Pakistan's energy sector is facing a serious crisis. Key challenges include large and growing shortages of energy, high energy costs, and inefficiencies that prevent the sector from financing all its costs. It therefore relies heavily on government support, through subsidies and funding for almost its entire investment program. Specific actions to overcome the dire situation can be classified along three main lines. The first are actions to overcome the investment deficit, which requires least-cost investment plans based on low-cost supply sources (notably hydropower), market competition, more efficient energy use, and incentives to manage consumer demand. Second, steps to improve sector finances are needed. Key actions include modifications to the current universal national tariff, cost-recovering tariffs, allocating additional gas for power generation, and improving utilities' operational and commercial performance. Third, to improve sector governance, managerial autonomy and accountability needs to be introduced in power utilities. Performance contracts or other tools for monitoring and improving the performance of the public utilities—for example, outsourcing management, leasing, sale of shares along with management control, and privatization—should be considered, and the approach deemed most appropriate should be introduced. The problems and potential solutions to the recovery of the Pakistan energy sector are all well known. What is needed now is leadership and a road map of sustained actions.

The energy sector is in serious crisis. Performance is far from satisfactory, and major issues need to be resolved. Key challenges include substantial and growing shortages of energy (6,000–7,000 megawatts [MW]—a third of peak demand for electricity; and up to 1,500 millions of cubic feet per day [mmcfd]—around 25 percent of peak demand for gas), as well as financial constraints that prevent the sector from financing all its costs. As a result, the sector relies heavily on government support—through subsidies amounting to about 2 percent of GDP from the budget to cover operating costs and funding for almost the entire investment program. This situation is unsustainable, as energy shortages are constraining the growth of productive activities (resulting in a loss of GDP of 2 percent or more a year; according to preliminary estimates), employment, and exports, while budgetary subsidies are diverting resources from other high-priority activities.

In recent years, the government (with donors) has prepared strategies and plans to address these issues. For example, the Asian Development Bank prepared a comprehensive assessment of the energy sector in 2010 (under the Friends of Democratic Pakistan umbrella), analyzing the sector’s challenges and recommending ways to address them (ADB 2010). Similarly, in September 2010 the government prepared a power sector reform plan that aimed at addressing governance and efficiency issues, regulatory challenges, investment requirements, and power sector finances. Implementation of these reform plans has, however, been incomplete at best.

Pakistan’s per capita energy consumption is on par with other countries at a similar stage of development.
(Table 1), and energy access has expanded rapidly. The number of electrified households rose from nearly half of households (7.8 million) in 1996 to two-thirds (13.4 million) in 2006 and to three-quarters (19.0 million) in 2011.¹ The greater access comes from a vigorous rural electrification program—financed by government resources—which the government continues to pursue, largely for social reasons. But while network expansion brings social and equity benefits, it has also increased the energy shortages. Although about 3,000 MW of generation capacity has been added since 2008, because of inefficiencies and the network expansion this addition has not reduced the overall shortfall—on the contrary, it has increased. The energy intensity of Pakistan is relatively high due to inefficiencies in not only supply (for example, public sector generation plants depict heat rates of 12,000–14,000 British thermal units per kilowatt hour [btu per kWh], whereas efficient gas fired generation plants should achieve heat rates of 8,000 btu per kWh or below) and transmission/distribution, but also in the use of energy across different sectors.

Issues

A large and growing shortfall of energy supply with a shift to a poor high-cost fuel mix

Installed capacity stagnated over 2000–08, with only two additions (325 MW at Chashma nuclear plant in 2002 and 1,450 MW at Ghazi Barotha hydropower plant in 2004). By comparison, installed capacity increased from 3,711 MW to 5,201 MW (40 percent) in Bangladesh over the same period, and from 97,885 MW to 143,061 MW (46 percent) in India. After 2008, some 3,000 MW were added, taking capacity to about 22,500 MW by the end of 2011. Around 2,500 MW (10 percent or more of total installed capacity) is unavailable, however, as lack of maintenance and rehabilitation has reduced the capacity of public sector plants. This capacity is further eroded in winter, when reduced water flows mean that about 5,000 MW of hydropower is unavailable. Total generation has therefore stagnated at 94–98 billion kWh since 2006/07, despite the additions; the newly installed capacity could have generated around 10 billion kWh, reducing the peak deficit by a comparable amount.

The deficit arose because investments fell heavily. They were needed to enhance supply and upgrade the networks to cater for the increased demand. From a peak of 26 percent of total investment and 51 percent of public investment in the mid-1990s, the share of energy (including power) investments had declined to 4 percent and 26 percent, respectively, by 2009/10. During this period, private investment (except for expenditures to complete plants that were initiated during the 1990s) was essentially zero.

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<tr>
<th>Table</th>
<th>Comparative energy use, 2011</th>
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<tr>
<td></td>
<td>Energy imports, (share of use)</td>
</tr>
<tr>
<td>Nepal</td>
<td>12</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>17</td>
</tr>
<tr>
<td>Pakistan</td>
<td>24</td>
</tr>
<tr>
<td>Vietnam</td>
<td>–11</td>
</tr>
<tr>
<td>India</td>
<td>25</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>44</td>
</tr>
<tr>
<td>Indonesia</td>
<td>–84</td>
</tr>
<tr>
<td>China</td>
<td>9</td>
</tr>
<tr>
<td>Region</td>
<td>South Asia</td>
</tr>
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</table>

TWh is terawatt hour; KGOE is kilograms of oil equivalent; PPP is purchasing power parity. Source: World Development Indicators database.
A number of factors led to the fall in investments. Some of the reasons why investments declined are historical, but they are still relevant and continue to impact on investments:

- While there is consensus on the need to develop hydropower resources, actual investments are often impeded by concerns of the constituents over the distribution of water resources that would be made available through large reservoirs. This issue is termed a “trust deficit” in the Bank’s water sector strategy report (Briscoe and Qamar 2005). Essentially, the provinces are concerned that they are not receiving their due allocations under the Water Accord of 1991 and have reservations about the efficacy of federal agencies (such as the Indus River System Authority) responsible for implementing the accord, the mechanisms set up for monitoring such allocations (for example, the telemetry systems installed by the Water and Power Development Authority [WAPDA] over the last decade), and the operations of the entities responsible for managing water rights and allocations (for example, WAPDA).
- The climate for private investment was hurt in the late 1990s. Pakistan went through a rather acrimonious debate with the sponsors of an independent power producers (IPP) program involving threats of, and actual, cancellation of licenses of some IPPs; accusations of corruption in the IPP program; and a widespread perception that those projects entailed higher power prices than required—and therefore a reversal of such programs was in order. More recent efforts to mobilize private investments for power generation have thus not attracted major international investors. The government recognizes that the public sector alone cannot finance the large investment requirements, and so may need to review the incentives for private sector participation to avert any further shortfalls in private investment in power.
- The surplus that emerged following the commissioning of IPPs in 1997–2001 led to some complacency in government circles. They felt that investments to enhance capacity were not really a high priority. Given that power generation projects have long lead times and that power demand follows income growth with a lag, the country is still facing the impacts of this attitude—and the resulting decline in investments.

The shortfall in supplies (during peak periods) widened over 2008–11, from around 4,000 MW to about 7,000, or about one-third of peak demand (Figure 1). The shortfall is essentially managed by load shedding—rotating shutdowns of supply feeders. These disruptions are hurting industrial, commercial, and other productive activities, and their impact is estimated at around 2 percent of GDP (Ministry of Finance 2012).

The historical pattern of development—which has yielded a suboptimal energy mix and heightened the

![Figure 1: Demand has risen faster than capacity, 2008–11](image)
economy’s vulnerability to world market oil prices—has increased generation costs by three to four times. Generation costs account for around two-thirds of power supply costs. The generation mix has shifted from two-thirds hydro and one-third thermal in the 1980s to only 30 percent hydro and 70 percent thermal today. Also, there has been a shift from domestic low-priced gas to imported, higher priced, dirtier furnace oil (Figures 2–4). The cost of generation of existing hydro plants is PRs 1.6 per kWh and for new hydro plants it is estimated to be between PRs 2.50–2.60 per kWh; by comparison, generation cost of gas based combined cycle plants is PRs 4.50 per kWh, nuclear PRs 4.20 per kWh, coal PRs 8.10 per kWh, fuel oil PRs 16.75 per kWh, and diesel around PRs 21.00 per kWh. By moving to thermal generation, Pakistan is not benefiting from the cheapest supply sources—hydro and coal (see Figure 2). Some of these consequences are self-inflicted, as investment decisions have been held up due to disagreements between provinces on water-resource use and mining rights. Even within oil and gas, reduced gas availability ensures that power generation is not based on the cheapest fuel sources—in fact, it is based on fuels (fuel oil, diesel) that are the most expensive and volatile in price movements. Nor is the allocation of lower cost gas for power generation based on least-cost criteria: while public sector plants installed 15–20 years ago receive gas, some private plants—which were installed in the last five years and incorporate more modern and

**Figure 2** Generation costs

- **Fuel**
- **Operations and maintenance**
- **Capital**

| Source: Tetra-tech and Hagler Bailly Pakistan 2012. |

**Figure 3** Power generation fuel mix, 1990–2011

- **Hydro**
- **Gas**
- **Oil**
- **Coal**
- **Nuclear**
- **Imports**

| Source: Pakistan Energy Yearbook various years. |
efficient technologies—do not. Hence, there is an overall inefficiency. The transition to thermal generation (and within thermal, from gas to fuel oil) has thus increased generation costs by three to four times; also, power generation costs move in tandem with fluctuations in international oil prices.

While natural gas can significantly reduce generation costs in Pakistan, in recent years the available gas has been reallocated to other activities and sectors—at the expense of power generation. Pakistan attracted investment in gas exploration in the 1990s, raising proven reserves more than 50 percent—to 32 trillion cubic feet (Tcf)—over 1996–2006. Gas production doubled to 3,800 mmcmd and sales to about 3,347 mmcmd. Much of this additional gas was allocated for power generation—rising from 511 mmcmd during 1995–96 to 1,343 mmcmd during 2005–06. But this success was not sustained: reserves have since fallen (27 Tcf in 2011), production and sales have stagnated at about 4,000 mmcmd and 3,400 mmcmd, and the allocation for power generation has fallen to 924 mmcmd. By the end of June 2011, gas demand had increased to 6,000 mmcmd. Despite stagnant supply, another 1.8 million consumers were added over 2006–11, bringing the total to 6.2 million.

In parallel, and partly due to the large expansion of the networks, the performance of the gas utilities has deteriorated. Unaccounted for gas rose from 188 mmcmd in 2006 (about 7 percent of production) to 300 mmcmd in 2011, or more than 10 percent of available gas (global best practice is 1 percent). Also, gas has been gradually diverted from power. Indeed, power generation receives about 400 mmcmd less gas today than in 2006. Thus, only 26 percent of power generated in 2011 came from gas, down from 41 percent in 2006.

The high costs are also driven by high transmission and distribution losses: 25 percent in 1996, 24 percent in 2006, and still 24 percent in 2011. But the distribution companies (DISCOs) show wide variation in losses: from 10 percent for Islamabad Electric Supply Company to 35 percent for Peshawar Electric Supply Company (PESCO) in 2011. Another issue is that the DISCOs do not collect all the bills issued—of the PRs 705 billion billed in 2010/11, some PRs 83 billion (12 percent), or nearly $1 billion, was not collected. Again, there is wide variation—four or five of DISCOs have achieved collection rates of 95–98 percent, while others have rates of just 60 percent.

Boosting energy efficiency could be one of the most cost-effective ways to narrow the power deficit in Pakistan and to address both peak load and energy shortages. Current “low-hanging” options with available technologies range from improvements in lighting and air-conditioning in buildings to street lighting and water pumping in municipalities—and waste heat recovery in industries. Although the importance of energy efficiency has been
recognized in Pakistan, and Enercon was established in the early 1990s, there has been relatively limited implementation of actions on this front (such as large-scale deployment of energy efficient lamps). As a result, the vast potential for energy savings across the buildings, industry, transport, and agriculture sectors, estimated to be in the range of 20 to 30 percent, remains largely untapped.

**Strained finances**

*Power tariffs (despite recent rises) are still far short of supply costs.* The aggregation of tariffs determined by the National Electric Power Regulatory Authority (NEPRA) can be taken as a proxy for full cost recovery. The tariffs notified by the government represent the reduced cost to consumers. The difference represents a steep financial shortfall relative to the cost of supply (Figure 5). At its peak (up to about July 2010) the shortfall was nearly 35 percent of supply costs; for the 2011/12 determinations, it was still around 25 percent of total supply costs. A major part of the current shortfall comes from the fact that tariffs were not adjusted between November 2003 and February 2008, while supply costs rose sharply—oil prices (around

| Better distribution companies have reduced losses to good-practice levels among developing countries, 1999, 2006, and 2011 |
|---|---|---|
| Distribution company | 1999 | 2006 | 2011 |
| Islamabad Electric Supply Company | 13.3 | 9.7 | |
| Gujranwala Electric Power Company | 16.5 | 10.2 | 12.0 |
| Lahore Electric Supply Company | 20.2 | 13.1 | 13.3 |
| Faisalabad Electric Supply Company | 12.7 | 11.6 | 11.2 |
| Multan Electric Power Company | 24.1 | 20.5 | 18.3 |
| Turkish Electricity Distribution Company, Istanbul | 16.2 | 11.0 | |
| North Delhi | 27.1 | 12.5 | |
| Eastern Power Distribution Company of Andhra Pradesh | 12.0 | 7.0 | |
| Dakshin Gujarat Vij Company | 24.3 | 12.1 | |
| Edenor, Buenos Aires | 10.2 | 11.1 | 12.6 |
| PLN, Jakarta (Java only) | 17.5 | 8.8 | |

Source: NEPRA (Pakistan); TEDAS (Turkey); Edenor (Argentina); PFC (India); PLN (Indonesia).

a. Data are for 2005.

b. Data are for 2008.
75 percent of supply costs) peaked at $150 a barrel in June 2008. While the government has aggressively adjusted tariffs since 2009—and changes in supply costs are promptly incorporated in consumer tariffs—the overhang from 2003/04–2007/08 has not been overcome.

The difficult financial picture is further complicated by uniform national tariff fixed at the cost of the most efficient DISCO, even though supply costs vary widely by province and DISCO. The government makes tariffs uniform by notifying the lowest determined tariff for each class of consumer to all DISCOs. The sum total of notifying a uniform national tariff equivalent to the costs of the most efficient utility implies that all other utilities automatically receive a subsidy through the tariff differential subsidy (TDS). In 2012, this amounted to PRs 465 billion (about 2 percent of GDP).

Another contributing factor is low collections. Even if tariffs are insufficient for cost recovery, DISCOs should collect all the revenues they bill. However, substantial accumulated arrears or receivables have developed within some DISCOs (discussed above). Due to inadequate tariff adjustments and insufficient cost recovery, most DISCOs continue to suffer financial losses and are compelled to defer investments for system enhancement, efficiency improvements, and the like. A tariff structure that does not promote energy conservation has also become a major barrier to pushing demand-side energy efficiency in Pakistan. Finally, NEPRA establishes performance targets for each DISCO, but some DISCOs do not meet them and thus require additional support. (Other DISCOs, however, achieve good levels of technical and financial performance.)

This lack of cost recovery is a huge burden on the federal budget, aggravating macroeconomic imbalances. The government provides subsidies from the budget for various (Table 3). The largest component of budgetary subsidies is the TDS. Since 2002/03, the government has kept power tariffs below the cost of supply and committed to pay the difference as a TDS. Yet the volume of such subsidies is unsustainable. The shortfall in DISCO revenues—which the government finances as TDS—has amounted to PRs 250–400 billion (roughly $3.0–4.5 billion) annually in recent years. The lower level is achieved in years when the government does not take actions to offset previous years’ accumulated deficits and payment shortfalls. In years when such overdues are also tackled, the level of TDS has approached the higher end of the range.

The TDS has also been very unpredictable. Each year, the budgeted level is exceeded by a factor of three or four. This places a high burden on the federal budget—which cannot be sustained—and adds great uncertainty to the budgeting process.

Finally is the issue of “circular debt.” With revenue and resource shortfalls, the DISCOs build up arrears in payments to the National Transmission and Dispatch Company (NTDC). The arrears force NTDC to delay payments to its power producers, which then build up

<table>
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<tr>
<th>Table</th>
<th>Federal government subsidies, 2008/09–2012/13</th>
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<tr>
<td></td>
<td>(PRs million)</td>
</tr>
<tr>
<td>Power sector</td>
<td></td>
</tr>
<tr>
<td>Budget</td>
<td>88,412</td>
</tr>
<tr>
<td>Revised</td>
<td>88,412</td>
</tr>
<tr>
<td>Ex-WAPDA DISCOs</td>
<td></td>
</tr>
<tr>
<td>Budget</td>
<td>74,612</td>
</tr>
<tr>
<td>Revised</td>
<td>74,612</td>
</tr>
<tr>
<td>Of which Tariff differential</td>
<td>65,000</td>
</tr>
<tr>
<td>KESC</td>
<td>13,800</td>
</tr>
<tr>
<td>Of which Tariff differential</td>
<td>12,000</td>
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WAPDA is Water and Power Development Authority; DISCO is distribution company; KESC is Karachi Electric Supply Company. Source: Budget documents (various years); World Bank estimates.
arrears to their fuel suppliers, refineries, and so on. This is often referred to as circular debt, though the arrears buildup is one-directional—from consumers to DISCOs and transmission companies, generators, and ultimately to fuel suppliers. The Ministry of Water and Power defines circular debt as the bills unpaid by NTDC/Pakistan Electric Power Company (PEPCO) to other energy suppliers. Based on this definition, the ministry estimated circular sector debt, as of June 30, 2012, at PRs 461 billion. However, this is only “current” circular debt, as it does not include debt swaps or other financing that the government resorts to for clearing arrears. For example, PRs 142 billion of term finance certificates were issued during 2011/12; similarly, PRs 302 billion of previously accumulated DISCO debts was consolidated into government debt. Total liabilities of the sector as of June 30, 2012, could thus be around PRs 600 billion. The Planning Commission estimated the circular debt (as of September 2011) at PRs 270 billion for PEPCO and PRs 27 billion for KESC, for a total of PRs 297 billion. It also reported that circular debt is increasing by PRs 30.5 billion a month because of shortcomings in NEPRA’s method to determine actual cost of service, underbudgeting of subsidy payments, and failure to collect revenues.

The large and growing subsidy requirement, along with circular debt, has two important impacts. First, it crowds out borrowing by the power and other energy sector entities for investment in new capacity and blights the further development of existing projects. If the amount of subsidies paid from the budget during 2007/08–2011/12 (PRs 1.2–1.4 trillion) had been invested in power generation, it could have financed 4,000–6,000 MW of new hydro or thermal capacity. This should be compared with the 3,470 MW added over 2008/09–2010/11 and the need for as much as 8,000 MW today. Second, circular debt creates severe liquidity shortages in the sector as a whole, such that suppliers refuse to provide fuel, generating plants stay idle, maintenance programs lag or are not implemented at all, and spare parts are unavailable when equipment breaks down (NEPRA 2011). But it must be stressed that the circular debt is a symptom of the inefficient and unsustainable energy system that can only be addressed once the underlying causes have been resolved—otherwise it would just reemerge.

**Weak governance**

Overall sector governance remains weak with diluted responsibilities across ministries. The government, as owner of the power and gas utilities, exercises almost no control over the management of public utilities. This is due partly to the limited capacities of the sector ministries, but it also highlights the lack of a reform champion or leader, who is fully empowered to implement the reforms. Past efforts at sector reform had limited impacts or were abandoned in between. Even when PEPCO was empowered to fully implement the reforms, the desired result was not achieved because it got bogged down in running the companies, rather than restructuring them (develop management capacities, systems, and human resources) and preparing them to operate as autonomous, commercial entities. To address these governance and high-level leadership challenges, the Friends of Democratic Pakistan report recommends merging the sector ministries and regulators and consolidating the authority and responsibility for completing the reforms in one office (a senior energy advisor).

Equally, the government has not announced its vision and strategy for the energy sector. As a result, investment decisions are not driven by rigorous analyses (such as least-cost planning). Over time, the capacity of the Planning Commission and the utilities to conduct such analyses has eroded. The process for approval of public sector projects has also been undermined.

Operational and technical performance can be improved across a wide spectrum, in technical areas (losses, voltage and other indicators of service quality), commercial areas (collections), and other areas. While some utilities in the power sector have achieved operational and technical performance standards that compare favorably with utilities elsewhere, most fall far short of these standards. The key reasons the utilities are not complying with mandated or internationally
accepted levels and standards of performance include:

- The sector’s unbundling—which was designed to improve performance gradually by, for example, enhancing private sector participation, increasing commercial pressure, and promoting greater accountability—has not been completed. At times, pressures from within the utilities have forestalled the process; at other times, action plans or programs prepared with inputs and the consensus of all stakeholders have not been implemented.

- There is limited progress in operating the sector on commercial principles and in assigning responsibility (along with accountability) to boards of directors and managements of the utilities. The government is involved heavily in the utilities’ day-to-day operations, with two effects: boards of directors and managements have no incentive to perform their functions efficiently or to the best of their ability, and the government cannot hold them accountable for improving the utilities’ performance.

- In 2009/10, the government signed performance contracts—initiating a process for holding the utilities accountable for performance—with all the DISCOs. But the contracts were not extended to subsequent years, and an important opportunity for strengthening governance and accountability was missed.

- Managing the power sector along commercial lines was introduced unevenly, creating efficiency gaps, as illustrated by the use of IPPs. The solicitation of IPPs in the 1990s was based on a fixed price, and the government guaranteed the offtake of power by NTDC or WAPDA and fuel supply by Pakistan State Oil or gas companies to the IPPs. This approach was appropriate at the time, as procedures to select IPPs based on competition on the price of power had yet to be developed. Also, direct contracting between IPPs and power consumers (as merchant plants or for part of their output) was not standard industry practice. However, both these concepts are now well established and are used for most IPP solicitations. Pakistan’s IPP policies have not, though, evolved to introduce or apply these concepts. As a result, private sponsors are not required to compete on the price of power that they offer, and the government continues to take on contingent liabilities—as guarantees for the offtake or fuel-supply obligations of their public sector counterparts.

Other options for improving operational and technical performance include decentralization of responsibilities (for the DISCOs) to the provinces—and privatization of the utilities. The former would require significant strengthening of the provincial governments’ capacity to manage the utilities. While privatizing the utilities remains a primary objective of the government, it needs to be recognized that in the current situation—the severely constrained financial situation of the power utilities—it would be difficult to attract private sector interest in owning and managing those utilities without some form of discount on the asset values and share prices. Since some privatization transactions have, in the past, been overturned due to such discounts, a consensus on the approach for privatization needs to be developed before such transactions can be taken to market.

Policy Recommendations

High-level leadership and management of the reform program is required. While addressing the challenges and constraints facing power and overall energy development requires actions across several fronts, strengthening governance and leadership should be an overarching objective. The government needs to establish a high-level and fully empowered structure (which could be a single ministry or a dedicated task force reporting to the Council of Common Interests or the Cabinet) to manage the transition. The responsible ministry or task force would need to be empowered to act on behalf of sector institutions, take the required administrative actions, address conflicting objectives, priorities, and points of view, and provide regular updates to the Council of Common Interests or the Cabinet. The ministry or task force would also need resources to conduct critical analyses and reviews and be guided by the vision or goal that the government
establishes—for example, for the sector for the next 15–20 years.

**Reduce supply shortfalls**

*The decline in investments has to be reversed and investments need to be prioritized through long-term and least-cost analysis.* Enhancing supply and overcoming the current shortages requires significant investments over the medium and long term. The focus of these investments has to be on low-cost sources of supply—particularly hydro, coal, and gas. Energy and power investments, because of their long gestation and large financing requirements, need to be carefully designed and implemented, requiring integrated energy planning as a forecasting tool, with the capacity to prepare and update forecasts or plans. Such forecasts for the power sector were traditionally prepared by NTDC, with the Planning Commission’s Energy Wing providing the macroeconomic and multisector framework. Over time, the capacity of NTDC and the Energy Wing to do this has eroded. The Asian Development Bank has provided an Integrated Energy Model to the Planning Commission for preparing comprehensive forecasts, impact analyses, and the like, though input requirements for the model are high. Whatever the mechanism, there is a need to develop and sustain capacity in the utilities (including NTDC) and the government for preparing comprehensive, integrated energy development plans and for updating them regularly.

*More effective use of existing generation capacity must also be ensured.* Much of the installed capacity in Pakistan is not available or only partially available—primarily due to a lack of maintenance, but also because most of the public sector plants were installed 20 or more years ago and now need to be replaced or rehabilitated. Rehabilitation and upgrading of such plants, including their conversion to coal, should be accorded a high priority—particularly for meeting the growth in demand over the next two to three years.

*Continuing efforts are required to develop domestic resources—coal, gas (conventional, shale and tight gas, liquefied natural gas, and pipeline imports) and renewables—as inputs for power generation.* The success of earlier policies in promoting exploration and development of gas highlights the need to further improve incentives. While the government has enhanced the producer price for natural gas under the 2012 Petroleum Policy and announced premiums for shale and tight gas development, it should also recognize that the gas pricing policy places a cap on the reference (fuel oil or crude) price, which is well below current world market prices. These imperatives for enhancing domestic gas supplies (and the policy measure to be used for encouraging further exploration—that is, further adjustments in the parity price) need to be weighed against the implications of such pricing policies. Specifically, an increase in the parity price would reduce the comparative advantage of gas-based generation projects—and may ultimately defeat the purpose of lowering power generation costs.

*Regional energy trade offers opportunities for reducing the supply deficit.* Pakistan can supplement domestic energy (power as well as gas) supplies through imports. There is a strong complementarity between the hydropower generation capacities of Central Asian countries, which peaks in summer, and seasonal demand patterns in Pakistan. Imports from Central Asia can contribute toward meeting the peak summer demand in Pakistan; it could also be a source for low-cost power for the country. Similarly, power imports from India—because of the close proximity of high consumption areas in Pakistan (such as Lahore and Faisalabad) to India—could alleviate the shortages in those areas. Efforts need to be made to expedite such projects.

*Improving energy efficiency is a “least-cost” option for curtailing the deficit, investment requirements would be reduced correspondingly.* This requires increased efforts by Enercon, to pursue strategies to scale up demand side energy efficiency measures across various sectors, in coordination with WAPDA, DISCOs, private sector entities, service providers, local financial institutions, and other stakeholders. There are significant opportunities for
tapping into energy savings across the buildings (public and private/residential), industry, transport, and agricultural sectors, which could be achieved through a combination of policy-based and market-driven interventions and associated financial incentive tools and capacity-building measures. They include robust energy-efficiency building codes, minimum energy performance standards for appliances, energy service companies (ESCOs), energy audit capacity building, and dedicated energy efficiency credit lines and funds. Global experience can be used and adapted to apply practical, effective, and proven delivery models in Pakistan, which could go far in improving energy efficiency and thus mitigating the energy shortages and crises, especially in the short term.

**Improve sector finances**

*A framework is urgently needed to reduce the across-the-board subsidies and the sector’s financial deficit.*

Key actions to improve sector finances include moving to cost-covering tariffs—for example, in three years, along with targeted subsidies for life-line consumers; eliminating the TDS and addressing, in parallel, the issues arising from the policy of uniform national tariffs; revamping the tariff notification process, to make it (essentially) automatic; and improving the DISCOs’ collection performance.

- While the government has increased tariffs substantially since 2007/08, these actions are seen as ad hoc measures to reduce the sector’s deficit at any one point of time. A firm commitment to implement cost-covering tariffs over the medium term—along with programs to shield the poor from further tariff increases—is therefore strongly recommended.
- In the absence of an announced timetable to eliminate the TDS, the utilities face no compulsions to reduce costs or increase collections, as the perception (and most often, the reality) is that the government will cover the deficit. Announcing a firm timetable for eliminating the TDS is therefore a high priority; it will also mean savings of PRs 300–400 billion a year in the federal budget. The government will, in parallel, need to address policy issues to maintain uniform national tariffs.
- Various mechanisms could be used to reconcile the differentiated cost of supply with this policy. They include enacting surcharge and subsidy schemes, using the bulk sale and power purchase price to equate consumer level tariffs, allowing some DISCOs to charge the actual cost of supply (which implies very small variations in tariffs), and directly subsidizing the remaining DISCOs for supply costs in excess of this level.
- Also, the government claims it notifies tariffs at the level of the lowest cost DISCO. This principle is, however, not always followed. The Planning Commission has estimated that if the government adjusted all tariffs to those of the lowest cost DISCO, the DISCOs could achieve PRs 98 billion in additional revenues, and the TDS requirement (PRs 592 billion) could be reduced by about 15 percent.
- The tariff notification process must also be revamped. First, the NEPRA Act, or NEPRA’s Tariff Rules, should be amended to require that NEPRA complete its determinations within six weeks after petitions are filed; currently it takes six to nine months. The time taken by Ministry of Water and Power to notify tariffs adds further delays. The cumulative impact (such as penalties and financial costs that the DISCOs have to incur, which NEPRA does not recognize or accept) is estimated to be around PRs 81 billion for 2012/13.
- Finally, requiring the DISCOs to improve performance—notably, collection of the amounts that they bill to consumers—will reduce the subsidy requirement, and improve the DISCOs’ cash flow. For 2012/13, the DISCOs will lose PRs 85 billion in revenues solely because they do not comply with NEPRA’s target for collections.

Other actions that should be considered include:

- As an interim step, publish the TDS amounts (both budgeted and actual) separately for each DISCO to identify the DISCOs and geographic areas benefiting from this subsidy.
• Strictly use the most efficient plants first, and allocate natural gas to them (as power generation costs account for the bulk of power supply costs).
• Improve the utilities’ operational performance and manage consumer demand more efficiently. This requires reducing theft and technical losses and improving metering. A 1 percent reduction in losses would generate PRs 9–10 billion in additional revenues or reduce costs by a similar amount.

Improving efficiency in supply and at the consumer and end-user level would also reduce power supply deficits and improve reliability of the system, though these approaches may face financial, institutional, and market barriers that need to be addressed through appropriately designed policies and programs. Key components of an energy efficiency improvement roadmap should include comprehensive legislation to promote energy efficiency, strengthened institutional set up and coordination, loss-reduction programs for DISCOs and public generation companies, demand-side management through DISCOs, building codes and equipment efficiency standards, and promotion of energy savings performance contracting by ESCOs. Such a strategy for scaling up energy efficiency should be accompanied by a comprehensive and targeted consumer awareness program and capacity building of a range of stakeholders from energy auditors, to ESCOs and to financial institutions, which will help mainstream energy efficiency as an integral component and business line within the sector framework and operations. Stronger energy efficiency policy signals will also attract the private sector, including appliance and equipment manufacturers, building contractors, industries, ESCOs, and local commercial banks.

Strengthen sector governance

The government must announce its vision for the sector and designate a high-level champion or leader to manage the reforms. This announcement has to be complemented by amendments (wherever required) in the current rules of business, to enable the high-level champion to make all the required decisions on behalf of the sector ministries and agencies to implement reforms. It also requires decisions on such issues as:
• Merging the Ministry of Water and Power and Ministry of Petroleum and Natural Resources into a single Ministry of Energy; merging NEPRA and OGRA into a single Energy Sector Regulator.
• Strengthening regulatory framework—updated rules and regulations, capacity building of regulators, and so on.

Other measures to improve sector governance include:
• Introducing legislation, along with enhanced investigation and prosecution, to combat energy theft.
• For all public sector companies, developing performance standards, which could be enforced through annual performance contracts or through more rigorous and timely monitoring of utility performance; ensuring compliance with such standards; and introducing reward and penalty schemes for boards of directors and management that comply with (or fail to comply with) such contracts. The responsibility for monitoring these performance contracts could be assigned to the boards of directors of the companies or (to further enhance transparency) to NEPRA. In the latter case, NEPRA’s performance monitoring capacity would need to be enhanced.
• Granting the public sector entities that can operate independently the required autonomy and accountability to operate along commercial lines. The government maintains strict administrative and operational control over all companies. Some companies, such as Islamabad Electric Supply Company, Faisalabad Electric Supply Company, Gujranwala Electric Power Company, and Lahore Electric Supply Company, can manage their affairs—including power purchase costs, investments, debt service, and operating costs—within the resource envelope provided by the determined tariffs. The government should cease intervening in the day-to-day management of these companies as a first step and hold the boards of directors and managements accountable for ensuring efficient electricity
supply. Gradually, such delegation should be extended to other companies, when they demonstrate the ability to manage their affairs independently.

The government needs to introduce market conditions for power, where commercial principles and trade among generators, distributors, and initially large customers would cater to all service requirements. Introducing market forces in the power sector should also be considered, which would absolve the government from responsibility for managing utilities, reduce government liabilities and subsidies, and allow the private sector to take over commercial activities (which it is best suited to perform). Introducing competition in the solicitation of new IPPs could be the first step. For this purpose, the policy and security package documents would need to be updated to allow for competition on the price of power and energy, enable the level guarantees and contingent liabilities required to analyze specific investments, and amend the selection criteria—to allow selection based on lowest energy cost, minimum contingent liabilities and commitments, and the like. The government will need expert advice and assistance, for amending the security package and selection process along these lines.

The government has announced a new exploration policy for natural gas, for which there may be room to improve the incentive structure. The policy aims to enhance local gas production by attracting investments for exploration and includes an increase in the wellhead producer price. This up-front incentive is reportedly attracting interest from local and international companies. The government may be reluctant to offer the full parity price, as that may generate windfall profits for exploration companies. However, mechanisms can be designed for the potential exploration companies to share some of the upside potential with the government. Without more domestic gas, Pakistan will need to import the required fuels, and thus the opportunity cost of forgoing gas development is high.

In parallel, the government should consider introducing market mechanisms in the gas sector. They could involve encouraging exploration companies to seek customers independently and enabling them to transport that gas through the gas transmission companies via an open-access framework.

Final Words

The above three pillars for reforming the energy framework are mutually reinforcing. Adding low-cost generation and improving governance are essential elements of financial sustainability. And without financial sustainability it would be difficult to achieve good governance or attract the investment needed for adding low-cost generation.

Notes

A. Ahmad, K. Saeed, M. Saqib, and L. Wang (Energy Unit, South Asia Sustainable Development Department) also contributed to this note.

1. However, according to household income and expenditure surveys (see Ministry of Finance 2011), 91 percent of households report electricity as their source of lighting.

2. Without government support to offset these performance failures, the DISCOs’ revenue and resource shortfall would become a charge on their equity. Applying this formula over time, a number of DISCOs erode all their equity. The support provided by the government can therefore be considered as recapitalizing those companies.

3. NEPRA-determined tariffs are taken to represent the cost of supply.


6. The most notable of such pressures is the incomplete transfer of human resources from WAPDA to the companies. A cadre of senior officials insists that because WAPDA employed them on a “common seniority” pool, they are entitled to serve in any of the companies that were created out of WAPDA. While this means their expertise can be available to all companies, it distorts the managerial incentives that would
arise once these officials opt for a specific company—and demonstrate their allegiance to that company alone.

7. Examples of such lack of implementation include the recommendations of the Energy Sector Task Force and the September 2010 Action Plan prepared by the government.

8. For a recent exposition of the need for such planning, see Alahdad (2012).

9. The last comprehensive National Power Plan was prepared, with assistance from the Canadian International Development Agency, in 1994; an update (based on a limited set of inputs and assumptions) was recently prepared by NTDC.

References

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