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PIDE Research Brief: Electricity Subsidies and Welfare Analysis in Pakistan*

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Pakistan is facing energy shortages over the past many years. One of the most important reasons for these extraordinary power outages is the competing use for resources. Moreover, energy mix for electricity generation and consequent circular debt issue are also aggravating the situation. Government of Pakistan has paid more than one trillion rupees as Tariff Differential Subsidy (TDS) to safeguard the masses against the increasing generation cost of electricity. However, TDS, being an untargeted subsidy, is not only piling financial burdens but also resulting in welfare loss.

Electricity plays a vital role in fueling economic activity and is considered an important need of everyday life. According to (reference) UN foundation estimates, almost one quarter of the global population or 1.5 billion people have no access to electricity, whereas 1 billion more have intermittent access. The developing countries are affected largely by this unavailability of electricity. In Pakistan, electricity crisis has been severely affecting the economy, especially the industrial sector. Siddiqui (2011) reveals that total industrial output losses due to power outages vary from 12% to 37% in Punjab. Similarly, the cost to the industrial sector of load shedding was estimated as Rs. 210 billion or over 2% of the GDP annually (Pasha, 2008). This crisis has resulted in potential exports earning losses of over US$ 1 billion and 400,000 displacements of potential workers. Large scale manufacturing industries that have their own alternative arrangements for electricity generation are performing well as compared to the small scale industries.

In Pakistan, energy is supplied from different sources such as, oil, LPG, gas, coal, hydro and nuclear. According to the Energy Year Book (2018), the total electricity generated during the year was 106,966 GWh and the fuel mix was dominated by the oil based electricity generation (figure 1). The company wise generation (see figure 2) during the year remains as follows: Water and Power Development Authority (WAPDA) about 42.3%, other Independent Power Producers (IPPs) 20%, Hub Power Company (HUBCO) 6%, Karachi Electric Supply Company (KESC) 9%, Kot Adu Power Company (KAPCO) 7%, and others around 10%. The provincial consumption of electricity reveals that Punjab province is the largest consumer of electricity (61.3%), followed by Sindh (21.3%), KPK (11.1%), Balochistan (5.3%) and AJK (1.1%) respectively.

Fig. 1. Fuel Mix of Electricity Generation: 2017-18

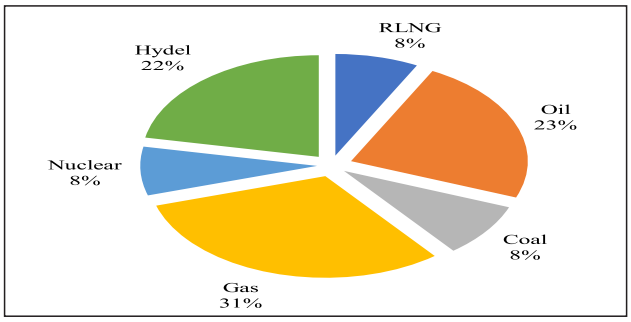


Fig. 2. Electricity Generation by Company: 2017-18

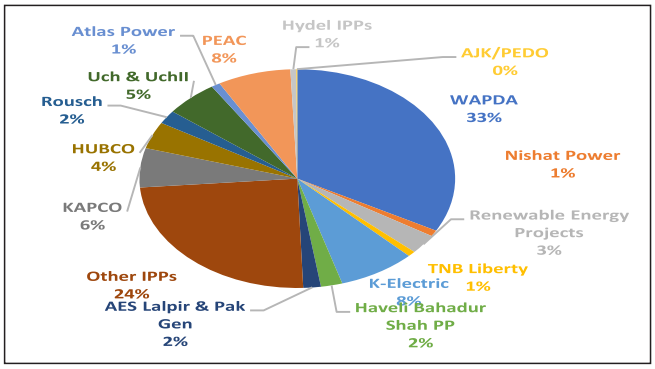
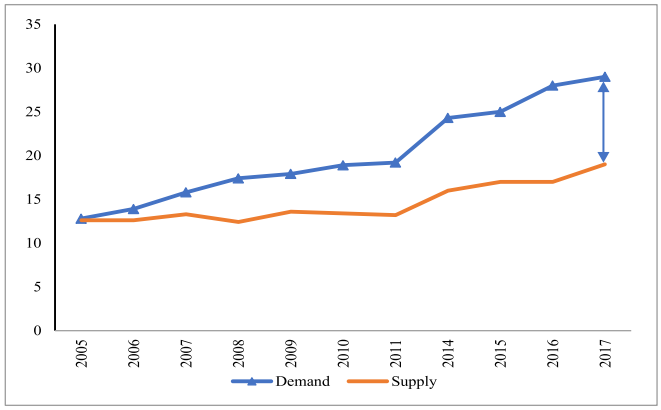


Fig. 3. Electricity Demand and Supply Gap (KMW)



Source: Energy Year Book, 2018

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[1]State of the Economy: Emerging from the Crises:2nd Annual Report;2009 :Institute of Public Policy, BNU.
[2]One of the largest Independent Power Producer (IPPs).
[3]Energy Year Book, 2012.
[4]Giga watt hour.
[5]Sadia Zafar Baig, Published in The Express Tribune, April 30th, 2012.

In Pakistan electricity demand supply mismatch remains largely unresolved. In recent years, the electricity generation in Pakistan has shrunk by 50.0%, whereas, the shortage of electricity has touched 6000 megawatt mark and is aggravating to an alarming level (see Figure 3).

Electricity consumption in 2011-12 was 76,761 GWh as compared to 77,099 GWh in 2010-11, registering a negative growth of 0.44%. Major decline in consumption was observed in the agriculture sector (4.7%) followed by bulk supply (4.5%), domestic sector (0.8%) and the commercial sector (0.4%). One of the main causes of electricity crises is the extremely high cost of generation. Currently, with 22,797 MW of total installed capacity, only 9000-10,000 MW is produced. As a result, the peak demand of 15000MV results in 10-12 hours of load-shedding in some parts of the country. An important contributing factor is also the transmission and distribution (T&D) losses of 17.4% from the net supply.

A number of factors are responsible for the long hours of power outages in Pakistan, few of them we explain here. First, dependence of electricity production on thermal resources, which are very expensive and costing the country's exchequer. Second, a huge dependency on furnace oil which makes it difficult for the government to purchase and provide oil at high and volatile prices. The price of furnace oil is rising very sharply and at present its price is almost 70,000 per ton. The cost of producing electricity from furnace oil is about Rs.16 per Kwh. This is only the fuel cost not the fixed cost and does not consider transmission losses. Third, circular debt, that is, the government's inability to pay the fuel cost to the generating companies because the consumers of electricity are paying less for every unit but the suppliers have to pay higher prices and this gap is filled by subsidies. Finally, increase in demand for energy is more expansionary than supply which poses a real challenge for the government to control the energy crisis for a longer period. This demand and supply mismatch is not only caused by poor governance but also due to natural factors like, population increase and resource depletion at a consistent rate.

In 2011, government provided Rs.285 billion subsidies for the power sector out of which Rs.750 million was spent on a daily basis. On average, the government pays at least Rs.3 for every Kwh used by domestic consumers, in order to bridge the gap between the billed rate and the cost of production of electricity. 45% of the country's electricity is consumed by the residential users, who pay an average rate of Rs.7/Kwh. 75 % of residential users use less than 300 units of electricity, which is charged at the rate of 5.5/Kwh, while electricity generation costs more than Rs.9/Kwh. This differential is covered by the subsidy. It is true that subsidies on power sector control inflation and benefits the poor. However, they ultimately translate into long hours of load shedding because the demand exceeds the revenue generated to sustain supply. If subsidies are reduced, the power sector will potentially improve. Money available from discounted subsidies can easily be transferred to oil and gas suppliers. As a result the smoother flow of finance can be confirmed and circular debt can be reduced if not eliminated altogether.

If we look into (see table 1) the budgeted figures of electricity related subsidies it ranges from Rs 97,849 million in 2007-08 to Rs 140,600 million in 2017 which is an increased more than 30%. If we look into the revised figures that are only available for 2017-08 (Rs 314,614 million) to 2010-11 (Rs 372,066 million), we found that in these four years the increase in electricity subsidies are approximately 18 % but if have data for the recent years it might be more 30 % based on budgeted and revised figures.

Table 1

Electricity Related Subsidies (Rs Million)

		2007-08	2008-09	2009-10	2010-11	2011-12	2015	2017
WAPDA	Budget	52,893	74,612	62,903	84,000	122,700	164,000	204,000
	Revised	113,658	92,840	147,005	295,827	-		
KESC	Budget	19,596	13,800	3,800	20,447	28,588	29,000	95,400
	Revised	19,596	18,800	32,521	64,447	-		
Oil Refineries/OMCs	Budget	15,000	140,000	15,000	10,807	7,921	7,000	22,600
	Revised	175,000	70,000	11,224	10,807			
Fertilizer Manufacturers	Budget	10,360	12,860	210	185	162		
	Revised	6,360	21,268	439	985	-	5,000	
Total	Budget	97,849	241,272	81,913	115,439	159,371	203,000	140,600
	Revised	314,614	202,908	191,189	372,066			

Source: Government of Pakistan various budget/economic survey documents.

The tariff structure (see table 2) is based on the slabs of monthly household consumption. These slabs are up to 50 units, 50 to 100 units, 101-300 units, 300-700 units, and greater than 700 units. The increase in electricity tariffs for these slabs are 34 %, 44%, 65%, 66%, and 74% from 2008-11. Between 2011-18 electricity tariffs were further increased by 114%, 106 %, 63%, 29% and 18% respectively. A highly concessional lifeline tariff is provided for the household who consumes less than 50 units. But if we see the burden of electricity tariffs on household that consumes less than 50 units it increased by 114 %. And, this burden is substantially decreasing on the households that consume relatively more electricity. It seems that the rich segment of the society enjoys electricity subsidies more than the poor segment of the society.

Table 2

Electricity Tariff Structure for Residential Users

	Notified Consumer Tariffs (Rs/KWh)				
KWh/month	March-2008	March-2011	March, 2018	% increase Between 2008 and 2011	% increase Between 2011 and 2018
Up to 50	1.4	1.87	4	34	114
50 -100	3.08	4.45	9.17	44	106
101 -300	4.08	6.73	10.97	65	63
301 - 700	6.53	10.65	13.74	66	29
Above 700	7.79	13.29	15.67	74	18

Source: Pakistan Electric Power Company (PEPCO).

In order to assess the impact of electricity subsidy cut and its alternative policy, we run three different simulations using Computable General Equilibrium (CGE) technique. The general equilibrium analysis depicted that reduction in tariff differential subsidy by 50% does not have any significant impact on GDP and overall demand, but it negatively affects private and public consumption. Moreover, slashing government expenditures on subsidy by 50%, reduces government spending, and affects private consumption due to the high cost of electricity-which elevates prices of almost all the commodities (Table 3).

Table 3

Impact on Macro Variables (in Real Terms)

Variable	BASE	TDS_Cut*	GOV_TRNSFR**	Prod_UP***
GDP	17,806.1	0.0	0.0	0.1
Absorption	19,230.1	0.0	0.0	0.1
Private Consumption	15,483.1	–0.4	–0.4	0.1
Investment	1,983.5	3.8	3.6	0.6
Government spending	1,481.0	–0.2	–0.2	–0.4
Exports	2,149.0	0.1	0.1	0.4
Imports	–3,573.0	0.0	0.0	0.2
Govt. Savings/Deficit	-683	–20.1	–19.0	–6.8

Source: Model Simulations.

*Tariff Differential Subsidy **Government Transfer ***Production Increase

The reduction of TDS has also augmented the investment levels in the economy. Higher investment (3.8%) comes mainly from higher public savings or less deficit. The second simulation of equivalent direct transfers to affected households (Gov_Transfr) indicates that due to these transfers at macro level, no significant change appeared. With the increase in productivity in electricity sector (Prod_Up) all the macro variables have been positively affected, except government spending, which declines by 0.4%. Higher electricity productivity increases real GDP. This positive impact mainly comes from higher investment level. In addition, private consumption is slightly better when productivity increases. This is also reflected by higher absorption level, where more goods are consumed domestically.

If we analyze the government savings/deficit, the subsidy cut automatically reduces government spending, which translates into lower deficit, and this pattern prevails in the last simulation as well because improved efficiency in electricity sector also contributes towards reducing the fiscal deficit problem.

Recommendations

Improve Subsidy Targeting: The PIDE study reveals that Tariff Differential Subsidy is an untargeted subsidy and urban rich segment of society are the largest beneficiaries of this subsidy. The analysis provides the insight that TDS, which is meant for providing relief to the poor, is benefiting rich class the most and, thus, may be phased out or be made more targeted to reap its benefits.

Reduce Tariff Differential Subsidies: Reduction of TDS lowers the fiscal deficit significantly and, thus, eases out financial hardships for the government. If subsidies are reduced, the power sector will potentially improve. Money available from discounted subsidies can easily be transferred to oil and gas suppliers. In this way, the smoother flow of finance can be confirmed and circular debt can be controlled. Improvement in productivity of electricity sector has tremendous implications for the economy and the welfare of poor households. Improved productivity augments electricity consumption, reduces electricity prices, generates employment opportunities, results in better wage levels and, thus, contributes towards improved household welfare.

Improve governance: Governance system and financial management of Power Generation Companies (GENCOs) and Power Distribution Companies (DISCOs) should be improved. Some serious steps with reference to better generation mix; such as improving coal mines and gas fields, are also required to get rid of the circular debt and to eliminate load shedding and improve electricity productivity.