea level or 928 ft. retention level of the dam and this could happen only once in a hundred years. As the entire river Indus flowed in Pakistan, the flood danger could be averted by an effective warning system and releasing appropriate amount of water from the Dam to keep water level within safe limits, he argued.[29]

The Federal Minister for Production, Khaqan Abbasi, also joined the debate and assured the people that Kalabagh Dam would definitely be constructed.[30]

As a result of elections, changes were affected in the Federal Cabinet and the Water and Power portfolio was entrusted to Kazi Abdul Majid Abid from Sindh replacing Mir Zafarullah Khan Jamali from Baluchistan. In a policy statement regarding Kalabagh Dam, Kazi Abdul Majid Abid announced that the Government was considering different proposals being presented from different schools of thought and the final decision would be made on the basis of consensus.[31]

In view of the gravity of situation, the Government constituted a Cabinet Committee on Dams, under the chairmanship of Dr. Mahboobul Haq, Federal Minister for Finance, Planning and Economic Affairs. The Chairman announced that the committee was likely to meet during January 1986, to deliberate on the issue. He said that the Government wanted to take into confidence the public representatives of the four provinces and planned to issue a white paper containing all facts and figures about the Dam. He described Kalabagh Dam project as a matter of national survival and said that the decision on it would be made in the supreme national interest. He dispelled the impression that the Pakistan Government was going to accept any condition of World Bank in this respect. Talking about the controversy on the issue of Kalabagh Dam, the Minister said, "we should not worry about it". Such a controversy even took place earlier on the construction of Mangla and Tarbela dams, he added.[32] In a follow-up statement, the Minister refuted the allegation that Government was responsible for delay in starting construction of the dam because of shortage of funds. He stated that Cabinet meeting would be held in the beginning of February 1986 which would consider the objections raised by the NWFP and Sindh to affect design changes if required.[33]

In a bid to satisfy the people of Punjab, statements by the federal ministers reiterating Government's commitment to construct Kalabagh Dam continued to appear in the press. In a public meeting organized by Awami Mohaz at Mianwali on 27 January 1986, the Federal Minister of State, Maqbool Ahmed Khan, declared that Kalabagh Dam would be constructed at all cost. He said that the Dam would also supply irrigation water to 14 to 15 lakh acres of land in Bannu and Dera Ismail Khan districts of the NWFP and to lakhs of acres of land in Mianwali and Khushab districts of Punjab.[34] The NWFP Chief Minister, Arbab Muhammad Jahangir Khan, however, wasted no time to rebut. On 2 March 1986, he stated that the dam would have adverse effects on the socioeconomic life of the province.[35]

The Federal Minister for Finance, therefore, had to issue a conciliatory statement on 26 April 1986. In a press briefing, the Minister said that efforts were being made to patch up the differences between the provincial governments and the work on the project would be started only after achieving consensus.[36] The explanation was not considered satisfactory by the Vice President of National Democratic Party, Ghulam Ahmed Balur, who issued a very strong statement in a press conference on 5 June 1986. He said that the construction of Kalabagh Dam would be considered 'a declaration of war against Pakhtoons, and they would put up vigorous resistance to stop it.[37]

The work on the project, however, continued. The Federal Minister for Planning informed the press that WAPDA had prepared seven design plans of the project. He gave the details of one of them which recommended to decrease the maximum retention level of the dam from 925 ft. to 915 ft. --- this retention level was eventually approved by the competent authority. He said that the new design would eliminate the possibility of flood danger to Nowshera. Also, no dykes would be required to protect Nowshera town.[38] In a subsequent briefing, the Standing Committee on Planning and Development of the National Assembly was apprised by the Minister for Planning and Development about Kalabagh Dam project. He emphasized the need for its completion on priority basis to prevent impending power crisis. He said that the power shortage in 1996 could be of the order of 4,000 MW if the project was delayed. He also informed the committee that the alternatives to Kalabagh Dam were too expensive and would place a very heavy burden on the people.[39] In response to a question in the National Assembly on 21 June 1986, the Minister informed the House that Kalabagh Dam was of immense national importance, that was why the Government was keen to create consensus among the provinces.[40]

The Punjab Government also stepped up its campaign for the support of the dam and lashed out severely on the opponents. Malik Salim Iqbal, the Punjab Minister for Cooperatives, stated on 23 June 1986 that the construction of Kalabagh Dam was absolutely essential for the socioeconomic progress of the country. Only those elements were opposing the dam who did not want Pakistan to be prosperous and strong, he added. He said that anti-Pakistan elements were fanning hatred and provincialism among the people of various provinces and inimical forces were harassing the public by bomb blasts to create a law and order crisis.[41] The leader of the opposition in the Punjab Provincial Assembly also supported the construction of Kalabagh Dam in a press conference.[42]

The Province of Sindh entered the scuffle as a result of differences developed with the Punjab on the question of distribution and use of Indus water. Both of these provinces had a long-standing dispute on the issue. Unfortunately, the weather conditions during 1984-85 were such that the water availability in the country deteriorated. The water storage in Tarbela Dam also depleted. The situation had turned very bad during the summer of 1985. Not enough snow was melting on the mountains due to unusually low temperature in the region. Besides, mismanagement of water resources contributed to worsen the situation. The President, General Ziaul Haq, ordered WAPDA not to resort to load-shedding during 1985. He was very happy to win vote of confidence in the national referendum held on 18 December 1984, and desired to reward the people for their prudence. General elections on non-party basis were also scheduled in February 1985, and the President did not want the opposition to use 'load-shedding' against the establishment. Lot of water was, therefore, released to generate hydroelectricity during the period when it was not required for irrigation purposes. Its impact was experienced in May 1985, when water was needed the most for irrigation purposes but was not available. The provinces of Sindh and Punjab both felt the pinch.[43]

The relations between the two provinces strained badly on the question of closure of Chashma--Jhelum Link Canal which supplied water to vast areas in the Punjab. This canal originates from River Indus at Chashma and is 14 ft. deep, 380 ft. wide and 67 miles long. The canal supplies 21,700 cusec of Indus water to River Jhelum which is used for irrigating vast areas in the Punjab. In May 1985, the Government of Sindh pressed hard to close the canal as not sufficient water was available in Tarbela Dam. Consequently, the Federal Government informed the Government of the Punjab about the closure of Chashma--Jhelum Link Canal. The decision was likely to decrease the sowing of crops by 300,000 acres in the punjab. The situation in the Punjab, therefore, became very volatile. To solve this problem, a meeting was held under the Chairmanship of the Federal Minister for Water and Power and attended by the Ministers for Irrigation, Governments of the Punjab and Sindh, Secretaries Irrigation of the NWFP and Baluchistan, Federal Secretary, Ministry of Water and Power, Chairman, WAPDA and other high-level officers. The issue remained unresolved even after eight hours of negotiations and discussion and the meeting ended without any decision. The Chief Minister of the Punjab disapproved the outcome and indicated his intentions to meet the Prime Minister to press for his demand not to the close the canal.[44]

On 11 May 1985, a high-level meeting was held to reconsider the demand of the Punjab. The meeting was chaired by Prime Minister Muhammad Khan Junejo and attended by Chief Ministers of all four provinces of Pakistan and high-level officers. The decision to close the canal was not reverted in the meeting. The Punjab, however, recorded the note of dissent.[45]

The water situation further deteriorated and the political activity gained momentum. The need to solve the long-standing water distribution problem amongst the four provinces of Pakistan was stressed by all and sundry. All the provinces, however, advanced conflicting claims as to the entitlement and modality.

The Members of the Punjab Provincial Assembly displayed their strong displeasure against the Federal Government decision to close Chashma--Jhelum Link Canal. The Speaker appointed a seven-member committee under the chairmanship of Minister for Irrigation, Sardar Arif Rasheed, to draft a resolution in the light of the views expressed by the Members on the floor of the House. The

Punjab Assembly passed a unanimous resolution drafted by the committee demanding immediate opening of the canal. Some of the Members, however, were not satisfied with the wording of the resolution. They threatened to resign from the Membership and go on hunger strike in front of the House if the canal was not opened within 24 hours.[46]

The Chief Minister of Sindh, in his rebuttal, pledged in the Sindh Provincial Assembly to protect the rights of the Province. He declared that no one would be allowed to use a drop of Indus water until the requirements of Sindh were met. The Members of the Punjab Provincial Assembly were free to resign, but Chashma-Jhelum Link Canal would get water only after meeting the requirements of Sindh, he added. Some of the Members threatened of dire consequences if the canal was opened.[47] The Sindh Minister for Irrigation and Power also assured the Sindh Provincial Assembly that Chashma--Jhelum Link Canal could only be opened with the permission of the Chief Minister of Sindh, and the permission would be granted when the requirements of Sindh had been met.[48]

The Chief Minister of the Punjab Mian Nawaz Sharif, in a rejoinder, declared in the Punjab Assembly that he would prefer to resign along with his colleagues instead of compromising on this issue. He criticized the Federal Government for not taking the Punjab Government into confidence at the time of closure of the canal. He declared that the Punjab could control all the canals whose headworks were located in the Punjab.[49]

The canal was opened on 9 June 1985 after a closure of one month. The WAPDA intimated the Punjab Government that the Punjab would get 15,000 cusec of water during the current cropping season.[50]

The Federal Minister for Water and Power threw light on the background of the water dispute in his statement in the National Assembly. He hoped that the water distribution dispute amongst the provinces would be solved during the current year.[51]

The opening of Chashma--Jhelum Link Canal annoyed Sindhi leaders. Some of them moved privilege motions in the Sindh Provincial Assembly seeking explanation about the statement of the Punjab Chief Minister and the opening of the canal without consulting the Sindh Chief Minister. The Chief Minister of Sindh, Ghous Ali Shah, made a lengthy statement in the House explaining the whole affair and advising the members to control their emotions. He, however, criticized the Punjab Government for its aggressive behaviour and the Federal Government for not consulting the Sindh Government before opening the Canal.[52]

The Government of the NWFP did not sit idle during the scuffle between the Punjab and Sindh. The Chief Minister told the NWFP Provincial Assembly in its Budget Session that they were watching their interests and would get their due share in the Indus Water.[53] Similar statements were issued by the Baluchistan Chief Minister, Mir Ghulam Quadir, who assured the people to get their due share in the Indus Water.[54]

The Prime Minister called a meeting to discuss the water dispute. The meeting was attended by Chief Ministers of the Punjab and Sindh, and elected Members of the National Assembly from the Punjab and Sindh. The Prime Minister assured that the water dispute would be discussed in a meeting attended by the Chief Ministers of all four provinces as soon as the report of the Justice Halim Committee was received by him. He disclosed that the report was under consideration with the President.[55]

With the above background in mind, the Sindhi leaders became apprehensive of Kalabagh Dam Project when they came to know that the Dam would also provide irrigation water to the Punjab and the NWFP. They suspected that the Dam would be controlled by the Punjab and without arriving at final decision regarding water distribution, Sindh would be left at the mercy of the Punjab. So the NWFP and Sindh put up strong resistance to stop the construction of Kalabagh Dam.

The Federal Minister for Water and Power assured the Senate on 2 October 1985 that the construction of the Dam would be started after receiving approval of the new design by the high-level committee comprising the representatives of the four provinces. The final decision would be made keeping in view the interests of all the provinces.[56]

The controversy somehow lingered on. The Sindh Provincial Assembly raised hue and cry when the Federal Minister for Water and Power, Kazi Abdul Majid Abid issued a statement that the construction of Kalabagh Dam was indispensable to meet the power and water needs of the country. He said that Basha Dam was important, but could not replace Kalabagh Dam. Hussain Haroon, a member of the Provincial Assembly, sought to discuss the matter in the House.

It was demanded that the Government of Sindh should adopt a clear policy to oppose the construction of Kalabagh Dam. The Chief Minister of Sindh assured the House that he had appointed a committee under the Chairmanship of Provincial Minister for Irrigation to look into the matter. He declared that any decrease in the share of Sindh in the Indus Water would not be tolerated.[57]

The Chief Minister of the Punjab reiterated in his rebuttal that no compromise would be made on the question of Kalabagh Dam. He said that the Punjab was magnanimous with the smaller provinces, but could not sacrifice its genuine rights. The members of the Punjab Provincial Assembly strongly criticized the Federal Government in the Budget Session for an inordinate delay in the implementation of Kalabagh Dam Project.[58]

The controversy also had its impact on the financiers of the project. The Punjab Minister for Irrigation and Tourism, Sardar Arif Rasheed, disclosed on 31 October 1987 that the World Bank might withdraw its financial assistance for the construction of Kalabagh Dam, if differences among the provinces were not sorted out and settled before the current financial year was out. The Minister stated that the Punjab Government had submitted its proposal for convening an inter-provincial meeting of Irrigation Ministers with a Federal Minister in the chair to resolve the differences immediately.[59]

On 3 November 1987, the Federal Minister of State for Water and Power, Malik Said Khan Mahsud, refuted the reports that Kalabagh Dam project was being dropped by the Government in favour of thermal power stations. He informed that the Cabinet Sub-committee would soon meet to review the recommendations of the Provincial Governments. The Government, he said, was trying to finalize the project as soon as possible.[60]

On 24 January 1988, the Provincial Minister for Law and Parliamentary Affairs, Akhtar Ali G. Kazi, assured the Sindh Provincial Assembly that the rights of the Province would be safeguarded on the question of the construction of Kalabagh Dam. The members of the House were pressing for passing a resolution against its construction. The matter was raised in the House in view of the forthcoming high-level meeting on the issue to be attended by all four Chief Ministers.[61]

To settle the Kalabagh Dam issue, Prime Minister Muhammad Khan Junejo presided over a high-level meeting on 26 January 1988. The meeting was attended by Chief Ministers of all four provinces, Federal Minister for Finance and Economic Affairs, Federal Minister for Water and Power, Federal Minister for Planning and Commerce, Federal Secretaries for Finance, Water and Power, and Planning, Chairman of WAPDA, Secretary, Prime Minister's Secretariat and other relevant high-level officers. The meeting continued for five hours and discussed the submissions of all concerned. It was decided that the Prime Minister would appoint a Committee consisting of members of the Parliament belonging to all four provinces which would deliberate on the issue and submit a comprehensive report to the Prime Minister.[62]

The report of the committee on Kalabagh Dam Project appointed by the Sindh Chief Minister was published by The Nawa-i-Waqat on 24 February 1988. The committee unanimously recommended that the Government of Sindh should not approve the construction of Kalabagh Dam without ensuring geographical guarantee against the diversion of the Indus Water.[63]

In March 1988, the Sindh National Alliance held a province-wide convention to oppose Kalabagh Dam Project. The convention was addressed by a number of politicians as well as technical experts from Sindh.[64]

The daily Jang invited experts from the NWFP at Peshawer Jang Forum in February 1988. These experts had worked on the Kalabagh Dam Project at various stages. Those who participated in the Forum included former Chairman WAPDA, Shah Nawaz Khan, former Vice Chancellor of Peshawer University and Geologist of international fame, Dr. Rasheed Ahmed Khan, former General Manager of Mangla and Tarbela Dams, Engr. Mehtab Khan, Social Geographer, Prof. Israruddin and Engr. Mumtaz Zafar. These experts pointed out technical defects in the Kalabagh Dam Project, although they considered the project technically feasible. They were of the opinion that if the retention height of the Dam was decreased to an appropriate level (more than 10 ft.) so as to reduce the losses of the NWFP to the minimum and the water distribution dispute was settled, then the NWFP would have no objection against the construction of the Kalabagh Dam. They, however, favoured the construction of Basha Dam.[65]

The daily Jang organized a symposium on Kalabagh Dam in March 1988. Prominent politicians and experts from all four provinces participated in the deliberations. The proceedings were published in Friday Magazine of The Jang. A perusal of the proceedings indicate that no one budged from the popular stand of the home province. The participants from the NWFP and Sindh opposed the project, whereas those from the punjab supported it unequivocally.[66]

The Awami National Party also organized an anti-Kalabagh Dam convention in Peshawer under the chairmanship of Khan Abdul Wali Khan. About 24 speakers from different walks of life of the NWFP addressed the convention and all of them opposed the construction of the Dam. The formation of Anti-Kalabagh Front comprising of all political parties was also recommended by the convention. The Front was subsequently formed under the chairmanship of Mian Muzaffar Shah, the Secretary General of Pakistan Peoples Party, NWFP.[67]

The matter was still under consideration when the Junejo Government was dismissed by President General Zia ul-Haq on 29 May 1988. Fresh elections on party basis were announced. As a result of these elections Benazir Bhutto took over as Prime Minister of Pakistan on 2 December 1988.

Her Government's relations with the Governments of the Punjab and Baluchistan remained strained throughout her tenure as Prime Minister. The Kalabagh Dam issue remained alive in the press. The NWFP and Sindh persistently opposed the project, while the Punjab kept pressing for an expeditious implementation of the project. The Provincial Assembly of the NWFP again passed a unanimous resolution in 1989 opposing the construction of Kalabagh Dam. The Prime Minister, being Sindhi, was even blamed by the Punjab lobby in the opposition for her inaction in respect of Kalabagh Dam Project. The Water Dispute, which was a major hindrance for the Dam, also remained unresolved. The Council of Common Interests (CCI) which has the power to settle such issues, was constituted very late. The Government of Benazir Bhutto was dismissed on 6 August, 1990 before the CCI was called into session.

## THE WATER APPORTIONMENT ACCORD

Mian Nawaz Sharif took over as Prime Minister of Pakistan on 6 November 1990 as a result of general elections held on 24 October 1990. Islami Jamhoori Itahad (IJI) under the leadership of Mian Nawaz Sharif got landslide victory in the general elections, enabling IJI to form governments in all the provinces. Kalabagh Dam was one of the priority issues with Mian Nawaz Sharif. He wasted no time to constitute the Council of Common Interests and the National Finance Commission.

The resolution of the dispute on distribution of Indus Water was considered the first step to solve the Kalabagh Dam issue. The first meeting of the CCI was held on 12 January 1991, just three months after taking over the Government by Mian Nawaz Sharif, at the Prime Minister's Secretariat to decide water apportionment of Indus Water amongst the four provinces.[68]

The Water Apportionment Accord was signed on 21 March 1991 and the seventy year old dispute over apportionment of water was solved according to the Constitution with complete consensus among the Chief Ministers of the four provinces. The Prime Minister announced the accord in a press conference. Replying to a question about the construction of Kalabagh Dam, he said that distribution of river water was the basic issue that defied solution. Once this issue was overcome, the Government would assess the possibility and location of building storage facilities in the country. Clause 6 of the accord says: "The need for storages wherever feasible, on Indus and other rivers was admitted and recognized by the participants for planned future agricultural development". Responding to another related question, the Prime Minister said that the issues of royalty on natural gas and electricity would be resolved in due course by the National Finance Commission.[69] The National Finance Commission announced its decision on 9 April 1991, and among other things, it decided that the profits on the hydel power generation would be paid to the provinces.[70]

It was expected that the water accord would put at rest the controversy on Kalabagh Dam issue. However, in a short time since the signing of the accord, divergent views were expressed about the project. The scenario appeared to be more or less similar to that before the accord - the Punjab persisting in its demand for implementation of the project and the NWFP and Sindh vehemently opposing the same.

The Sindh Chief Minister, Jam Sadiq Ali, responding to a question in his post-accord news conference said that Kalabagh Dam project was not being considered and if the Federal Finance Minister, Sartaj Aziz, had said that the

Government might consider the project, it was also agreed that any irrigation project of such magnitude would be taken up amicably. He said that Sindh had never supported Kalabagh Dam and also water was not available for the purpose.[71] Federal Finance Minister, Sartaj Aziz, in a press conference on 24 March 1991 had hoped that the dispute over Kalabagh Dam Project would be resolved in a matter of two to three months.[72]

The interpretation of the Punjab was quite different to that of Sindh. Finance Minister of the Punjab, Shah Mahmood Qureshi, who represented his province in the water distribution negotiations and was a signatory to the accord, stated that the accord had set the stage for building Kalabagh Dam and any other feasible projects of the same kind.[73] He argued:

> Para 6 of the Agreement recognizes "the need for storages, wherever feasible, on the Indus and other rivers". Para 8 specifically states that "there would be no restriction on the Provinces to undertake new projects within their agreed shares". Finally para 14(e) says "all efforts will be made to avoid wastage."
>
> I think that if you read these terms carefully you will find that we have, in fact, opened the doors to the building of new storages, as long as we remain within our share of the allocation. As I have stated earlier, the quantity of surplus water is much greater than what we envisage for storage in future dams.[74]

Engr. Mehtab Khan Yusafzai from the NWFP, a staunch opponent of Kalabagh Dam Project, agreed with the above interpretation of the accord, although did not like the accord. He stated:

> It seems that the whole exercise of resolving the 70 years old issue of the so-called equitable distribution of waters of the river Indus, among the provinces through which the river Indus passes, has been done in an irrational manner, in order to pave the way for undertaking the ill-conceived Kalabagh Dam Project, on the same river Indus, near Kalabagh.
>
> But here the main and pertinent question - which would obviously arise, when the Apportionment Accord was finally agreed to, by all the provinces and adopted - would be, as to whether the Punjab would like to have a Dam, with a height lower than 925 ft.- as proposed, just to divert its own share of water to its side; or stick to the original proposal of putting a Dam of the same height and specifications, as was suggested and insisted upon before the Water Apportionment Accord was concluded.[75]

Another analyst offers the following comments:

> ...it appears that the matter of Kalabagh Dam has not been sorted out in full. There are reports that the Federal Government has started dusting its Kalabagh Dam files but whether the NWFP and Sindh will allow its construction still remains to be seen. There is no doubt that water storage has been allowed by the Water Accord but it does not mean it will allow storage of water at Kalabagh. In any case, a dam at Kalabagh has to be constructed by the Federal Government since the Punjab Government cannot handle or finance such a huge project and Kalabagh thus falls outside the ambit of the Water Accord.

> There is talk that the NWFP Government has agreed to allow Kalabagh Dam to go up provided its height is brought down, which is acceptable to the Punjab but Mir Afzal Khan [Chief Minister of NWFP] does not appear to have taken his ANP allies into confidence while signing the accord and whereas the Punjab politicians have been cheering about Kalabagh ever since the accord was signed, ANP leaders have consistently warned they will never allow it to go up.[76]

On 31 May 1991, the NWFP Assembly for the third time passed a resolution unanimously saying 'no' to Kalabagh Dam Project. The first resolution against Kalabagh Dam was unanimously adopted by the NWFP Assembly when Arbab Muhammad Jahangir Khan was Chief Minister and the second was passed when Pakistan People's Party leader Aftab Ahmed Khan Sherpao was in power.[77]

The WAPDA, however, was still busy in conducting various studies in the light of objections raised by the opponents of this project. A working paper prepared by WAPDA for the Technical Committee on Kalabagh Dam stated that the World Bank had suggested to carry out an in-depth environmental study before it could be presented for financing. The Technical Committee headed by the Chairman of WAPDA included 10 more members - two senior officials of the WAPDA, two representatives each from the Punjab and Sindh, three from the NWFP and one from Baluchistan. It had been given an eight point terms of reference to study different aspects of the Kalabagh Dam project including the environmental impact.[78]

On 6 May 1991, Minister in charge for Water and Power, Sartaj Aziz, told the National Assembly that nothing could be stated categorically at the moment whether a storage dam would be constructed at Kalabagh or Basha as the matter would be decided by the Planning Commission and related agencies. He was responding to a question from a member.[79] Thus the fate of Kalabagh Dam Project, as of May 1991, remained unsettled.

## CONCLUSION

The Kalabagh Dam Project was conceived in the early 1950s in line with the Government policy of developing country's hydroelectric potential as an integral part of developing water storages for irrigation purposes. It was approved by the Government in 1953 and was planned to be constructed after the completion of Mangla Dam. The World Bank also agreed to provide finances for the project. The implementation of this project, however, did not sail smoothly. An expenditure of Rs. 1,023.177 had been incurred as of June 1989, but its fate was still in the balance. A number of factors contributed to bring about this state of affairs.

**The Affected Interests.** To begin with, the project was formulated by the energy bureaucracy without involving the people. No public debate was allowed to discuss its implications and benefits. Its design and other project features were the guarded secrets buried in the files of the Government. This approach was not different to what was followed in other similar projects such as Mangla and Tarbela. But it was to be implemented at a time when the political scenario in the country had undergone material changes which rendered the old approach unsuitable. Had the affected public been involved in the project formulation, they would have not reacted so violently which might result in the demise of the project.

Theodore Lowi holds that the kind of policy being made determines the kind of political activity to be stimulated by the policymaking process.[80] This observation can be applied with equal validity to the implementation process of the Kalabagh Dam Project. The Kalabagh Dam Project intended to introduce significant changes in social, political, and economic relationships of the people. It was therefore natural for it to stimulate considerable opposition from those whose interests were threatened by the changes. As the Project offered divisible benefits, it was likely to exacerbate conflict and competition among those seeking to benefit from it. The exclusion of the affected interests at the project formulation stage made its implementation uncertain. The cabinet approved the project initially in 1975 when Prime Minister Zulfiqar Ali Bhutto had full control on national affairs. If the people had been involved in the project formulation at that time, the achievement of consensus on the project would not have been too difficult. The experience of the energy bureaucracy in respect of Mangla and Tarbela dams, however, had made it complacent and did not care to take the people into confidence.

The Kalabagh Dam Project was envisaged to affect a wide range of interests throughout the nation. On the one hand, a vast land was to be submerged in water displacing thousands of people. On the hand, it was to provide 3600 MW of electricity and more than 6 million acre feet of water for irrigation purposes to the people of all the provinces. Those who were to be adversely affected needed to be compensated to their satisfaction. It was therefore necessary that the Government had formulated an agreed upon compensation plan for those who were going to be adversely affected before the launching of the project. Throughout the controversy, one cannot find any concrete plans addressed to satisfy the adversely affected interests. The people were confused with generalities.

The importance of the interest group influences in policy implementation cannot be overemphasized in any setting. In the case of Third World countries, the interest groups are particularly active due to their exclusion at the policy making stage.[81] The energy bureaucracy in Pakistan, however, ignored them in the context of implementation of Kalabagh Dam project. Effective 'compliance mechanisms'[82] were not developed in response to the affected interests.

**Personality Interplay.** The initial setback to the project was caused in 1959 by the personal interference of a powerful dictator General Ayub Khan. In a bid to muster popular support in his home province, he manipulated to change the project priority in favour of Tarbela Dam which envisaged to bring more benefits to the NWFP. He even deceptively locked in the World Bank to finance Tarbela Dam. He got enthusiastic cooperation from the then Chairman of WAPDA who happened to hail from the same province, although it was contrary to the expert advice. Prior to this, another strong personality, very powerful Governor of the then West Pakistan, Malik Amir Muhammad Khan had also pressurized WAPDA to shift the site of the dam which necessitated further studies and investigations before the project could be launched.

In 1985, the project suffered another serious blow as a result of personal vendetta between President General Zia ul-Haq and the then Governor of the NWFP Lt. General Fazale Haq. At the time when the project had created distress among the affected people, Lt. General Fazale Haq was also distressed due to rumours of his replacement. Fazale Haq, in an endeavour to refurbish his position, extended his full support to the opponents of the dam. This paved the way for forging complete unity in the politicians of the NWFP against the dam.

The opposition to the project was spearheaded by Abdul Ghaffar Khan who had opposed the creation of Pakistan and had harboured life time vendetta against Punjabi who had humbled him. He saw an opportunity to settle the scores with them and Pakistan, and in spite of his very old age he toured extensively to arouse emotions against the project and the Punjab domination.

**The Timing.** The project was launched at the most inopportune time. The Martial Law regime of General Zia ul-Haq had recently decided to allow limited political freedom to the people. He had conducted referendum in December 1984 on the basis of which he had declared himself to be elected President for a five years term. General elections had also been held in February 1985 on non-party basis and Muhammad Khan Junejo had been installed as Prime Minister. The political activity was therefore picking up in the country. In July 1985, the WAPDA staff broke the news to the residents of Nowshera area in the NWFP while marking the places to be submerged in the dam. The politicians thus found a live issue to fetch them place in the news papers. The print media had also been freed from restrictions. General Zia restrained to take strong action personally, and left the matter to his weak prime minister. The issue was blown out of proportions resulting in sharp divisions on provincial lines with divergent positions.

In addition, the relations between the Punjab and Sindh were at the lowest ebb in July 1985 due to a dispute on the issue of sharing of Indus water. These provinces of Pakistan had a long-standing dispute on the sharing of water. Due to bad weather conditions, the water availability in the Indus river during 1984-85 had deteriorated. Moreover, lot of water was released from Tarbela Dam only to produce electricity to avoid load-shedding on the orders of the President. Due to the depletion of water storage, supply of water to the Punjab had to be stopped which incited furious reaction from the Punjab because of its severe damage to the crops. Sindh was pressing for the stoppage to ensure the availability of water for its crops. The tension between these provinces was at the highest level when the issue of Kalabagh Dam was brought to the lime light due the folly of the WAPDA employees which caused to further sharpen the differences.

The importance of appropriate timing for the implementation of public policies has been highlighted by a number of case studies[83]. However, the WAPDA authorities acted even contrary to the common sense and caused irreparable damage.

**Faulty Project Design.** The project was also challenged on technical grounds and defects were pointed out in the project design. The WAPDA authorities initially defended the project design, but subsequently agreed to review it in the light of objections raised by its critics. Consequently, changes were affected in the design which seriously undermined the credibility of the WAPDA authorities. Careful formulation of the project would have saved it from criticism on technical grounds.

**Implementation Strategy**. The project suffered due to faulty implementation strategy. Grindle[84] holds that while planning the implementation of a project, it is necessary to consider the context or environment in which the administrative action will be pursued. In the process of administering a program, many actors are involved and would include national level planners; national, regional, and local politicians; economic elite groups, especially at the local level; recipient groups; and bureaucratic implementors at middle and lower levels. These actors may be intensely or marginally involved in implementation, depending upon the content of the program and the form in which it is administered. Each may have a particular interest in the program, and the goals of the actors may be in direct conflict with each other. In the case of Kalabagh Dam, the actors were intensely involved. The implementation strategy therefore should have been based on an assessment of the power capabilities and political leverages of the actors, their interests and the strategies for achieving them within the context of Martial Law regime's willingness to put up with greater political freedom. This would have enabled the implementers to assess the potential for achieving the policy and program goals. The Government should have addressed the problem of how to achieve compliance with the ends enunciated in the policy. Eliciting this kind of compliance required much bargaining, much accommodation, and again, considerable conflict. But, if overall policy goals were to be realized, a systematic approach was essential to be followed. However, this did not occur. Instead, the implementing officials scared the people and generated tension in the country.

Moreover, the implementers would fail if they 'have little control over the rewards or the penalties necessary to elicit compliance with program goals'.[85] At the time of launching of the Kalabagh Dam project, the real authority rested with the President/Chief Martial Law Administrator General Zia ul-Haq. It was therefore imperative that implementation negotiations were handled at the level of President. Decentralization of implementation authority and responsibility to the Prime Minister would have been a viable strategy if he had the capacity to ensure that implementing activities would remain within the boundaries of program objectives and structures. He did not have those powers and therefore the project suffered.

**The Related Issues.** The implementation of the project raised some related issues which had fundamental importance not only for this project but also for national integration. The issued raised were: the distribution of Indus water amongst the provinces; the regulation and control of Indus water; and the distribution of income from the hydroelectricity to be generated at Kalabagh. The underlying theme behind all the issues was the question of provincial autonomy and the fear of the smaller provinces of the "Punjab domination". The solution to these issues needed concerted efforts at the highest level with full devotion and confidence. This required a stable democratic government with overwhelming support of the people in all the provinces. Since 1985, Prime Minister Mian Nawaz Sharif was in a position to address such issues with confidence until serious differences developed between him and President Ghulam Ishaq Khan. He was able to solve the seventy year old water apportionment problem within four months after he took over government in November 1990. The ground had been prepared for the solution of Kalabagh tangle, but the strained relations with the President incapacitated him to address this problem with confidence. Prime Minister Benazir Bhutto did not attempt to solve the Kalabagh Dam issue as she did not enjoy the requisite political support. The opposition even dubbed her to be prejudicial against the Punjab for her inaction.

To sum up, the implementation of Kalabagh Dam Project witnessed intensive clash between the affected interests involving the entire nation. As the project offered divisible benefits to a large portion of the population having long range consequences, it invoked violent reaction from the opponents as well as supporters of the project. As a result, a process of tough bargaining, which is usually witnessed in the developed countries in such cases at the policy formulation stage, was set in requiring fundamental changes in the project. This again lends support to the premise held by the proponents of the holistic approach to the study of policy implementation. The implementation of the project faltered due to a number of factors. The most critical being the failure of the energy bureaucracy to involve the affected interests at the project formulation stage and subsequently the adoption of a wrong implementation strategy at a highly inopportune time. Many related issues were raised by the opponents which had no immediate solution. Faulty design of the project of the project added to the problems of the implementers. An interesting finding of the study is that the intervention of strong persons due to their personal reasons damaged the project implementation considerably.

## NOTES

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10. The Pakistan Times (Daily), Rawalpindi, 27 July, 1985. For details of the studies and the experts involved, also see, Sultan Ali Barq, "Kalabagh Dam: Facts, Fears and Misconceptions", in The Nation (Friday Magazine), 14 December, 1991, pp.1 & 4.

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26. *The Nawa-i-Waqat*, Lahore, 19 November, 1985.

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30. *The Mashraq*, Lahore, 10 January, 1986.

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33. *Ibid.*, 24 January, 1986.

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45. The Jang, Lahore, 12 May, 1985.

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# CHAPTER VI

# IMPLEMENTATION OF NEW AND RENEWABLE SOURCES OF ENERGY PROJECTS

## INTRODUCTION

The Sixth Five Year Plan (1983-88) placed special emphasis on the development of new and renewable sources of energy. The Directorate General of New and Renewable Energy Resources (DGNER) under the Ministry of Petroleum and Natural Resources was entrusted with the responsibility of preparing, implementing and operating solar energy, wind energy and biogas projects throughout the country. As mentioned in the preceding pages, the DGNER was also the Secretariat of the powerful National Energy Policy Committee (NEPC). It implemented a number of projects in all the provinces of Pakistan.

The present Chapter discusses the implementation of these projects. In the absence of published material, the analysis in this Chapter is based on the information obtained from the DGNER and the Projects Wing of the Planning and Development Division, Government of Pakistan.[1] The analysis, perforce, includes only those projects about which sufficient information could be gathered. The Chapter, therefore, discusses the implementation of such solar energy and biogas projects.

## ADMINISTRATIVE SET-UP OF THE DGNER

The DGNER functions through its headquarters in Islamabad. Three regional offices, one each at Lahore, Karachi and Rawalpindi, existed once, but without any financial and administrative powers. These offices were closed in the incipient stage without assigning any reasons. In fact, these were allowed to dissipate by the withholding of resources by the centre. All administrative and financial powers are centralized at the headquarters in Islamabad. The Director General of the DGNER, however, is appointed by the Federal Government on an ad hoc basis. Other employees of the DGNER are also ad hoc appointees, who have no career and promotion prospects in the department. After getting training in the implementation and operation of the PV solar systems, biogas and wind energy technology, they are always looking for better opportunities elsewhere. They leave the department as soon as they get regular jobs. As of June 1988, most of the trained staff had left the department, resulting in an acute shortage of trained manpower both at the headquarters in Islamabad and at the field unit levels.

Some of the completed units had not even been started due to non-availability of staff. Mechanisms for coordination with the provincial governments were also nonexistent.[2]

## IMPLEMENTATION OF SOLAR ENERGY PROJECTS

The DGNER prepared the following five projects to be implemented during the 1977-88 period for development and demonstration of Solar and Wind systems:[3]

A. Rural Energy Project.
B. Development of Solar Energy.
C. Renewable Energy for Village Electrification.
D. Solar Energy for Remote and Under-Developed Areas.
E. Japanese Aided Solar Systems.

The objectives of these projects were as follows:[4]

a. Domestic Sub-system for household electricity supply;

b. Community Sub-systems for street lights, mosques, community T.V., schools etc.; and

c. Water Sub-system for drinking and small irrigation depending upon water availability.

These projects envisaged the establishment of photovoltaic solar systems, wind generating systems, water pumping systems and domestic distribution sub-systems for household electricity, originally at an estimated capital cost of Rs.89.30 million having a Foreign Exchange Component (FEC) of Rs.66.150 million. The implementing agency, DGNER, revised the projects during implementation which resulted in downward revision of project scope and upward revision of cost. After the revision, it was planned to establish 25 PV solar units at different places with a proposed capacity of $503.5KW_p$ and other systems as mentioned above at an estimated total cost of Rs.197.42 million having FEC of Rs.114.95 million.[5] The implementation of these projects is discussed below.

**i. Rural Energy Project**

The original Project was approved by the Central Development Working Party (CDWP) in 1977 for an estimated cost of Rs. 4.96 million including FEC of Rs. 1.302 million. The main objective of the project was to establish Rural Energy Centres in the country to demonstrate Biogas, Solar and Wind technologies. The Rural Energy Project envisaged the installation of following systems:[6]

| | | |
|---|---|---|
| (i) | Solar Cookers .. .. | (320) |
| (ii) | Solar Water Heaters .. | (320) |
| (iii) | Solar PV System .. .. | (6) |
| (iv) | Solar Pumps .. .. | (2) |
| (v) | Wind Mills for Water Pumping | (100) |
| (vi) | Biogas Plants .. .. | (320) |

The scope of the approved project was subsequently changed by the DGNER. The activities completed under the project were:[7]

| | | |
|---|---|---|
| (i) | Solar Cookers .. | (100) |
| (ii) | Solar Water Heaters .. | (68) |
| (iii) | Isolated Solar Systems .. | (2) |
| (iv) | Solar Pumps .. | (2) |
| (v) | Wind Mills for Water Pumping .. | (3) |
| (vi) | Biogas Plants .. | (320) |
| (vii) | Solar PV Systems .. | (6) |

The DGNER proposed to establish Solar PV Systems one each at: (a) Mumniala (Punjab) 8.0 $KW_p$; (b) Miro Padiar (Punjab) 18.5 $KW_p$; (c) Dittal Khan Laghari (Sindh) 20.0 $KW_p$; (d) Baiker (Baluchistan) 5.0 $KW_p$;(e) Sundus (Northern Areas) 10.0 $KW_p$; and (f) Nasirabad (Northern Areas) 10.0 $KW_p$.[8]

The project was completed on 30 June, 1988, at a cost of Rs. 37.823 million with FEC of Rs. 16.80 million. The increase in cost works out as 662 % of the original cost (4.96 million) with significantly reduced scope of the project. The work on the project commenced during 1977-78 and the original completion date was June 1979. The project, therefore, suffered a delay of 108 months.[9]

Information obtained from the Projects Wing of the Planning and Development Division indicates that, as of June

1988, two out of the six PV Solar Systems at Dittal Khan Laghari and Nasirabad were out of order, while the remaining four were facing various problems for a variety of reasons.[10] The observations of a monitoring team of the Projects Wing after a site visit to the Solar Power Station at Mumniala commissioned in 1981 are summarized below. The report highlighted a number of problems. It was stated that the other projects were facing similar problems.

**Observations for Mumniala Solar Power Station.[11]**

- The supply is discontinued daily for maintenance from 4.00 to 6.00 P.M.
- During Winter season, supply is stopped frequently and is most unreliable.
- No record in any form is maintained. A register showing some reading up to 1983 was maintained but this practice had been discontinued since then.
- There is no concept of maintaining log-book, log-sheets for power station to note the maximum/minimum demand, voltage observation etc. Voltmeter and Am-meter are provided but no readings are taken.
- One T.V. has been provided for the community which is out of order for the last six months.
- Panels of the Station are not cleaned regularly.
- No charges/revenues are being collected from consumers.
- Nearby village at 2 KM has been provided electricity from the National Grid.
- Villagers are of the view that A.C. supply instead of D.C. supply be provided. They are willing to

pay some reasonable cost if the supply is made reliable and continuous. At present, they can use only one tube light and one fan. The villagers are well-off and want to use electricity appliances like T.V. , Refrigerators, Pedestal fans, Irons etc. They are very angry at the present state of affairs as the nearby villages are enjoying the facility of electricity supply from the National Grid.

- One water pump of 1.5 horse-power which can pump 1000 Gallons of water in 3 days has been provided for the public. This facility is being used to provide water to animals only whereas the villagers are using hand pumps/wells for drinking water purposes.

- As stated by DGNER representative, the maximum consumption comes out to be only 1.44 KW whereas the station's rated capacity is 8 KW.

- The existing information is not sufficient to comment on the maximum generation of the Solar Power Station. The efficiency of Solar Cells and the distribution losses can not be calculated.

- No new connections/appliances are being provided although system can take the load. This has added to the annoyance of the people.

**ii. Japanese Aided Solar System Project**

The Project was developed to install two PV power systems at Dhok Mian Jewan (District Jhelum) and Bhakkar (District Attock) in Punjab at an estimated cost of Rs. 25.499 million including FEC of Rs. 18.95 million. The work on the project commenced on the basis of anticipatory approval. The installation of PV Solar Units were completed by 30 June, 1988 at a cost of Rs. 21.922 million. Originally, the project was planned to be completed by June 1987 at an estimated cost of Rs. 22.99 million. The project, thus, suffered a delay of 12 months but was completed well within the estimated cost.[12]

The Gakhar Solar Power Station with a capacity of 57.2 KW was commissioned in October, 1986, whereas Dhok Mian Jewan Solar Power Station with a capacity of 39 KW was commissioned in September, 1987. According to information provided by the Projects Wing of the Planning and Development Division, Dhok Mian Jewan Station had been functioning since its installation, but the beneficiaries had refused to pay the electricity bills, while the unit at Gakhar had not been working as beneficiaries had refused to use the D.C. current.[13] A report of the Projects Wing which was compiled on the basis of site visits carries revealing observations:[14]

**Observations for Gakhar Solar Power Station.**

- Villagers have refused to take power from the station and are demanding A.C. power and the Station is, therefore, closed and not providing power to any house in the village since 1986. The station is manned by one chowkidar only.

- Shahpur, which is 3 KM from the Gakhar village, has electricity from the National Grid. Another village which is one and half KM from Gakhar also has electricity from the National Grid.

- Street lights are not properly designed as no water-shields are provided with them. DGNER has not visited the plant for ten months.

**Observations for Dhok Mian Jewan Solar Power Station.**

- The Power station is manned by only one Chowkidar who is also responsible for the operation and maintenance of the station and the distribution system.

- The plant operates only between 7 P.M. to 6 A.M.

- Rs.10 per tube-light are being charged from consumers, but they have stopped paying revenues from February, 1988.

- Energy meters are not installed at the Power Station.

- Three feeders emanate from the station. Maximum drop, as informed by the person in charge of the station, has been observed as 15 volts. However, villagers complained of low voltage.

- Village Agara Moro which is 2 KM from Dhok Mian Jewan has electricity from the National Grid. In fact, all the villages within 2 KM radius of Dhok Mian Jewan are being electrified from the National Grid. The villagers are demanding for the provision of A.C. power. They have also demanded for the provision of fans at reduced rates.

- Voltage and current readings are not regularly taken and proper record of maximum/minimum load, voltages, current, etc. is also not maintained.

**iii. Development of Solar Energy Project**

The project was approved by CDWP in May, 1980 for a period of 30 months at an estimated cost of Rs.19.933 million including FEC of Rs.14.90 million. It was developed to demonstrate solar technology under the following systems:[15]

(i) 05 $KW_p$ photovoltaic non-tracking system;
(ii) 20 $KW_p$ photovoltaic tracking system; and
(iii) 35 $KW_p$ Solar Thermal generation system.

The scope of the project was reportedly revised later on to cover the following activities:[16]

(a) Kankoi Solar Station (NWFP):

* Installation of 60.0 $KW_p$ power station and diesel generator to utilize power for domestic use and water pumping.

* Installation of performance monitoring and communication equipment to carry out technical and economic analysis of the system to determine the unit cost.

* Installation of the invertors to convert D.C. system into A.C. system.

(b) Maskipur Solar Station (NWFP):

* Installation of 10 $KW_p$ solar system to supply electricity for domestic requirements.

* Installation of performance monitoring equipment to carry out the technical and economic analysis of the system to determine the unit cost.

(c) Installation of two Solar Stations of 50 $KW_p$ in Baluchistan.

Under the project, as of 30 June 1988, two PV solar systems one each at Kankoi and Maskipur, with capacity of

36.8 and 10 $KW_p$ respectively and an Isolated Solar System (144 $W_p$) at Dagger were installed. The Solar Power Station at Kankoi was originally commissioned in 1983 with capacity of 5 $KW_p$ which was increased to 36.8 $KW_p$ in 1985 as a result of project revision by the DGNER.[17] As of 30 June 1988, the work on the following planned items had not yet started:[18]

(a) Installation of two solar systems each of 20 $KW_p$ in Baluchistan.

(b) Installation of two invertors each of 20 $KW_p$ to convert D.C. system into A.C. system.

(c) Installation of two water pumping systems.

(d) Installation of 60 $KW_p$ units in NWFP.

It is obvious from above that only 46.80 $KW_p$ systems had been installed, while 80 $KW_p$ PV solar units were yet to be installed along with two water pumping systems for which even sites had not been identified. This means that only 37 per cent of PV solar system work had been completed in 78 months. The DGNER proposed to complete the remaining 63 % work by June, 1989.

The information provided by the Projects Wing of the Planning and Development Division contains the following observations about the Solar Power Stations at Kankoi and

Muskipur commissioned in 1985 and 1987 respectively:[19]

**Observations for Kankoi Solar Power Station.**

- NO record is maintained at the Station. Control room of the Station is equipped with computerized data logger to collect complete information of the Power automatically, which is not operating for the last two years due to non-availability of computer diskettes.

- The Station has been provided with batteries so that power can be supplied during night and cloudy days. Terminals of the batteries were not clear and needed proper maintenance. Water level in some batteries was very low.

- The Station has been provided with a diesel generator of 40 KVA rating operated at 440 Volts A.C. to charge the batteries. However, the diesel generator has not been in operation since 1986 due to non-provision of diesel oil. Diesel engine being non-operative is becoming rusty and needs maintenance before it is put into operation.

- One solar radiation recording system to record solar intensity with the change in the direction of Solar Panels had been provided which was not operating for over a year due to non-provision of graph paper.

- The Solar Panels have a provision for changing their direction so that maximum sunlight falls on the panels. However, the direction of the Panels was not being changed at the Power Station.

- Solar Panels are dirty and the cleaning is not being carried out regularly.

- Monitoring of current from panels is also not being done.

- The tube well at the station is operated daily for 8-9 hours to supply water for irrigation purposes for which no revenues are collected.

- One 1/2 h.p. A.C. motor with invertor is also in operation with Solar Power Station to supply potable water for power station.

- The maximum load of the Power Station is 80 Amp. indicating that it is supplying maximum power of 9.6 KW. However, the Station is designed to provide 36.8 KW of load.

- The feeder to village is 300 meter long. At 9.00 AM when load was maximum (80 amp.) and voltage at Station was 120 volts d.c., the voltage actually measured at the remote point of the village was 75 volts indicating the drop of 45 volts. Such a large voltage drop indicated that the distribution system was not designed properly. The consumers are connected to the Solar Power Station with a cable of 6 mm due to which voltage drop is large. Villagers complained of voltage drop.

- The record of max./min. load, shut downs, maintenance schedule, and break down, is not maintained properly and there is no record to assess its performance since operation.

- The Station is manned by one Sub-Engineer and one Chowkidar only which is not sufficient.

- It was observed that smoke from the village encircled the Solar Station in the evening thereby polluting solar panels. This indicated that the site for the station was not selected properly.

- The villagers are not satisfied with the performance of the Solar Power Station. They are concerned that power is not supplied regularly especially during winter months. Sometime they are without power for 3 to 4 days. Fans are not being provided to them although they have deposited the requisite amount. Further-more, they are greatly annoyed that with the electricity supplied by the Power Station they can not use mixers, blenders, irons and refrigerators. They are even willing to pay some fixed amount if power is supplied regularly and reliably.

- National Grid 11 KV line is passing at 2 KM from the village Kankoi and nearby village named Koga was electrified from it in 1986. The residents of

Kankoi are demanding for the provision of similar facility. Faced with this situation, DGNER have proposed to shift Kankoi Solar Power Station to some yet unidentified place in the N.W.F.P.

**Observations for Muskipur Solar Power Station.**

- Different types of Solar Cells are being used at the Station.
- Solar Panels are not being cleaned regularly.
- There is a provision to change angles of PV panels for optimum utilization, but these are being changed only twice in a year for winter/summer seasons.
- No record of any type is being maintained.
- The distance of 11 KV National Grid supply from the village is only 1 KM.
- No revenues are being collected from the villagers although A.C. is being supplied.
- Villagers complained that only a few fans were being issued.

### iv. Renewable Energy for Village Electrification Project

This project was developed to demonstrate Biogas, Solar and Wind technologies in the country. The objectives of the project were:[20]

a. Generation of 500 cu. ft. of gas per day at Rakh Taragarh from agriculture waste; and Installation of Solar Photovoltaic system of 15 KW capacity for (i) pumping water for drinking and irrigation purposes and (ii) for electrification purposes for 5 hours during the night.

b. Production of electricity by using biogas along with setting up of a 15 KW photovoltaic generation system for general energy supply purposes at Angara in Sindh.

c. Installation of 15 KW photovoltaic generation system at project site in Baluchistan for pumping and storage of water for drinking and irrigation; and Installation of a Wind Mill for generating 3200 KWH per year.

d. Support to the 15 KW photovoltaic production at the 4th energy center in Bonair Valley with wind mill producing 64,000 KWh per year.

The project[21] was approved by CDWP on 15th September, 1980 for a period of 24 months at an estimated cost of Rs.19.933 million including foreign exchange component of Rs.16.60 million. The scope of the project was revised in 1988 after a delay of 6 years in completion. The project was revised as follows:

a. Mera Rehmat Khan Solar Station (NWFP)

Installation of 18 $KW_p$ PV power station to supply power for domestic requirements.

Installation of performance monitoring equipment to carry out the technical and economic analysis of the system.

b. Qila Mojgarh Solar Station (Punjab)

Installation of 48.8 $KW_p$ solar system to supply electricity for domestic requirements.

Installation of water pumping system for drinking water.

Installation of performance monitoring equipment for the techno-economic analysis of the system.

c. Khurkera Hybrid System (Baluchistan)

Installation of hybrid system comprising 8.8 $KW_p$ Solar PV station and 2 $KW_p$ aerogeneration system at Khurkera to supply electricity and water for domestic requirements.

Installation of performance monitoring equipment to carry out the technical and economic analysis of the system.

d. Malmari Hybrid System (Sindh)

Installation of hybrid system comprising 10 $KW_p$ solar PV station and 16 $KW_p$ wind system to supply electricity and water for domestic needs.

Installation of performance monitoring equipment to carry out the economic and technical analysis of the system.

e. Installation of two mechanical wind pumpers, one each at Dahri and Khurkera villages.

Under the project, the DGNER had established by 30 June 1988 four PV solar units of 75.90 $KW_p$ capacity and two wind generating systems, one of 2 $KW_p$ and the other of 16 $KW_p$. The work was in progress on other items. The DGNER had proposed further revision of the project for the upgrading of Kkurkera PV solar system by 5 $KW_p$.[22] The Projects Wing of the Planning and Development Division also compiled a report on the Solar Power Stations at Khurkera and Malmari after visiting the sites in June 1988. The main observations contained in the report are summarized below:[23]

## Observations for Khurkera Solar Power Station

- The station is manned by one Sub-Engineer and one Chowkidar who also carry out minor repairs of the distribution system.

- The supply of the village is discontinued since April, 1988 due to the breakage of carrier wire. Villagers were very angry as they were without electricity since then.

- Villagers are charged Rs. 10 for each connection.

- There is one Primary School in the village. It has not been provided electricity. There is no Community TV Center in the village.

- Wind Mill was in operation. It operates 1.5 h.p. pumps to provide water to animals and villagers.

- At the station compilator is installed but is not fully operative. Sub-Engineer is not trained properly to operate the compilator.

- Energy meters have been installed at the station.

- The wind mill operates about 22 hours daily through-out the year except in April when the wind speed is slow. Wind generation is located on the tower of 85 feet height.

- Feeders emanate from the station in three directions; the longest feeder is 3.5 KM. Maximum voltage drop on the feeder is 10 volts. The maximum load of the station is 25 Amp. between 6 P.M. to 8 P.M.

- Bela which is about 3 KM away from Khurkera has electricity from the National Grid. Villagers feel deprived of a better and more reliable facility because of this solar station.

- The distribution poles are of steel which are not galvanized or painted due to which there is extensive corrosion of poles.

- The distribution system consists of overhead cables with carrier wire which is extensively corroded.

**Observations for Malmari Solar Power Station.**

- The station is manned by one Sub-Engineer and one Chowkidar who also attend minor faults in the distribution system.

- No proper record is maintained at the station. There is no concept of maintaining log sheet for Power Station to note maximum/minimum demand, voltage and current. Voltmeters and Am-meters are provided but no readings are being taken. Energy meters are installed, but the readings are not taken regularly.

- A wind mill of 10 KW planned to be installed at Malmari for providing drinking water to the villagers was damaged during testing and commissioning in March 1988. The equipment of the wind mill was found rusting in open space waiting for repairs. Water supply arrangements were, therefore, not yet completed.

- The villagers are charged at the rate of Rs.10 per house.

- Each of the two mosques in the village has been provided two tube-lights and one fan, but no street lights have been provided.

- Four feeders emanate from Solar Power Station. The maximum length of feeder is 500 meter and maximum drop on feeder is 10 volts. The maximum load of station is 35 amp. between 7 to 8.00 P.M.

- Villagers are not demanding fans, however, they require more tube-lights.

- Automatic universal charge controller for measuring discharging current of the battery has been installed at the station but is not in operation.

- National Grid 11 KV feeder was passing at a distance of 22 KM from the Malmari village. The availability of power to this area was not anticipated from the National Grid in near future. It was also reported that plant had not been closed due to non-availability of sun light. The location of the Solar Power Station was, therefore, good.

- The distribution poles are of steel which are not galvanized or painted due to which there is extensive corrosion. The distribution system consists of overhead cables with carrier wire which is also extensively corroded.

- The station is closed on alternate days for about 2 hours for general maintenance and cleaning. However, the angles of modules are not changed regularly, and batteries are not maintained properly.

- The villagers are not generally satisfied as due to D.C. power they cannot use T.V., refrigerators, washing machines, irons and other electronic appliances. They are demanding that the station should be converted into A.C. immediately. They are even willing to pay charges for A.C. power.

**v. Solar Energy for Remote and Under-Developed Areas Project**

The project was developed to set up 100 $KW_p$ solar system at Kharan town (Baluchistan), at an estimated cost of Rs. 21.5 million including foreign exchange component of Rs. 14.4 million. The project was originally planned to be completed by 30 June 1987. However, the DGNER revised the scope of the project, and instead of setting up 100 $KW_p$ solar system at one site, decided to set up solar stations at four places. As of June 1988, two solar stations, namely, 8$KW_p$ solar PV station at Sherozai, District Kharan and 15 $KW_p$ solar PV station at Lehtar, District Kharan had been completed.[24] The electrical distribution, civil works and installation of equipment were in progress at the following solar systems:[25]

a. 20 $KW_p$ solar PV station at Nawtani, District Kharan: and

b. 20 $KW_p$ solar PV station at Bughat, District Loralai.

In addition to the above four solar stations, the DGNER intended to establish two more PV solar systems of 17- 20 $KW_p$ capacity each in Baluchistan for which sites had not been identified by June 1988. Under the project, only 23 $KW_p$ had been installed by June 1988.

**Physical Progress of the Projects**

As discussed in the preceding pages, the DGNER planned to establish 25 PV solar units at different locations in the country with a proposed capacity of 503.5 $KW_p$. The other components of these projects were wind generating systems, and isolated sub-systems for house-hold electricity. As of June 1988, 15 units with capacity of 301.5 $KW_p$ had been completed, 3 units with capacity of 80 $KW_p$ were at different stages of implementation and locations for 7 remaining units had not been identified. This means that physical progress up to June 1988 was 60 per cent of the planned capacity.[26]

## Financial Utilization

The financial utilization of all the five projects, as of June 30 1988, was Rs. 134.783 million against the total allocation of Rs. 197.443 million. The utilization of foreign exchange was Rs. 77.654 million against a provision of Rs. 114.974. The implementing agency had utilized about two-third of the funds in a period of ten years (from 1977-78 to 1987-88).[27]

## Delay in Implementation

All the five projects witnessed delays in implementation, ranging from 12 months to 108 months. The longest delay was observed in "Rural Energy for Village Electrification Project" and the shortest in the Japanese Aided Solar Project. Project-wise details of original date of completion and actual/estimated date of completion along with period of delay in implementation are given in Table 6.1 below.

TABLE 6.1

ORIGINAL AND EXPECTED DATE OF COMPLETION

| S.No. | Name of Project | Date of Commencement | Original Date of Completion | Actual/ Expected Date of Completion | Delay (months) |
|---|---|---|---|---|---|
| A. | Rural Energy for Village Electrification. | June 1977 | June 1979 | June 1988 | 108 |
| B. | Development of Solar Energy. | June 1980 | June 1983 | June 1989 | 78 |
| C. | Renewable Energy for Village Electrification. | June 1980 | June 1983 | June 1989 | 84 |
| D. | Solar Energy for Remote and Under-Developed Areas. | June 1984 | June 1987 | June 1989 | 24 |
| E. | Japanese Aided Solar System. | June 1985 | June 1987 | June 1988 | 12 |

Source: Information provided by the Directorate General of New and Renewable Resources.

**Cost Over-run**

The original capital cost of the five projects was estimated at Rs. 89.30 million having a total foreign exchange component of Rs. 66.15 million. The cost of these projects increased to Rs. 197.42 million with foreign ex- change cost also going up to Rs. 114.95 million. The project-wise details of original and revised costs are given in Table 6.2 below.

TABLE 6.2

ORIGINAL AND REVISED CAPITAL COST

(Million Rupees)

| S.NO. | Name of Project | Original approved cost | Revised cost | Percentage change |
|---|---|---|---|---|
| A. | Rural Energy for Village Electrification. | 4.97 | 37.82 | 661 |
| B. | Development of Solar Energy. | 19.93 | 57.02 | 186 |
| C. | Renewable Energy for Village Electrification. | 19.91 | 39.94 | 101 |
| D. | Solar Energy for Remote and Under-Developed Areas. | 21.50 | 37.14 | 73 |
| E. | Japanese Aided Solar System. | 22.99 | 25.50 | 11 |
| | Total. | 89.30 | 197.42 | 121 |

Source: Information provided by the Directorate General of New and Renewable Resources.

Table 6.2 indicates that the increase in capital cost was 121 per cent of the original cost. The highest cost over run was observed in the Rural Energy for Village Electrification Project, which was 662 % of the approved cost, while the lowest cost over run (73%) was in Solar Energy for Remote and Under-Developed Areas Project. These two projects also experienced the maximum and minimum delay in implementation. This indicates that cost over run was positively correlated to delay in implementation.

**Change in Scope and Location of Projects**

The scope of four of the five projects was changed during the implementation, the only exception being the Japanese Aided Project. As is apparent from the foregoing discussion, the change in scope generally resulted in downward revision of project scope and upward revision of cost.

The solar system is ideal for remote areas, where supply of energy from usual sources is expensive due to long distances involving huge capital investment and distribution losses. A cost effective solar system should be located some 30-35 KM away from the national grid. The DGNER changed the approved sites of units during the implementation without regard to the above principle and without approval of the competent authority. The rationale for such changes had not been given by the sponsoring agency. Most of the new locations were not ideal for solar units as these were near the National Grid.

The sponsoring agency did not furnish data regarding distance of each unit from the National Grid network. However, an internal evaluation report by the Projects Wing of the Planning Division indicates that its evaluation team during the field visit noted distance of 7 units from the National Grid. Except Malmari, which was about 25 KM from it, all other units were located within a range of 0-2 KM from the National Grid. This placed the beneficiaries of solar electricity in a difficult situation, unhappy with the restricted supply of DC solar electricity in lieu of the nearby National Grid system.

The implementing agency not only changed the locations but also changed the concept of these projects. For example, in the case of Solar Energy for Remote and Under-Developed Areas, the concept was to establish a 100 $KW_p$ PV solar unit at Kharan town to supplement the existing source of electricity. But during the implementation process, the project was shifted from Kharan town to four places in the districts of Kharan and Loralai without the approval of the competent authority. Like-wise, the scope of the Rural Energy Project was changed from domestic sub-system to community subsystem resulting in higher cost and delay in implementation.[28]

## Performance of Installed Units

The major components of the five projects were PV Solar system, diesel generating system, wind generating system and water pumping system, but the single main major component of these projects was PV solar system. By June 1988, out of the total planned capacity of 503.5 $KW_p$, only 301.5 $KW_p$ had been installed at 15 different locations. In addition to PV solar units, following items had also been completed under these projects to the extent indicated against each:[29]

| | | |
|---|---|---|
| i. | Domestic sub-system for household: | |
| | (a) Solar Cooker .. .. .. | 100 |
| | (b) Solar Water Heater .. .. | 68 |
| | (c) Isolated Solar unit .. .. | 2 |
| ii. | Diesel generating set .. .. | 1 |
| iii. | Wind generating system .. .. | 3 |
| iv. | Water pumping system .. .. | 6 |

According to information provided by the DGNER, as of June 1988, out of the 15 completed PV solar units, 8 units were operational, 3 units had never worked since installation and 4 units had been out of order for 6 to 12 months. In other words, about 50% units had been out of operation for different reasons.[30] The position of the operating units was also depressing. Most of them were operating much below their rated capacity. The supply of electricity was unreliable, irregular and for fewer hours than should have been the case. The demand was much higher than supply. There was also problem of non-availability of D.C. appliances. The operating units were suffering due to the centralization of financial and administrative powers in the DGNER headquarters at Islamabad, resulting in inordinate delays in repair work and poor maintenance.[31]

The list of beneficiaries of the isolated solar system and the beneficiaries to whom solar cookers and heaters were supplied could not be obtained from the DGNER. The Projects Wing of the Planning and Development Division reported that even they failed to obtain the list from the DGNER. Therefore, it is not possible to comment on the performance of the household items. The possibility that those might had not even been purchased, however, cannot be ruled out. According to a report of the Projects Wing of the Planning and Development Division, Isolated Solar Systems at Dhok Mian Jewan and Dagger were working fault-free and the beneficiaries were satisfied with the performance.[32]

## Project Revenues

Information supplied by the DGNER on revenue collection indicates that there were two rates for billing. The metered consumers were charged at the rate of Rs.0.50 per KWH, and the rest at the rate of Rs.10.0 each per fan and tube-light per month. Further, in some areas like Mumniala, Baikar, Kankoi, Muskipur, electricity was being supplied free of cost, while the beneficiaries of Dhok Mian Jewan had refused to pay the dues.[33]

The Projects Wing of the Planning and Development Division believed that the revenue figures furnished by the DGNER were on the higher side. However, if the figures supplied are taken to be correct, then the total annual revenue worked out to be Rs.67,138, whereas the total recurring expenditure of these projects was Rs.3.125 million. This meant that none of the projects was in a position to meet even its recurring cost or operational expenditure.

**Subsidies**

The data provided by the DGNER indicate that the annual subsidy for these projects amounted to Rs. 31.582 million at 12 % opportunity cost of the capital. Annual recurring expenditure for all the five projects worked out to be Rs.3.125 million, whereas the annual revenue had been estimated at Rs. 0.067 million, which left a gap of Rs.3.058 million to be filled by the Government.[34] The Government was therefore suffering from sustained financial loss for erroneously planned and poorly implemented so-called 'demonstration projects'.

## IMPLEMENTATION OF BIOGAS DEVELOPMENT PROJECT

The DGNER prepared the "Biogas Development Project" for the establishment of biogas units which would produce renewable energy at a cost cheaper than commercial sources of energy by utilizing animal waste and provide to the selected villages their total energy requirements at the cheapest rate. Phase-I and Phase-II of the Project envisaged to achieve the following objectives:[35]

a. Generation of Electricity (AC) 220 Volts having capacity of 5 KW to 10 KW at each site, which would be sufficient for lighting and for pumping water for the existing water wells and/or newly acquired sources of water.

b. Provision of fuel for cooking and heating in winter to replace the growing consumption of petroleum products and kerosene.

c. Conversion of animal waste into enriched manure.

To achieve the above objectives, the following physical targets were planned with an estimated capital cost of Rs.33.537 million having foreign exchange component of Rs.5.048 million in three years of implementation period:[36]

| | | |
|---|---|---|
| i. | Family biogas units (FBU) | 1140 |
| ii. | Community Plants (CP) | 45 |
| iii. | Biogenerators (BG) | 200 |
| iv. | Compressors/Biofans | 160 |
| v. | Workshop | 1 |
| vi. | Testing Laboratory | 1 |

**Change in Scope**

The project envisaged the establishment of 1140 biogas units at various places throughout Pakistan on a cost free basis for familiarization of biogas technology. During the process of implementation, however, the implementing agency made major changes in the project without the approval of the competent authority. As a result, the cost of the project rose to Rs. 41 million. The Family Biogas Units (FBU) were installed on cost sharing basis instead of cost free basis. The following changes were made in the project:[37]

a. Family Biogas Units installed were four times bigger than the approved size.

b. The proposed facilities of Workshop and Testing Laboratory were dropped from the project.

c. The number of Family Biogas Units was increased from 1140 to 4137.

d. The implementation period was increased from 3 years to 6 years.

## Financial Utilization

The data provided by the DGNER indicate that the actual expenditure on the project proved to be Rs. 32.643 million against an estimated cost of Rs. 41 million. Table 6.3 below gives the year-wise allocations, releases and actual utilization during the 1981-87 (six years) implementation period.

**TABLE 6.3**

**ADP Allocation, Funds Released and Actual Utilization (1981-87)**

(Million Rs.)

| Year | Allocation | Releases | Utilization | Un-utilized amount |
|---|---|---|---|---|
| 1981-82 | 10.100 | 10.100 | 5.101 | 4.999 |
| 1982-83 | 10.000 | 10.000 | 8.229 | 1.771 |
| 1983-84 | 8.600 | 8.600 | 8.406 | 0.194 |
| 1984-85 | 1.500 | 1.500 | 0.237 | 0.263 |
| 1985-86 | 8.090 | 8.090 | 7.700 | 0.390 |
| 1986-87 | 2.710 | 2.710 | 1.970 | 0.740 |
| Total: | 41.000 | 41.000 | 32.643 | 8.357 |

Source: The Directorate General of New and Renewable Energy Resources, Ministry of Petroleum and Natural Resources, Government of Pakistan.

## Physical Progress

According to the original schedule, the implementation of the project was to commence in the year 1981-82 and was to be completed by June, 1984. The work on the project did start according to the schedule but as a result of various changes affected in the project during its implementation by the implementing agency, the progress remained slow during the first two years of the project and could not be improved in the subsequent years, resulting in a three-year delay in the completion of the project.

During the implementation, the installation of family biogas units and purchase of compressors/biofans received more attention of the implementing agency, whereas the targets in respect of other activities as compared to original planning, remained unachieved. The Workshop and the Testing Lab. were dropped altogether. The implementing agency (DGNER) had no reasons to assign for not establishing the workshop and testing lab. Furthermore, as of 30 June 1988, only 49 biogenerators and 59 biofans were distributed although 110 biogas generators and 300 compressors/ biofans had been purchased which were lying in the DGNER stores for the past four years. Only 3 Community Units were installed against 45 planned. It was disclosed by the officials in the Planning and Development Division that the implementing agency offered no explanation for change in scope of the project to the Evaluation Team of the Projects

Wing of the Planning and Development Division.[38]

**Implementation of "Biogas Development Project" in the Provinces of NWFP and Baluchistan.**

The Projects Wing of the Planning and Development Division carried out an evaluation of the implementation of the Biogas Development Project in the NWFP and Baluchistan provinces on the directive of the Central Development Working Party (CDWP). The DGNER was directed to furnish necessary information and data regarding implementation and operation of the project.

The Evaluation Team selected a minimum sample of 20% of FBUs on random basis for each district in the provinces of NWFP and Baluchistan, out of the 611 units installed in these provinces which were mentioned in the list provided to the Evaluation Team. The list of the sample units was prepared before the start of field work. During the field visit, the units installed in the vicinity of sample units, were also visited/reviewed, resulting in an 8% increase in the sample. In a few cases, the sample units were not accessible/traceable, which necessitated substitution. In all, 133 units were visited.[39] The information supplied by the Projects Wing Team is quite revealing. The salient features of its findings are discussed below.

## Physical Progress

In the Provinces of NWFP and Baluchistan, a total of 1,178 family biogas units (FBU) were installed out of 4,137 installed in the whole of Pakistan. The DGNER, however, provided a list of only 611 Family Biogas Units (FBUs) . No reasons for not providing the complete list of the FBUs were given by the DGNER. It was suspected that the remaining FBUs existed on paper only. Not a single community biogas unit was installed in these provinces. Also, no Compressor/Biofan was supplied. Only one generator had been given in the province of NWFP. The review team visited the site of the generator and found the house locked and biogas unit out of order. It was reported to the Team that the generator had never worked since its installation due to low pressure of gas.[40]

In NWFP, out of 10 districts where FBUs were installed, 6 districts were covered by the study. In these districts, 92 units were visited out of 390 units. Table 6.4 below depicts district-wise operational status of these units. The table indicates that out of 92 units only 19 units were working which constituted 23 % of units visited. The highest number of working units were observed in Abbotabad district whereas in Peshawer, Bannu and Swat all units were out of order. In the district of Mansehra, only 5 out of 29 units were operational with low pressure. It was also observed by the Evaluation Team that during the visit none of the working units was in such a condition that could replace the use of other sources of energy for cooking. The gas pressure of the working units was usually too low and could only be used for preparing tea or heating water. For the purpose of other cooking, the beneficiaries needed alternative sources of energy. Of the 92 units, 41 units reportedly "never worked" and 32 units worked only for a short time.[41]

**TABLE 6.4**

**District-wise operational status of units in NWFP**

| Districts | | Units Visited | Units Operating | Remarks |
|---|---|---|---|---|
| Mardan | .. | 14 | 3 | |
| Peshawar | .. | 11 | -- | |
| Bannu | .. | 6 | -- | |
| Swat | .. | 8 | 1 | Low pressure. |
| Mansehra | .. | 29 | 5 | " |
| Abbotabad | .. | 24 | 10 | |
| Total.. | | 92 | 19 | |

Source: The Projects Wing, Planning and Development Division, Government of Pakistan.

In Baluchistan, out of 79 units installed in the 3 sample districts, 41 units were visited by the Evaluation Team. The district-wise performance of these units is depicted in Table 6.5 below. The table indicates that only 5 units in Zhob district were working, which was 12 % of the total units visited, while in the other two districts, all the units were out of order. The Evaluation Team further observed that out of 41 units, 31 units had never become operative and 5 were out of order. In Kharan district, the beneficiaries informed the Team that all the 43 units installed never became operative due to non-supply of fittings by the contractor. They reported that the Office of the DGNER was very much in the picture, but no corrective measures were taken.[42]

**TABLE 6.5**

**District-wise operational status of units in Baluchistan**

| District | Visited | Operating | Remarks |
|---|---|---|---|
| Pishin | 9 | - | |
| Kharan | 17 | - | |
| Zhob | 15 | 5 | (3 with low pressure) |
| Total: | 41 | 5 | |

Source: The Projects Wing, Planning and Development Division, Government of Pakistan.

## Financial Status of Owners

The report of the Projects Wing pointed out that the biogas units were installed in semi-urban areas and the owners of these units were Local Councillors, Khans, Sardars, members of provincial and national assemblies, businessmen and retired government servants. Their position in respect of the size of their land holding is exhibited in Table 6.6 below. The report also pointed out that they were financially well off and were using LPG, electricity and firewood for cooking, lighting and heating purposes. Socioeconomic conditions of beneficiaries were not assessed and considered by the DGNER to determine their suitability.

**TABLE 6.6**

**Size of Land Holding of the Owners of Biogas Units**

| Land Holding (In Acres) | NWFP | Baluchistan | Total |
|---|---|---|---|
| Without land | 1 | - | 1 |
| Less than 5 Acres | 17 | - | 17 |
| 5 Acres and above | 74 | 41 | 115 |
| Total: | 92 | 41 | 133 |

Source: The Projects Wing, Planning and Development Division, Government of Pakistan.

## Availability of Cattle waste

For the successful operation of family biogas units, 4-5 animals' dung is required to produce 80-100 cft gas for family of 6-8 persons. During the survey, the information about the availability of cattle waste/dung with owners of these units was also collected by the Projects Wing Team. The position of the owners of the family biogas units regarding their cattle numbers is summarized in Table 6.7 below. The table indicates that out of 133 owners of FBUs, 24 or 18 % are without cattle and 41% have 4 and more cattle.

**TABLE 6.7**

**Cattle Ownership of the Owners of the Biogas Units**

| No. of Cattle | NWFP | Baluchistan | Total |
|---|---|---|---|
| Without Cattle | 11 | 13 | 24 |
| Less than 4 | 48 | 6 | 54 |
| 4 and above | 33 | 22 | 55 |
| | -- | -- | -- |
| Total | 92 | 41 | 133 |

Source: The Projects Wing, Planning and Development Division, Government of Pakistan.

## Alternate Fuels

The main objective of the project was to replace the use of Kerosene Oil, firewood and electricity for cooking and lighting. The Projects Team, however, found during the visit that 80-90 % owners of the units had electricity and were meeting their lighting requirements from that source. For the purposes of cooking in semi-urban and rural areas, the use of LPG was growing rapidly. However, the main source of energy for cooking was still the firewood which was readily available in the NWFP. Moreover, due to low pressure in the NWFP and Baluchistan, biogas was not regarded as a reliable source of energy during the winter season.[43]

## Supervision

Biogas being a new technology, the beneficiaries do occasionally need guidance and supervision to ensure successful operation of the units. The supervision aspect of the project was found to be very weak. The project authority placed more emphasis on installation of units rather than on their operation. During the field visits, it was observed by the Projects Wing Team that out of 133 units, 72 units never operated and 37 units became out of order due to lack of interest and maintenance (Table 6.4 & Table 6.5).

The installation of the units was carried out on a contract basis. According to the contract agreement, the responsibility of the contractor was limited to installation/construction of the units and getting these approved from the representative of the DGNER before start-up. The initial start-up of the units was the responsibility of the owner, which was reportedly the main reason for non-operation of "never operative units". The contractor and project officer visited the project sites after the completion of physical works, but they did not help the owners in the initial start. The owners of the units being ignorant, did not start the units. No representative from the DGNER's Office ever visited the units for the purpose of rendering guidance and supervision. The existing administrative set-up as well as the spread of the units hindered effective supervision.[44]

**Selection of Locations**

The locations of units under the project were selected on pick and choose basis and no proper survey was carried out for the purpose. AS a result of this lapse, the biogas units suffered due to the following factors:[45]

i. **Weather**: In districts of Abbotabad, Mansehra, Swat, Pishin and Zhob, due to weather conditions the units could not work in winter, while during the remaining period of the year the pressure of gas remained so low that it failed to substitute the other sources of energy.

ii. **Availability of firewood and LPG:** In the districts of Abbotabad, Mansehra, Swat, Mardan and Pishin, the firewood and LPG were readily available. Therefore, people preferred to use firewood and LPG.

## Technology

Although the technology used in these plants was very simple, its users still needed some training and guidance which were not provided by the implementing organization (DGNER). Moreover, plants installed under the project were open wells which were socially not acceptable. Further, the gas pipes used were blocked with water which caused the stoppage of gas. It was further observed by the Projects Wing report that if once a plant stopped the supply of gas, it never became operational again. The Project did not have a provision for the training of beneficiaries, and it had no in-built system of supervision and guidance.[46]

## Achievement of Project Objective

The project was planned to meet the total energy requirements of selected villages by installation of biogas units. It is evident from the preceding pages that this remained to be realized. The FBUs installed in Baluchistan and the NWFP could not become fully operational . As of June 1988, only 18 per cent of the installed units visited by the Evaluation Team were found working and those too with low pressure. The working units, therefore, were not able to meet the energy requirements of the owners who were compelled to shift to other sources of energy. The most alarming feature of the program was that out of the total installed units, about 55 per cent never became operative.

## Coordination

The Project was spread over the entire country which made it impossible for the DGNER to coordinate effectively due to shortage of trained staff and enormous traveling involved. Enough interest on the part of the beneficiaries could not be generated to make them committed to the concept due to coordination difficulties. In fact, the DGNER lacked the capacity and capability for the implementation and operation of the project. Defective procedures and practices further added to the problems. To achieve better results, the implementation of the project could be handed over to the provincial governments and the DGNER could act as "coordinator" with a minimum of staff.

## CONCLUSION

The implementation of the projects relating to new and renewable sources of energy has been examined in this chapter. The implementation of a number of projects pertaining to the solar energy, wind energy, and biogas were analyzed. All the five projects for solar and wind energy suffered a delay ranging from 12 months to 108 months (Table 6.1) and an average cost over-run of 121 percent. The scope of four of the projects also underwent a downward revision. The performance of the installed solar and wind systems was unsatisfactory; 7 out of 15 were not operational and the remaining were operating at much below their rated capacity. Similarly, the "Biogas Development Project" with a significantly reduced scope suffered a delay of 3 years. The performance of the installed biogas units was depressing; majority of them were non-operational. The beneficiaries of both of these projects were highly dissatisfied and the projects failed to achieve their objectives. In the case of solar and wind energy systems, the projects were not even able to meet their operational cost and the Government was incurring a loss of more than three million rupees per annum. A number of factors influenced the implementation of these projects as discussed below.

**Organizational Capacity.** The foregoing discussion has demonstrated that the implementing organization (DGNER) did not possess the capacity and capabilities to execute the projects. It suffered due to lack of trained staff. Moreover, the projects were spread over the entire country. It was therefore not possible for the DGNER to effectively supervise their implementation. The DGNER was not even able to spend the budgetary allocations released to it on yearly basis. It could utilize only about two-third of the funds in a period of ten years. The project formulation was faulty and particularly the sites selected for the projects were not suitable. The locations for seven solar energy projects could not be identified by the DGNER in ten years. The projects suffered inordinate delays in their completion and the implementing organization could not complete the projects even within the revised completion schedule. AT the end of the project period, the physical progress in the case of solar energy projects was only 60 percent. The delays in the completion of the projects were accompanied with cost increases. The inability of the DGNER to complete the projects on time resulted in cost increases and wastage of national resources.

Kelman[47] holds that 'organizational capabilities' are crucial for the implementation of public policies. One cannot expect good results if a task is entrusted to an organization which does not possess the requisite competency and the capacity to handle it. Durant's[48] perspective has wider implications and considers both 'adequacy and credibility of enforcement resources' necessary for implementation success. In other studies, it is contended that lack of 'needed skills and knowledge'[49] and 'weakness of provider institutions'[50] render even the best policies useless. The DGNER did not possess the requisite capabilities and capacity and therefore could not do better. Ironically, no attention was paid to improve the state of affairs.

**Organizational Structure and Procedures.** An inappropriate organizational structure and faulty procedures and practices affected the implementation of the projects adversely. The DGNER centralized all the powers at its headquarters at Islamabad. Instead of decentralization which was necessary for efficient implementation of the projects spread over the entire country, the DGNER chose to wind up the regional offices in the incipient stage. Lack of proper personnel policies and incentives for the staff resulted in high turn over of the trained manpower. The installed solar, wind and biogas units equally suffered due to poor maintenance, lack of technical advice and proper supervision. There was no check on the field staff. The operations of these units were stalled due to difficulties in carrying out repairs and non-provision of supplies such as diesel, computer diskettes, log/graph paper for which approvals had to be obtained from the Head Office at Islamabad. Due to lack of proper supervision, the contractors also resorted to malpractice such as use of substandard material and equipment. They did not even supply certain components.

The importance of an effective and appropriate organizational structure and efficient procedures cannot be overemphasized. A number of case studies, as mentioned in the preceding chapters, have highlighted their importance for an effective implementation of public policies. Administrative weaknesses and defective personnel policies contributed significantly to reduce the capacity of the DGNER to implement the projects effectively.

**Bureaucratic Politics.** Sapolsky[51] considers the 'skill at bureaucratic politics' an asset for the implementers in multi-actor implementation situations. The DGNER exhibited high proficiency in it. In spite of the faulty implementation of the projects, the DGNER was able to receive huge sums of money for ten years to spend the way it liked. This demonstrates that the top management of the DGNER was highly skilled in bureaucratic politics. The approval of defective projects by the competent authority, subsequent revisions without the knowledge of the competent authority, and withholding of information by disregarding the orders of the higher authorities speak of the extraordinary skills and prowess of the implementers. The approval for the projects was obtained by exaggerating the benefits and underestimating the costs. No corrective action could be taken in spite of the disclosures of the Projects Wing Team of the Planning and Development Division. In the case of Pakistan's energy policy implementation therefore the skill of the DGNER at bureaucratic politics brought about dire consequences. The present study points towards the need to institute an effective system of accountability to guard against the undesirable consequences of the 'skill at bureaucratic politics'.

**Faulty Project Formulation.** The implementation suffered significantly due to the faulty project formulation by the DGNER. All the projects, except Japanese Aided Project, had to be revised by scaling down the scope and enhancing the cost. The selection of suitable locations for the projects was crucial for the achievement of project objectives. This aspect was completely ignored by the DGNER. Even the Japanese Aided Project was no exception to this. It has been demonstrated in the preceding pages that all the projects, except one at Malmari, were located at wrong sites. The solar and wind energy projects were located near the national grid power lines, whereas the biogas projects were located at places where the weather conditions were not suitable for biogas generation. Moreover, the financial status of the beneficiaries and the availability of animal waste were completely ignored in the case of biogas projects. The power distribution system of the solar power stations also suffered due design defects and substandard equipments. There was also no system for the guidance and training of the users of biogas technology. It has been pointed out by several studies, as discussed in the preceding chapters, that defective project formulation adds to the implementation problems and makes it difficult to realize the policy goals. The present study provides further evidence to support these findings.

**Interorganizational Coordination.** The project suffered due to lack of interorganizatioal coordination. Proper coordination with the provincial governments could improve not only the field supervision of the projects but also would have helped in the selection of suitable locations for the projects. The DGNER could benefit from the work of the organizations engaged in research and development of solar, wind and biogas technologies. Coordination with WAPDA would have helped the DGNER to select sites for the solar energy projects away from the national grid. The knowledge about the weather conditions of an area was crucial to locate solar, wind and biogas projects. The DGNER located these projects with scant regard to the weather conditions. Coordination with the Metreology Department would have helped in the selection of suitable sites for the projects. Lack of coordination with other organizations proved fatal for the realization of project objectives.

**Organizational Control and Accountability.** It appears that there was no effective control over the DGNER and its management was not accountable for anything to anybody. It formulated defective projects, mismanaged their implementation and failed to achieve the project goals and caused considerable distress to the people, but there was no one to rectify the situation. The scope of the projects was also downgraded without any approval of the competent authority. There was no system to know what it was doing. There existed no system by which it could be found whether the DGNER had actually purchased and distributed the household appliances and whether it had established the FBUs. The DGNER refused to provide the list of the beneficiaries even to the officers of the Planning Division. It selected absolutely unsuitable locations for its projects. The performance of the installed units was highly unsatisfactory. The people were dissatisfied and angry. Expensive machinery and equipment continued to be rusted (for example, wind mill at Malmari and other equipment in its stores at Islamabad), but no body pointed a finger. The solar station at Khurkera was located within 3 km from the national grid and the people were unhappy, but the DGNER was planning further expansion in it. The DGNER was planning to shift the solar station at Kankoi to some unidentified place as the people were demanding electricity supply from the national grid which was only 2km from the village. This station was also first upgraded from

$5kw_p$ to $36.8kw_p$. In spite of this, the DGNER continued to spend national resources the way it liked and without any accountability and rectification of the state of affairs. Absence of effective control over the implementing agency as well as lack of accountability caused the public money to go down the drain.

McLanahan[52] contends that 'public accountability' is crucial for effective implementation of public policies. Thompson[53] adds that the 'capacity of oversight actors' plays a central role to evolve an effective system of accountability. The implementation of solar and wind energy and biogas projects demonstrated the importance of having an effective system of accountability and vigilant control by the sovereigns.

**Participation of Target Groups/Beneficiaries.** The projects had been inflicted on the target groups who were dissatisfied and unhappy about the situation. In the case of the solar energy projects, the people were unhappy as the power supply was not regular especially in winter months, fans/tube-lights were not supplied to them according to their requirements, and they could not use household electrical appliances. Moreover, they felt cheated as they were deprived of the facility of electricity from the national grid due to the solar projects, whereas the nearby villagers were enjoying the facility of electricity supply from the national grid. In certain cases, the villagers had refused to take power, and in others refused to pay electricity charges. Even those who had been provided electricity free of charge were not satisfied due to irregular and unreliable power supply and were demanding A.C. supply. Similarly, the performance of the biogas units was hopeless and the people were dissatisfied. Under the existing arrangements, these units were absolutely useless for them which were unnecessarily occupying space in their houses. The DGNER probably envisaged that no one would look the 'gift horse' in the mouth. However, the gift of the DGNER became a liability for the villagers and the projects failed to achieve the policy objectives. The case study demonstrates that the participation of the target groups/beneficiaries in the project formulation is essential where their interests are significantly affected. The importance of interest group participation in such situations has also been recognized by several implementation analysts as discussed earlier.

**Bureaucratic Corruption**. The implementation analysis in the preceding pages suggests a strong possibility of bureaucratic corruption. The whole affair appears to be scandalous. The refusal of the DGNER to provide the lists of the beneficiaries of FBUs and household equipment, substandard work of the contractors, use of substandard equipment and high cost escalation all point towards the possibility of embezzlement of public funds.

To sum up, the implementation of solar and wind energy and the biogas projects was affected by a number of factors. It was a case of total failure in the realization of project objectives as a result of faulty project formulation and poor implementation by an inadequate but corrupt organization with high level skills at bureaucratic politics. It also proved that policy implementation was not a straight forward matter, and that the implementers exercised considerable discretion to affect changes in the original policy in intents. The factors which influenced the implementation of these projects were: organizational capacity; organizational structure and procedures; bureaucratic politics; faulty project formulation; interorganizational coordination; target groups/beneficiaries' participation; organizational control and accountability; and bureaucratic corruption. The implementation was affected adversely due to the negative implications in all the areas.

## NOTES

1. Due to its sensitive nature, the officials were reluctant to provide information. They were afraid of the repercussions and were therefore assured of anonymity. The sources of information therefore have remained anonymous.

2. Information provided by the DGNER, Islamabad, December 1988.

3. Ibid.

4. Ibid.

5. Ibid.

6. Government of Pakistan, Planning and Development Division (Projects Wing), Report on Performance Evaluation of Solar Energy Projects, Islamabad, 1989, p. 5.

7. Ibid.

8. Ibid.

9. Ibid.

10. Information provided by the Projects Wing, Planning and Development Division, Islamabad, December 1988.

11. Government of Pakistan, Planning and Development Division (Projects Wing), Notes of the Evaluation Team on the Field Visits to the Solar POwer Stations, Islamabad, December 1988.

12. Information provided by the DGNER, Islamabad, December 1988.

13. Information provided by the Projects Wing, Planning and Development Division, Islamabad, December 1988.

14. Notes of the Evaluation Team on the Field Visits to Solar Power Stations, op. cit.

15. Report on Performance Evaluation of Solar Energy Projects, op. cit., p. 6.

16. Ibid., pp. 6-7.

17. Information provided by the Projects Wing, Planning and Development Division, Islamabad, December 1988.

18. _Ibid_.

19. _Notes of the Evaluation Team on the Field Visits of Solar Energy Projects, op. cit._

20. _Report on Performance Evaluation of Solar Energy Projects, op. cit._, p. 8.

21. _Ibid._, pp. 8-9.

22. Information provided by the Projects Wing, Planning and Development Division, Islamabad, December 1988.

23. _Notes of the Evaluation Team on the Field Visits to Solar Power Stations, op. cit._

24. _Report on Performance Evaluation of Solar Energy Projects, op. cit._, p. 10.

25. _Ibid._

26. Information provided by the Projects Wing, Planning and Development Division, Islamabad, December 1988.

27. _Ibid._

28. Information provided by the DGNER, Islamabad, December 1988.

29. _Ibid._

30. _Ibid._

31. Information provided by the Projects Wing, Planning and Development Division, Islamabad, December 1988.

32. _Ibid._

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# CHAPTER VII

## CONCLUSION

This thesis has examined the implementation of energy policy in Pakistan. The particular focus has been on the identification and analysis of factors which have influenced the implementation of energy sector projects and programmes during the 1947-88 period. The study has analyzed major policy initiatives with a view to exploring the dynamics of the implementation process. The thrust of Pakistan's energy policy during the study period, irrespective of regime changes, has remained to decrease dependence on imported energy by developing indigenous resources. The energy sector therefore has been receiving high priority and substantial financial allocations, on the basis of careful assessment of indigenous potential and energy requirements in the light of Pakistan's socioeconomic goals, throughout the study period. However, the implementation dynamics blocked the realization of policy objectives and targets, resulting in a widening gap between commercial energy requirements and domestic production. It rendered the achievement of energy policy objectives and targets, over time, increasingly unpredict-able and delayed.

The study has identified a number of factors which influenced the implementation of energy policy in Pakistan during the 1947-88 period. The cases clearly are illustrative of the dominant paradigms of the policy implementation literature as discussed in Chapter I. The cases demonstrate that implementation is a bargaining process as the policy could not be dictated and was negotiated with participants striving to condition implementation in whatever forum and at whatever stage of the policy process seemed promising to them in the pursuit of self-interests (Kalabagh Dam Project). The implementing agencies also used their discretion to change the policy contents during the implementation (for example, WAPDA in cases of power system losses and rural electrification), or while translating policy into programs (for example, DGNER in the case of solar energy and biogas projects). This supports our viewing the 'holistic approach' as more appropriate for studying the implementation of energy policy in Pakistan. Nevertheless, the cases also suggest refinements to the conventional wisdom associated with prominent concepts of the policy implementation literature: refinements inspired by the identification of implications in the context of Pakistan's energy policy as well as the identification of additional factors critical for implementation success in particular situations. The factors which influenced the implementation of energy policy in Pakistan during the 1947-88 period as highlighted by the present study are examined below.

**Formal Policy**. A number of implementation studies identify poorly framed policies as a source of a litany of implementation problems.[1] The clarity, specificity and consistency of policy goals, problem tractability, and sound technical theory, according to these studies, facilitate implementation. The policy itself would be responsible for implementation difficulties if it contains erroneous assumptions about either the nature of the problems that were to be solved by the policy or how the agencies operate in practice. In addition, the policies would fail if their underlying aims were unclear or contained ambiguities that permitted multiple interpretations.[2]

The present study generally lends support to the above findings. The implementation of power generation targets and programmes suffered as a result of erroneous assumptions and wrong assessment about weather conditions, access to nuclear technology, geopolitical environment, availability of gas for thermal generation, and future requirements. Lack of clear and specific policy directives posed constraints in respect of rural electrification, the coal policy, and oil and gas exploration and exploitation. The policy variables were therefore critical for implementation success in these areas. However, in spite of clear and specific policy goals in respect of the Kalabagh Dam Project, and the New and Renewable Sources of Energy Project, the policy goals remained unachieved due to various other factors. The critical factors for implementation success in those cases were different: the affected interests in the case of Kalabagh Dam Project; and organizational accountability and control in the case of the New and Renewable Sources of Energy Project.

**Project Formulation.** The policies are translated into programmes and projects/schemes. Project formulation is a critical factor for successful implementation of any policy as it is in this phase that many decisions are made on which depends the implementation of a project. These decisions include not only the design and scheduling for implementation but also assumptions on matters such as technical methods, costs, availability of skilled manpower, location, pricing, and participation by the recipient population. These assumptions may be wrong or may not eventuate once the project is being implemented if proper attention is not paid to the project formulation. The project approval system must provide for the formulation of projects which are viable and contribute to the policy objectives. Firstly, these programmes and projects should be so conceived that they would contribute to achieve the policy objectives. Moreover, all projects within a policy area should reinforce each other. Secondly, they should be technically sound. Thirdly, they must be acceptable to the target groups/affected interests. In cases where opposition and conflict is anticipated, the stakeholders must be associated at the project formulation stage.

Pakistan has an elaborate project approval system. However, the cases of the Kalabagh Dam Project, power system losses, rural electrification and the New and Renewable Sources of Energy Project demonstrate that scant attention was paid to the above mentioned aspects. The DGNER was able to manipulate the approval of projects which failed to achieve the policy goals, and the WAPDA became instrumental to start a national controversy on the Kalabagh Dam issue. The Kalabagh Dam Project was challenged even on technical grounds which lent support to the opponents of the project. Defective project formulation is rampant in developing countries. Rondinelli notes that the three most frequently observed causes for implementation failures in Third World countries are: ineffective project planning and preparation; faulty appraisal and selection processes; and defective project design.[3] Pakistan is particularly infested with this problem. The findings of a study group (Chapter I) of Planning and Development Division indicate that 10 out of the 20 most frequently observed implementation difficulties during the 1978-83 period related to project formulation.[4]

**Implementation Strategy.** Implementation strategy can influence policy effectiveness considerably.[5] The strategy has to be conceived in the context or environment of the administrative action.[6] It should therefore be very carefully planned, particularly in situations where the projects offer divisible benefits. However, our study demonstrates that the implementation of energy policy in Pakistan suffered due to the absence of an appropriate implementation strategy responsive to objective realities. It resembled the bureaucratic-authoritative archetype which expected prompt and complete compliance with policies formulated without regard for the interests of lower levels of authority and nongovernmental actors.[7] This approach created insurmountable difficulties for the energy bureaucracy of Pakistan. It had telling effects on the implementation of the Kalabagh

Dam Project (Chapter V). Research recognizes the value of using other methods of dispute resolution such as mediation, facilitation and arbitration in similar situations.[8] The possibility of using these techniques to resolve the Kalabagh Dam dispute could be assessed. The strategy adopted for the implementation of nuclear energy policy also proved equally harmful (Chapter IV). A better strategy would have helped to realize policy goals in both of these cases. For both of these cases, appropriate implementing strategy was critical for implementation success.

**Institutional Structure and Procedures.** At the time of independence, the administrative arrangements for the formulation and implementation of energy policies were inadequate. Oil and coal production was handled by the private sector. In the power sector, there were a number of small electric undertakings which served urban areas. The strengthening of institutional arrangements, therefore, received attention immediately after independence. The Government adopted policies which aimed at enhancing its control over the power development and distribution operations in the country. The policy of nationalization of electric companies was pursued with conviction, and the Government nationalized the entire power sector in a short period. By 1985, WAPDA gained monopolistic control over the power sector, under nominal supervision of the Ministry of Water and Power. The approach in respect of the fuels sector was different. The policy in respect of the fuels sector initially provided for complete dependence on private sector investment but with maximum control over the operations of the private sector operators by the Ministry of Petroleum and Natural Resources. The Government could not have direct involvement due to paucity of funds. Its role, however, expanded in 1961 when it established the Oil and Gas Development Corporation (OGDC) to undertake oil and gas exploration and exploitation activities directly.

The present study demonstrates that the structure and procedures of the implementing agencies adversely affected the realization of energy policy goals in Pakistan. Overcentralization, defective organizational structure, irrational personnel policies and practices, inefficient and archaic procedures, lack of internal coordination, ineffective supervision, inefficient operating techniques, poor maintenance practices, and lack of rational internal priority setting systems were observed to infest the energy sector organizations, which imposed constraints upon effective implementation. Poor implementation of transmission and distribution projects, power system breakdowns, misreporting of rural electrification and power losses, poor thermal efficiency, defective project formulation, and lack of progress in railway electrification (Chapters IV & V) were the manifestations of poor structures and procedures. Similarly, institutional inadequacies and poor management practices hampered the realization of policy goals in the fuels sector. Coal policy has particularly suffered due to structural and procedural flaws. In the bureaucratic hierarchy, the position of the officers dealing with coal policies has remained low. Their views, therefore, do not get proper attention of the higher-ups. Consequently, most of the policy measures suggested from time to time have remained unimplemented (Chapters IV & VI).

A number of implementation studies have underlined the importance of efficient and appropriate organizational structure and procedures for successful implementation.[9] The findings of the present study are in consonance with them. The authors of Pakistan's First Five Year Plan (1955-60) also had a similar assessment: 'We are of the view that in the period immediately ahead, the inadequacies of Pakistan's administrative machinery will operate as the most serious single impediment to the maximum economical use of the country's financial and material resources'.[10] The present study demonstrates that the energy sector organizations continued to be infested with administrative inadequacies resulting in the wastage of national resources.

**Organizational Capacity.** "Capacity" is defined as the ability of an organization to:[11]

- anticipate and influence change;
- make informed, intelligent decisions about policy;
- develop programs to implement policy;
- attract and absorb resources;
- manage resources; and
- evaluate current activities to guide future action.

The importance of 'organizational capacity' has been recognized by several implementation studies[12]. The implementation of a number of energy policy initiatives and projects in Pakistan suffered due to lack of organizational capacity and capabilities. The fuels sector was particularly the victim of organizational inadequacies. This was even recognized by outside observers (Chapter IV). The oil and gas exploration and exploitation and the coal policy goals remained unachieved due to this weakness of Pakistan's energy bureaucracy. The implementation failure in the case of New and Renewable Sources of Energy Project (Chapter VI) was mainly the result of organizational inadequacies of the implementing agency (DGNER) which simply did not have the capacity to formulate and implement the projects. Ironically, no efforts were made to affect improvements.

**Interorganizational Coordination.** In multi-actor implementation situations, interorganizational coordination is critical for implementation success. A number of implementation studies have recognized the importance of coordination in situations where the agreement of a number of actors is crucial for successful implementation of a policy.[13] In their study, Pressman and Wildavsky[14] highlight the implementation difficulties arising out of the complexity of joint action and demonstrate that these difficulties can stall the progress to achieve policy objectives. The number of actors, in addition to the lead agency whose agreement is crucial for the implementation of a policy, is the key element for coordination. The lead agency can secure agreement by offering inducements which are considered important by them. The implementation of "new towns in-towns" program to build model new communities on surplus federally owned land in metropolitan areas started by Johnson administration in 1967, however, demonstrates the fluid nature of these agreements. No construction could be initiated due to initial agreements changing to disagreements.[15]

The present study has demonstrated that coordination is crucial for successful implementation, but difficult to achieve. Integration and coordination of various programmes and appropriate linkages for optimal utilization of local resources consistent with the plan objectives, national needs and regional disparities (horizontal and vertical) are indispensable. In such situations of interaction and interdependence as are observable in the energy sector, efficient action comes about through coordination only. However, coordination has often not been considered to be a necessary precondition, or is lacking due to conflicts between various line agencies, resulting in the complete absence of well structured and workable systems or mechanisms of coordination. The energy sector of Pakistan is fraught with inter-organizational implementation problems. Realizing its importance, the Government established a coordination committee (NEPC). Bureaucratic in-fighting, however, hampered its proper functioning (Chapter IV). The case of NEPC is a typical case of coordination difficulties caused by bureaucratic infighting for domain extension. Even a powerful Chairman with full backing from the Head of the State failed to achieve desired results. The organizations involved in the implementation of energy policy persistently raised issues with a view to get prominence. The basic issues somehow remained unsolved and coordination of implementation of energy policy suffered. With the departure of the Chairman, even the meeting of National Energy Policy Committee could not be held.

Due to lack of coordination, the implementation of various projects was adversely affected. The implementation of transmission and distribution schemes of WAPDA, the electrification of railway, WAPDA's fuel mix policy for thermal generation and coal policy suffered due to lack of interorganizational coordination (Chapter IV). Lack of coordination was a major factor in the failure of the New and Renewable Sources of Energy Project (Chapter VI). The case of the Kalabagh Dam has highlighted the difficulties arising out of the complexities of joint action. There were several "veto points" which stalled the implementation of the project. Effective coordination with various actors in this situation to secure agreement was critical for the implementation of this project.

**Organizational Control and Accountability.** Prior research suggests that if policy-makers do not have the capacity to monitor the activities of the implementing agencies, they will find it difficult to exert effective control over them.[16] Waterman and Wood[17] stress the need to institute a reliable monitoring system to enhance the effectiveness of the policy-makers in controlling the implementers. They argue that without a monitoring system, the implementing agencies tend to mislead the policy-makers by virtue of having a greater knowledge about the implementation process and particularly about the relevant policy outputs. They can, for example, convince the policy-makers that their policy goals are being achieved, when in fact they are not. Since the implementers themselves are evaluated on the basis of this faulty but complementary information, they also have the incentive to provide misleading information to the policy-makers. An effective monitoring system can provide policy-makers, in real-world situations, with direct, systematically derived, and unbiased information on the level and nature of a particular policy output on a continual basis. Hogwood and Gunn[18] consider the 'control over implementers' essential for implementation success.

The absence of an independent, reliable and effective monitoring system prompted the energy bureaucracy in Pakistan to resort to the malpractices referred to in the preceding paragraph. WAPDA misled the Government in respect of the Kalabagh Dam Project (design and its implications), power distribution system, power losses and rural electrification. It withheld information in respect of thermal efficiency, fuel mix for thermal generation and other inefficient procedures and practices (Chapter IV). The implementation of the rural electrification programme presents an interesting situation. The political bosses desired to accelerate the process of rural electrification. The funds were also provided. It was only after a decade that they came to know that WAPDA was inflating the figures and its reports contained paper connections to such an extent that the entire scenario changed. Similarly, the DGNER continued to expend resources with scant regard to the achievement of policy goals. In fact, they worked to cause an alienation amongst the people (Chapter VI), and nobody could stop them from squandering the national resources. Lack of a reliable system of accountability and control in Pakistan left the energy bureaucracy on its own, to the detriment of realization of policy goals.

**Technology.** The implementation of nuclear energy policy in Pakistan suffered due to non-availability of nuclear technology. It was one of the critical factors which stalled the implementation of nuclear energy policy. In other policy areas, though it affected the implementation adversely, it was not a critical factor. In the case of New and Renewable Sources of Energy Project, inappropriate technology (notably biogas plants not acceptable to the people) also contributed to implementation failure. In the case of WAPDA projects, delayed availability of technical documents and supplies from abroad contributed to implementation delays. Similarly, restricted access to the latest technology hampered the oil, gas and coal exploration and exploitation efforts of the Government.

Transfer of sensitive technology is an international problem. The case of nuclear power policy has demonstrated (Chapter IV) that international relations influence such transfers. This is a factor which is critical only for developing countries. Nevertheless, organizational concerns such as 'technical requirements of the task' or 'task technology' are universally applicable and have been recognized in certain cases to pose constraints for successful implementation.[19]

**Bureaucratic Politics.** Anthony Downs, in his classic work Inside Bureaucracy, argues that agency members will routinely strive to advance their agendas, whether from their desire to engage in personal aggrandizement or to promote their own policy goals, at the expense of functional rivals. At the organizational level, this generates vigorous competition for turf, responsibility, personnel, and budgets.[20] Renate Mayntz perceives the public agencies 'as actors whose task is the basis of their existence, but whose actions are largely oriented towards the achievement of organizational goals such as domain extension, conflict avoidance, saving energy and obtaining resources'.[21] In the developed world where the supremacy of the political sector over the bureaucratic is established, the functional rivalry between agencies facilitates the monitoring of administrative behaviour by the politicians charged with oversight and spurs the adoption of efficient production techniques by the bureaucrats being scrutinized.[22] In the absence of strong political leadership in Pakistan, bureaucratic politics generally followed the pattern described by Renate Mayntz and the public sector turned into a highly differentiated macro-system of organizations.[23] Thompson,[24] following Cyert and March,[25] argues that in all organizations, coalitions will form in order to control the organization.

The present study demonstrates that bureaucratic politics substantially contributed to the implementation failure of energy policy in Pakistan. The case of NEPC demonstrates the degeneration of bureaucratic politics into domain extension and aggrandizement of personal interest at the cost of energy policy goals (Chapter IV). The DGNER was able to secure resources for extended periods without any objection from any colleague (Chapter VI). The implementation of railway electrification programme is an example of bureaucratic infighting within an organization. The powerful group of the agency did not allow the policy to be implemented as it affected its position in the organizational setup (Chapter IV). The agency response in respect of controlling power losses was an example of determined effort to protect the interest of the employees. Power theft with and without the connivance of the staff of the implementing agency contributed significantly to the overall losses, but could not be controlled due to the vested interest. WAPDA reportedly resorted to false reporting and underestimation of the losses, but no action was taken against anybody (Chapter IV).

**Bureaucratic Apathy and Resistance to Change.** An important finding of the present study is that bureaucratic apathy and resistance to change affected the achievement of energy policy goals adversely. York Willbern holds: 'Civil servants carry out the instructions of their political superiors with vigor and alacrity if they agree with them, and with some foot dragging and modification if they disagree'.[26] Lots of 'foot dragging and modification' by the energy bureaucracy of Pakistan is depicted by the present study. Reforms efforts have been resisted by the energy bureaucracy with tenacity. The case of the Power Commission of Pakistan offers a classic example of determined effort against such measures (Chapter IV).

The rules and regulations for the development of the fuels sector remained unchanged until 1976 and consequently private investment in this sector, on which the development of this sector depended, remained minimal. The change required the removal of procedural bottlenecks and elimination of undue interference by the bureaucracy, which was resisted by the bureaucrats. The first revision of rules took place in 1976 when the politicians were in power. The second change in rules was affected in 1986, and this again happened during the period when the politicians were staging a comeback. They provided the necessary stimulus to break the bureaucratic apathy. The lack of interest of the private oil and gas companies in the exploration and exploitation activities coupled with the enhanced interest of the USSR in Pakistan motivated the bureaucrats in the Ministry of Petroleum and Natural Resources to involve themselves directly in oil and gas exploration and exploitation in 1961. The establishment of the Oil and Gas Development Corporation (OGDC) was the result. Soon, their interest faded away as it required delegation of power to the technocrats which was not in their interest. Therefore, OGDC could not expand its activities until 1973. The 1973 oil shock and the fact that politicians were in power during those days, made it possible for the OGDC technocrats to secure enhanced allocations and reasonable freedom of action to increase the level of their activities. However, continued domination by the generalist administrators on the Board of Directors posed considerable constraints for the healthy growth of the fuels sector. Similarly, the development and utilization of coal remained neglected, although almost all the plans emphasized its development and utilization. Bureaucratic apathy and inertia again played a major role. (Chapter IV).

The DGNER affected major changes in the projects without the approval of the competent authority. It refused to provide the complete lists of the beneficiaries even to the monitoring team of the Planning and Development Division. It ultimately failed to achieve the policy goals, but did not affect any structural and procedural improvements

(Chapter VI). Similarly, WAPDA resisted the measures aimed at procedural, technical and organizational improvements. Its officials even sabotaged the efforts of the Governments to control power losses by resisting the installation of capacitors (Chapter IV).

**Political Support/Influence.** An interesting finding of the present study is that political support to some projects affected the implementation adversely. The support of the sovereigns is generally considered an asset for the successful implementation of a policy.[27] However, in the context of Third World countries, political commitment and support is not a sufficient condition for successful implementation and may even become a liability. Stephen Quick's[28] analysis of the cooperative policy of Zambia demonstrates that the policies which are extensively supported but poorly defined will fail to achieve any useful developmental objectives. In such situations, the implementing agencies continue to spend resources to prove that action is being taken and results are being achieved in order to satisfy the political leadership or the sovereigns. In the context of present study, the cases of the rural electrification (Chapter IV) and the New and Renewable Sources of Energy Project (Chapter VI) support the findings of Stephen Quick.

In both of these cases, the projects enjoyed extensive support and commitment of the sovereigns but the policy goals lacked specificity. WAPDA and the DGNER therefore resorted to misreporting the achievements to obtain resources as well as satisfy the sovereigns.

The study also demonstrates that powerful sections of society exerted pressure on the energy bureaucracy to bend the programs to their advantage, which affected the realization of policy goals adversely. Excessive power losses in the WAPDA power system were partly the result of these pressures. This is also a typical Third World phenomena which has been highlighted by a number of studies.[29]

**The Affected Interests.** A number of studies have highlighted the importance of affected interests and target groups for the implementation of public policies.[30] The theme of the existing research is: if the policy offers divisible benefits or adversely affects certain interests, its implementation will be problematic. The severity of constraints will be dependent upon the quantum of positive or negative consequences of the policy and the size and power of the affected population. The involvement of the affected interests/target groups at the policy/project formulation stage can contribute to mitigating the implementation difficulties.

The present study provides further evidence to support the thrust of this existing research. The Kalabagh Dam sparked intense political activity as the project was envisaged to bring about significant changes in the socio-political and economic life of the nation. As the people were not involved at the formulation stage of policy cycle, the reaction was very violent. The Government had already incurred an expenditure of about one billion rupees when the controversy began and consequently the whole nation stood divided on the issue. The implementation of the project was stalled (Chapter V). The case of the New and Renewable Sources of Energy Project demonstrates that the failure of the DGNER to involve the people at the project formulation as well as at the implementation stage proved fatal for the achievement of policy goals. Lots of public resources were expended only to make the people unhappy (Chapter VI).

**The Timing.** Prior research suggests that more analytic attention should be given to the role of "time" in the compliance decision calculi.[31] The running theme is that while the policy is the product of conditions and coalitions at a single point of time, implementation must occur over time. Consequently, it is vulnerable to shifting public concerns, policy attitudes, and political agendas that can render implementation both unpopular and problematic. Such shifts benefit recalcitrant targets who may mobilize those who share a stake (material or ideological) in frustrating implementation. The more inconsistent a policy becomes with the priorities of the current political agenda, the more enforcement zeal diminishes and the chances of its implementation are minimized. The case of the Kalabagh Dam Project adds further evidence to the findings of the existing research. The project was launched at a time when political readjustments were taking place in the country. Provincial, linguistic and ethnic issues had occupied a prominent place in the political agenda of the country. A weak political setup was struggling to get rid of martial law, and a bewildered Chief Martial Law Administrator was endeavouring to carve out a place for himself in the emerging political setup of the country. The print media had just been freed from long captivity. In fact, it was the most inappropriate time for launching a project which offered divisive benefits to a large segment of the population (Chapter V).

**The Related Issues.** An interesting finding of the study is that the implementation of a project offering divisive benefits with repercussions at the national level may lure opponents to associate it with controversial and ticklish national issues. This was observed in the case of the Kalabagh Dam Project. A number of issues were raised by the opponents of the project which had no immediate solution. Such tactics caused long-term delay. This was a situation-specific factor which contributed significantly to the implementation difficulties (Chapter V).

**Personality Interplay.** Another interesting finding of the present study is that intervention of strong personalities with political clout due to personal reasons can influence implementation considerably. This is also a situation specific factor rampant in the developing countries. The case of the Kalabagh Dam Project provides evidence to this effect (Chapter V).

**International Agencies.** The study demonstrates that international agencies such as the World Bank, IMF and Asian Development Bank influenced the implementation of energy policy in Pakistan. The pressure of loan-giving agencies to affect structural changes in the economy have forced the implementing agencies and the Government to increase energy tariffs. Most of these organizations have also attached the covenant of self-financing to the loan agreements, thereby forcing the implementing agencies to improve efficiency and control wasteful use of resources. Their influence has mainly been positive. This is also a situation-specific phenomenon generally applicable in the developing countries.

**International Politics/Events.** An important finding of the study is that international politics and events significantly affected the implementation of energy in Pakistan. Their impact was mainly negative. The implementation of the nuclear power development programme of Pakistan presents a classic case of a super power involvement to stop a country from implementing a national policy which has the full backing of the people. Pakistan has not been able to implement its nuclear energy development programme, although efforts in this regard have been persistently made for the last two decades. The Government of Pakistan has admitted on various occasions its failure to enlist support of foreign governments in this regard. The Indian nuclear explosion created a commotion in the world and the United States of America went all out to stop nuclear technology transfer to Pakistan. The wars with India and the secession of the erstwhile East Pakistan had a telling effect on Pakistan's economy due to diversion of resources to meet the national emergency. Moreover, they also caused the stoppage of aid by the donor countries. Overall resource constraints therefore also affected the energy sector adversely. Pakistan's refusal to agree to the terms dictated by the USA in respect of nuclear programme also caused the stoppage of US aid for extended periods, which affected the implementation of energy policy adversely due to resource constraints (Chapter IV).

**Bureaucratic Corruption.** A significant finding of the present study is that bureaucratic corruption affected the implementation of energy policy adversely. The study provides strong evidence for bureaucratic corruption in the form of embezzlement of public funds and fraud in the collection of revenues. The theft of electricity with the connivance of WAPDA staff, use of substandard material and equipment, kick-backs from the contractors, and paper connections, all prove the contention (Chapter IV). The case of the New and Renewable Sources of Energy Project demonstrates that bureaucratic corruption is rampant in the DGNER (Chapter VI).

Corruption in some form exists in all political and administrative systems. However, it is wide-spread in the developing countries. Myrdal[32] and many other writers[33] contend that there is a well entrenched process of corruption in the political and administrative systems of the developing countries and the presence of corruption retards developmental processes. There are multi-factor reasons given for the continuation of corrupt practices in Third World nations — not the least is that public officials are paid very small salaries and must seek extra funds to support their families. Whatever the reasons, bureaucratic corruption is a situation-specific factor which affects the implementation of public policies in Third World countries. The present study provides evidence to support this contention.

The foregoing discussion of the factors influencing the implementation of energy policy in Pakistan demonstrates that these factors can be classified into two categories: core factors; and contingent factors. There are some factors which have universal relevance and affect public policy implementation in any sector and system or situation. They may be called the "core factors". These factors must be considered in implementation success calculi of any policy in any system. From the present study, the "core factors" are: formal policy; project formulation; implementation strategy; institutional structure and procedures; organizational capacity; interorganizational coordination; organizational control and accountability; and the affected interests. The "contingent factors" are situation specific and vary from situation to situation. A factor belonging to this category may have critical importance in a particular situation, but be of no consequence in another. From the present study, the "contingent factors" are: technology; bureaucratic politics; bureaucratic apathy and resistance to change; political support/influence; the related issues; the timing; personality interplay; international agencies; international politics/events; and bureaucratic corruption. The categorization of factors has an analytic value for implementation analysts and practitioners allowing them to make intelligent decisions when planning implementation.

## NOTES

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ANNEXURE I

## SANCTIONING POWERS OF THE VARIOUS AUTHORITIES (OPERATIVE FROM 1 JULY, 1988)

| | Authority | Power |
|---|---|---|
| 1. | ECNEC | All schemes costing above Rs. 60.00 million (Non-recurring). |
| 2. | CDWP | Federal schemes costing between Rs.20.00 million and Rs.60.00 million (Non-recurring) subject to the condition that the Ministry of Finance does not disagree. |
| 3. | Provincial Governments | All schemes costing up to and including Rs.60.00 million (Non-recurring). The power will be subject to the following conditions:- |

a) The schemes sanctioned by the Provincial Governments are in line with the objectives of the National Plans and there is no deviation from the principles and policies laid down in the Plan.

b) The schemes do not have economic or other repercussions beyond the Province.

c) A copy of PC-1 form of the scheme will be furnished to the Planning Commission at least 10 days before the meeting of the Provincial Development Workshop Party at which it is proposed to consider the scheme to enable the Planning Commission to furnish their views, if they so desire. The Planning Commission will also have the right to attend the meeting of the Provincial Development Working Party.

d) A copy of the scheme finally approved by the Provincial Development Working Party will be promptly furnished to the Planning Commission, the Ministry of Finance and other agencies concerned.

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| 4. | Azad Government of the State of Jammu & Kashmir | All schemes costing up to and including Rs.60.00 million (Non-recurring). The power will be subject to the conditions as mentioned against S.No.3 above. |
| 5. | Northern Areas Council | All schemes costing up to and including Rs.60.00 million (Non-recurring). The power will be subject to the following conditions:- |

a) The schemes sanctioned by the Northern Areas Council are in line with the objectives of the National Plans and there is no deviation from the principles and policies laid down in the Plan.

b) The schemes do not have economic or other repercussions beyond the Northern Areas.

c) A copy of PC-I form of the scheme will be furnished to the Planning Commission at least 10 days before the meeting of the Northern Areas Council at which it is proposed to consider the scheme to enable the Planning Commission to furnish their views, if they so desire. The Planning Commission will also have the right to attend the meeting of the Northern Areas Council.

d) A copy of the scheme finally approved by the Northern Areas Council will be promptly furnished to the Planning Commis-

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| | | sion, the Ministry of Finance and other agencies concerned. |
| 6. | Federal Ministries | All schemes costing below Rs.20.00 million (Non-recurring). The power will be subject to the following conditions:-<br><br>a)The Ministry concerned shall create a proper planning and monitoring unit within the organization and set up a Departmental Development Working Party in which a representative of the Ministry of Finance should also be included.<br><br>b)The Ministry of Finance does not disagree with the decision of the Departmental Development Working Party. In case there is any disagreement, the scheme will be submitted to the CDWP/ECNEC.<br><br>c)A copy of PC-I of the scheme shall be furnished to the Planning and Development Division at least 10 days before the meeting of the Departmental Development Working Party. The Planning and Development Division will also have the right to express their views on the PC-I and to attend the meeting of the Departmental Development Working Party.<br><br>d)A copy of the scheme finally approved by the Departmental Development Working Party will be promptly furnished to the Planning and Development Division and Ministry of Finance (Dev. Wing). |
| 7. | Commercial Organizations having Finance Member/Director appointed in | All schemes costing below Rs. 20.00 million (Non-recurring) and/or Rs. 4.00 million (Recurring) with the concurrence of the Ministry of Finance. The power is subject to |

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| | consultation with the Finance Division. | the conditions mentioned against S.No.6 above. |
| 8. | Corporations/ Non-Commercial Organizations having a Director/ Member Finance approved by the Finance Division. | All schemes costing below Rs. 8.00 million (Non-recurring) and/or Rs. 2.00 million (Recurring). The power is subject to the conditions mentioned against S.No.6 above. |
| 9. | Northern Areas Development Working Party. | All schemes costing below Rs.20.00 million (Non-recurring) and/or Rs. 4.00 million (Recurring). The power is subject to the conditions mentioned against S.No.6 above. |
| 10. | Islamabad Development Working Party. | All schemes costing below Rs. 20.00 million (Non-recurring) and/or Rs. 4.00 million (Recurring). The power is subject to the conditions mentioned against S.No.6 above. |
| 11. | Federally Administered Tribal Areas Development Corporation. | All schemes costing below Rs.20.00 million (Non-recurring) and/or Rs. 4.00 million (Recurring). The power is subject to the conditions mentioned against S.No.6 above. |
| 12. | Federally Administered Tribal Areas (FATA) | Governor NWFP is empowered to sanction FATA schemes to the extent permissible in respect of Provincial schemes i.e. all FATA schemes costing upto and including Rs.60.00 million (Non-recurring) after they have been processed by the PDWP. |

Source: Government of Pakistan, Planning and Development Division, Notification No.20(1)DA/PC/87, 15 November, 1987, Islamabad.

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