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Abstract

Pakistan's power sector is suffering from a number of maladies such as circular debt and high tariff price for electricity. The root causes of these issues lie in failed deregulation which was carried out during the 1990s and 2000s. Fixing these issues and making the energy mix affordable, available and sustainable will require all stakeholders (Independent Power Producers, the federal government, policy makers, and market operators) to pitch in towards power sector reforms.

Introduction

The energy sector makes a very significant contribution to the Return on Investment (ROI) and National Income (NI) of economies. This can be measured not only in terms of economic activity, but also employment and contribution to the exchequer. This is especially true for developing countries like Pakistan from an economic standpoint. Energy heats, cools, lights our homes and businesses and powers our factories i.e., feeds economic activity. However, inadequate access to the same has serious implications for economic development (Zhang 2018), and right now, Pakistan is suffering from an energy menace (Valasai et al. 2017). Although its electricity sector has been under the limelight for more than two decades now, yet the problems in the sector have increased to a point where major reforms are inevitable, and failing to achieve the same, can lead to the possibility of bringing the whole economy down.

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Evidence suggests that power sector reforms have the potential to remove economic cost of distortions worth USD 17.69 billion (Zhang 2018). Moreover, efficient power sectors operate on economic principles (Lee et al. 2018). However, the power sector in Pakistan is not managed on commercial basis (USAID 2013). Right now, this social criterion¹ for production, distribution, and transmission of electricity is the kingpin (Khalid and Iftikhar-ul-Husnain 2016). It is absolutely critical to understand that whatever electricity is generated its true cost, which includes the cost of theft/losses/non-recovery, is either paid by the customer or subsidy funding. Moreover, as it is often argued, this true cost² is high, thus, appropriate measures need to be adopted to bring it down. According to an estimate by the Central Power Purchasing Agency (CPPA), the annual billing of power sector for the entire country hovers around PKR 1.5 trillion per year, and thus, any attempt to use funded subsidies for meeting this cost is neither affordable nor sustainable for the government. The Power Policy of Pakistan needs to strike a balance among three fundamental factors: Availability, Affordability and Sustainability.

Background

According to Khalid and Iftikhar-ul-Husnain (2016: 350) in the 1990s, electric utilities witnessed deregulation trends in the United States, Europe, Asia and many other countries. They cite Chang (2017) that ‘deregulation of vertically integrated utilities into generation, transmission and distribution not only encourages competition but also brings clarity in the regulation sector which in turn attracts investments.’ On the contrary, Sioshansi (2006) and Woo et al. (2003) as cited by Khalid and Iftikhar-ul-Husnain (2016) argue that the motivations and outcomes behind deregulation in the energy sector are not always positive. For instance, Pakistan commenced deregulation of its energy sector with promulgation of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997. The aim was to address price subsidies, poor service quality, insufficient revenue collection, exorbitant network losses and poor customer services (Saleem 2002, cited in Khalid and Iftikhar-ul-Husnain 2016: 350). However, two decades later, the power sector is still a mess.

¹ Power production in a country is social criteria based on when the government owns and controls major power production activities.

² Cost of Generation + Cost of Distribution and Transmission.

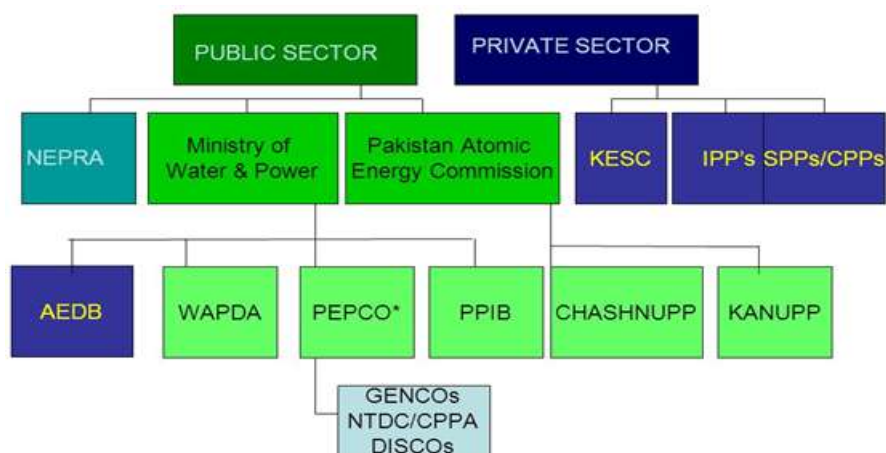
The institutional structure of Pakistan's power sector encompasses a complex set of several entities with ambiguous and overlapping roles. This structure has evolved as a result of restructuring. In early 1990s, a Power Sector Reform Programme was conceived suggesting unbundling of generation, transmission and distribution and formulation of a regulator. Initially, the plan was to bring the private sector into generation (large multi-purpose hydro and atomic energy plants were to stay with the government), privatise distribution and retain as well develop power transmission infrastructure. The reforms process was initiated and the sole power enterprise Water and Power Development Authority (WAPDA) was divided into thermal generation companies (GENCOs) and distribution companies (DISCOs). Similarly, Pakistan Electric Power Company (PEPCO) was formed to oversee the corporatisation and privatisation of the power sector.

National Electric Power Regulatory Authority (NEPRA) was set up as a regulator and tasked to safeguard interest of state, public and the investors through its regulatory guidelines and rules. NEPRA was also tasked with introduction of a decentralised, competitive power pool. In fulfilment of the same, NEPRA approved the Commercial Code 2015, through which PEPCO was dissolved into National Transmission Distribution Company (NTDC), and later, Central Power Purchasing Authority CPPA(G). CPPA-G was created to act as buyer of Electric Power in a Single Buyer Market Model. While, CPPA procures power on behalf of all DISCOs from a power pool of GENCOs, WAPDA (Hydel Generation) and a number of IPPs through long-term contracts; the power system operator i.e., National Power Control Center (NPCC) under the umbrella of NTDC, dispatches power (Haseeb and Kashif 2018).

It is pertinent to mention that although the generation companies submit the energy and capacity bids 36 hours ahead of dispatch interval, NTDC dispatches power in a security constrained environment over an operational interval of 30 minutes (Shaikh et al. 2017) which clearly shows the preference that dispatch is dictated by

system security rather than economics. Karachi Electric Supply Corporation (now KE) was privatised in 2015, and emerged as a vertically integrated electric company responsible for electricity generation and distribution in Karachi.

Figure 1: Structure of Pakistan's Power Sector



Source: NEPRA 2018.

As evident from Figure 1, the power sector today constitutes of unbundled WAPDA, Pakistan Atomic Energy Commission (which operates hydro and nuclear power stations), four generation companies, 11 distribution companies, NEPRA, NTDC and CPPA (G). Except for K-Electric serving Karachi, 32 Independent Power Producers (IPPs), Small Power Producers (SPPs), and captive generators are working under the umbrella of Ministry of Water and Power.

In essence, the sole motivation behind unbundling WAPDA (shifting from monopoly to single buyer model), allowing private investment in generation and setting up NEPRA, was development of a self-sustaining and competitive power market by 2016. However, the deadline was later revised and extended up to 2020. Moreover, reforms implementation process was halted many times and the process was never completed. In essence, the government aimed for affordable, available and sustainable power, but failed to realise it due to a number of issues. These issues and their potential fixes will be

elucidated in the following discussion. However, all this negative experience has not discouraged the government. The most recent Power Policy 2015 encompasses development of competitive wholesale electricity market.

Discussion

According to USAID and GoP (2013), the current situation in the market is dominated by circular debt and lack of coherence in government policies. Circular debt can be simplified as lack of balance in the following equation:

$$\begin{array}{ll}
 \textit{Cost of delivery of power to end} & = \textit{Revenue received (Net} \\
 \textit{consumers} & \textit{Actual Recovery from End} \\
 \textit{(i.e. Generation +} & \textit{Consumers +Funded} \\
 \textit{Transmission} & \textit{Subsidy)} \\
 \textit{Distribution)} &
 \end{array}$$

The left hand side indicates the cost components, while the right hand side shows the revenue stream. Ideally, this equation should be balanced i.e., the left and right side of the equation should always be equal. However, this is never the case. There is always some cost unpaid i.e., the left hand side is always higher. Whenever this equation is not balanced in the medium to long-term, the country will suffer from circular debt. Therefore, keeping units produced constant, if the cost side of the equation goes up, then, ideally the consumer tariff needs to go up concurrently to maintain equilibrium in the equation. This equilibrium has been disturbed because of systematic losses.

Systematic losses have contributed to the power crises by aggravating circular debt. These systematic losses increase the cost of power generation. This increase in cost has to be balanced with an increase in power tariff. This has led to tariffs becoming one of the most ‘controversial issues of the power sector in Pakistan. None of the (stakeholders) is satisfied with the current structure of tariffs. Currently, NEPRA has tariff disputes with existing power generators, distributors, potential investors and even customers’ (SBP 2010: 18).

The cost per unit kilowatt-hour (kWh) of electricity in Pakistan delivered to the customer is PKR 14 / kWh. Consumers, on average across all segments, pay PKR 11.50/ kWh. The systematic subsidy, which is almost 15% of the cost, adds up to billions in losses. But this is not all. Across the country, [28%] of the generated electricity is lost due to theft and some transmission losses. Collection is another challenge, where the distribution companies fail to collect outstanding dues from consumers (Haier 2015).

The recovery rate ranges between 70 and 80%. A simple illustration, taken from the Ministry of Water and Power, can explain how T&D losses, subsidies and collection issues can quickly compound into becoming a PKR 1.4 trillion problem.

Let us assume that Pakistan generates 100 units of electricity. The system loses 22 units to theft and only 78 units reach consumers. The distribution companies collect approximately 85% of the amounts billed to consumers, thus, reducing the revenue recovered to 66 units of total 100 generated. Now comes the subsidy. Since it costs 14 cents to generate a unit of electricity, and the average tariff charged is 11.5 cents (Haider 2015).

Thus, at full cost, the recovery rate is merely 54 units. In nutshell, 46% revenue lost leads to the self-inflicted wound known as circular debt. Simple math can explain how billions of dollars are added each year to this circular debt (Ibid.). Pakistan generated 110 billion kWh of electricity in 2016. Based on 14 cents/ kWh cost of electricity recovery rate of 54%, the total annual circular debt was estimated at USD 7.1 billion (updated from Haider 2015). In addition to the tactical mistake of creating circular debt, the governing bodies also seem to lack strategic direction when it comes to fixing this problem.

Lack of Planning/Vision

Myopic focus on power availability has led to the possibility of a capacity trap. In the five years tenure of the previous government, while some long-term measures were taken (as a part of the China-

Pakistan Economic Corridor [CPEC]) such as adding generation, all the targets for energy security specified in the government's manifesto were missed. The government approved addition of over 20,000 MW, mostly under CPEC or to be undertaken by public entities themselves. However, NTDC feared that blindly setting up power plants without considering the demand may push the power sector into a capacity trap (Kiani 2017), whereby there will be excess capacity, which will have to be paid for, but will not get used. NEPRA's special 'Visiting Report' clearly highlighted that loadshedding will not end by 2018 (Kiani 2016), and rightly so as 2019 is still witnessing black-outs/loadshedding. The report also mentioned that NTDC 'had no specific plans for reduction of transmission losses' (Ibid.). To make matters worse, the poor performance of DISCOs and GENCOs remained unaddressed.

The General Elections of 2018 brought a new party into power. In its early days, the government set up an Energy Task Force to bring reforms in the power sector. This task force hopes to make two new innovations in power planning. First, it aims to introduce long-term planning in the power sector; and second, to introduce integrated energy planning. Ramachandra (2009) has identified the need for integration of upstream energy fuels and downstream electric production in planning. In addition, Mirjat et al. (2017) identified the need for integrated energy planning in order to alleviate Pakistan's power crises.

Currently, Pakistan needs to have an energy map which shows how the supply chain transforms primary energy into electricity. First, the long-term energy plan would provide a roadmap for integration of the power sector (generation, transmission, distribution, and conservation). The integrated energy plan will then integrate the energy sector. The energy sector includes refineries, local gas Exploration and Production (E&P), pipelines and importation of gas. A synergy of power and electric sector will follow the integration of these two sectors. Affordability or environmental sustainability is much easier in a synergised system.

The government has to make adjustments in the budget for electricity subsidy shortfall. Based on the priorities, this subsidy commonly referred to as Tariff Differential Subsidy was fixed at PKR 134 billion

[PKR 102.5 bn in FY 2017-18] in FY 2018-19 (GoP 2018). However, due to lack of foresight, appropriate planning and inability to identify and address the root cause, circular debt inflates to unmanageable levels every now and then. Government then opts for a quick fix i.e., borrowing from banks to deflate it, rather than funding it from the budget, thereby just kicking the can down the road. It is pertinent to mention that subsidy alone cannot be used to tackle circular debt. Keeping in view the available fiscal space, the government cannot allocate more than the given maximum amount for subsidy and therefore, it is inevitable to take appropriate measures to reduce the true cost of electricity as well as ensuring full recovery (adjusted for subsidy) of this cost through customer collections to ensure equation balance³ is maintained.

Policy Recommendations

All stakeholders can play their part in improving the current market situation as outlined below:

Independent Power Producer (IPPs)

The right incentives with respect to an optimal energy mix are crucial. The ideal scenario is to shift to hydropower and indigenous coal resources, and continue to develop other renewable sources such as wind and solar power. IPPs can play their part in utilising indigenous Thar coal reserves and participating in hydel power generation. In the short-term, IPPs can play their part in the shift to imported coal or gas. However, changing the energy mix provides only a partial answer. The arrangement under which private or public providers of energy come online, perverse incentives, regarding the energy mix and guaranteed equity returns, are in reality the root cause of the power sector crisis.

Government – Policy Making Unit

It is absolutely critical to understand that the inherent policy driving the sector is flawed. It is a no-brainer that private sector delivers through competition. In a competitive market, businesses compete with each other and, in this process, pass value to the consumer. Sadly, the existing Power Policy clearly does not foster such an environment. Instead, it is the other way around i.e., inefficiency in

³ Cost of delivery of power to end-consumers versus revenue received.

the system is encouraged where private power has no incentive to utilise more efficient technology, optimise fuel, or scale choices.

It is interesting that all the current solutions proposed by economists are price-focused. This essentially means moving towards a further tariff hike, burdening the already burdened good customers, shrinking the affordability net and encouraging more theft. All this will only lead to more social unrest. The industrial output is drastically declining and circular debt consistently increasing. Moreover, when the problem becomes untenable, the government looks for short-term fixes, prints money and uses it as a bailout. However, in order to permanently solve this problem, the underlying cause of this high basket price of energy needs to be addressed. The public interest needs to be safeguarded which, unfortunately, has been completely ignored in the past power regimes. This interest can only be guaranteed by going to the root of the problem rather than looking for short-term fixes.

Government - Market Operation (CPPA and Federal Government)

Even if it is assumed that price correction is the only sensible solution, no such measure will prove fruitful unless the policy driving the sector is corrected. Both the previous as well as current government are focusing on the generation side. However, it is absolutely critical to focus on demand creation that will dilute the share of capacity payments. For starters, the government needs to move away from the current 'take or pay' policy and contract all future IPPs (regardless of the source) in the form of hybrid merchant market i.e., not providing any guaranteed return and profitability of these IPPs to be derived by their cost of production. All the existing generation projects set up under 'take or pay' contracts, which have not yet achieved their financial close, need to be converted to 'take and pay' contracts. Moreover, the private sector interested to put up generation needs to bear the risk. This essentially means IPPs will be responsible to secure their bilateral contracts, and if they wish to sell to the government, power off-taker (NTDC) will only dispatch in order of merit which is based on cost of production. This will imply that new IPPs coming online will bear the cost of idle time.

Although these steps will set the scene for the market, however, in order for the market to work, the basket price of existing public and IPPs holding 'take or pay' contracts need to be reduced. Currently,

this is not possible as 40% of the total energy price that power purchaser pays accounts for capacity payments. In order to create a conducive environment for the market, the government needs to reduce the basket price of electricity of existing generation plants. As this cannot happen overnight, thus, for the next four years, the government should consider recovering the variable cost component only in the tariffs and fund the fixed cost component through subsidy. Simultaneously, the government needs to focus on demand creation and promote industrialisation. This can be done by:

1. Providing competitive tariffs and reliability to the industrialists to encourage them to move away from off-grid solutions (captive power plants) and buy power from the grid.
2. Recovering the variable cost component only will broaden the affordability net.
3. Expediting rural electrification efforts.
4. Exploring and exploiting the possibility of exporting electricity to the Central Asian countries.

All these measures will generate/create demand. By increasing the demand base, the economies of scale will enable the government to build in the fixed cost component in the tariffs without adversely affecting affordability and eventually, discontinuing the subsidy.

Distribution Sector - DISCOs

Another area which needs to be targeted for demand creation is the distribution sector. One possible way could be to encourage private investors (could be existing IPPs) to invest in the distribution companies. This will not only aid infrastructure investment, but also turn around these loss-making entities into profitable ones. This, in turn, will again contribute towards reduction in thefts and line losses, better collection, and eventually, broadening of demand base.

Conclusion

In essence, policymakers, market operation, the federal government and DISCOS will need to make valuable contribution towards power sector reforms. Policymaking needs to incentivise efficient power generation. Moreover, market operators and the federal government can address subsidy burdens by promoting merchant markets and nurturing demand creation. Furthermore, privatisation of DISCOS

should be on the cards as it will help in revamping the sector. Overall, all stakeholders need to complement each other to ensure that Pakistan's power sector realises its full potential.

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Annexure: Conference Programme

SDPI's Twenty-first Sustainable Development Conference
and
Eleventh South Asia Economic Summit

Corridors of Knowledge for Peace and Development
4 – 7 December 2018

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Corridors of Knowledge for Peace and Development

This anthology offers a big picture view on key global sustainable development issues through the eyes of leading policy and academic stalwarts from Pakistan in particular, as well as neighbouring South Asian countries and beyond. It touches upon a host of thematic areas such as human capital; social exclusion; institutional governance; poverty alleviation; role of electronic and social media; the Fourth Industrial Revolution; unfair laws and legal systems; fiscal rules and regulations; transport corridors; a deteriorating global climate; ultra-nationalism; human rights and violence against women.

This collaborative effort of some 30 authors from 10 countries seeks to demystify these issues and chart a way forward, while explaining, as clearly as possible, the most pressing policy questions and the different policy positions that define them.

Our hope is that those actively involved in such debates - as thought leaders, change agents, and strategists - will be able to draw on the penetrating reflections and learnings to help generate new ideas that spur action towards the common goal of achieving sustainable development and regional connectivity.



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