Pakistan's Energy Sector: From Crisis to Crisis - Breaking the Chain

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ABSTRACT

The critical state of Pakistan's energy sector is a primary constraint on the country's economic development. Despite a significant body of literature on issues and options in the sector, the deterioration continues, contributing to an ever-widening energy deficit. This paper attributes the prevailing condition to lost opportunities, prohibitive delays, implementation performance, and reform reversals. The story of Pakistan's energy sector is symptomatic of virtually all sectors of the economy. Pakistan's policy-makers have been remarkably adept in articulating the overall objectives for energy policy within a national development context. The problem is not *what* the objectives are but *how* they can be achieved.

Overwhelming evidence from energy analysts points to the absence of coordinated policy formulation as a fundamental issue. This paper picks up where the contemporary writings leave off by introducing the concept of Integrated Energy Planning and Policy Formulation (IEP) and the institutional structure which supports it. Without this, decision-making in the sector remains inherently flawed, and policy initiatives are reduced to shooting in the dark. Rather than offering prescriptive solutions, the paper advocates building Pakistan's own capacity to facilitate sound policy decisions.

The IEP mechanism, tried and tested in developed and developing countries alike, is not new to Pakistan where it was introduced in the early 1980s. However, over time, with declining institutions and erosion of human capacity, the fledgling efforts were abandoned. This was partly because IEP lost favour with international institutions on the presumption that market forces would lead to the right policy choices. This premise does not hold for the special issues in Pakistan. As a result, what is now in place is a largely ad-hoc process which responds to crisis situations instead of averting crises through a long-term vision. Although energy remains a corner-stone of the Five-year Plans, the quality of information and analysis needs substantial upgrading to enable informed policy decisions. In a high-deficit situation with significant energy reserves and vast areas of the country deprived of commercial energy access, there is a temptation to develop all forms of available energy— entirely counterproductive in a severely cash-strapped environment. IEP facilitates balanced development through optimal resource allocation.

A key element in IEP, perhaps the most difficult and therefore requiring strong political will, is the restructuring of policy institutions to reverse the unchecked fragmentation that has occurred over the years— in other words to consolidate policy institutions into a single ministry of energy. Policy makers are beginning to think along these lines but inherent in their initial deliberations is the potential spin-off of hydropower into another ministry, a move which would undermine the whole effort. This must be prevented.

The skills necessary for re-invigorating IEP are available locally and can be deployed rapidly. Combined with the consolidation of policy institutions, a strengthened policy environment can emerge, capable of addressing Pakistan's special energy issues, thereby paving the way to recovery in the sector and the economy as a whole. With universal recognition of the crisis, the time to act is now.

PREAMBLE AND STRUCTURE

The Crisis

Pakistan's energy sector is beset by a host of issues and shortcomings. Sadly, although many positive initiatives have been implemented, too many opportunities have been lost and reforms reversed. Burki (2008) notes that, "There cannot be any doubt that Pakistan is currently faced with a serious economic crisis, one of the most serious in its history." Specifically on energy policy, he maintains: "The most glaring failure of the policy makers was in the area of energy where shortages of electricity and gas have seriously begun to hurt the people and damage the economy."[1] An op-ed in the *New York Times* goes further, warning that, "Pakistan is in the throes of an energy crisis, with Pakistanis now enduring about 12 hours of power cuts a day, a grueling schedule that is melting ice, stopping fans and enraging an already exhausted populace just as the blast furnace of summer gets started."[2] In the space of a year, between 2008 and 2009, power outages went up by 30 percent.[3] Since then, the situation has become even worse. After the catastrophic floods of 2010, there are areas where daily power outages exceed 18 hours. Further deterioration or even the continuation of this state of affairs could trigger serious social upheaval among those who are most severely affected.

Aziz, *et al.* (2010) quantify the prohibitive cost to the economy of energy shortages, and convincingly demonstrate how these shortages are impeding Pakistan's economic development.[4] They estimate that, as a result of power shortages in the industrial sector alone, the loss to the economy was over $3.8 billion in 2009—about 2.5 percent of the gross domestic product (GDP). Half a million jobs and exports worth $1.3 billion were lost—and this is only a small part of the overall problem.

Paradoxically, the broad energy sector objectives stipulated in Pakistan's five-year plans are well conceived and coherent.[5] Thus, the problem is not where Pakistan needs to

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[1]S. J. Burki. (2008, February 12). Causes of the Crisis. *Dawn*.

[2]S. Tavernise. (2010, April 27). Pakistanis living on the brink and too often in the dark. *The New York Times*.

[3]S. Aziz, S. J. Burki, A. Ghaus-Pasha, S. Hamid, P. Hasan, A. Hussain, H. A. Pasha, and A. Z. K. Sherdil. (2010). *Third Annual Report—State of the Economy: Pulling back from the abyss* (p. 66). Lahore, Pakistan: Beaconhouse National University, Institute of Public Policy.

[4]Ibid.

[5]Pakistan Planning Commission. (2005). *Medium-term Development Framework 2005–10*. Islamabad, Pakistan: Author.

go, but how to get there. In a state of crisis, it is often tempting to propose prescriptive solutions. While this should not be discouraged, far more important is the need to build the necessary capacity in the country through which appropriate solutions can be indigenously generated, thoroughly analyzed, prioritized, or rejected—in other words, to strengthen Pakistan's capability to make its own informed decisions. Accordingly, this paper focuses on how Pakistan's capacity can be developed to achieve the goals stipulated in its national and energy sector objectives.

Despite the dire situation, recovery is possible and within reach. Islands of excellence still exist in Pakistan and simply need to be tapped. Moreover, perhaps because of the national and international attention that the country and its energy crisis have received, Pakistan has seen some movement at the policy level. The recent proposal to merge the Ministry of Petroleum and the Ministry of Water and Power to form a ministry of energy with a view to facilitating policy coordination is a significant step in the right direction. However, as this paper will show, this is only a start—a means to an end. It is hoped that this paper will play at least a small part in building on this glimmer of hope, and provide traction for subsequent, much needed policy reform in the energy sector.

Policy Fundamentals

Getting the policy fundamentals right is critical, whether in the context of resolving the deep financial crisis in the world today or of addressing issues in Pakistan's energy sector. In a negative policy environment, a positive initiative tends to generate a negative effect, rather than simply no effect. A glaring example of this is the recent devolution of authority and responsibility of economic management from the center to the provinces, together with the transfer of concomitant financial resources. On the face of it, devolution is an excellent policy initiative for a host of reasons, not the least of which are increased ownership by the beneficiaries; more meaningful and relevant service delivery and development schemes based on client-oriented assessments; and the resultant gains in efficiency and productivity. However, in stark contrast to expectations, the overall initiative is bogged down by a variety of issues, which has all but stymied progress. Among these are issues such as poor governance, insufficient provincial capacity, and gross inadequacies in the planning and provisioning of financial resources. As a result, the system is in a state of flux, and the delivery of services, particularly in health and education, is in jeopardy, further exacerbating an already unacceptable state of affairs.

Examples of the negative impacts of positive initiatives abound in Pakistan's energy sector, and are dealt with in some depth in the following pages. More broadly, as shown for the devolution experience, the situation is symptomatic of all other sectors of the economy and, in aggregate, the economy as a whole. This paper

focuses on a critical missing fundamental in Pakistan's energy sector—coordinated planning and policy formulation. Without such coordination, numerous well-meaning and well-conceived initiatives have failed to take root, and policy decision-making has been reduced to shooting in the dark.

Policy Coordination

In the light of overwhelming evidence, analysts unanimously agree that the absence of coordinated planning and policy formulation is a fundamental drawback to Pakistan's energy sector. This does not apply to Pakistan alone. Many developing countries are affected to varying degrees by this constraint, and have begun to voice their concerns and seek assistance to address the issue. The analytical mechanism to achieve this is integrated energy planning and policy formulation (IEP), which requires a supportive institutional structure at the policy level. Introduced globally in the 1970s, IEP is a means of integrating energy sector plans and policies with national objectives while ensuring close coordination between each of the energy subsectors. Tried and tested the world over, IEP develops indigenous capacity to optimize the sustainable exploitation and utilization of energy within existing resource constraints in the short, medium, and long term. It is critical that policymakers in Pakistan tackle on an informed basis both the urgent and long-term problems facing the sector, and replace the primarily crisis-driven approach that has hitherto dominated the scene. This aspect, as well as others covered in more detail later, shows the similarity of policy shortfalls at the level of the overall economy and at the sector level, reaffirming that the big picture is a function of its parts.

IEP was introduced in Pakistan, albeit partially and briefly, in the 1980s, but could not be sustained due to the increasing fragmentation of policy-level institutions. The good news is that the analytical base for IEP can be rapidly revitalized. The first steps to a supporting institutional structure can also be put in place quickly as an interim measure, prior to broader changes to reverse the fragmentation of institutions, which can be phased in gradually to avoid disruption.

It is reassuring to know that the need to revitalize IEP is not entirely lost on senior members of Pakistan's administration. Some four years ago, the author had the privilege of chairing the first session of a significant conference on Pakistan's energy sector at the Woodrow Wilson Center in Washington, DC (see Ahmed, 2007).[6] There were two striking aspects of the opening address by the then energy advisor to the prime minister. The first, on a positive note, was the advisor's strong

[6]M. Ahmed. (2007). Meeting Pakistan's energy needs. In R. M. Hathaway, B. Muchhala, and M. Kugelman (Eds.), *Fueling the Future: Meeting Pakistan's Energy Needs in the 21st Century* (pp. 17–18). Washington, DC: Woodrow Wilson International Center.

recommendation to reinvigorate IEP in Pakistan, acknowledging its success in many other parts of the world, both in developed and developing countries. The second, on the not-so-positive side, was that the presentation evoked a strong sense of déjà vu dating back to the early 1980s, when the author was the World Bank's energy advisor in Pakistan. Today, it seems that the basic issues remain the same, although greatly magnified. Of even greater concern is that the very same policy initiatives are being advocated today—indicating that no significant progress in policy planning, formulation, and implementation had been made in the intervening years, during which the situation continued to deteriorate.

That said, at least a noteworthy start in the right direction has been made toward forming a ministry of energy.[7] However, the potential merger of the Ministry of Petroleum and Ministry of Water and Power, significant as it is, is a very small first step and, by itself, will not yield the desired results. Changing and streamlining the structure of policy institutions is a prerequisite for successful policy formulation. Successful implementation and rapid follow-up on subsequent steps is now a policy imperative. Delay will lead to disappointment, inevitable unraveling, and demise, as we have seen all too often in Pakistan with many well-meaning policy initiatives.

Structure

Starting with a brief discourse on state-of-the-art concepts of capacity building, this paper goes on to introduce the concept and principles of IEP. It outlines the policy mechanisms available for managing the sector, emphasizing that it is not just the availability of resources but, more importantly, how they are managed that marks the difference between success and failure of energy policy. We discuss the institutional structure necessary to sustain IEP, together with a phased approach for establishing it. This is followed by a brief critical account of the international experience with IEP. Against the backdrop of the current energy situation in Pakistan, we then analyze the prevailing energy policies and strategy, highlighting key problems and showing how IEP can address these. The paper is not meant to be a comprehensive issues-and-options analysis, which is a huge task and deserves separate treatment. However, in demonstrating how IEP can address Pakistan's most pressing energy problems, many of the principal issues and their solutions inevitably come to light.

We address four sets of issues. The first deals with policymakers' preoccupation with commercial energy—energy for consumers connected to national grids and billed for services—and the consequence of neglecting non-commercial forms. The second set addresses an interesting dynamic that arises from a combination of two characteristics: (i) an alarming and growing energy deficit, and (ii) the perception of abundant unexploited

[7]K. Kiani. (2011, August 22). Ministries of petroleum and power being merged. *Dawn*.

resources. The third set deals with the circular debt issue that has paralyzed many energy-related enterprises and severely curtailed power supplies despite ample installed generation capacity. This issue brings to light the fallacy of relying mainly on short-term, stop-gap solutions while paying little attention to the inherent systemic problems that have been building up over decades. The fourth set of issues consists of examples of lost opportunities and of how things would have been different had IEP been in place. It then traces the history of IEP in Pakistan, its encouraging start and the reasons for its demise, including the unchecked fragmentation of policy institutions and functions, notwithstanding the very recent initiative to consider forming a ministry of energy. It goes on to show how IEP can be rapidly reintroduced as a vibrant policy tool to address Pakistan's special energy issues, paving the way to recovery in the sector and the economy as a whole.

CAPACITY BUILDING: THREE LEVELS

Capacity building is the core function of the development process and the raison d'être of the international development community. Traditionally, efforts focused on the individual, with an emphasis on training. This was clearly insufficient and development remained elusive, lack of capacity being the main constraint. Experts were forced to return to the drawing board. Today, state-of-the-art analysis by key development institutions such as the World Bank Institute indicates that, in order to be effective, capacity must be built concurrently at three levels.[8]

The most disaggregate level is the development of the individual's relevant skills and knowledge base. However, once trained, the individual can only be of benefit if she or he works in an appropriate organizational or institutional structure that directs the use of these skills toward attaining the organization's goals. Otherwise, the trained individual will revert to business as usual or move on to where his or her talents are better utilized.

Hence, the second level is the institutional level. In the private sector, institutional capacity is the ability of organizations to deliver needed goods and services at defined productivity levels. In the public sector, it is the capability of institutions to deliver services equitably, balancing efficiency and effectiveness.

The third level is the policy environment in which the institutions function—this, in turn, provides the requisite incentive structure and governance for institutions to operate efficiently. The combination and mutual compatibility of the three levels are essential prerequisites for building capacity for sustainable development. This paper examines the extent to which capacity building in Pakistan's energy sector deviates from these principles, and the implications of this deviation.

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[8]World Bank Institute. (2005). *Developing capacity interventions at three levels* (pp. 21–22). Washington, DC: Author.

INTEGRATED ENERGY PLANNING: CONCEPT AND PRINCIPLES

The Integrated Approach

Over the last three to four decades, policymakers and analysts in an increasing number of countries have advocated an integrated approach to energy sector planning and policy formulation. The instrument to achieve this is known by many names and acronyms. Names do not matter; what matters are the basic concept and processes applied, which are more or less similar. For the sake of simplicity in this paper, we refer to the instrument as IEP, and the principles presented below are derived from Munasinghe (1980), arguably one of the clearest and most comprehensive treatments of the subject.[9] The principles have been adapted to suit conditions in Pakistan, particularly with regard to the degree of analytical sophistication. In other words, we avoid over-sophistication, particularly where it offers only marginal returns.

In many developing countries, including Pakistan, energy planning is carried out and policies formulated largely on an ad hoc, crisis-driven, subsector basis. For instance, plans for the petroleum, electric power, or coal subsectors, and of other energy subsectors such as fuelwood and other renewables, are prepared largely independently of each other. By virtue of its high profile and visibility, the electric power subsector often gets the lion's share of attention. This inevitably leads to serious distortions in the policy framework in areas such as pricing and subsidies, which favor this subsector at the cost of others as well as of the overall economy. This is clearly being recognized in Pakistan where, finally, the government is actively considering the merger of the Ministry of Water and Power with the Ministry of Petroleum. By this measure, the government also hopes to do away with harmful cross-subsidies by July 2013.

Even more harmful are the distortions introduced by preferential treatment accorded to commercial forms of energy over non-commercial energy, often with drastic consequences for the poor and, eventually, for the growth of the economy as a whole. In times when energy is cheap and supplies abundant, a disaggregated approach might not have serious consequences. With rising international oil prices, significant fluctuations in relative fuel prices, and acute energy shortages, the approach fails. Integration becomes vital. This is certainly the case today and has been so several times in the last three to four decades.

In a nutshell, IEP harmonizes the policies and plans of the energy sector to meet national socioeconomic objectives, while ensuring close coordination and consistency between each of the energy subsectors. It is part and parcel of the overall economic planning process with which it is closely coordinated. IEP develops a coherent set of energy policies in key areas such as: the energy requirements to fuel national growth

[9] M. Munasinghe. (1980). *Integrated national energy planning in developing countries* (pp. 359–437). World Bank Reprint Series, No. 165. Reprinted from Natural Resources Forum. New York, NY: United Nations.

while meeting environmental targets; the optimum mix of fuels; conservation measures; measures to diversify and increase energy security by reducing dependence on foreign sources; meeting the energy needs of the poor; saving foreign exchange; reducing the trade deficit; and raising sufficient revenues to finance continued sector development.

Three characteristics of IEP help to better understand the process. The first concerns the different levels at which IEP operates. The second relates to the policy mechanisms available. The third deals with the time horizons over which IEP can work effectively, bearing in mind that the level of uncertainty in any planning process inevitably increases with the planning period. A broad underlying consideration is the necessity of matching the level of analytical sophistication with the quality and reliability of input data.

Three-Tier Operation

IEP operates in three tiers. In the highest tier, within the context of the whole economy, it establishes links between the energy sector and the rest of the economy in terms of the sector's input, output, and outcome requirements. Input requirements include materials, labor, and capital. Output requirements essentially consist of production from the individual subsectors, such as petroleum products, electric power, delivered fuelwood products, and so on. Outcomes are perhaps the most difficult to analyze and quantify, but are nevertheless critical as they reflect real achievement. Key examples include growth in per capita income and poverty reduction.

As the most aggregate level, this tier analyzes the impact on the economy of policies affecting energy supplies, pricing and taxation. As energy affects every part of the economy, the energy sector is analogous to the financial sector; some analysts describe energy as the physical counterpart of money.

The second tier treats the energy sector separately, in terms of its subsectors—oil, gas, electric power, fuelwood, etc.—analyzing the economics of inter-fuel substitution, optimal development, and the supply and consumption of fuels.

The third tier, the most disaggregate, consists of planning within each subsector, e.g., the electricity subsector develops its own least-cost plan backed by investment requirements and a policy package.

Policy Mechanisms

A range of policy tools is available to achieve the desired objectives. Physical tools are generally used to elicit short-term responses in the face of energy shortages. Examples include power load-shedding and fuel rationing for vehicles. Technical tools can be used to adopt the most efficient technologies for production, utilization, fuel mix, and substitution. Education tools are employed to raise public awareness and encourage cooperation. Pricing and taxation tools are used to provide the appropriate incentives and generate public revenue.

Time Horizons

IEP encompasses the short, medium, and long term. Although commonly misconceived as primarily a long-term planning tool—given its sophisticated analysis—IEP is also very effective for short-term planning once it has been comprehensively established. Over the short term (one to two years), IEP facilitates supply–demand management to deal with unexpected problems, including supply disruptions. These supply–demand management measures include contingency plans such as physical rationing or price surcharges. Some countries, including Pakistan, tend to stop at this level, thus adopting a continuous crisis management mode. Energy planning for the medium term (two to five years) allows sufficient time to make significant decisions concerning project planning and implementation; pricing; inter-fuel substitution; and conservation and environmental policies. In the long term (five to ten years), IEP facilitates decisions about resource development, energy use patterns, and the adoption of emerging technologies. Scenario planning over a range of conditions helps cope with the uncertainty inherent in the long term.

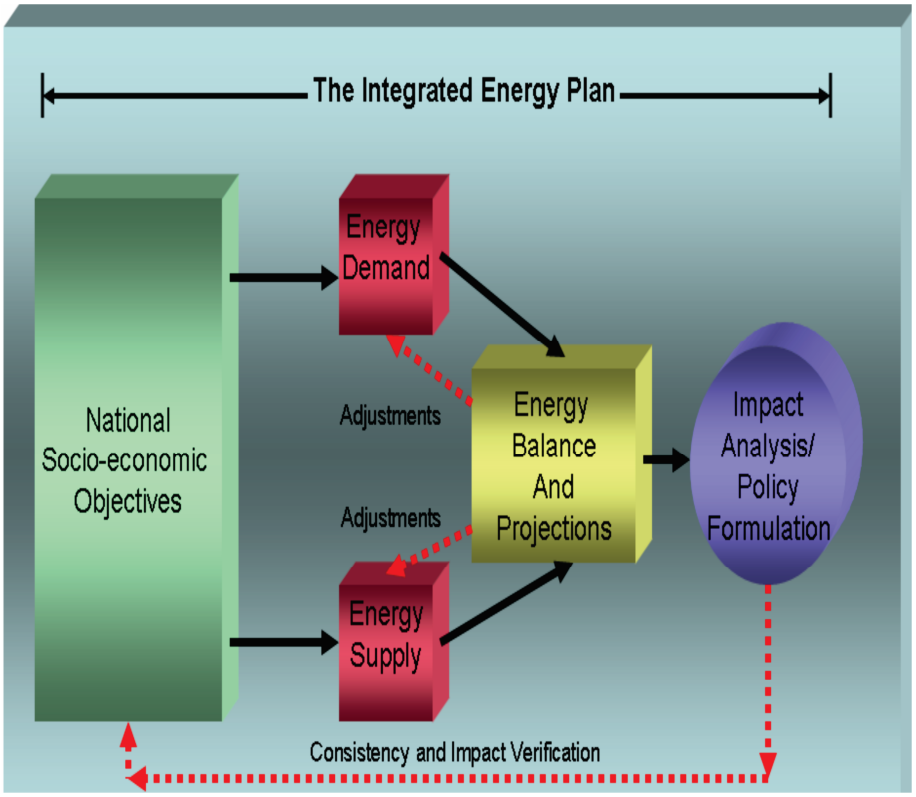
The Process

As Figure 1 shows, IEP is a five-stage process. The first stage establishes a country's socioeconomic background and national objectives. The second analyzes and quantifies the structure of energy demand. The third identifies and evaluates energy supply options. The fourth stage constructs the energy balance. The final stage formulates policies and analyzes their impact. The first and last stages examine the energy sector's relationship with the economy and, therefore, correspond to the highest tier mentioned earlier. The second to fourth steps relate mainly to the two lower tiers.

The principal objective of energy demand analysis is to determine future requirements by types of fuel and consumer category (households, industry, transport, etc.). Energy supply analysis involves determining all possible future energy supply options, disaggregated by energy subsector.

Constructing the energy balance is a complex process and lies at the core of IEP. It entails developing a supply–demand balance, matching each type of energy use to specific sources. It quantifies the flow of energy from supply to consumption, taking into account domestic production and imports, inventory variations, system usage, and conversion losses in production, transmission, processing, refining, and distribution. Figure 2 shows how the balance is prepared, and gives some indication of the complexity of the process. In its final form, it is presented as a table. Based on factors such as past trends in demand and supply, infrastructure bottlenecks and constraints, and new supply options, analysts are expected to make judgment calls in projecting the balance table into future years. In terms of analysis, it is the most sophisticated part of the process.

Fig.1. The IEP Process



Fortunately for Pakistan, the Hydrocarbon Development Institute of Pakistan (HDIP) in the Ministry of Petroleum and Natural Resources produces this table as a matter of routine. Based on input from energy ministries and line agencies, the HDIP publishes the noteworthy *Pakistan Energy Yearbook*,[10] which contains energy balances. Notwithstanding deficiencies in the input data, such as the absence of non-commercial energy, the caliber of the analysis and the quality of information contained in this publication are impressive by any standard. The work proves beyond doubt that, in spite of loss of technical human resources over the years and the concomitant decline in the quality of institutions, islands of excellence still exist in Pakistan. This should inspire confidence in the future and silence those who feel that the situation is beyond remedy. The challenge is to mainstream and encourage these islands of excellence by making good use of their output.

[10]Hydrocarbon Development Institute of Pakistan. (2010). Energy situation. In *Pakistan Energy Yearbook 2010* (pp. 3–8). Islamabad, Pakistan: Ministry of Petroleum and Natural Resources.

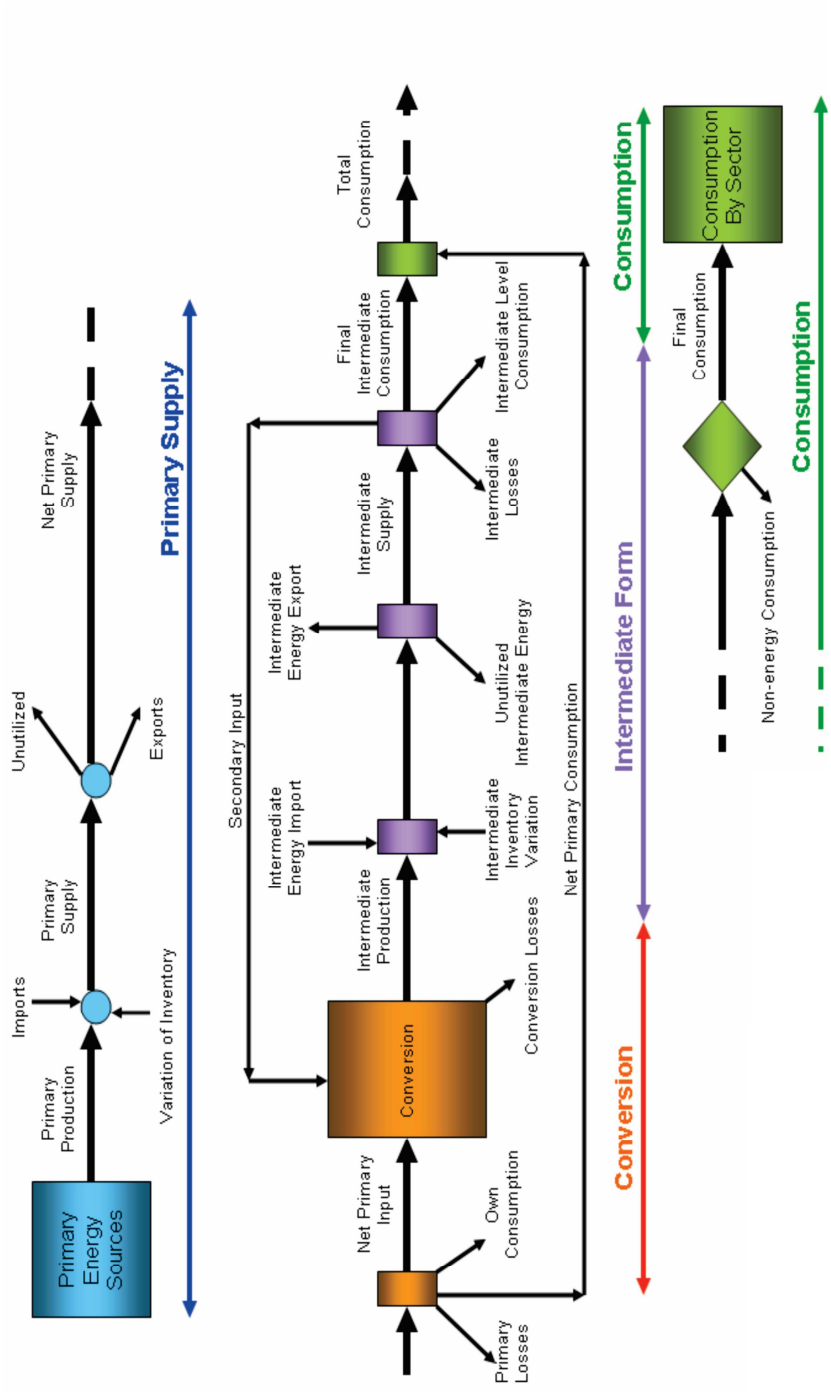


Fig. 2. Energy Balance Flow Diagram

The steps above yield a set of energy policies with which to manage supply and demand. Different policy combinations lead to several alternative packages, which are then tested for their impact on the rest of the economy. The final policy package and associated set of supply and demand forecasts and balances constitute the integrated energy plan. By its very nature, IEP is an iterative and dynamic process that needs to be revisited whenever there are significant changes in the prevailing conditions. The plan itself needs to be updated at least once a year. Its principal benefits are threefold. First, it provides a consistent and comprehensive approach to identifying and solving national energy issues that is far superior to uncoordinated or subsector analysis alone. Second, it identifies shortfalls in information, data collection, and human resource skills. Finally, it facilitates the formulation of explicit energy policies to meet national objectives.

Institutional Requirements

In the past, the main organizational problem has been the fragmentation of the energy sector. Subsector institutions such as the electricity authority, petroleum authority, and forestry department are scattered among as many different ministries and pursue their own policies with insufficient coordination. Under such conditions, IEP cannot deliver. A start could be made by creating a small energy-planning group within a subsector agency, with the mandate and authority to coordinate with all ministries representing each of the energy subsectors and their line agencies. However, this tends to strengthen the bias and influence of the subsector agency or becomes a burden on it. Alternatively, a cell in a more central location, such as the planning ministry, could be established to facilitate coordination between energy and other sectors. Such an arrangement, however, runs the risk of eventually diluting energy responsibilities.

These are all stop-gap solutions. Eventually, what is needed is a single ministry of energy with overarching responsibility for the whole sector, within which the planning cell should be located. Given the sector's pervasive role throughout the economy, this ministry must be given due recognition, authority, and access to the highest policymaking levels in the country. The execution of energy policy, day-to-day operations, and preparation of subsector investment or pricing proposals could then be left to the concerned line agencies where such tasks belong.

It should be emphasized that the concept of integration in IEP does not endorse the revival of centrally planned economies, nor does it result in a more obstructive bureaucracy. On the contrary, IEP facilitates coordination and enhances the speed and quality of decision-making. The accompanying institutional structure streamlines and considerably reduces bureaucracy and red tape, not only in terms of process, but also by reducing the number of ministries and their staff. The inertia to

change, however, becomes the main impediment, especially since it involves inevitably reducing staff and realigning responsibilities. This obstacle can only be overcome by strong political will and determination.

IEP in the Developing World

Introduced to the developing world in the 1970s, IEP was successful in transforming energy planning in many countries, although its principles were well known and had been successfully applied in developed countries much earlier. In each country, IEP was customized to suit local conditions. In the early 1990s, with the breakup of the former Soviet Union, IEP suffered a reversal, largely motivated by the international development community's reluctance to encourage any form of central planning. It was believed that the growth of the free market would determine appropriate policy choices. The IEP nomenclature was largely dropped, and its principles, while not entirely eliminated, were expected to re-emerge through free market reform. In hindsight, this was, at best, a premature assumption since the free market would take a long time to mature.

Ironically, the former Soviet Union's newly independent states, while assimilating market reform principles to varying degrees, retained the essence of integrated energy policy formulation. Today, many other countries that dropped IEP are regretting their mistake. During feedback[11] received for the update of the World Bank's global energy sector strategy individual developing countries flagged the absence of "long-term comprehensive energy planning" as the most common and serious issue, signaling the triumph of common sense over ideology.

Throughout these changes, many developing countries continued with integrated energy planning in some form or other. Where energy development has been successful, three characteristics of IEP were maintained: (i) coordinated analysis, (ii) policy-level institutional arrangements supporting close coordination, and (iii) a strong emphasis on implementation. The institutional level was configured either as a separate energy ministry or an integrated energy department within a central ministry—both approaches advocated by IEP. Examples include Belarus, Bulgaria, Cambodia, the Czech Republic, Hungary, Indonesia, Kazakhstan, Kyrgyzstan, Malaysia, the Philippines, Poland, Romania, Russia, Slovakia, Tajikistan, Thailand, Turkey, Uganda, the Ukraine, Uzbekistan, and Vietnam. Two of these countries, Turkey and Kazakhstan, with integrated line ministries and successfully implemented policies, are good models for Pakistan to follow.[12]

[11]Presentation to the World Bank Group (Energy strategy feedback and discussion points, Slide 2) at the World Bank, Washington, DC, July 2010.

[12]In 2010, Kazakhstan's integrated line ministry structure suffered a partial setback when, for work-load reasons, the electricity sub-sector was moved to the Ministry of Industry.

Interestingly, Pakistan was well ahead of most developing countries in the early 1980s before it, too, dropped the integrated approach.

PAKISTAN'S ENERGY SECTOR: ITS STATE, SIZE, AND STRUCTURE

Five-Year Plan Objectives

A review of the energy objectives through several of Pakistan's five-year plan cycles reveals that the objectives are well thought out and clearly stated.[13] The overall objective is to develop the sector to support an expanding economy. To accomplish this, a number of subsidiary objectives are stipulated, which are summarized in three groups as follows. The first is to enhance energy supplies by developing indigenous resources, importing energy at competitive prices to meet deficits, expanding delivery infrastructure, and improving energy efficiency and reliability. The second is to improve energy security by relying more heavily on indigenous resources, thus reducing import dependence, and by diversifying energy supplies to manage risks and external shocks. The third is to strengthen the sector's long-term viability by gradually shifting the government's role from that of owner to policymaker and regulator, encouraging the private sector to own and run the country's energy enterprises through appropriate incentives, such as attracting foreign and local private capital using competitive means. Consumer orientation would be achieved through an emphasis on service provision. Pro-poor interventions would promote affordable energy for the underprivileged. Due emphasis would be given to upgrading environmental protection measures in the production and utilization of energy.

The above vision is in stark contrast to what is actually occurring in the sector. The disconnect can be attributed in part to persistent shortfalls in implementation performance. However, this does not fully explain the severity of the contrast. Perhaps the more prominent reason is that, while policymakers' objectives are clear, they are less sure of the mechanisms needed to achieve them. Thus, even the policy options and investment schemes put forward with the best of intentions are likely to be questionable.

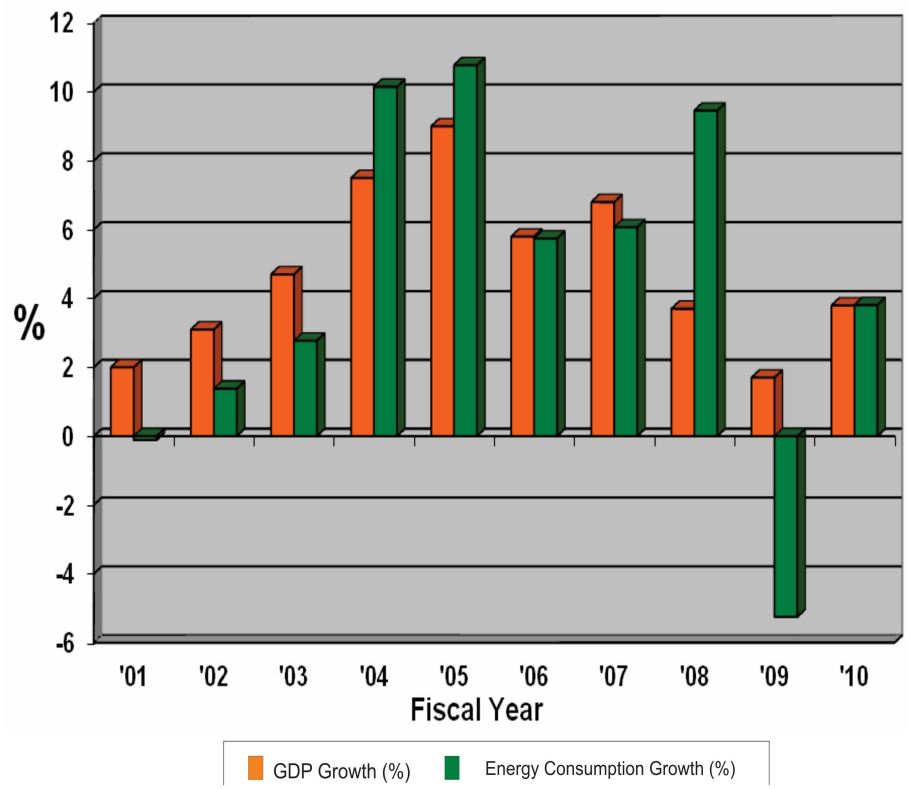
The Importance and State of the Sector

Before understanding how IEP can address Pakistan's energy issues, it is worthwhile appreciating the sector's importance for the national economy and examining where the country's energy sector stands in comparison with that of other countries. The sector's importance for the economy can be demonstrated in many

[13]Pakistan Planning Commission. (2005). *Medium-term development framework, 2005–10*. Islamabad, Pakistan: Author. Pakistan Planning Commission. (2006). *Medium-term development framework, 2005–15*. Islamabad, Pakistan: Author.

ways. One is to assess the economic impact of energy shortages [see Aziz, *et al.* (2010)].[14] On a broader level, a key indicator is the correlation between energy consumption and overall economic growth. Growth rates for energy consumption and GDP have followed very similar patterns. Figure 3 depicts the situation over the last ten years.

Fig. 3. GDP and Energy Consumption Growth Rates*



Source: For GDP growth: Federal Bureau of Statistics. (n.d.). Detail of tables, Table 12 (GDP/GNP (real) growth rates). In *National accounts*. Islamabad, Pakistan: Author. For energy consumption growth: Hydrocarbon Development Institute of Pakistan. (2006–2010). *Pakistan energy yearbook* (energy consumption tables). Islamabad, Pakistan: Ministry of Petroleum and Natural Resources.

*Based on commercial energy.

[14]S. Aziz, S. J. Burki, A. Ghaus-Pasha, S. Hamid, P. Hasan, A. Hussain, H. A. Pasha, & A. Z. K. Sherdil. (2010). *Third annual report – State of the economy: Pulling back from the abyss* (p. 64–72). Lahore, Pakistan: Beaconhouse National University, Institute of Public Policy.

Given that there have been no significant improvements in production, transmission, and utilization efficiency, this finding confirms what may be intuitively known—energy fuels the economy and, conversely, its shortage impedes economic growth. Energy has been and remains, therefore, a key determinant of Pakistan's economic growth.

The state of the sector in relation to the world can be assessed through a wide, almost inexhaustible, range of parameters. For the purpose of this paper, two indicators, presented in Table 1 below, will suffice.

Table 1

Pakistan Energy in Relation to the World[15]

Indicator	Pakistan	World Average
Per Capita Energy Consumption (Tons of Oil Equivalent/Capita)*	0.49	1.78
Energy Consumption per Dollar of GDP Growth *	0.82	0.32

* Based on commercial energy.

Per Capita Consumption

Energy consumption per capita in Pakistan is less than a third of the world average. This reflects the country's level of development, and since energy availability is a key determinant of the individual's standard of living, this ratio is also reflective of the high incidence of poverty.

Consumption per Dollar of GDP Growth

Equally disturbing is the energy consumption per dollar of GDP growth in Pakistan, which is nearly three times higher than the world average. This indicates the low efficiency of energy use in Pakistan, and underscores the pressing need to focus on policy reforms that stimulate greater utilization efficiency. Efficiency improvement in a constrained supply situation is tantamount to augmenting supply. Due to the paucity of reliable data on non-commercial energy, the figures in Table 1 are based on commercial energy consumption alone. Given the relatively large proportion of non-commercial energy in Pakistan's supply mix, the comparisons will be much more pronounced if this form of energy is factored in.

Size and Structure

Figure 5 indicates energy supply and consumption patterns. According to the Hydrocarbon Development Institute of Pakistan (2010),[16] the total primary energy

[15]Akhtar Awan, Member (Energy), Pakistan Planning Commission, "Renewable Energy and Pakistan," Slides 1 and 2 from presentation in Islamabad, 2008.

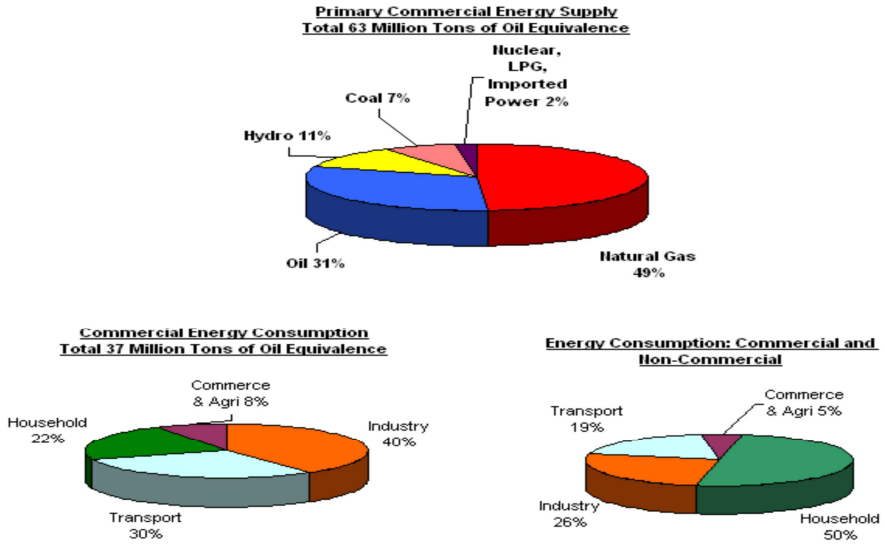
[16]Hydrocarbon Development Institute of Pakistan. (2010). Primary energy supplies by source. In *Pakistan energy yearbook 2010* (pp. 3–8). Islamabad, Pakistan: Ministry of Petroleum and Natural Resources.

supply in Pakistan is 63 million tons of oil equivalent (MTOE), with natural gas supplying 49 percent, oil 31 percent, hydroelectricity 11 percent, and coal around 7 percent. The remaining 2 percent comes from nuclear power, liquefied petroleum gas (LPG), and imported electricity. A significant amount, about a third, is imported in the form of oil and coal, although the country has vast indigenous reserves of coal and considerable exploration prospects for petroleum. Oil imports, which meet around 80 percent of Pakistan's crude oil and products requirements, cost upward of $12 billion annually. Some 60 percent of coal requirements are imported.

More alarming is the effect of the recent and continuing rise in prices of crude oil and petroleum products. The oil import bill is expected to triple its current level to a prohibitive $38 billion by as soon as 2015.[17]

Energy consumption is 39 MTOE.[18] The difference between supply and consumption covers losses in conversion, processing, transmission, distribution, as well as nontechnical losses, the latter being a euphemism for theft. The dominant consumer (40 percent of the market) is the industrial sector. The transport sector consumes 30 percent and households around 22 percent, with the remainder going mainly to the agricultural and commercial sectors.

Fig. 4. Pakistan Energy Supply and Consumption 2010



Source: Derived from Pakistan Energy Yearbook and Other Sources.

[17]K. Kiani. (2011, August 22). Ministries of petroleum and power being merged. *Dawn*.

[18]Hydrocarbon Development Institute of Pakistan. (2010). Final energy consumption by source. In *Pakistan energy yearbook 2010* (p. 3). Islamabad, Pakistan: Ministry of Petroleum and Natural Resources.

ADDRESSING PAKISTAN'S ENERGY ISSUES THROUGH IEP

The Neglect of Non-commercial Energy

Policymakers' preoccupation with commercial energy as a vehicle for GDP growth and the consequent neglect of non-commercial energy have had a number of serious repercussions.

A closer examination of the supply–consumption picture presented in the official energy yearbook and depicted in the first two pie charts in Figure 4 reveals a critical flaw. It covers only commercial energy and completely misses or ignores non-commercial traditional sources. Basic reliable data on non-commercial energy is scarce, but this is primarily due to the low priority it is accorded—a vicious cycle under which non-commercial energy sinks even further into oblivion in the eyes of policymakers. However, if non-commercial energy is factored in using whatever rough data may be available, the supply matrix looks radically different. Topping the supply list by a wide margin are biofuels (mainly fuelwood and other biomass), followed by natural gas, oil, hydropower, and coal, in that order.[19] As a result, the consumption pattern also looks completely different.[20] The principal consumer, again by a wide margin, is the household sector with 50 percent of the share. Around 85 percent of household consumption is in the form of biofuels, the bulk of which is fuelwood.

There are three main reasons why energy analysts and policymakers in many developing countries, including Pakistan, tend to ignore non-commercial energy. The first reflects policymakers' overwhelming concern with economic growth. In this respect, the pervasive neglect of non-commercial energy seems understandable, even if not justifiable. Commercial energy is a primary driver of economic growth and, on the face of it, deserves to be the focus of attention. This is particularly so when policymakers are confronted with the urgent need to regenerate stagnant or declining growth rates, as is frequently the case in Pakistan. Yet, there is a critical shortcoming in this reasoning. While commercial energy does drive national growth, the concomitant neglect of non-commercial consumers contributes directly to poverty, which bogs down national output over the longer term.

Some may argue that national growth eventually helps alleviate poverty through a trickle-down effect, and early empirical data supported this assumption.

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[19]S. Qureshi. (2007). Energy, poverty reduction and equitable development in Pakistan. In R. M. Hathaway, B. Muchhala, & M. Kugelman (Eds.), *Fueling the future: Meeting Pakistan's energy needs in the 21st century* (pp. 66–67). Washington, DC: Woodrow Wilson International Center.

[20]Ibid.

Subsequent work, however, shows that growth alone would not be sufficient to reduce poverty, and that adequate distribution measures would also be needed. Pakistan‘s military rulers and bureaucracy, being out of touch with the citizenry, worked on the earlier premise that growth alone would suffice. Later Zulfikar Ali Bhutto ostensibly brought in the social safety net, but put in mechanisms that were doomed to failure. The pendulum swung too far toward sham socialism and widespread nationalization, thus stifling private enterprise.

The current working model for poverty alleviation supports economic growth with two important provisos. There must be adequate incentives to deploy the growth in productive channels, and there must be appropriate social protection measures to equitably distribute wealth. Both these conditions, which require a longer-term vision, are largely ignored in Pakistan. Immediate pressures seem to drown out any serious long-term vision, let alone putting the vision into practice. Thus, Pakistan continues to live from crisis to crisis. Moreover, between 2008 and 2011, a substantial part of the wealth was captured by the well-to-do, leaving the poor even poorer, with the pool of poverty expanding at 10 percent a year. During 2011, over five million people were added to those living in abject poverty. The shortage of energy and disregard for the poor contributed substantially to this decline.

Perhaps more than simply a neglect of the poor is the preoccupation of vested interests with protecting their own turf—a factor clearly seen at both the macro- and sector level. This tendency has persisted throughout Pakistan’s history. It is a continuation of the colonial legacy when even vast development initiatives, such as the Indus basin irrigation system, were put in place by the British as a means of securing colonial rule rather than promoting people’s wellbeing. The prevailing regulatory and legal systems ensured that the economic benefits would be channeled largely to the rulers and their proxies. Essentially, the only difference is a change of beneficiary from colonial rulers to the country’s rich and powerful. Even today, the establishment continues to resist any changes in the legal system that would favor the needs of the common person, despite strong pressure from both inside and outside Pakistan. Interestingly, even at the time that Zulfikar Ali Bhutto introduced social protection measures ostensibly to protect the poor, the interests of the powerful remained well protected and, some would argue, became even more entrenched. Then, as today, in times of acute power or fuel shortage, the immediate measures taken favor the ruling elite.

The focus on commercial energy is also apparent in the recent proposal to merge the Ministry of Petroleum with the Ministry of Water and Power. While, as stated before, this is a good first step in consolidating policy agencies in the energy sector, it essentially addresses only commercial forms of energy. Steps to include

non-commercial subsectors within the same consolidated energy ministry would be an essential follow-up. There are no indications that this is in the offing, signaling once again the government's short-term concerns with spurring economic growth, and once again neglecting the poor. This approach will lead to the same pitfalls and history will repeat itself.

The second reason for the relative lack of attention to non-commercial energy is that data on it is scarce and often unreliable. Moreover, when integrated with commercial energy data, it not only increases the margins of error in the analysis but also devalues the worth of commercial energy data, which is much more accurate. The margin of error and bias in the energy balance is further enhanced if the share of non-commercial energy in the total mix is significant, as is generally the case in many parts of the developing world.

Finally, the primary energy equivalence for non-commercial fuels is difficult to assess accurately because they generally burn at much lower efficiencies (which vary considerably with the type and quality of end-use devices) than commercial fuels. Their share in useful energy consumption is, therefore, much lower.

These reasons, cogent as they may appear, do not sufficiently justify the omission, particularly when non-commercial energy constitutes a significant portion of the overall supply mix. Policy and investment priorities in the energy sector established without considering non-commercial energy are misleading, at the very least. IEP would highlight the shortcomings and signal the need to improve non-commercial energy data, as well as enhance the efficiency of end-use appliances. This prevailing situation also underscores the need for policymakers to improve the quality and reliability of Pakistan's statistical base in order to manage the economy more efficiently.

How serious is this neglect and what are its implications? About half of the energy use in Pakistan is in the form of non-commercial energy. Its neglect, therefore, completely distorts the picture. Its inclusion will inevitably lead policymakers to consider radical changes in priorities.

At the supply end of the energy chain, the neglect of non-commercial energy is manifest in poorly regulated and unenforced practices that squander resources and deplete the resource base. In particular, forestry resources are harvested well in excess of levels at which the resource remains sustainable; in fragile ecosystems, they can be permanently destroyed. The main drivers seem to be increasing fuelwood needs, the expansion of land for food and cash crop production, and the notorious lumber industry. The socioeconomic impact on the environment warrants separate

study, but the results of past policies, or lack thereof, are starkly visible today in terms of poverty and the decimation of forest resources. As Qureshi (2007), dealing with energy and poverty reduction in Pakistan, states, "The forestry policy in Pakistan needs to be more closely linked to the energy policy, together with improved management of forest resources which . . . contribute a good deal to the economy and the livelihood of the poor."[21]

Even more seriously, an answer is needed to the following question: To what extent is the damage caused by the recent devastating floods in Pakistan attributable to an act of Nature and to what extent has it been exacerbated by the hand of man? The clearly visible denudation of forests over the years has caused a major displacement of the topsoil, increasing siltation in the rivers and canals that make up Pakistan's vast irrigation system. This, in turn, has impacted the system's efficiency and placed undue burden on its maintenance. A comprehensive study needs to be launched to give an accurate answer to the question posed above. This is necessary for the sake of posterity to illustrate the impact of neglecting the long term and to stimulate a radical change in policies. It is hoped that the findings of the proposed study will contribute toward strengthening Pakistan's ability to deal with natural disasters, which are likely to be more frequent with future climatic changes under global warming.

Recent press reports on efforts to restructure ministries also mention the possible creation of a separate ministry for irrigation, agriculture, and hydropower. This would be a retrograde measure. Not only would it split the commercial subsectors of energy by separating out hydropower, it would also keep the fuelwood and biomass subsectors separate from the proposed ministry of energy. As far as integrating the plans and policies of the energy sector is concerned, separating hydropower would clearly undo the benefits of merging the two ministries. Again, drawing on lessons from history, it is important to break the chain of "one step forward, two steps back."

The neglect of non-commercial energy also has major implications for the utilization end of the energy chain. In a number of countries, including Pakistan, analysts tend to define energy consumption in individual sectors as the energy delivered to that sector. This approach does not take into account end-use efficiency, i.e., the efficiency of utilizing the delivered energy. By emphasizing conservation as a means of effectively augmenting energy supplies, IEP draws the attention of analysts to end-use efficiency rather than stopping at the stage of delivered energy. Since the major consumer of energy in Pakistan, the household sector, relies mainly

[21]Ibid.

on non-commercial energy, the application of IEP will shift the emphasis of analysts to this sector. This will inevitably lead to measures such as the introduction and spread of improved-efficiency cook-stoves to replace highly wasteful traditional devices. Many low-cost designs have been tested and tried successfully in countries facing similar challenges. Pakistan only needs to select (and modify as needed) those that are compatible with the social practices of its domestic consumers.

Shifting the emphasis to the household sector does not imply that the industrial sector would or should be overlooked. On the contrary, it should remain at the very least the focus of low-cost and no-cost initiatives that have been found to be extremely effective the world over. The critical message here is that the appropriate balance needs to be struck between the concentration of effort and the financial resources available. IEP provides the mechanism to achieve this.

Apart from a few notable exceptions, the pattern of policymaking in Pakistan seems to be premised on short-term crisis response rather than on an informed longer-term vision and a determination to implement it, backed by unwavering political will. In the energy sector at least, IEP could help reverse this shortcoming by establishing the optimum mix from primary supply sources, through conversion technology, to utilization patterns. In the final analysis, perhaps no country actually adheres to this optimum, which remains an unattainable ideal. This does not mean, however, that striving for the optimum should be abandoned. On the contrary, it should remain something to strive toward. In practice, there is much more to nation building than economics alone. Departures from the optimum will be necessary. The cost of each deviation must be known in order to make informed decisions, while bearing in mind that the degree of departure from the optimum can make the difference between success and failure of energy policy. In the case of Pakistan, the optimum remains undetermined, as does the cost of deviations.

Pakistan is not alone in facing the types of issues raised here, although they are admittedly more pronounced than in many parts of the developing world. The feedback received from developing countries during the preparation of the update of the World Bank's Global Energy Strategy was very telling. In all meetings, client countries underscored the centrality of non-commercial energy and "stressed the importance of: affordability; cooking and heating fuels, including sustainable agro-forestry; capacity building across all areas of the energy sector; inter-linkages to other sectors (transport, agriculture, forestry, urban, water); and social engagement (gender, human rights, empowerment, consultation, ownership, and participation)."[22]

[22]Presentation to the World Bank Group (Energy strategy feedback and discussion points, Slide 2) at the World Bank, Washington, DC, July 2010.

The IEP mechanism is eminently suited to quantify the cost penalty (opportunity cost in economic terms) of less-than-optimal choices. This is critical for a country like Pakistan, which faces so many emergent problems requiring immediate attention. The high incidence of poverty exacerbated by an inequitable distribution of wealth is one such issue, driven in part by the unavailability of affordable energy for the rural and urban poor. To tackle this, energy price subsidies become essential in the short term. So why introduce sophisticated planning mechanisms when significant deviations are inevitable? The answer is simple. First, without the mechanism, the full economic impact of the deviation on the energy sector—and by extension on the national economy—will not be known. Second, the very existence of such a mechanism will force policymakers to ensure some basic discipline in applying the criteria for providing energy subsidies, i.e., subsidies must be affordable to the economy, clearly targeted at the poor, and transparent. The moral hazard of subsidizing waste would also need to be dealt with. Scenario and impact analysis under IEP provides the mechanism to assess quantitatively the effect of subsidies on the energy sector and the economy as a whole, thus facilitating informed decision-making.

Neglecting non-commercial sources in formulating energy policy is tantamount to ignoring half the country's population and half its energy supply. It certainly does not augur well for Pakistan's efforts to fight poverty and improve its social conditions.

The Growing Deficit Despite Abundance

A large and growing energy deficit despite the apparent abundance of unexploited energy resources often leads to an interesting policy response, which further exacerbates the situation.

The present level of the energy deficit and its projected growth illustrate, perhaps more than any other parameter, the fragility of the energy sector. The energy deficit is the difference between the demand for primary energy and its indigenous availability, the latter constrained by limits on exploration and exploitation, transmission and distribution infrastructure, financial resources, physical access, and human capacity. Planning Commission figures, even though missing non-commercial energy, amply demonstrate the extent of the issue.[23] Factoring in non-commercial energy would make the picture even bleaker. To meet the demand between today and the year 2025, energy supply needs to grow from 60 MTOE per

[23]M. Ahmed. Meeting Pakistan's energy needs. In R. M. Hathaway, B. Muchhala, & M. Kugelman (Eds.), *Fueling the future: Meeting Pakistan's energy needs in the 21st century* (Exhibit 5, p. 22). Washington, DC: Woodrow Wilson International Center.

year to 198 MTOE. This assumes an annual economic growth rate of 6.5 percent. While this growth rate far exceeds current levels, it could be achieved with the receding of the global financial crisis and a more serious commitment to reform. In fact, the current national growth strategy prepared by the Planning Commission envisages a growth rate of 4.5 percent in the fiscal year 2012 climbing to 6 percent in the next two years, barring unforeseen setbacks.[24]

Over the same 15-year period, aggregate indigenous supply is assumed to increase from the present level of 40 MTOE per year to a maximum of 75 MTOE. Considering the constraints to oil and gas exploration and development activities, supplies from these sources are projected to increase minimally. On the other hand, indigenous supplies from coal, hydroelectricity, nuclear, and non-traditional renewable sources would need to be substantially enhanced to substitute for oil and gas to the extent possible. The projected shortfall increases from the already disturbing level of 20 MTOE per year to an overwhelming 122 MTOE by 2025. This state of affairs implies an unrealistic long-term dependence on unaffordable external sources of energy.

The specter of a growing deficit exists despite the perception that Pakistan's energy resource base is substantial and largely unexploited. A brief review of the individual sources of energy reveals that, while the country is endowed with a large energy potential, not all of it is currently financially or technically exploitable. The main energy resources in Pakistan are made up of depleting fossil fuels and renewable forms. Fossil fuels are in the form of petroleum (oil and gas) and coal. Renewable resources consist of hydropower, solar power, wind power, and biofuels, the latter made up of fuelwood, agricultural residues, and biogas. This paper does not cover nuclear energy, but a comprehensive issues-and-options paper should assess its viability as a potential strategic option in the event that other forms of energy cannot bridge the deficit.

Petroleum

For petroleum, the prospective area (sedimentary basin in geological terms) is significant, totaling some 830,000 square kilometers. Probable reserves for oil are estimated at an impressive 27 billion barrels. Of this, 965 million barrels of oil had been confirmed (proven) through mid-year 2010 and 659 million barrels produced, leaving 306 million barrels of proven reserves yet to be recovered. The corresponding figures for gas are equally impressive. Probable reserves are estimated

[24]Presentation to the World Bank-IMF Pakistan Staff Association by Abdul Hafeez Shaikh (federal minister of finance) and deputy chairman of the Planning Commission, September 26, 2011.

at 282 trillion cubic feet (TCF), of which 54 TCF have been confirmed and 26 TCF produced, leaving 28 TCF of proven reserves.[25]

A brief analysis of the figures in Tables 2 to 4 below is sufficient to give an idea of the petroleum potential, and the main issues and directions, going forward.

Table 2

Pakistan Selected Oil Data

Probable Reserves (billion barrels)	27
Confirmed Reserves (million barrels)	965
Confirmed to Probable Reserves Ratio	3.6%
Total Produced till 2010 (million barrels)	659
Remaining Reserves (million barrels)	306
Production in 2010 (million barrels)	24
Reserves to Production Ratio (years)	13
World Reserves to Production Ratio (years)	40

Sources: Ministry of Petroleum and Natural Resources. (2008). *An overview of fossil fuel energy resources of Pakistan* (p. 2). Islamabad, Pakistan: Author. Confirmed/proven reserves and production figures from: Hydrocarbon Development Institute of Pakistan. (2010). *Pakistan energy yearbook 2010* (pp. 11, 65–67). Islamabad, Pakistan: Ministry of Petroleum and Natural Resources.

Table 3

Pakistan Selected Natural Gas Data

Probable Reserves (trillion cubic ft.)	282
Confirmed Reserves (trillion cubic ft.)	54
Confirmed to Probable Reserves Ratio	19.1%
Total Produced till 2010 (trillion cubic ft.)	26
Remaining Reserves (trillion cubic ft.)	28
Production in 2010 (trillion cubic ft.)	1.5
Reserves to Production Ratio (years)	19
World Reserves to Production Ratio (years)	59

Sources: Ministry of Petroleum and Natural Resources. (2008). *An overview of fossil fuel energy resources of Pakistan* (p. 2). Islamabad, Pakistan: Author. Confirmed/proven reserves and production figures from: Hydrocarbon Development Institute of Pakistan. (2010). *Pakistan energy yearbook 2010* (pp. 11, 65–67). Islamabad, Pakistan: Ministry of Petroleum and Natural Resources.

[25]Ministry of Petroleum and Natural Resources. (2008). *An overview of fossil fuel energy resources of Pakistan* (p. 2). Islamabad, Pakistan: Author. Confirmed/proven reserves and production figures from: Hydrocarbon Development Institute of Pakistan. (2010). *Pakistan energy yearbook 2010* (pp. 11, 65–67). Islamabad, Pakistan: Ministry of Petroleum and Natural Resources.

Table 4

Pakistan Selected Oil and Gas Exploration Statistics

Exploration Wells Drilled till early 2009	725
Number of Discoveries	219
Success Rate	1:1.33
World Average Success Rate	1:10
Drilling Density (wells per 1,000 sq. km)	1.99
World Av. Drilling Density (wells per 1,000 sq. km)	10

Sources: Ministry of Petroleum and Natural Resources (2009). "Successful Past and a Brighter Future," from "Opportunities in Pakistan's Upstream Oil and Gas Sector".

The reserves-to-production ratio is equivalent to the number of years that proven reserves will last at current levels of production, without adding to these reserves. For oil in Pakistan, this ratio is 13, which is precariously low given the high and rising level of import dependence. It is only a third of the world average of 40.[26] For natural gas, it stands at 19, which is low in view of Pakistan's reliance on natural gas. Again, the world average of 59 is three times higher.[27]

Only a very small portion of probable reserves has been proven, less than 4 percent for oil and around 19 percent for gas. Key factors in increasing the level of proven reserves—and therefore the likelihood of enhancing recovery—include the level of exploration activity and its success rate. In addition to the high proportion of unconfirmed reserves and the large prospective geographic area, Table 4 clearly shows that the drilling density in Pakistan is low—about a fifth of the world average—and, in contrast, the drilling success rate is impressive—over seven times the world average. Putting these facts together, it does not take much to surmise that, with increased exploration activity, the prospects of enhancing proven reserves and, by extension, the chances of increasing oil and gas production are sound. However, with large portions of the sedimentary basin in areas of deteriorating security, the expansion of exploration activity is becoming increasingly challenging, particularly as such activity is undertaken by international oil companies funded by their own risk capital and utilizing their own personnel.

Coal

Probable coal reserves in Pakistan are extremely large, totaling 186 billion tons. Among these, the Thar deposit, containing 175 billion tons, is ranked as the world's fifth largest find. Proven reserves stand at 1,980 million tons. At the present

[26]Schneider, D. (n.d.). An interview with David Goodstein. *American Scientist*. Retrieved from http://www.americanscientist.org/bookshelf/pub/david-goodstein

[27]US Department of Energy. (2008). *International energy outlook 2008*. Washington, DC: Author.

rate of production, the reserves will last well over 400 years. The bulk of the deposits are of poor quality with high sulfur, ash, and moisture content. Moreover, much of the coal is situated in remote areas where, again, security is a concern. Its exploitation would, therefore, require expensive excavation, treatment, and transport infrastructure. For these reasons, Pakistan's demand exceeds current production levels and is topped up with imports. Under these conditions, further exploration does not seem to be a priority unless deposits of higher quality coal are discovered. The main emphasis would be on identifying and introducing the appropriate technology to clean the coal (to mitigate environmental concerns) and reduce exploitation and infrastructure costs. This is a challenging prospect, but one which must be pursued as a possible alternative to continued imports. Essentially, this would be a medium- and long-term pursuit under IEP. Given policymakers' pre-occupation with the short term, such efforts do not seem to have been sufficiently followed through, although some of the coal deposits were discovered decades ago.

Renewable Energy

Pakistan is also endowed with considerable—and largely untapped—renewable energy resources. Its hydroelectric potential for large and medium plants stands at 41,700 megawatts (MW). Only 16 percent (6,600 MW) has been harnessed to date. Small-hydro potential is about 1,500 MW, of which a mere 4 percent (60 MW) has been tapped.[28]

Solar energy potential remains unexploited other than a few pilot-scale efforts. Katz (2008) indicates, somewhat sensationally, that if only a quarter of one percent of the land area of Balochistan were covered with solar panels of 20 percent efficiency, the photo-voltaic energy generated would meet the country's total electricity needs.[29] Pakistan's wind energy potential also remains virtually untouched. The USAID Renewable Energy Lab, on the basis of a study of wind regimes, estimates this potential to be around 41,000 MW.[30] However, a word of caution is needed here. Admittedly, with continuing research and development, the feasibility of generating large quantities of solar and wind power is dramatically improving. However, there is a long way to go before these sources can compete with existing well-established technologies based on the major commercial fossil fuels.

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[28]Presentation by A. Awan (member [energy], Planning Commission) on "Renewable energy and Pakistan" (Slides 15 and 19), Islamabad, 2008.

[29]M. Katz. (2008, March 16). The feasibility of renewable energy in Pakistan. *Eco-Efficiency*, p. 2.

[30]Presentation by A. Awan (member [Energy], Planning Commission) on "Renewable energy and Pakistan" (Slide 15), Islamabad, 2008.

While estimates for non-commercial forms of energy, chiefly fuelwood, are less reliable, there is no doubt that these resources are considerable and account for nearly half of Pakistan's supply mix. This is despite the unregulated and unsustainable harvesting of this poorly managed resource.

The juxtaposition of the above two contradictory characteristics of Pakistan's energy situation—prohibitive and growing deficits on one hand and seemingly abundant resources on the other—leads to an interesting dynamic among policymakers. It induces an overwhelming sense of urgency that drives politicians and other policymakers to promote the exploitation and development of all forms of energy available, with insufficient regard for cost implications. Many countries, including Pakistan, have at one time or another reacted in a similar fashion—sometimes even for political reasons—to demonstrate visibly to the electorate that "corrective" action is being taken. In a cash-constrained situation, such as in Pakistan, this is prohibitively expensive.

The first and most obvious outcome is the distortion of development priorities. Renewable forms, such as solar and wind power generation, are given higher priority than warranted on the grounds that they are free resources, capable of generating energy in remote locations. Among energy specialists, there is a common adage that while these forms of energy are "free," since they are constantly renewable and abundant, they are certainly not cheap. We mentioned earlier that the cost of power generation from these sources, while rapidly improving with intensified research and development, is still relatively high. Compared with nuclear power generation, which in itself is an expensive option, solar power is around 30 percent more expensive and wind power about 60 percent. A concrete example is that of the Cape Project—the first major wind power project in the United States. As of the end of 2010, despite support from subsidies, the project had not been able secure buyers for half its available output. Even for the half that was secured, the agreed tariff was twice the level of conventional fossil fuel sources.[31] If a project like this does not work for a country with the resources available to the United States, how can one reasonably expect it to work for a less wealthy country such as Pakistan? Another drawback is that wind and solar generation schemes are generally small-scale and would not, therefore, effectively bridge the immense deficits that Pakistan faces.

All this does not imply that solar and wind power generation should be excluded. Solar energy, for example, may have other applications such as water and even space heating, where the economics are favorable. All options should remain on

[31]WTOP Radio. (2010, December 19). *News bulletin.* Washington, DC.

the table. Under IEP, while wind and solar power generation may not readily fit in today's optimum scenario, they could well become economical in the years ahead, for which technology development projections over the longer term would be necessary. To anticipate the future, some preparatory analysis and groundwork may be required in the short term. This could consist of pilot schemes and even development efforts to improve and devise appropriate technologies. Also, in order to tackle issues such as poverty alleviation in areas remote from the national grid, departures from the optimum may be necessary even in the short term. Again, IEP provides the mechanism to strike an affordable balance, keeping in mind that departures also need to be contained to ensure the success of energy policy.

Circular Debt

The phenomenon termed "circular debt" in Pakistan has paralyzed many energy-related enterprises and severely curtailed power supplies despite ample installed generation capacity. The problem of circular debt receives widespread sensationalized coverage in the national media, but is also a prime example of chronic neglect for which short-term bailout solutions seem to have become the norm. Efforts to address the systemic underlying causes remain on the back burner—a classic case of throwing good money after bad.

What has become a bizarre and convoluted situation is, in simple terms, a payment arrears problem gone out of control. The largely government-owned electric power system pays for its operational expenditures through its sales earnings. The government pitches in to the extent possible to cover the shortfalls—a policy that introduces a clear moral hazard since it goes against the declared intent of promoting commercially oriented and profitable utilities for eventual privatization. Insufficient consumer tariffs and the government's inability to fill the gap due to its overstretched financial resources result in sustained losses for the power companies, year after year. Tariff levels have not been increased sufficiently to cope with the recent spikes in petroleum prices, or depressed hydel generation resulting from drops in rainfall levels. In general, tariff increases are hampered by consumer affordability issues. The result is mounting arrears from the inability to pay contractors and suppliers of spare parts. The same pattern applies to independent private power producers (IPPs), despite the obligations under take-or-pay agreements. (Under such agreements the buyer is obliged to pay a prescribed amount based on an agreed minimum level of power sale, even if the buyer takes less power than the agreed minimum.) Even within the power system itself, this destructive cycle gives rise to a succession of outstanding arrears through the generation, transmission, and distribution entities. Thus, the flow of funds is jammed throughout the whole power supply chain and deprives fuel suppliers and IPPs of cash, to the extent that their viability and, therefore, their output is impaired.

For policymakers operating in a crisis mode, there is a strong temptation to inject government capital as the most effective short-term solution, to get the monkey off their backs, so to speak. Clearly, this can only be a stop-gap measure, one fraught with many pitfalls including the moral hazard mentioned earlier. Relieving the pressure has the effect of relegating the underlying systemic issue, i.e., the high and unaffordable cost of power delivery, to the back burner.

The systemic issue has many facets: Slow or stalled reform measures, deteriorating maintenance standards, inadequate management and organizational structure, declining plant utilization and efficiency, suboptimal load dispatch, high system losses, and poor bill collection performance. System losses are unacceptably high at 25–30 percent of net generation; most of these are attributed to "nontechnical losses," a euphemism for theft. Consumer payment arrears stand at a prohibitive 30 percent of the amount billed. Again, while precise figures are difficult to obtain, a significant portion of the latter is also attributable to questionable practices.[32] This underscores the need to address, across the board for the economy as a whole, the issues of poor governance and corruption to which scant attention has been paid throughout the country's history. The situation has now reached a point where it cannot be ignored by the ruling establishment. At the level of the energy sector, the prohibitive power system losses and unacceptable outstanding billings are a strong testimony to this state of affairs.

Perhaps the most significant effect is a precipitous decline in the net availability of electric power, a vicious cycle that continues to impair the productive capability of the country. There is a common misconception that Pakistan has insufficient installed capacity. The following figures speak for themselves. Installed capacity in Pakistan is 20,922 MW, while the peak demand is around 14,500 MW. However, due to the issues mentioned above, the system is only able to satisfy less than 70 percent of peak demand, explaining the outages and dispelling the myth of inadequate capacity.[33] While in the long term capacity additions are likely to be necessary, in the short term the emphasis must be on enhancing the utilization of the existing capacity and thereby postponing, where possible, capital-intensive additions to installed capacity.

Financially and operationally unviable, the power system is constrained to rely on government bailouts and subsidies. Given the government's own cash-strapped situation, this inevitably adds to the fiscal deficit, promotes deficit financing and depletes scarce reserves, eventually eroding the value of the rupee. Of course, without addressing the

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[32]A. Adamantiades & V. Vucetic. (2009). *Power sector reform in Pakistan: Issues and challenges* (pp. 9–10).

[33]B. A. Syed. (2010). *Pakistan's energy crisis, causes, new policies, and plausible solutions* (p. 1).

underlying operational problems, circular debt continues to spiral. Starting from a government-owned power system and IPPs, it has mushroomed to encompass nearly all organizations dealing with commercial energy. Being continually changeable and because of inevitable overlaps, the precise amount of circular debt is elusive. Ahmad (2010) estimates that the net circular debt grew by nearly 40 percent in the space of one year—from $3.5 billion in mid-2009 to $4.8 billion in mid-2010. The gross receivables of related entities, which stand at around $6 billion, also illustrate the extent of the problem.[34] A $1.3 billion bailout is currently under consideration by the government to bridge the gap for only the state-owned power system.[35]

Once again, IEP is conspicuous by its absence, which explains the reliance on stop-gap measures without a long-term integrated approach. Had it been in place, IEP would certainly have prevented this almost absurd, self-inflicted situation by anticipating the endemic problems and recommending solutions well in advance, both short- and longer-term. In the worst case, if some stop-gap bail-outs became expedient, IEP's impact analysis could have helped strike the appropriate balance between the amount of capital injection and corrective measures to deal with endemic issues. At the very least, the bailouts would have been accompanied by strict conditionality requiring time-bound actions to address the underlying issues.

In the context of circular debt, the IPP experience deserves special attention. It is a prime example of the futility of introducing a positive change in a negative policy environment. Moreover, the factors influencing the stagnation and decline of the IPPs are precisely the kind that IEP would have pre-empted.

The erstwhile path-breaking Private Power Policy of 1994, which underpinned the bulk of the IPP projects, was based on valuable experience gained during the preparation of the 1,292 MW Hub Power Project, itself hailed as a global milestone in private infrastructure finance. The Hub Project was named "deal of the decade" by Euromoney Institutional Investor. For the global financial market, it was the first major private infrastructure project in a risky developing country environment with financing from international commercial banks under limited recourse arrangements. It was the first private infrastructure project in Pakistan and the first project of any kind in the country to deploy limited recourse financing.[36]

Under the Private Power Policy, 19 IPP projects were rapidly completed, adding 3,400 MW to the national grid. Pakistan achieved international recognition as a model country for private power development. After visiting Karachi in September

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[34]M. B. Ahmad. (2010, Jul 4). Managing the energy sector financial gap. *The Nation.*

[35]Ensuring energy security through diversified strategies. (2010, July 3). *The Pak Banker*.

[36]M. Gerrard. (1997). *Financing Pakistan's Hub Power Project: A review of experience for future projects* (p. 35). Washington, DC: World Bank.

1994, the U.S. energy secretary referred to Pakistan's energy policy as the best in the world.

All this was achieved without IEP. However, within the space of four years, a notice of intent to terminate 11 of the IPPs—two thirds of the capacity contracted—had been issued, signaling a complete reversal of Pakistan's image and prestige. The intent to terminate was based on both technical considerations and allegations of corruption. An extremely arduous and highly controversial process of renegotiating the contracts was begun. In hindsight, the collapse is attributable to flaws in the 1994 policy, which in turn can be attributed to the absence of IEP.[37] To begin with, the designs of individual projects were not in line with least-cost power development programs. Neither the capacity nor the location of most of the individual power plants fit with least-cost system expansion requirements. There was excessive reliance on imported fuel as opposed to locally available natural gas. Admittedly, gas reserves were on the decline and gas allocations for power generation were difficult to obtain at the time. However, this situation can also be construed as one that developed over time due to the lack of integration of gas subsector plans with the power subsector. The type of technology chosen was also questionable, relying on diesel generation and steam turbines instead of the more efficient combined-cycle plants—again, a shortcoming that could have been pre-empted had IEP been in place.

The rapid rate of capacity expansion outpaced power demand, resulting in excess capacity. A more gradual phasing-in of projects in line with changing demand projections (as determined by IEP) would have gone a long way in preventing this situation. It was evident that there was no clear mechanism to prioritize the IPPs. As demand declined, the liability of the government-owned power system became prohibitive. Under the provisions of the power purchase agreements, the system was obligated to take or pay for an agreed minimum power offtake. This would guarantee the IPPs an agreed minimum plant factor.[38] It was unable to service this obligation.

The selection process for individual projects was not sufficiently transparent, which led to strong perceptions of corruption and political patronage. Rather than competitive bidding for private power, policymakers chose the route of a tariff ceiling for investors. This was meant to accelerate financial closure, which it did at the cost of creating excess capacity. Moreover, the tariff ceiling approach did not provide an incentive for investors to reduce costs. All this led to the public perception that the cost of privately generated power was too high. Accordingly, the

[37]J. M. Fraser. (2005). *Lessons from the independent private power experience in Pakistan* (pp. 3, 6–9). Energy and Mining Sector Board Discussion Paper No. 14. Washington, DC: World Bank.

[38]A. Adamantiades. (2006). *Pakistan electricity sector profile* (p. 23). Prepared for the World Bank, South Asia Region.

tariff issue became the front and centre of the renegotiation process. The process itself led to confusion and mistrust among investors, and to the general belief that the government no longer honored agreed contracts.

The success of the IPP program also depended on the pace of the restructuring and privatization process of the Water and Power Development Authority (WAPDA) and on the establishment of an appropriate regulatory regime. Here, again, coordination remained a problem, one that IEP could have been foreseen had it been in place. WAPDA was unable to match the rapid expansion of the IPPs. The resulting mix of private generation and government-owned transmission and (partly) distribution led to an unwieldy and inflexible system that was highly vulnerable to external shocks and fuel price fluctuations. The reforms necessary to reduce the vulnerability were too slow in coming.

It is significant how each of the main causes for the decline of the IPPs fit in so well with what IEP is designed to prevent.

The Cost of Lost Opportunities

This section consists of a few examples from history that highlight the impact of lost opportunities. It shows how IEP, had it been in place, could have flagged the warning signs well in advance. Burki (2007) speaks of "turning points" in the history of Pakistan which, given the way they were handled by policymakers, became lost opportunities. As he asserts, it pays to factor in history to achieve sustainable development. It is in this spirit that the examples given here have been included, to enable learning from past experience and avoid repeating mistakes.

The downward path of the energy sector is strewn with policy reversals, delayed or stalled reforms, bureaucratic red tape, and missed opportunities. Worsening security concerns have aggravated the situation over the last decade. Over the years, there have been many sincere efforts to introduce and implement sound policy initiatives, for which due credit must be given to policymakers and implementing agencies. However, these efforts were unable to take root in the overall negative policy environment. Useful accounts of the repeated mistakes of history can be found in many studies. A good example is that of Burki (2007), who focuses mainly on the power subsector and underscores the need for a comprehensive energy strategy to prevent the mistakes of history from recurring.[39]

Three key examples of lost opportunities are discussed here.[40] The first example deals with petroleum exploration. Four international oil companies were

[39]S. J. Burki. (2007). The weight of history: Pakistan's energy problem. In R. M. Hathaway, B. Muchhala, & M. Kugelman (Eds.), *Fueling the future: Meeting Pakistan's energy needs in the 21st century* (pp. 41–45, 55). Washington, DC: Woodrow Wilson International Center.

[40]The examples relate to periods during which the author was the World Bank's advisor on energy projects in Pakistan, and later, the Bank's coordinator of energy operations in Central Asia.

engaged in exploration in Pakistan in the early 1980s. It is standard practice for such companies to put at risk their own capital for exploration, with the expectation that, once a discovery is made and commercial production begins, their expenditures can be recouped through profit-sharing or production-sharing agreements with the government. Drilling costs were substantial due to the need for deep wells, often through challenging high-pressure zones. However, as discussed earlier in the paper, Pakistan's success ratio had been impressive and the prospects of discovery were reasonable. It was therefore difficult to understand why a major oil company on the verge of a potentially significant discovery suspended its drilling operations, revoked its concession, and decided to leave the country. The more serious impact of this pullout was the negative signal the action conveyed to at least ten other companies that were ready to embark on exploration activities in Pakistan for the first time with their own risk capital. Had these companies come forward at that time, the energy situation today could well have been entirely different.

Among the many reasons for the pullout, two most clearly serve to illustrate the penalty cost of poor policies and delayed action. The first was the reluctance and inflexibility of a government agency to correct an obvious anomaly in the tax structure, which resulted in double taxation and thereby severely eroded the cash flow prospects of the oil company—especially detrimental when the company was incurring unusually high drilling expenses under difficult geological conditions. The second reason was the prevailing pricing policy under which the well-head price of oil and gas was established through a process of negotiations with the government after commercial discovery. The uncertainty this caused was apparently enough of a disincentive for a company deploying risk capital in costly drilling operations to pull out at the very threshold of success. Pakistan's policymakers at the time failed to understand that it was competing with other countries throughout the world to attract scarce exploration risk capital. As a consequence, it needed to make its pricing regime as attractive as possible since the size of the deposits was perceived as modest. The strongly gas-prone nature of Pakistan's geology was an added disincentive, as oil exploitation was and still remains more profitable than natural gas for a number of reasons, including marketability and infrastructure costs.

The above is a prime example of foregoing long-term benefits in favor of immediate financial gains (through double taxation) and perceived gains by maintaining a lack of transparency (by not establishing up-front the post-discovery pricing regime). IEP would have certainly exposed these shortcomings and their impact in terms of the immense cost to the economy of pursuing prevailing policies. It is fair to point out that these retrogressive policies were eventually rectified—a credit to subsequent policymakers. The revised policies are outlined in the

government's current exploration promotion[41] and investment promotion documents.[42] However, now another challenge, that of deteriorating security, has emerged over the last ten years and is understandably hampering exploration efforts. This story of "too little, too late" is symptomatic of a series of lost opportunities through the pursuit of inadequate policies and the reluctance to change.

The second example also concerns the petroleum subsector and relates to events that occurred at around the same time. A major international petroleum company involved, through its local subsidiary, in a joint venture with the government had decided to sell the government its shares in a natural gas field development operation. This venture produced natural gas with a high nitrogen content, which provided a valuable feedstock to the fertilizer industry. It took over a year to negotiate the sale price, and the government negotiators were able to reduce the purchase price by what they considered a significant amount.

This might be considered a success, but for one serious repercussion. The departing petroleum company, once it had decided to sell its interest, was obviously no longer interested in further field development programs. Hence, during the protracted negotiations, its very lucrative field expansion program was put on hold, resulting in immense opportunity cost losses. These constituted not only direct losses in terms of revenues to the joint venture itself, but also even more significant losses to the fertilizer industry, which was deprived of feedstock and did not have recourse to equally economical alternatives. In addition, there was the linkage effect in the form of lost agricultural productivity due to lack of fertilizer that would have been available had the field development operation been pursued as originally scheduled. Again, a mechanism to assess the penalty could well have prompted a speedier negotiation with less immediate financial gains but with longer-term economic benefits, which would have been vastly greater.

A third example that even more starkly emphasizes the impact of lost opportunities occurred in the first half of the 1990s, and concerns the search for export routes for Central Asia's very substantial surplus energy resources. As the euphoria in the new Central Asian states of recently won independence gradually gave way to the pragmatism of economic collaboration, they began to work together on options for exporting their surplus untapped energy, mainly in the form of oil, natural gas, and hydropower. The capital-intensive and high-return infrastructure projects needed to harness and transport the energy were ideal for private sector financing. In any event,

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[41]Ministry of Petroleum and Natural Resources. (2009). *Petroleum exploration and production policy 2009*. Islamabad, Pakistan: Author.

[42]Ministry of Petroleum and Natural Resources. (2009). *Investment opportunities in Pakistan's upstream oil and gas sector* (pp. 11–24). Islamabad, Pakistan: Author.

official sources were inadequate. In hindsight, the most sensible approach from the standpoint of the Central Asian countries would have been to introduce the necessary incentives to attract private capital (under an appropriate regulatory framework) and then to let the private sector compete. Instead, the issue became highly politicized as each of the potential target areas vied for the resources. As could be anticipated, there were many players in this revival of the Great Game and, given the high stakes, the competition was intense. Europe promoted a western route as a viable strategic alternative to the grand trunk lines from Russia. Japan, with its reliance on LNG to fuel its economy, sought to secure an eastern route. China's growing energy-deficient economy lay in the same direction. To the north, Russia looked to top up crude oil supplies for its more remote southern refineries. To the south, there was the potentially lucrative South Asian market.

The Central Asian states gave serious consideration to the vast energy-starved region of South Asia, for which the major portion of the most economic route passed through Pakistan. The resulting access to ports on the Indian Ocean for extending exports beyond South Asia was an added attraction. Establishing an energy corridor would have promoted trade in other goods and services between the connected countries. The security situation in the region had not yet begun to deteriorate. Although the Central Asian authorities and international consortia made several attempts to start negotiations with Pakistani authorities, progress was elusive. The response in Pakistan, both from official channels and the private sector, was lukewarm at best, and completely overshadowed by the aggressive enthusiasm of competing interests. One cannot help but wonder how things might have turned out if the South Asian trade corridors had been established. The revenues from the trade as well as from wheeling energy across the region would have benefited Afghanistan and Pakistan immensely. IEP, had it existed, would have signaled the need to aggressively pursue this route as a policy imperative for Pakistan. The additional energy supplies would have fueled the economies of Pakistan and Afghanistan as well as India. The resulting interdependence would certainly have alleviated the escalating discord in the region and may even have changed the course of history.

IEP IN PAKISTAN

Universal Recognition of the Problem

The lack of energy policy coordination is a recurring theme in many important writings on Pakistan's energy sector. Burki (2007), who focuses on commercial energy, underscores "the need for a comprehensive strategy to deal with the problem of energy."[43] Dealing primarily with non-commercial traditional fuels, Qureshi

[43]S. J. Burki. (2007). The weight of history: Pakistan's energy problem. In R. M. Hathaway, B. Muchhala, & M. Kugelman (Eds.), *Fueling the future: Meeting Pakistan's energy needs in the 21st century* (p. 55). Washington, DC: Woodrow Wilson International Center.

(2007) argues that "it is imperative that government policies and strategies recognize" the "near invisibility of the role of traditional fuels," for which the study urges "better inter-sectoral policy coordination, and integrated development approaches," reminding us that "the costs of inaction are high."[44] Nor has the issue escaped international attention. The New York Times, as early as April 2010, quoted a Pakistani senior official as saying, "There is nobody in Islamabad who is working on a coherent, integrated plan. The discussion just keeps going in circles."[45] Weynand (2007) maintains that the most glaring shortcoming in Pakistan's energy sector was "the ability to perform system-wide planning in the electricity and energy sector as a whole, both in terms of technical analysis and ability to develop and implement plans of action."[46]

Capacity Development at the Level of Policy Institutions

The opening section of this paper introduced the three essential levels of capacity development: (i) individual, (ii) institutional, and (iii) policy. At the individual level, despite the gradual exodus of trained personnel, the energy sector in Pakistan has been able to retain some islands of excellence. Moreover, the country has adequate access to training facilities and programs both within the country and overseas. Shortcomings at the policy level have been dealt with in some detail. The institutional level needs some scrutiny. This paper confines itself to the overall organizational structure of policy institutions, especially the lead ministries, main regulatory bodies, and planning institutions in the energy sector.

The Early Years

IEP is not a stranger to Pakistan. In the early 1980s,[47] the government, in consultation with the World Bank, established IEP expertise within the Directorate General of Energy Resources (DGER) under the Ministry of Petroleum. Concerned with the dominance of the petroleum subsector under this arrangement, the government decided to shift this expertise to a special cell, the ENERPLAN Cell created within the Planning Division. The necessary government administrative approvals were granted and expenditures sanctioned.[48] The cell was charged with the integrated energy

[44]S. Qureshi. (2007). Energy, poverty reduction and equitable development in Pakistan. In R. M. Hathaway, B. Muchhala, & M. Kugelman (Eds.), *Fueling the future: Meeting Pakistan's energy needs in the 21st century*. Washington, DC: Woodrow Wilson International Center.

[45]S. Tavernise. (2010, April 27). Pakistanis living on the brink and too often in the dark. *The New York Times*.

[46]G. Weynand. (2007). *Energy sector assessment for USAID/Pakistan* (p. 34). United States Agency for International Development.

[47]At the time, the author was the World Bank's advisor on energy projects in Pakistan.

[48]Planning and Development Division. (1984, October 1). Administrative approval and expenditure sanction in respect of Energy Planning and Development Project (ENERPLAN) (No. Energy/ENP/19(1)PC/84).

planning function, including the preparation of energy balances and impact analysis. For coordination with national plans, a high-level coordination committee was constituted with membership from energy-related ministries and agencies.[49] The committee was charged with providing "a central coordination forum for policy decisions, program guidelines, monitoring and evaluation of all components of the [ENERPLAN] project, to be implemented by various Ministries and Organizations," for which it was given the "role of overall leadership in fulfilling the objectives of the project." Together, the cell and the committee constituted a mechanism to devise policy options for the energy sector in line with national economic objectives. Critical decisions of national import were raised to the level of the Executive Committee of the National Economic Council (ECNEC) or the Cabinet.

Unraveling

These early arrangements were intended as stop-gap measures until a ministry of energy emerged, in line with the phased approach recommended under IEP. Despite its shortcomings, such as the underrepresentation of agencies dealing with non-commercial energy, this was a commendable initiative. Although the interim arrangements worked for a while, they began to falter and eventually unravel.

One reason for this unraveling was possibly the wavering of the international community which, with the breakup of the former Soviet Union, backpedaled on policies that could be construed as support for central planning. The World Bank's lack of attention to comprehensive energy sector reform in Pakistan also needs to be mentioned. Despite the recognition that energy shortages and imbalances were instrumental in holding back Pakistan's economic growth, the Bank's last comprehensive energy sector report dates back to 1980.[50] At the subsector level, the last report, on the petroleum subsector, was issued in 2003.[51] While the weaknesses in energy planning and policy formulation were pointed out from time to time as part of the dialogue with Pakistan, they were not accorded the profile they deserved; nor did this modest level of attention have the desired effect. The state of the sector today bears testament to these failures. Weynand's (2007) energy review for USAID correctly singled out the absence of integrated planning as the main shortcoming, but needed major follow-up work on precisely how to address the issue.[52]

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[49]Government of Pakistan. (1984, September 26). Gazette notification No. 12 (29-1) Energy/PC/83.

[50]World Bank. (1980, June 5). *Pakistan: Issues and options in the energy sector* (Report No. 2953-PAK). Washington, DC: Author.

[51]World Bank Institute. (2003, July 10). *Pakistan oil and gas sector review* (Report No. 26072-PK). Washington, DC: Author.

[52]G. Weynand. (2007). *Energy sector assessment for USAID/Pakistan* (p. 34). United States Agency for International Development.

A second reason that the early efforts did not succeed was the unchecked expansion of the bureaucracy. On an overall basis, Pakistan's bureaucracy today supports 61 federal ministers and ministerial-level advisors,[53] many based on party patronage, in contrast to most countries' cabinets, which consist of around 15 to 20 members. The US cabinet has 16 members and even the Nigerian cabinet, which is considered prohibitively top-heavy, has about 40. This bloating also affected the energy sector. Instead of moving toward a streamlined structure and a consolidated ministry of energy, responsibility for the sector was fragmented even further among new and existing agencies, thus adding to the complexity and confusion.

The Fragmentation of the Sector

Listing the energy-related lead ministries, planning institutions, and regulatory agencies and their responsibilities illustrates the extent of the fragmentation as well as overlap.[54] The Ministry of Petroleum and Natural Resources is responsible for the oil and gas subsectors and the coal subsector. Coal exploration and development, however, are managed by the Pakistan Mineral Development Corporation through leases granted to the private sector and administered by the provincial governments. The Ministry for Water and Power oversees the electric power subsector. The Pakistan Atomic Energy Commission is responsible for nuclear power generation. The Ministry of Urban Affairs, Forestry, and Wildlife heads the fuelwood subsector. The Ministry of Food, Agriculture, and Livestock handles other biomass such as agricultural residues. The Alternative Energy Development Board is the central national body for renewable energy and is also charged with rural electrification in areas remote from the power grid. The South Asian Association for Regional Cooperation (SAARC) Energy Center was set up to address regional and global energy issues, to facilitate energy trade within SAARC, and to enhance more efficient energy use within the region. The Ministry of Finance, Planning, and Economic Affairs is involved in energy pricing and taxation policies. The Ministry of Production is involved in policies for petroleum refining. The Ministry of Production and the Ministry of Industries both deal with industrial energy conservation policies. This listing does not include the vast array of line agencies and corporate entities, private and public, in each of the energy subsectors, which is normal in a country of the size and complexity of Pakistan.

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[53]K. Brulliard. (2011, October 17). Pakistan faulted on cabinet's size. *Washington Post*.

[54]Z. Alahdad. (2008, October 11). *Institutional structure for integrated energy planning: The case for Pakistan* (p. 5). Paper presented at a seminar on Pakistan's Energy Needs by the UET Alumni Association, Washington, DC. Z. Alahdad. (2011). Turning energy around (p. 244). In M. Lodhi (Ed.), *Pakistan beyond the crisis state*. New York, NY: Columbia University Press.

As mentioned earlier, the function of assessing energy demand and supply and preparing energy balances lies with the HDIP. As this institution comes under the Ministry of Petroleum and Natural Resource, the function has now reverted to the subsector ministry where it was originally located.

As for regulatory bodies, the Oil and Gas Regulatory Authority regulates petroleum product distribution, including compressed natural gas (CNG) for vehicles, sets safety standards, and equalizes prices across the country. The National Electric Power Regulatory Authority is charged with ensuring fair competition and consumer protection. The Private Power and Infrastructure Board was set up to improve investment incentives in the power sector and as a one-stop facility for investors. Regulatory functions for other energy subsectors are included in the respective subsector ministries, while key pricing and taxation regulatory functions are held in central ministries such as Finance and Planning. While regulatory bodies should be independent of line ministries, they could at least be under one administrative cover with clear links between them, even physically under one roof if possible, to facilitate coordination.

Thus, responsibility for the energy sector is highly fragmented and, in some cases, there are significant overlaps, neither of which is conducive to IEP.

Retrieval Possibilities and Measures

Despite the picture presented above, the situation is certainly not hopeless. It can be rectified much more rapidly than pessimists would have us believe. However, this time IEP needs to be comprehensively introduced, together with the supporting institutional framework, the latter on a phased basis to minimize administrative disruption. The pace could be rapid because the steps to start IEP in Pakistan have already been taken once before. On the administrative side, the institutional memory should be available in the archives in the form of organizational and technical studies, and administrative and budget approvals. On the more sophisticated side dealing with analytical expertise, the situation is, paradoxically, even easier to handle. Most of the sophisticated national planning and budget processes as well as the knowhow for preparing energy balances already exist. It is simply a question of transferring the skills from the HDIP to an energy cell in the Planning Division, as done before, or in the new ministry of energy if one is formed. This time around, the cell would be strengthened by expertise on non-commercial and alternative energy from the line agencies under the Ministry of Forestry, the Ministry of Agriculture and Livestock, and the Alternative Energy Development Board.

Institutional restructuring can be phased in, starting with the cell in the Planning Division or the new ministry of energy, with access to top policy levels. In

parallel, if the new ministry is not yet formed, plans to establish it inclusive of a planning cell should be launched. The plans should cover concomitant administrative changes in existing ministries and agencies to consolidate energy-related responsibilities and functions in the proposed ministry. While maintaining the independence of the regulating agencies, their functions should be reviewed to facilitate a coordinated approach. Administratively, the possibility of housing them under one roof should be examined.

To signal political and administrative will, it would be expedient to publicly announce up-front the intent to establish the new ministry, its structure and responsibilities, as well as a tentative timeframe. Not doing so would increase the chances of, once again, unraveling the process.

Specific aspects of the potential merger between the Ministry of Petroleum and Natural Resources and the Ministry of Water and Power to form a new ministry of energy have been discussed in different parts of this paper. Consolidating these discussions here might be useful. To begin with, the merger and formation of the new ministry is far from a done deal. At this stage, it is simply a proposal by the minister of petroleum to counter the difficulties in dealing with the Ministry of Water and Power in preparing and implementing policies and plans to address the energy crisis.[55] The proposal stems from similar misgivings by individual enterprises throughout the energy sector. The merger is expected to be completed in the second half of 2012, and cross-subsidies eliminated by July 2013. The president, while supporting the proposal in principle, has asked that the authorities concerned, including the Ministry of Law, study the necessary legal and administrative underpinnings before presenting the full package to the cabinet for approval. In other words, a detailed due diligence has yet to be carried out and we know that the devil often lies in the details. One can expect the usual pitfalls along the way, including bureaucratic wrangling, turf protection, and the omnipresent inertia against change, particularly if the change envisages, as it must, downsizing and shifting authority and responsibility.

Nevertheless, the proposed merger is an important and welcome initiative indicating an awareness of the current structure's inadequacy and the need to bring about a more integrated framework to facilitate informed decision-making. The status quo is no longer acceptable. That said, the measure, if implemented, is only a means to an end, a first step in the process. It will need to be followed by further consolidation within the new ministry of energy of other energy-related policy-level bodies to facilitate the IEP process, and thereby to generate sound policies to

[55]K. Kiani. (2011, August 22). Ministries of petroleum and power being merged. *Dawn*.

revitalize the energy sector as an engine of growth and economic prosperity for the population at large. In parallel, a similar exercise needs to be designed and implemented for the fragmented energy regulatory bodies, which are hindered by conflicting mandates and responsibilities. These institutions need to be brought under one roof independent of the ministry of energy, and the terms of reference of each of these bodies need to be revisited to eliminate the overlaps.

A word of caution is necessary here. It appears that, ostensibly for administrative convenience, the proposal also mentions the subsequent spinoff of the hydropower subsector from the ministry of energy, and the creation of a separate ministry "to deal with irrigation, agriculture, and hydropower policies and projects." This would be a retrograde step tantamount to undoing much of the consolidation that would have been achieved in the initial merger. It is hoped that saner heads will prevail during the due diligence process. Hydropower cannot be dealt with separately from the rest of the power subsector and the energy sector as a whole if a sustained capacity to produce a coherent integrated energy policy is the goal.

THE VERDICT

It is vital to reintroduce IEP in Pakistan, and this time comprehensively. Policymakers can then move beyond defining where Pakistan needs to be to how to get there. Every crisis presents an opportunity. Given the high level of both domestic and international attention to Pakistan's energy problems, now is the time for action, to build on the momentum of recent initiatives to consolidate the sector. Starting with the skills available in Pakistan and with the political will to launch the structural changes, IEP could be put in place relatively quickly, paving the way for the recovery of the energy sector and thereby for the economy as a whole.

ABOUT THE AUTHOR

As Director of Operations, World Bank, Ziad Alahdad helped manage the World Bank Institute and was a member of the Bank's Operations Committee and Operations Policy Committee. He headed the Bank's offices in Turkey and Romania. In Turkey, he managed the turnaround of one of the Bank's largest country portfolios. In Romania, he helped reverse the economic decline, securing Romania's path to European integration. He headed the *Central and Eastern Europe Regional Energy Network* which provided analytical foundations for extensive energy investment. He helped manage the global *Energy Sector Management Assistance Programme*. He managed energy operations in several countries including the Russia Oil Rehabilitation Project, the Bank's largest-ever investment, and its first in Russia. He served as energy advisor in Pakistan, East Africa and Central Asia.

Prior to the Bank, he was a senior executive in Sui Gas Transmission and General Manager and Director in the Pakistan Automobile Corporation.

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