

ENERGY SECTOR

PIDE Working Papers

No. 2020:20



Circular Debt— an Unfortunate Misnomer

Afia Malik

PIDE Working Papers
No. 2020:20

Circular Debt—an Unfortunate Misnomer

Afia Malik

Pakistan Institute of Development Economics, Islamabad.

PAKISTAN INSTITUTE OF DEVELOPMENT ECONOMICS
ISLAMABAD
2020

Editorial Committee

Lubna Hasan

Saima Bashir

Junaid Ahmed

Disclaimer: Copyrights to this PIDE Working Paper remain with the author(s). The author(s) may publish the paper, in part or whole, in any journal of their choice.

Pakistan Institute of Development Economics
Islamabad, Pakistan

E-mail: publications@pide.org.pk

Website: <http://www.pide.org.pk>

Fax: +92-51-9248065

Designed, composed, and finished at the Publications Division, PIDE.

C O N T E N T S

	<i>Page</i>
Abstract	v
1. Introduction	1
2. Governance Structure	3
3. Growth of Circular Debt	3
3.1. Origin	4
3.2. Growth	5
4. Reasons of Circular Debt—Discussion	8
4.1. Lack of Effective Planning	9
4.2. Subsidies and Pricing Strategy	15
4.3. Mismanagement and Inefficiencies in the Electricity Supply Chain	22
5. Conclusion and Way Forward	28
5.1. Way Forward	29
References	33

List of Tables

Table 1. Losses in GENCOs	13
Table 2. Distribution Losses	23
Table 3. % Recovery	24

List of Figure

Figure 1. Circular Debt—Payments and Supply Chain	1
Figure 2. Circular Debt Growth and Government Liquidity Support	2
Figure 3. Electricity Sale Price (Average) Rs/KWh	4
Figure 4. Total Receivables (Rs Billion)	6
Figure 5. Source-wise Distribution of Arrears 2018-19	9
Figure 6. Source-wise Distribution of Arrears 2019-20	9
Figure 7. IPPS in Pakistan	10

	<i>Page</i>
Figure 8. Tariff Forecast	11
Figure 9. Electricity Fuel Mix (FY2019)	14
Figure 10. Subsidies to WAPDA/PEPCO	15
Figure 11. Subsidies to K-Electric	16
Figure 12. Tariff Analysis	16
Figure 13. Residential Electricity Tariffs (Rs/KWh)	17
Figure 14. Final Residential Electricity Tariff Rs/kwh (Including Surcharges and Three Tariff Hikes, 2019)	18
Figure 15. Average Sale Rate across Sectors (Rs/ KWh)	20
Figure 16. Impact of T&D Losses on Circular Debt (Rs Billion)	22

ABSTRACT

The electricity sector in Pakistan has suffered huge losses (cumulated loss of Rs 5 trillion about 12 percent of current GDP). The nomenclature of “circular debt” has confused policy-makers to think that it is a mere accounting problem and not a result of deep structural issues that need to be carefully unravelled. Besides creating budgetary issues it has badly affected the overall sustainability of the electricity supply chain for many years. The study finds that not only governance issues, operational and commercial inefficiencies in the system; it is the lack of effective planning and flawed policies on the generation side, and distortions in our pricing strategy accompanied with irrational subsidies on the demand side, that are contributing to this financial liability.

JEL Classifications: G38, H11, L94

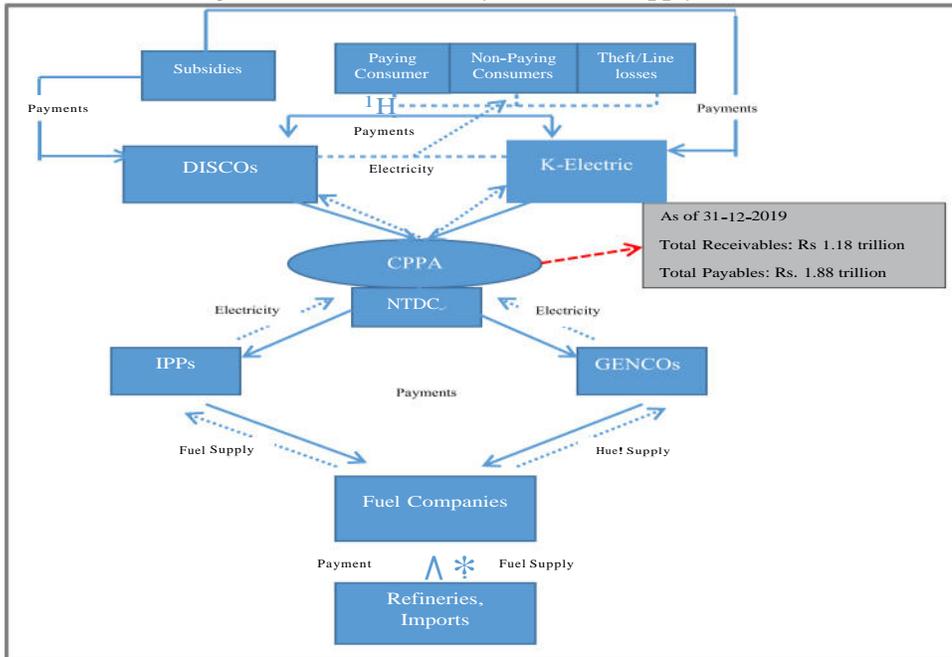
Keywords: Circular Debt, Power Sector, Governance, Weak Policies

1. INTRODUCTION

Pakistan’s power sector confronts serious challenges in the form of institutional weaknesses, weak governance and financial sustainability. Despite having surplus supplies consumers are getting not only expensive electricity but sometimes have to face power outages due to inefficiencies in the power system. Inept corporate governance and unsustainable financial management in Pakistan’s power companies have led to a chronic shortfall between cash inflows and outflows famously known as circular debt.

“Circular debt” is a shortfall of payments at the Central Power Purchasing Agency (CPPA). CPPA does not receive the outstanding payment from power distribution companies (DISCOs) due to shortfall in receivables by the state-owned distribution companies (DISCOS) and privatised K-Electric (K-EI). Thus, CPPA does not make payments to other power companies in the supply chain, that is, state-owned generation companies (GENCOs), Independent Power Producers (IPPs) and National Transmission and Dispatch Company (NTDC). GENCOs fail to clear their dues to fuel suppliers. Similarly, IPPs, due to delay in payment from the government could not make payment to the fuel suppliers. The fuel suppliers, in turn, default on their payment towards refineries and international fuel suppliers. As a consequence, most of the thermal plants are forced to operate at a very low ‘capacity factor’.

Fig. 1. Circular Debt—Payments and Supply Chain



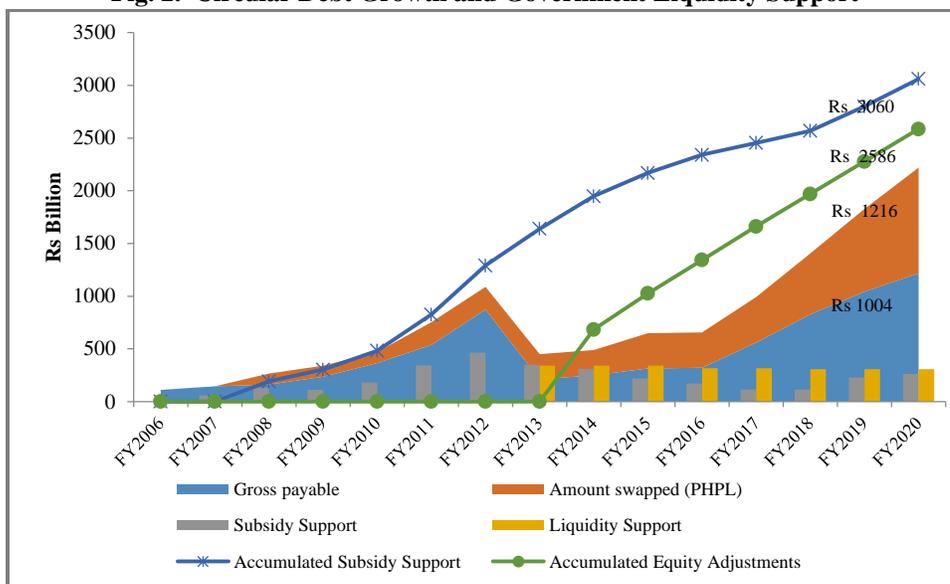
Acknowledgements: The author is grateful to Dr Nadeem Ul Haque, Vice-Chancellor PIDE, for his comments/suggestions on the first draft of the paper in a webinar and afterwards. All errors or omissions remain the sole responsibility of the author.

Outflows are guaranteed payments as they are contractual. On the other hand, inflows are not certain due to absence (in some cases) or delay (in others) in tariff payments, subsidies or other discrepancies. This means that inflows (or receivables) from the distribution sector to CPPA always lag behind outflows (payables to generators), creating deficit.

As on June 10th, 2020, the power sector liability stood at Rs. 1.22 trillion. With addition of loans of Syndicated Term Finance Facility (STFF), that is, Rs. 1.00 trillion parked at the Power Holding Private Limited (PHPL), the total figure is more than Rs 2.22 trillion (Sattar, 2020). In FY2019, 122802 GWh was procured in the system, at the cost of Rs.766.6 billion (CPPA, 2019). This implies that the total value of circular debt or power sector deficit is far greater than the annual generation cost.

Since FY2013 about 2.6 trillion are injected into the power sector as equity adjustments to clear circular debt. In addition, about Rs 3.1 trillion are injected as subsidy since FY2007 (Figure 2).

Fig. 2. Circular Debt Growth and Government Liquidity Support



Source: CPPA Annual Reports 2017, 2018, 2019, *Budget in Brief* (various years), Government Documents, USAID (2013) and Sattar (2020).

Note: Equity payments in FY2020 are assumed to be the same as in FY2019.

The power sector is eating up a bulk of budgetary sources, which otherwise could have been used in other development activities. In FY2020, electricity subsidies account for almost 8 percent of net revenue. In comparison, education is hardly 2.6 percent (Budget in Brief, 2021). Despite various measures taken by successive governments, power sector financial losses are increasing. These are affecting not only the available capacity; the creditworthiness of the country/sector in the investor's eye is also badly affected. Above all, it is adversely impacting the country's economy.

Circular debt is now like a chronic disease, Pakistan is suffering since 2006. Unless its underlying causes are deeply explored and treated, it will continue to haunt our financial managers. The goal of this paper is to carry out an in-depth analysis of the

sector—on supply-side and demand-side to understand the underlying causes of continuously rising debt despite receiving enormous financial support over the years. The analysis is based on available evidence/ data in various reports, research studies etc.

Plan of the paper is: Section 2 describes the governance structure of Pakistan's power sector. Section 3 reflects on the origin and growth of circular debt. Section 4 discusses in detail the supply and demand side issues behind the unstoppable debt. Finally, Section 5 offers summary and suggestions for future.

2. GOVERNANCE STRUCTURE

The Government of Pakistan prepared the strategic plan for restructuring in the electricity sector to improve efficiency, service, and quality in 1992. The government unbundled WAPDA's vertically integrated power wing into separate generation, transmission, and distribution companies; whereas, the hydroelectric power development and operation functions remained with WAPDA. Pakistan Electric Power Company Private Limited (PEPCO), a separate company, within WAPDA was made responsible for the restructuring and preparation for privatisation of the generation and distribution companies in due course through the Privatisation Commission.

In 1994, the government formulated a Private Power Policy to invite private producers in the sector. In 1997, the National Electric Power Regulatory Authority (NEPRA) was created to ensure fair competition and consumer and producer protection; and to introduce transparent and judicious economic regulation. In 2009, Central Power Purchasing Guaranteed Limited (CPPA-G) was incorporated (as market operator) in National Transmission and Dispatch System (NTDC) as a government body. Later in 2015, the Central Power Purchasing Agency (CPPA) was reformed as a corporate entity separate from NTDC; and NTDC remained as system operator.

Now Pakistan power sector includes both private and state-owned companies. In the generation sector, almost 58 percent of the total installed capacity is in the private sector (IPPs) and the rest is in the public sector. In FY2019, about 61 percent of the total electricity generation was by the private sector companies. Transmission and distribution are mainly state-owned. The only exception is Karachi, where not only generation, transmission and distribution are controlled by privatised K-Electric. In the distribution sector, about 90 percent of total consumers are served by state-owned companies.

The power sector restructuring process which began in 1992 is still in transition from a vertically integrated state-owned sector to a competitive multi-buyer structure. Currently, the power system is operating as a single-buyer model—where the CPPA buy power from GENCOs, IPPs and WAPDA and other producers, pooled it and sell it to all the DISCOs.

3. GROWTH OF CIRCULAR DEBT

Circular debt is gross payables¹ as on CPPA financial statements plus the loan amount parked at Power Holding Private Limited (PHPL).²

¹This includes an amount payable under the late payment surcharge (Rs. 96828 million in 2018-19). Out of which, Rs 69989 million is disputed in respect of liquidity damages penalties, imposed on power producers due to non-fulfillment of contractual provisions of PPAs (CPPA, 2019a).

² PHPL uses government guarantees to borrow from commercial banks at KIBOR plus 2 percent to reduce CPPA liabilities to generation companies. Servicing of half of these loans is through surcharge (Rs 40 billion annually), whereas, the residual amount is covered by power sector revenues, which again generates additional arrears (IMF, 2019).

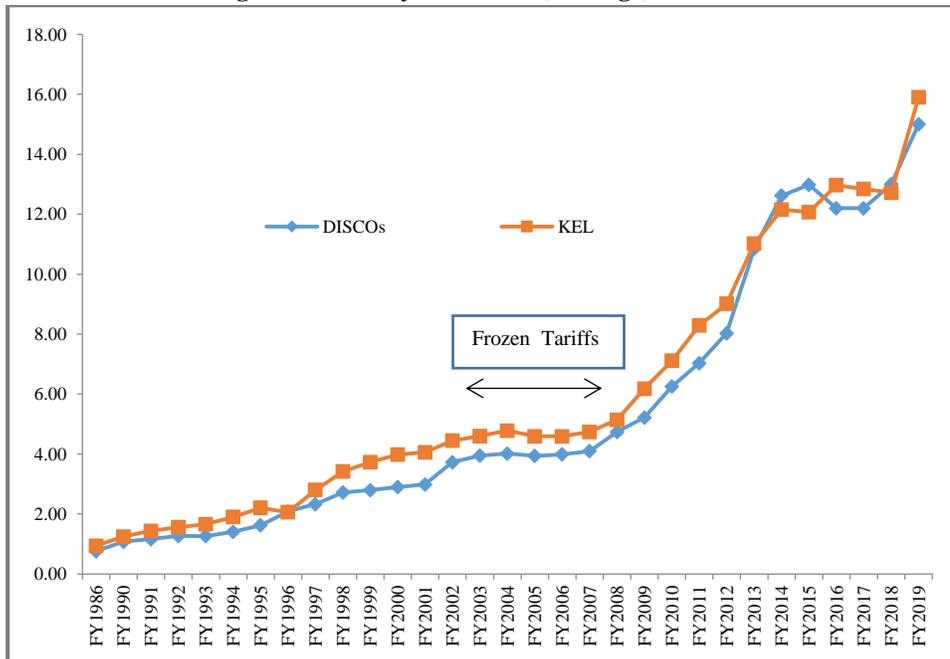
3.1. Origin

The problem of circular debt (power sector deficit) first broke out in 2006 when electricity prices were not allowed to rise in line with a steep rise in international oil prices.³ Pakistani Rupee also got depreciated significantly in those years. The military government in that period did not allow the rise in electricity prices for obvious political reasons. Notified electricity tariffs remained below cost-recovery level. Tariffs were frozen between FY2003 and FY2007 at a very low level (Figure 3).

Fuel cost in electricity generation rose but notified tariffs were not sufficient enough to cover the increased cost. High operational (technical and non-technical) losses of distribution companies (DISCOs) further add to the cost of service. Besides, delay in payments by consumers contributed to low revenue collection from electricity sale.⁴

There was a huge gap between the cost of service and the government notified uniform tariff across all DISCOs to be covered through tariff differential subsidy. However, the government did not compensate power companies accordingly against the provision of increasingly subsidised electricity at the consumer-end. The power companies, therefore, were not in a position to make payments to the oil companies, and oil companies, in turn, were not in a position to import oil needed for thermal power plants. As a result, the debt (of about Rs 111 billion) emerged in 2006 for the first time.

Fig. 3. Electricity Sale Price (Average) Rs/KWh



Source: Electricity Marketing Data, 43rd Edition.

³The price of imported furnace oil which represents about one third of the fuel mix for power generation in that period increased by 76 percent from 2003-04 to 2007-08. Global gas prices also increase significantly (76 percent between 2007 and 2008).

⁴Law and order situation in certain areas also effected payment collection negatively (Cheema, 2020).

3.2. Growth

3.2.1. PPP Government (2008-2013)

In 2008 and 2009, oil prices increased further in the global financial crisis and so was the stock of circular debt (Rs 236 billion in 2009). The government did increase notified tariff, but it remained below the NEPRA determined tariff⁵, as the global crude oil prices continued to increase.⁶ This was accompanied with frequent delays in tariff determination and delays in tariff differential subsidy payments; while other inefficiencies in the sector were also not addressed.

This led to the accumulation of power sector arrears and under-utilisation of existing capacity.⁷ As a result, power outages increased to an alarming level of 8 to 10 hours and the stock of circular debt rose to about Rs 366 billion in 2010.

The electricity sector formally becomes hostage to the circular debt in FY2009. The government (PPP) did intervene but on an ad hoc basis by pumping in money many times (more than Rs 1 trillion) between FY2008 to FY2012 to rescue the system from total collapse and keep debt to a manageable limit (Malik, 2012). Since default amount was more than the government's capacity to pay at a given time; the circular debt kept building up and reached to Rs 872 billion in FY2012.

The injection of money compelled the government to borrow billions of rupees from commercial banks through various instruments. From 2008 onwards, government (directly or indirectly) started converted debts owed by GENCOs, NTDC, CPPA, DISCOs and other power sector entities to banks and other creditors into public debt. That is, the government started swapping the energy payables with commercial loans and Ijara Agreement from banks. Since 2008, these syndicated term finance facilities are being parked in Power Holding Private Limited (PHPL) under the Ministry of Energy (CPPA, 2019a).

The government also took a tough decision of regularly revising the power tariffs in line with international oil prices on a quarterly basis to recover the cost of power despite political compulsions and severe criticism. The government notified tariff increased by about 82 percent in this period. Yet and importantly, this increase was insufficient (as the government kept on paying a subsidy to cover the cost). To pass-on the changes in oil prices more frequently, the government then decided for monthly fuel adjustments to be passed on to the DISCOs (Malik, 2012). But despite all these changes

⁵In FY2011, in addition to increase in tariffs, general sales tax was also imposed on the consumption of more than 100 units of electricity. Given the progressive nature of tariffs (i.e., higher rate at higher levels of consumption), the price of electricity was greater than the cost of supply in the highest slab for domestic consumers. However, this does not significantly reduce the fiscal burden as there are relatively fewer consumers in the higher slabs (Trimble et al., 2011).

⁶Average fuel cost on FO based generation was Rs 8.59/kWh in FY2009, which increased to Rs 12.02/kWh in 2010-11, i.e., 40 percent; generation cost using HSD increased from Rs.11.55/kWh to Rs 14.81/kWh, i.e., 28 percent; and generation cost using gas as fuel in the same period increased by about 9 percent (NEPRA, 2011).

⁷Most of the thermal power plants were forced to operate at a very low 'capacity factor'—the country lost between 2000 MW to 2500 MW of potential thermal power generated by private power companies as they remained off grid due to non-availability of fuel supply coupled with lack of funds due to increasing dues (cited from Malik, 2012).

in the tariff structure, circular debt kept piling up, as the government failed to answer the root causes of circular debt, that is, inefficiencies in the system weak governance structure.

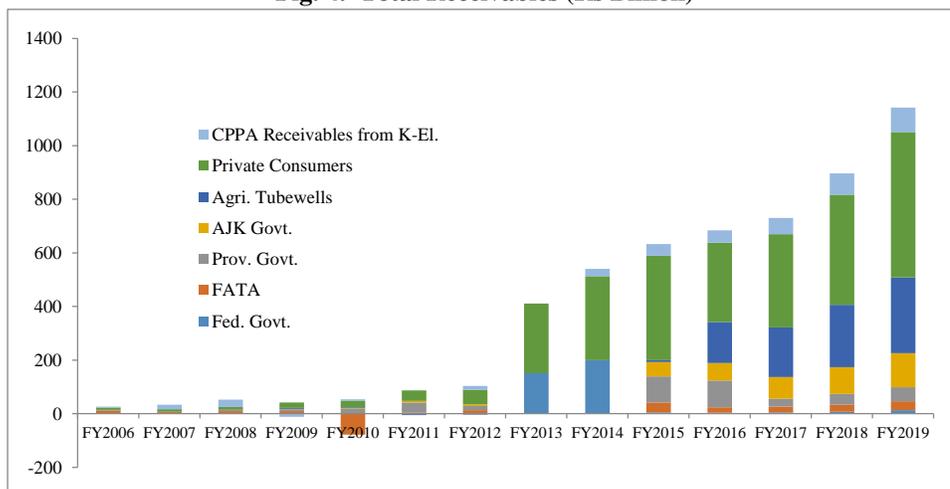
3.2.2. PML-N Government (2013-2018)

In June and July of 2013, the newly elected government (PML-N) cleared the entire stock of circular debt (Rs 480 billion) using budgetary support as well as direct liquidity injection of Rs 342 billion. However, there was little focus on reforming the expensive generation mix.⁸ Similarly, no serious effort was made to remove inefficiencies in the system. Instead NEPRA revised the T &D loss target upwards (from 13.19 percent to 15.23 percent in FY2016) under government advice; reducing incentive (if any) for improvement (Cheema, 2020). Policy-makers again choose for the quick fix, that is, to settle payables.

By the end of 2013, circular debt re-emerged (i.e., Rs 266 billion). The capacity utilisation which improved from 56 percent to 73 percent after the clearance of debt; declined again to 63 percent in less than a year, as the circular debt reduced cash flows to power generation companies (SBP, 2014).

In September 2015, the government introduced a comprehensive circular debt management plan to gradually reduce flows and eliminate the stock. The plan focussed on the privatisation of DISCOs with the hope to increase their efficiency, and to resolve subsidy and tariff issues and discrepancies. However, DISCOs receivables kept on increasing (Fig. 4). Later, the government shelved the decision to privatise DISCOs.

Fig. 4. Total Receivables (Rs Billion)



Source: NEPRA State of Industry Reports (Various Years).

Note: for 2013 and 2014, separate data for provincial, federal, FATA, AJK Govt. and Agri. Tube-well not available.

⁸ In FY2013, about 40 percent of the total power generated in the country was based on furnace oil (up from 32 percent in FY2008). Conversion of gas based plants to oil due to gas shortages and the commissioning of new FO based plants increased import demand of oil. Thus making Pakistan's external account vulnerable as the oil prices kept rising (SBP, 2014).

Instead of addressing the existing tariff policy issues,⁹ the government introduced three different surcharges in the tariff structure in 2015,¹⁰ besides increase in general tariff by about 44 percent.¹¹ To overcome supply shortages, the government made huge investments (in the light of Power Policies 2013 and 2015) in the generation sector. Not only inefficiencies in the transmission and distribution sector were ignored; no effort was made to utilise the existing installed capacity to the maximum level. As a result of newly installed capacity, electricity generation became expensive due to increase in capacity payments and expensive fuel mix.

Receivables kept on piling in this period and the basic challenge of shortage of cash inflows continued—forcing non-payments or delayed payments to generation companies and onward disruptions in the supply chain. Gross payables reached to Rs 560 billion by the end of FY2017. Besides, the debts raised to retire the previous liabilities became another source of the circular debt. That is, the amount parked in PHPL increased to Rs 432 billion by the end of FY2017.

3.2.3. PTI Government (2018 to date)

The power sector was/ is a major challenge for the newly elected policymakers. As on July 31, 2018 (when the PTI government took charge) the circular debt amounted to Rs 1.18 trillion, including Rs 582 billion parked in PHPL (Bhutta, 2018).

So far this government has followed a policy (more or less) similar to the previous ones. Their main focus is on increasing prices. The government continued with the policy of uniform tariffs and direct subsidies for tariff differential, FATA, AJK, agriculture tube-wells and industry.¹² In July 2019 the government discontinued industrial support package but approved again in February 2020. Under this plan, electricity tariff would be reduced by Rs. 3.50 per unit for boosting industrial exports.

In January 2019, the government notified the consumer tariff for various categories in ten distributions companies (DISCOs) via SRO1 (I)/2019 to SRO12 (I)/2019. Instead of a national average unified tariff of Rs. 15.53 per unit, the government notified the average unified consumer tariff of Rs. 11.95 per unit. The difference was left to be covered through subsidies. Besides, in one year the government increased prices three times for all the consumer categories except for domestic consumers below 300 units and imposed two surcharges to cover deficits (details in Section 3.2). But all in vain, as the payables are rising continuously.

⁹That is low tariff arrangements in certain regions, unpaid arrears of government (provincial and federal) electricity bills, recovery issues in Balochistan and FATA and inadequate taxation structures by FBR.

¹⁰(i) Tariff Rationalisation Surcharge (Rs 1.54 per KWh) for recovering the determined cost of power producers. This surcharge was meant to cover line losses and non-collection of revenues; financing costs due to delays in tariff determination; and eliminating subsidies on non-residential consumers, and equalising tariffs across DISCOs; (ii) debt servicing surcharge (Rs 0.43 per KWh) for clearing the financing cost of various power sector loans obtained under PHPL; and Surcharge of Rs 0.1 per KWh for Neelum-Jhelum Hydro Power Project.

¹¹The average tariff should have come down ranging from Re 1 to Rs 4 per unit for various consumer groups due to fall in oil prices in 2015. But a surcharge of around Rs3 was imposed on domestic consumers and Rs 4 on commercial and industrial consumers to absorb the fall in prices.

¹² Industrial Support package of Rs 3 per unit in off peak hours was introduced by PML-N government.

Since 2013 (when the debt was cleared) the total amount of debt has increased by about 393 percent. As on June 10, 2020, the total circular debt reached Rs 2.2 trillion, including the amount parked at PHPL. The debt stock parked in the PHPL, which stood at Rs 105 billion in 2008, has inflated by 856 percent to Rs 1.004 trillion. Including liquidity interventions, that is, Rs 3.06 trillion of subsidy support (largely for tariff differential)¹³ (FY2007 to FY2020) and equity adjustments¹⁴ of Rs 2.59 trillion for clearance of circular debt (FY2013 to FY2020), power sector has eaten up about Rs 7.87 trillion since FY2006 (Fig. 2).

Without any doubt, every successive government pays attention to the issue of circular debt but it was mainly a short-term response to rescue the system from total collapse. None of them tried to cure the reasons behind the circular debt. Easing the pressure in the short-term only shift the underlying systemic issues to the back burner, and not eliminates it. As the power sector continues to rely on subsidy support, equity payments and sovereign credit guarantees to maintain their operations. Continuous bank borrowing for energy sector deficit financing is also crowding out private borrowing (ADB, 2019).

4. REASONS OF CIRCULAR DEBT—DISCUSSION

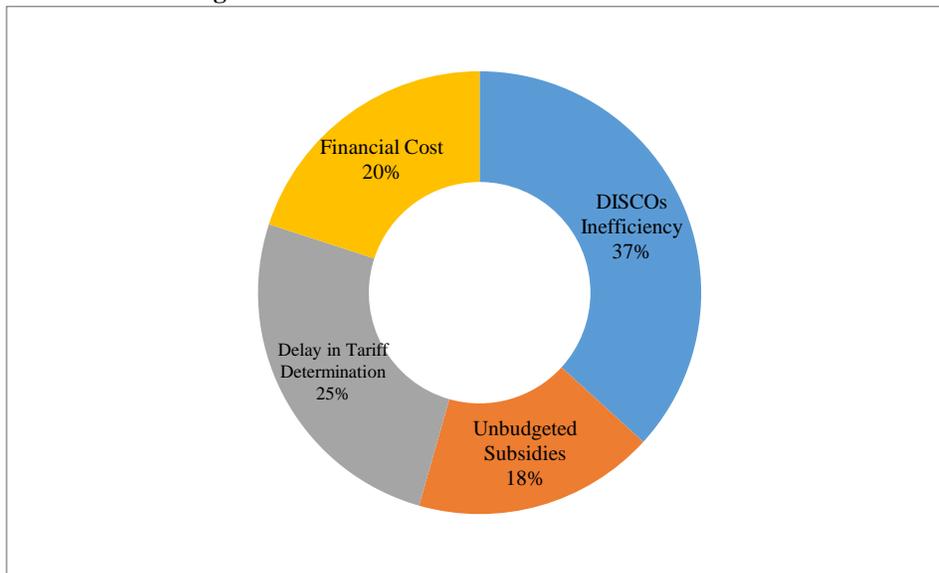
According to Ministry of Energy documents, debt flows are due to delayed tariff notifications, insufficient subsidies, taxation issues¹⁵ and financial costs generated by the existing stock of debt, including late payment surcharge payable to generators, while rest of them are due to distribution inefficiencies (receivables), that is, low collections and the difference between the allowed and actual distribution losses by NEPRA (Fig. 5 and Fig. 6).

No doubt, the above mentioned are responsible for monthly arrears. Yet, there are some other underlying issues responsible for these arrears to appear repeatedly and adding to power sector losses in the form of circular debt. Outcomes of our planning/ policy failures over the years on the supply side and subsidy and pricing policy on the demand side are creating distortions in the power system leading to circular debt issue in Pakistan. Additionally, governance and mismanagement issues prevalent in the system Cheema (2020), also mentioned in the government documents and in other earlier studies Faraz (2018); Lodhi (2019); USAID (2013); & Malik (2012) are mainly responsible for the existing stock of debt. All these issues are analysed below in detail.

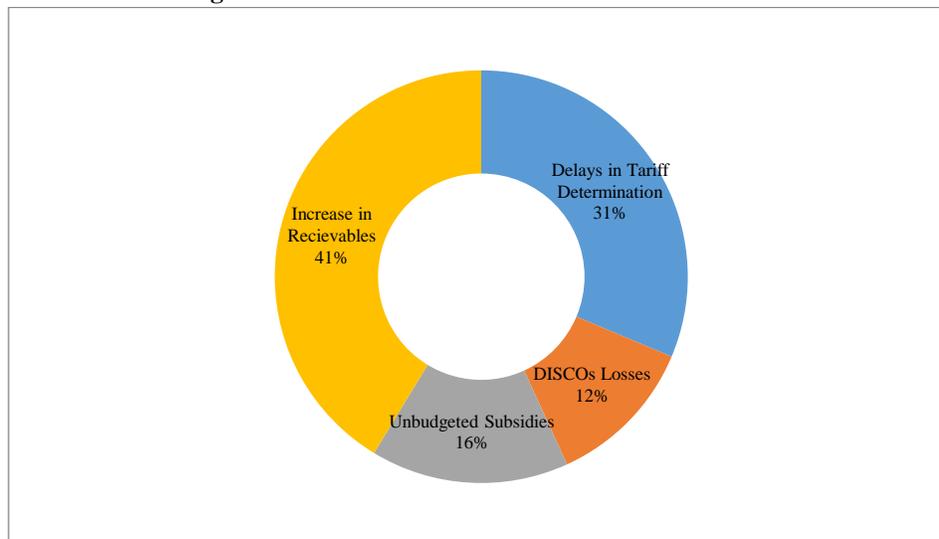
¹³ Government policy of uniform tariff.

¹⁴ In 2012-13, the government sanctioned payment of Rs 342 billion annually to PEPCO, for the clearance of circular debt. In April, 2016 the amount reduced by Rs 23962 million, which was further reduced by Rs 9900 million in January 22, 2018 to annual equity adjustment of Rs 308 billion (CPPA, 2019a).

¹⁵ FBR charged sales tax on billed units rather than the realised units, gap is added to deficit.

Fig. 5. Source-wise Distribution of Arrears 2018-19

Source: IMF (2019).

Fig. 6. Source-wise Distribution of Arrears 2019-20

Source: Sattar (2020).

4.1. Lack of Effective Planning

4.1.1. Planning Failures and Independent Power Plants (IPPs)

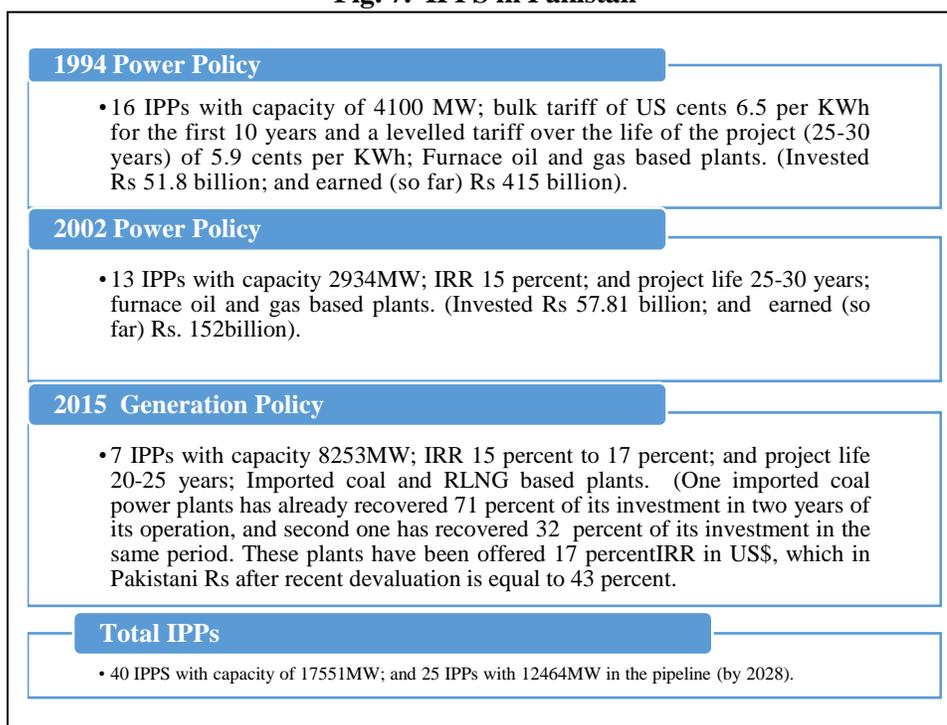
Lack of informed long-term vision in our policymakers has cost Pakistan dearly (Alahdad, 2012). Although induction of private capital via IPPs has proved to be an efficient means of increasing installed capacity around the world. Likewise in Pakistan, induction of

IPPs has relieved some burden from the public sector but has increased the cost of generation considerably because of ballooned capacity payments. Besides other factors (discussed in later sub-sections) this has depleted the sector's liquidity considerably.

Governments' capacity to plan and bid determines the quality and outcome of IPP projects. The price and guarantees offered by the government when accompanied by vested interests and political considerations limit the market correcting mechanism (Albouy and Bousba, 1998). In Pakistan, the lack of cost-effective planning resulted in direct deals with IPPs (Hasan, 2010). Strict take or pay contracts with sovereign guarantees provided by the government have created severe financial issues in Pakistan's power sector.

The absence of competitive bidding for these projects and non-transparent procurement processes has always raised serious concerns about the potential for corruption. Many a time, these IPPs also get involved in corruption accusations, disputes/litigations over the set rates and payments (Malik, 2007 and Report on the Power Sector, 2020). The guarantee clauses in power purchase agreements (PPA) with these IPPs have not only restrained the dispatching efficiency but overburdened the power sector and the government with hefty liabilities.

Fig. 7. IPPS in Pakistan



Source: www.ppib.org.pk and Report on the Power Sector, 2020.

Since the 1994 power policy, IPPs are playing a leading role in the electricity generation¹⁶. The policy allowed IPPs to select location, technology and fuel. There was

¹⁶ Hub Power Plant commissioned prior to 1994 policy.

no corporate income tax on income from these projects with guarantees for free repatriation of their equity and dividends with no import tax or duty. The 1994 Power Policy resulted in projects which did not meet the “least cost” generation test due to small size, unsuitable location, excessive reliance on oil and steam turbines technology instead of more efficient combined-cycle plants (Fraser, 2004).

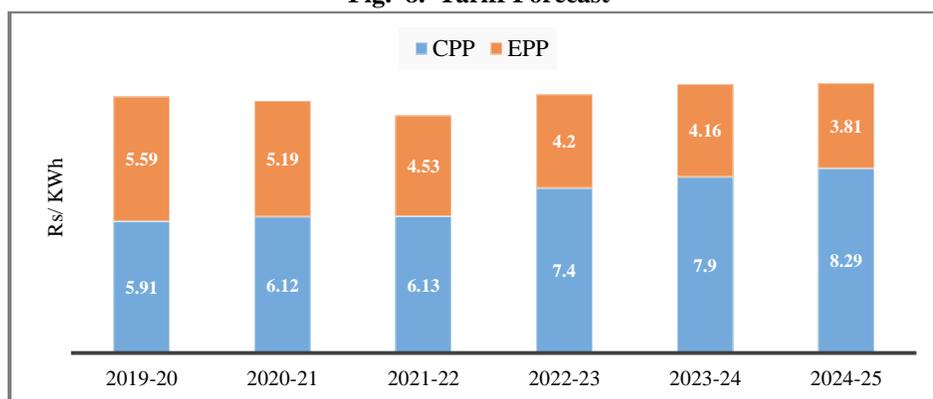
Two-part tariff structure was allowed including fixed capacity charges and variable energy costs, with a guaranteed payment of capacity charges of about 60 percent by the government¹⁷, regardless of whether power is purchased or not. Long term contract and guarantees leaves no room for competition (Saeed, 2013).

The same mistake was repeated in the Power Policy 2002. The policy encouraged the exploitation of indigenous resources but attracted plants with the same expensive fuel mix. Similarly, in 2013 and later in 2015, despite severe criticism on the 1994 and 2002 power policies, the new policies come up with more or less the same set of incentives for the generators. That is guaranteed capacity charges and guaranteed off-take.¹⁸ Not only these policies have led to expensive fuel mix, these IPPs are primarily paid in US \$, thus putting more pressure on foreign exchange reserves.

These policies supporting guaranteed capacity payments have deeply affected the cost structure of electricity generation in Pakistan. As in June 2018, the generation capacity of about 42349 MW has made contracts with CPPA against the maximum billed demand of 28687 MW (CPPA, 2019b). That is, installed capacity is far greater than demand, but still, we are paying huge capacity payments.

Prior to the recent capacity additions, the capacity purchase price (CPP) was 30 percent of the total power purchase price (PPP). But due to the unplanned addition of large capacity in the system, the CPP has increased from Rs 664 billion to Rs 907 billion. Thus, causing an increase in per unit CPP by more than Rs 1.5 per KWh. Based on the projects that are in the pipeline, due to these capacity payments, despite a decrease in energy price component from FY2020 to FY2025, PPP will increase from Rs 11.50 per KWh to Rs 12.10 per KWh (Fig. 8).

Fig. 8. Tariff Forecast



Source: CPPA (2019b).

¹⁷ The government not only gave guarantee for power purchase but also for fuel supply.

¹⁸ CPEC power projects under 2015 Power Generation Policy have also been allowed 80 percent obligatory off-take even when these do not come within the realm of the economic dispatch order.

At present, all generation plants (except for renewables) are designed with capacity payments, but there is hardly any monitoring of actual capacity (as per capacity payments) and availability. Also, there is no verification of IPPs claims of power supply and what is actually supplied. Due to the lack of transparency and an independent regulatory audit, IPPs are getting paid for the electricity they have not generated. This is increasing the cost of generation.

For costs reduction, NEPRA needs to ensure that generation plants are operational in compliance with their respective generation licenses. Proper check and balance processes must be in place (Haque, *et al.*, 2020 and ADB, 2019b) which so far missing.

Moreover, excess profitability of these IPPs (Fig. 7) is due to their misreporting to NEPRA while seeking tariff or its adjustment at the time of commercial operations (Report on the Power Sector, 2020). It is probably due to these factors there is always strong resistance by the IPPs for an independent audit.

Absence of competitive bidding in the power procurement process and long term contracts has brought structural rigidity and hindrances to the creation of competitive market and competitive prices. These unplanned contracts have forced consumers to pay an un-competitive price for the electricity.

As estimated in Faraz (2018) per unit increase in price by Rs 1 would add to an additional loss of more than Rs 10 billion; as it affects the paying capacity of consumers that in turn will increase poverty, theft and delayed or no payment resulting in an increase in arrears. Secondly, payables to IPPs are in US\$ (as per their agreements) and revenue from tariffs (or subsidies) is in rupees. Decreasing rupee dollar parity due to devaluation, further add to these arrears.

In other words, the power sector is expected to remain in this capacity trap and under circular debt in the years to come in the absence of effective remedial measures.

4.1.2. Inefficient Public Sector Generation Plants (GENCOs)

Public sector generation plants (GENCOs) is another area of great concern. Almost 48 percent of the installed capacity is in the public sector but generation capacity is hardly 39 percent. These GENCOs are running below their net available capacities because the desired maintenance and scheduled outages over the years as per standard industry practices are not in place. Lack of maintenance has increased their cost of generation. Using similar fuel, energy price component (EPP) in these plants is higher than IPPs. The Framework of Economic Growth by PIDE (2020) reports that an amount of Rs 251.6 billion lost due to inefficiency in these public sector generation companies (Table 1). Similar findings were revealed in two audit reports (as cited in Malik, 2012).

The unproductive use of resources in these plants is adding to the power sector deficit. It also denies the sector of relatively cheaper electricity (NEPRA, 2019). Over the years, policymakers have kept their focus towards new projects rather than maintaining the available capacity, thus hurting their fuel efficiency and putting costly electricity in the system.

Table 1
Losses in GENCOs

Capacity loss due to Mismanagement	1500MW	Rs. 130 billion
Efficiency loss due to mismanagement on average	5%	Rs. 8.6 billion
Extra use of fuel due to inefficient plants		Rs. 103 billion
Leakages in fuel Supply estimated		Rs. 10 billion

Source: Framework of Economic Growth, PIDE, 2020.

4.1.3. Shortage of Transmission and Distribution (T&D) Network

On the top of planning failures in Pakistan, is the shortage of T&D networks. Investments to increase generation capacity are not complemented by equivalent investment in downstream T&D infrastructure. Capacity payments are being made but there is no way to transmit the available electricity to the consumer. More than one-fourth of electricity generated is lost due to ruined network, theft, and insufficient energy accounting. T&D capacity is much less than the installed generation capacity. The transmission network allows only 23000 MW-peak, with loss levels of close to 3 percent. About 10GWh of generation cannot be evacuated due to system constraints (ADB, 2019b). The mismatch between generation and T&D network is another reason for the capacity trap, exhausting sector's liquidity and adding to circular debt woes.

Given the slow economic growth and current covid19 crisis, it has been a challenge to keep capacity payment per unit at the current levels, as this would require energy sales to grow significantly. Besides, no serious efforts are being made to increase electricity sales in Sindh, Balochistan and KP, where many areas are still not connected to national grid.

4.1.4. Sub-optimal Energy Mix

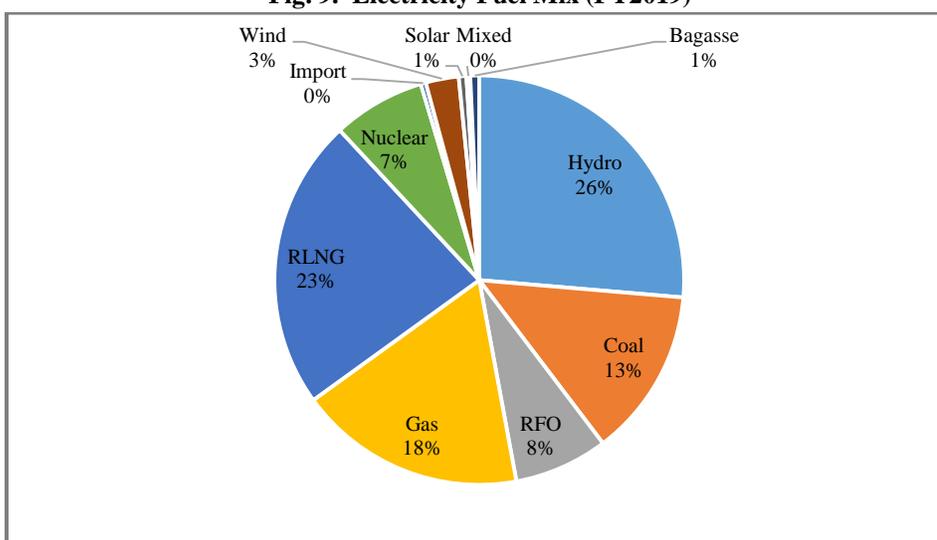
As more than 40 percent of generation is based on imported fuels. Any increase in international fuel prices or devaluation of the Pakistani rupee exacerbates the power sector deficit. Our policymakers have always chosen for quick fixes. In the 1990s, they could have opted for other options, as they had space to undertake long-term policy decision. The generous tariffs offered to IPPs, if were extended to hydro plants, our power sector would have been far better off (SBP, 2014). Lack of long term planning capacity (Alahdad, 2012) has led to an expensive power generation mix in the country.

Alahdad (2012) also talked about the impact of lost opportunities in the 1980s and 1990s if our policymakers had handled these effectively, the situation would have been different.

As discussed in Section 4.1.1, incentives given in successive policies helped in the development of thermal power plants. Now the dynamics of the electricity supply chain is changing with fast depleting cheap indigenous resources of natural gas and with the retirement of furnace oil plants; but unfortunately not our dependence on imported fuels. All the new projects are increasingly dependent on imported fuels.

For instance, the share of oil in has decreased from 47 percent in FY1998 to only 7.4 percent in FY2019¹⁹ in our generation mix. But our dependence on another imported fuel RLNG has increased from 0.7 percent in FY2015 to 23 percent in FY2019. Similarly, the share of coal in electricity fuel mix has increased from 0.5 percent in FY2014 to 13.3 percent in FY2019. Where most of the new coal-fired power plants are fueled by imported coal, which has become extremely expensive after rupee devaluation. Both coal and RLNG plants will keep Pakistan's reliance on expensive imported fuels.

Fig. 9. Electricity Fuel Mix (FY2019)



Source: CPPA_G (2019).

In our total energy supplies, the share of hydro was 13.1 percent in FY1998 which stands at 7.7 percent in FY2018. Similarly, share of renewables was 0.3 percent in FY2015, which now stands at 1.1 percent in FY2018 (in electricity fuel mix its share is less than 4 percent). Renewables have clear advantages over polluting thermal coal plants.²⁰ But their share in our fuel mix is increasing at a snail's pace.

Failure to add new hydro capacity in the system over the years due to lack of political consensus among the provinces (Hasan, 2010 and FODP, 2010) and continued dependence on imported fuels resulted in an unbearable financial burden of subsidies and circular debt. In our planning strategies, the utilisation of indigenous resources has always been at the forefront, but unfortunately, these plans have not been timely implemented (Malik, 2012). We started Neelum-Jhelum from Rs 18 billion in 2008 and completed in 2018 at the cost of Rs 510 billion (levelised tariff of Rs 13.5 per unit). Rs 510 billion is more than \$5 million per MW when countries around us are doing the same at under \$2 million per MW.

¹⁹ With the retirement of some of 1994 IPPs.

²⁰ Given the new generation projects in the pipeline (18705 MW) in which coal will contribute about 43 percent (39 percent imported and 3.5 percent local) in our power generation mix by 2022. Whereas, share of solar would be 8.5 percent and that of hydro 21 percent (ADB, 2019b)

Similarly, nuclear power projects increasingly suffer large cost and time over-runs around the world. Pakistan is building nuclear power units at a time when nuclear power is declining globally, and its outlook is clouded (Nicholas and Buckley, 2018).

Coordinated policy formulation has remained a fundamental issue in Pakistan. Due to which decision-making in the sector has remained essentially flawed (Alahdad, 2012).

4.2. Subsidies and Pricing Strategy

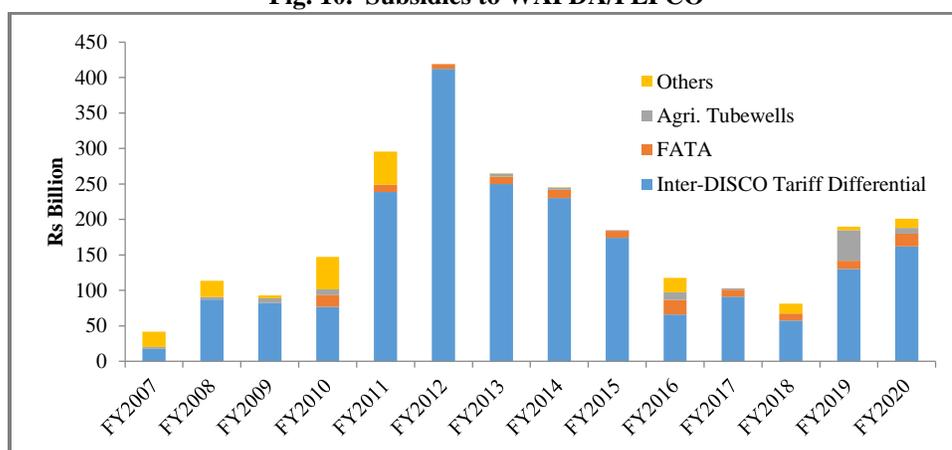
In this section, we reflect on the demand side issues. System of electricity subsidies (that is, cross-subsidisation across sectors as well as across different geographical regions—DISCOs, and inability to pass on the actual cost to some consumer categories) is another area of great concern and responsible for circular debt in Pakistan. These subsidies put an enormous burden on the government; which sometimes government is unable to pay or have to delay (Figure 5 and Figure 6) or pass on to the compliant consumers through taxes, surcharges and tariff hikes.

Apparently, subsidies are introduced as welfare measure but international evidence suggests this, as an inefficient tool to achieve the said objective (Walker et al. 2016). That's why many countries are abolishing these subsidies (IISD, 2018 and IMF, 2013).

Tariff structure in which costs are not recovered from all consumer categories indiscriminately, besides creating financial difficulties for the government, also create inefficiencies in the system and misleads investment decisions in the supply system.

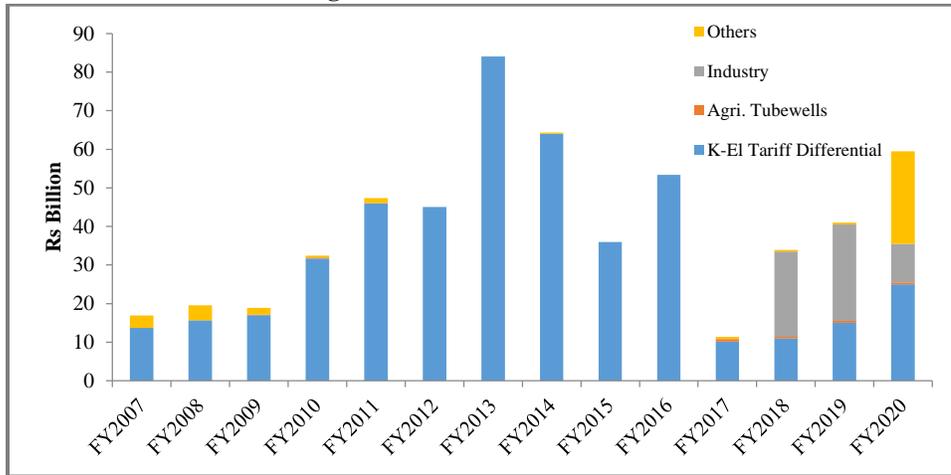
Over the years, a weak link between price and demand and substantive cross-subsidisation has skewed consumption in favour of less-productive domestic consumers. Domestic consumption has increased substantially over the years. Domestic consumption (energy sale) of electricity in FY2019 was more than 55 percent in PEPCO areas and more than 59 percent in K-Electric. In comparison, industry consumes 22 percent and 20 percent in both the areas respectively. The industry is relying on other sources of energy due to expensive electricity from the national grid. In other words, the productive sectors that require a continuous supply of electricity either have to restrict their production or have to rely on other sources when electricity service is considered as a 'right' (Burgess et al. 2020).

Fig. 10. Subsidies to WAPDA/PEPCO



Source: Budget in Briefs (FY2008 to FY2021).

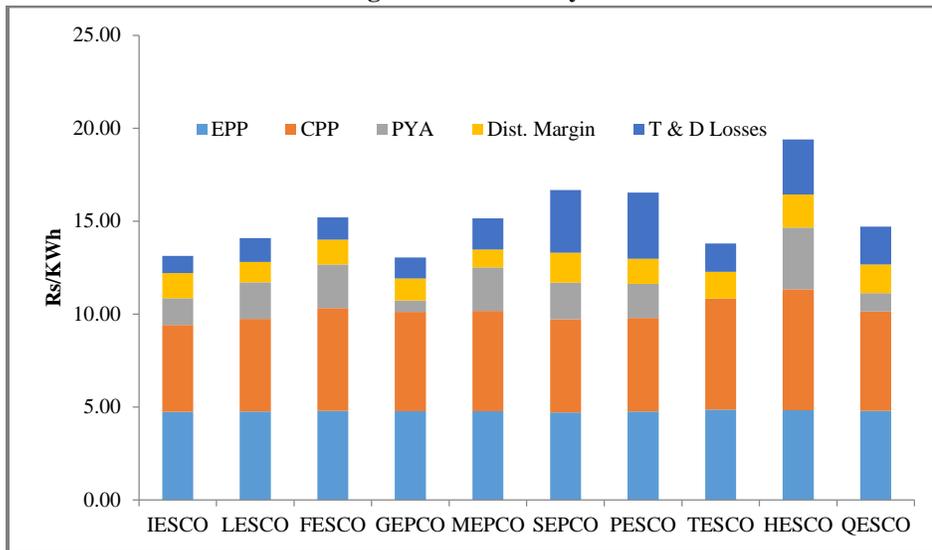
Fig. 11. Subsidies to K-Electric



Source: Budget in Briefs (FY2008 to FY2021).

The Government of Pakistan provides several subsidies to the power sector. The largest portion of this subsidy is for inter-DISCO tariff differential. It is the difference between government notified uniform tariff and the tariff determined by NEPRA. NEPRA determined tariff for different DISCOs based on energy price, capacity payment, distribution-margin, and T & D losses of DISCOs allowed by NEPRA (Figure 12). The tariff determined is different for each DISCO. *The government as a policy apply uniform tariff across all the geographical areas.* The minimum consumer-end tariff for a particular consumer category is applied across all DISCOs. The difference is paid by the government in the form of subsidy to DISCOs.

Fig. 12. Tariff Analysis



Source: SRO 01 (01) 2019, Ministry of Energy, Government of Pakistan.

Fig. 13. Residential Electricity Tariffs (Rs/KWh)

Source: SRO 01 (01) 2019, Ministry of Energy, Government of Pakistan.

Out of Rs 260.5 billion of power subsidy in FY2020, 72 percent (Rs 187 billion) was for inter-DISCO tariff differential. Since FY2007, the government has paid over Rs. 3 trillion subsidies to the power sector out of which Rs. 2.5 trillion are for tariff differential. It means

this huge burden of subsidy is due to the policy decision to maintain a uniform tariff across different geographical regions in the country, irrespective of the efficiency level (measuring costs) in these regions (DISCOs). Through these subsidies, the government is providing electricity to consumers at below-market price and shield them from the impact of high input costs, high capacity payments and inefficiencies across the supply chain (SBP, 2019).

Apparently, the objective of the government is to protect the end-consumers. Therefore, K-electric despite being privatised is also the major beneficiary of energy subsidies (Fig. 11). So even if prices are increased for consumers, it would only be to the extent of maintaining uniformity across the country; the rest of the increase is settled at the government level through subsidy.

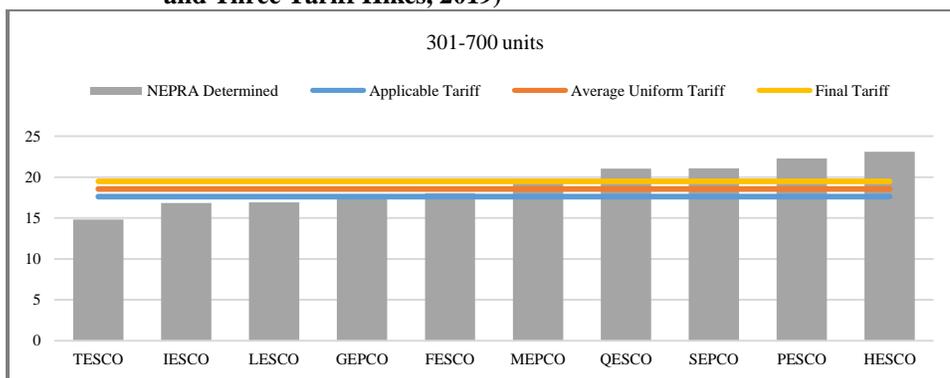
As mentioned earlier, the government also provide subsidies to certain consumer groups like agriculture tube wells in Baluchistan, consumers in FATA and AJK and export-oriented industry.

Whenever the government is unable to manage this subsidy amount or delay the payment (as happened most of the times due to fiscal constraints), it is added to the circular debt. Additionally, there are some distortionary effects associated with these subsidies and price structure.

First of all, this welfare move by the government is encouraging inefficient behaviour in some of the distribution companies. If a different tariff is charged in different DISCOs, the profitable DISCOs will be in a position to sell adequate and affordable electricity to its consumers (Malik, 2012).

Secondly, it is putting extra burden on compliant consumers, through various surcharges, taxes and tariff hikes. The consumer tariff notified in January 2019 created a financial gap of Rs 371.5 billion, to be covered through direct subsidies by the government, and through a surcharge, named as financial cost surcharge (Rs 0.43 per unit) to be charged from all the electricity consumers except the lifeline consumers.²¹

Fig. 14. Final Residential Electricity Tariff Rs/kwh (Including Surcharges and Three Tariff Hikes, 2019)



Source: SRO 01 (01) 2019, Ministry of Energy, Government of Pakistan.

Note: Final Tariff does not include fuel price adjustments in the year.

²¹ Besides, government also charges a Neelum Jhelum Surcharge of Rs. 0.10 per KWh from all the consumers (except lifeline consumers); general sales tax @ 17 percent, electricity duty @ 1.5 percent; and TV fees of Rs 35 from all the consumers.

As per the tariff notification in January 2019, residential consumers are given the benefit of one previous slab. As we can see in Figure 13, for domestic consumers who consume up to 300 units of electricity, the applicable uniform tariff is even lower than what NEPRA determines for most efficient distribution company (even after including surcharges). Whereas, consumers (especially those consuming more than 300 units) of efficient distribution companies like IESCO, LESCO and GEPCO are paying a very high price; only because of inefficient DISCOs as well as because of the government policy of uniform tariff and extra surcharges (Fig. 14). Moreover, whatever increase in tariff is announced by the government (e.g., three times in the last year²²) is only applicable to those who consume 300 plus units.

So not only the government is bearing the burden of tariff hike (to cover cost escalation) through subsidies; it is partially shared by compliant consumers (more than 300 units).

This government policy is meant to insulate the poor and the lower middle income (0-300 units) from the tariff hike. As of May 2019, 86 percent of domestic consumers use electricity up to 300 units while the remaining 14 percent consume electricity above 300 units in Pakistan. It means that notwithstanding the nominal increases, there have been no real increases in the electricity tariff for approximately 86 percent of domestic consumers.

But who are these 86 percent? In rural areas, about 46 percent of the population is not connected to the national grid. In urban localities, this group (0-300 units) normally resides in congested localities. However, there are apprehensions, that congested areas mean more power theft (through meter-tempering) and line losses. As distribution companies avoid technological up-gradation in those areas considering them low revenue areas. Similarly, there is ample evidence of the misuse of electricity in rural areas too, where people instead of paying regular bills prefer to pay a monthly fixed amount to the lower staff of DISCO (details in Section 4.3.1).

Besides, in urban areas there is a culture of having two to three meters in a house to distribute power load between them; and below 300 units in most of the cases. So indirectly, all of the above groups are unnecessarily getting the subsidised tariff. In other words, subsidies may not necessarily be going to genuine deserving consumers.

Maximum subsidy is availed by the domestic sector. Unless or until tariffs are not allowed to cover the cost of providing electricity to consumers, the power sector will continue to face financial difficulties.

As argued by Burgess et al. (2020) the issue arises when we start treating electricity as a right rather than as a private good. It leads to subsidies, theft, supply without payment, and losses for distribution companies, which may at the end limit supply.

Agriculture is the second major beneficiary of electricity subsidy. Since FY2007 Rs 47 billion of subsidy is provided for agriculture tube-wells in Baluchistan. *This policy has increased pressure on groundwater resources (Khair et al. 2012) as well as has increased the wastage of water resources (Ahmad, 2006).* According to ENERCON,

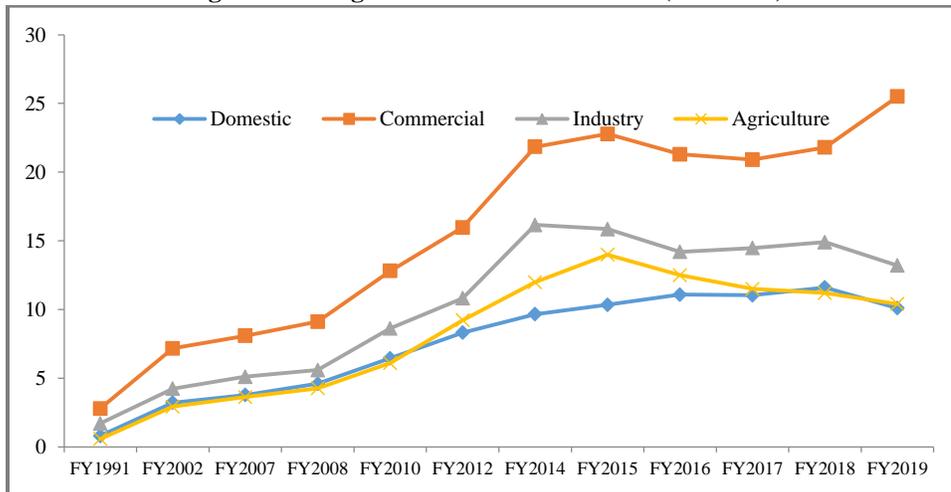
²² First increase was of Rs. 1.49 / kwh (applicable Rs. 0.75/ kwh), second of Rs. 0.53 / kwh and third one of Rs. 0.07 / kwh.

there is about 25 percent of electricity wastage in the agriculture sector. This unconditional and huge subsidy to the sector is encouraging them to continue with the current practice of consuming electricity (other related issues are discussed in Section 4.3). The plan of solarisation of agriculture tube-wells and drip irrigation system (by the government of Baluchistan in collaboration with Alternative Development Board) may reduce the subsidy burden but chances are that it will further increase the wastage of under-ground water resources.

Some industries (export-oriented) are now also getting subsidised tariff, but in general, there is *significant presence of cross-subsidy from industrial and commercial consumers to agricultural and domestic consumers* (below 300 units). Over the years, limited progress has been made in reducing cross-subsidies (Fig. 15).

For instance, the government announced a uniform quarterly adjustment of Rs 1.49 in July 2019 (for 1st and 2nd quarter of 2018-19) for all consumer categories, but the applicable tariff in the domestic sector was of Rs 0.75 per unit; but only those domestic consumers who consume above 300 units. All the difference is paid by the government via subsidy. But this rebate was not applicable to the commercial and industrial consumers. Although average sale price for industry has decreased due to subsidy (especially in the last year), it is still higher than domestic and agriculture sector.

Fig. 15. Average Sale Rate across Sectors (Rs/ KWh)



Source: Author's Estimation.

Another shortfall associated with the current structure of subsidies is, it lifts pressures from inefficient power producers who continue to use more expensive fuels for thermal generation. For instance, as we can see in Fig. 12, in the end-user NEPRA determined tariff, the power purchase price (PPP=CPP+EPP) constitutes on average 65 percent. Tariff notified by the government to subsidise households consuming up to 200 units is Rs 8.11 per KWh (Figure 13), is even lower than the price at which DISCOs procure electricity from CPPA.²³ This implies that while subsidising power to end-

²³ Three tariff hikes in 2019 were meant to cover this gap.

consumers, the government pays not only for the inefficiencies at the DISCOs level; but also for inefficiencies and excess capacities in the generation sector (Khalid, 2019). This subsidy policy led to inefficient power producers to continue with their on-going practice (as discussed in Section 4.1.1 and 4.1.2).

Price reforms since 2015, which involves an increase in prices, not only exempt around 86 percent of domestic consumers, gives direct subsidies to FATA and AJK as well. For instance, the government is providing subsidy to WAPDA for receivables from AJK. But it is not sufficient as the government in AJK does not accept NEPRA determined tariffs, and allows a tariff of only Rs 2.59 per KWh (agreed at the time of Mangla Dam Construction). The difference adds to the receivables of suppliers, that is, IESCO, GEPCO and PESCO. Similarly, issues at FATA impelled the government to split TESCO from PESCO, and subsidise domestic consumers. But consumption is more than the allocated subsidy, and the difference is left as arrears (ADB, 2019). Inadequate budgeting of subsidies, thus adds to the circular debt.

Subsidies to the sector have not been phased out as planned, and distribution companies are asking for more subsidies. They claim that the estimation of actual costs is too low. It includes only efficient costs and leaves a shortfall in cost recovery even with the subsidy and surcharges—adding more to the circular debt. DISCOs want to transfer all their inefficiencies to consumers via tariff or to the government via subsidy.

The government envisioned that after the privatisation of DISCOs, private management would lower costs. It would lower subsidies automatically. After almost 15 years of privatisation, K-EI is still receiving a subsidy; yet, its payables are still very high. In FY2019, Rs 91.7 billion was due from K-EI; what it owes to NTDC for the 600MW it receives from the grid and payables to fuel suppliers (NEPRA, 2019).

Over the last ten years or so, these subsidies have exhausted fiscal resources immensely, leaving little (in the form of PSDP) for renovation or expansion of transmission and distribution infrastructure²⁴ (SBP, 2019).

The tariff structure since 2015 is tackling the circular debt issue by partially transmitting the cost of mismanagement and inefficiencies in the power system to compliant consumers. Any increase in theft or increase in unpaid bills, due to tariff hike is paid by consumers who are already paying their bills. The plan to reduce the future accumulation of circular debt is still dependent on continuous upward adjustments in tariffs. Whatever decrease in subsidies is recorded; is by putting an extra financial burden on consumers who are paying their bills regularly.²⁵

As discussed earlier, delay in determining and applying the tariff also adds to payment arrears. A multiyear tariff mechanism was introduced to reduce tariff-setting delays for some efficient DISCOs. However, DISCOs were unsatisfied with the determination and filled complaint in courts against NEPRA in 2016. According to DISCOs the determination underestimated system losses and overestimated collections by NEPRA. This led to a delay in tariff revisions for these DISCOs. In 2017, the court decided in their favour. However, for the

²⁴Installment of high voltage transformers and smart grids and safety protocols such as proper earthing and plugging current leakages is left for DISCOs to undertake. But weak administrative and financial capacity in DISCOs does not allow them to invest in these areas.

²⁵The tariff rationalisation surcharge introduced in 2015 brought down subsidy to the power sector subsidy from Rs 292 billion in FY2014 to Rs 118 billion in FY2017.

time when the case was under trial, these utilities bill their consumers on the basis of old tariff notification (i.e., 2015). Thus, the growth in revenues could not keep pace with the cost,²⁶ and these DISCOs recorded losses in their balance-sheets. By the time tariffs got revised in 2017-18, a large buildup of uncharged system costs contributed significantly to the circular debt (SBP, 2019 and ADB, 2019b).

The government put an additional burden of Rs 405 billion on consumers through an increase in prices (FY2018 to FY2019). Subsidies have also gone up from Rs. 115 billion in FY2018 to Rs. 261 billion in FY2020. But this increase is not sufficient to cover the cost which has increased tremendously. The gap is adding to the circular debt. It means this pricing strategy is not working. But the government is planning to continue with the uniform tariff policy as stated in National Electric Supply Policy 2020 (draft).

4.3. Mismanagement and Inefficiencies in the Electricity Supply Chain

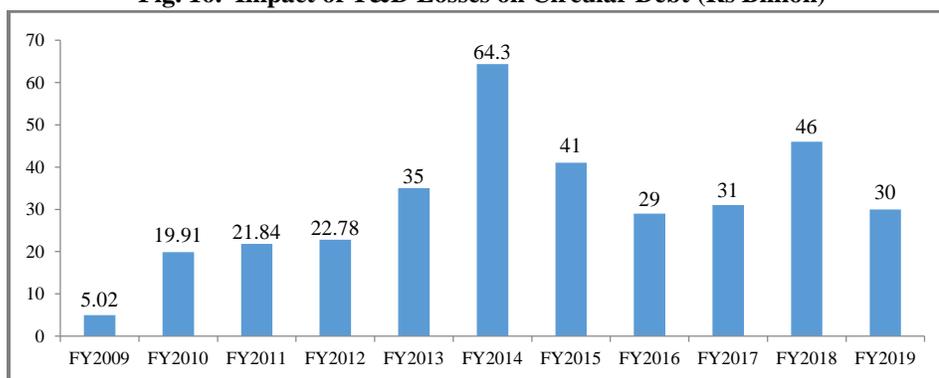
The functioning of the power system in Pakistan is unsatisfactory since the mid-1980s. Even after major reform measures in the 1990s, the inefficiencies in the sector still persist.

4.3.1. Operational Performance

Consumer end tariffs are highly sensitive to the losses in the transmission and distribution (T&D) systems. With every percentage increase in losses, the tariff increases exponentially (as the cost of generation goes up). When a certain percentage of these losses are not accounted in tariffs, it adds to the circular debt.

One of the policy tools adopted by NEPRA to improve the operational performance is to set some target for T & D losses for each DISCO in their revenue requirements. When the respective DISCO does not meet the target, it is added to the payables of that respective distribution company; as it is not compensated by tariff differential subsidy. Via this tool, NEPRA anticipates that in order to avoid deficits DISCOs would make improvement in their operational efficiency. However, this strategy is not working for most of the DISCOs, as there is no penalty associated with utility mismanagement and operational inefficiency. DISCOs are aware they will be subsidised at the end of the day.

Fig. 16. Impact of T&D Losses on Circular Debt (Rs Billion)



Source: NEPRA State of Industry Reports (Various Years)

²⁶Fuel price changes are adjusted automatically in tariffs but not the increase in capacity payments which are paid in US\$. The impact of capacity payments aggravates as the Pakistan rupee depreciated by nearly 48 percent during 2016–2019.

Table 2 shows losses claimed by various DISCOs and K-EI in their T&D systems. It seems that the distribution companies have failed to control their inefficiencies. Except for IESCO, LESCO, GEPCO, and FESCO; the rest of them have extremely high losses. IESCO, GEPCO and FESCO have had low rates for the whole period (2006 to 2019) and closed to the target set by NEPRA. However, the rest of DISCOs, especially, PESCO, HESCO, SEPCO and QESCO have shown no significant improvement, thus adding to the circular debt (Fig. 16). The accumulated impact of these losses, after the clearance of debt in 2013, was about Rs 241billion (FY2014 to FY2019).

Table 2

<i>Distribution Losses</i>						
FY	2006	2009	2012	2015	2018	2019
PESCO	34.1	37.4	36.0	34.81	38.15	36.6
TESCO				21.68	12.47	10.4
IESCO	13.2	10.8	9.5	9.41	9.14	8.9
GEPCO	10.2	10.7	11.2	10.72	10.01	9.9
LESCO	13.1	13.3	13.5	14.10	13.83	13.2
FESCO	11.6	10.7	10.9	11.03	10.53	9.8
MEPCO	20.5	18.4	17.9	15.50	16.59	15.8
HESCO	39.2	35.1	27.7	27.08	29.88	29.5
SEPCO			39.5	38.29	36.67	37.0
QESCO	20.7	20.4	20.9	23.10	22.44	23.6
K-EI	37.5	38.5	29.7	23.7	20.4	19.1

Source: NEPRA State of Industry Report (Various Years).

Safe and reliable transmission and distribution of electricity have remained a major problem in Pakistan. The situation of huge power losses over the years has hardly improved. In FY2019, these losses stand at around 18 percent in public sector DISCOs and 19 percent in private sector K-EI, equivalent to about Rs 352.4 billion. As per NEPRA tariff determination of January 2019; we are paying extra Rs 2/KWh in our tariffs due to these losses. This is based on NEPRA targets for T&D losses. If actual losses are accounted for in tariffs, this will increase.

Neither unbundling nor price structures introduced by NEPRA seems to improve efficiency in distribution utilities. Even the profit motive associated with privatisation leads to limited improvement in K-EI operational efficiency (Bacon, 2019). Some of the state-owned DISCOs performed better than K-EI.

In comparison to the international benchmark, these losses are extremely high.²⁷ In the distribution losses, non-technical losses (mainly theft) are almost 68 percent while the rest of them are technical losses (overloading of transformers and the limited capacity of transmission lines to transfer power to consumers efficiently). In the period (FY1986 to FY1995) units of electricity supplied which were also billed grew at the rate of about 10 percent, while in the period (FY1995 to FY2007) units billed grew at the rate of about

²⁷Comparison to other Asian countries: South Korea and China, T&D losses are only 3 percent and 5 percent. Even in Bangladesh T&D losses are only 9 percent.

5 percent. In the period (FY2008 to FY2019) units billed increased at the rate of 4 percent. This indicates declining efficiency to curtail power theft.

Electricity is stolen mainly by domestic consumers with the help of meter readers and officials from the electric supply companies (as also discussed in Section 4.2). As 11kV and below feeders (which primarily caters to the household power needs) accounted for almost 91 percent of distribution losses to DISCOs during FY2019 (NEPRA, 2019). In other words, domestic consumers are not only subsidised, they are contributing more to T&D losses.

Corruption by the DISCO officials²⁸ and sheer negligence by the senior management of DISCOs as well as in the ministry are mainly responsible for the theft and other technical losses. Bribery culture in DISCOs prevents managers from investing in theft controlling techniques (NEPRA, 2014 and Abro, 2019).

4.3.2. Commercial Efficiency

Adding further to circular debt is the low recovery ratio of DISCOs. In tariff determination, NEPRA counts 100 percent recovery. However, the actually reported recovery percentage of DISCOs remained around 90 percent in FY2019. This resulted in an annual shortfall of around Rs. 130 billion (NEPRA, 2019).

As in Table 3, companies with high system losses also suffer from low recoveries of the billed amount. Secondly, over the years, recovery ratio gets deteriorated except for FESCO and to some extent LESCO. Even in IESCO, one of the best performing utility in terms of T&D losses, recovery ratio has come down from 98 percent in FY2008 to 88 percent in FY2019. QESCO had a recovery ratio of 86 percent in FY2008, after declining consistently was recorded at 27 percent in FY2019. Even the privatised K-EI is showing a billing loss of about 10 percent since 2011. Sector-wise, in FY2019, highest recovery ratio was recorded for the commercial (98 percent), followed by industry (92.4 percent) and domestic sector (91.6 percent). Lowest recovery ratio was recorded for the agriculture sector (48 percent).

Table 3

% Recovery

FY	2008	2010	2012	2014	2016	2018	2019
PESCO	92	85	83	86	89	89	89
TESCO				7	437	67	68
IESCO	98	96	96	90	91	90	88
GEPCO	98	96	99	96	99	97	96
LESCO	98	96	96	98	99	98	98
FESCO	99	97	100	100	100	99.6	99.2
MEPCO	97	94	97	96	100	97	99
HESCO	77	60	69	79	72	77	75
SEPCO			51	60	55	60	63
QESCO	86	76	36	42	72	26	27
K-EI		100	91	87	88	91	92.6

Source: NEPRA State of Industry Report (Various Years).

²⁸Theft is carried out with the support of the DISCO employees as well as officers.

The basic principle of exchange in economics is the willingness to pay for the service used. Due to poor revenue collection, DISCOs are unable to pay for power cost. Despite getting subsidy from the government, receivables as on June 31, 2019, from the private consumers and agriculture tube-wells stand at Rs 857 billion and Rs 283 billion respectively (Fig. 4).

Total receivables owed to DISCOs have grown at the rate of about 31 percent from FY2006 to FY2019. Amounts owed by private sector consumers excluding private consumers in FATA have grown by 34 percent in the same period. This growth rate in part be attributed to poor recovery rate, but it may also highlight the point that private consumers reaching an elasticity point whereby they are more willing to pay or delay for electricity because of recent large tariff increases and extra surcharges imposed. Another reason could be their dissatisfaction with service delivery. Consequently, it leads to an additional unjustified cost to those consumers who are paying their bills regularly or extra costs to the government in the form of subsidy.

The second largest amount is owed by agriculture tube-wells, followed by AJK government, K-Electric, provincial governments, FATA and Federal government. The amount owed by provinces is small but over the years have grown by 25 percent. One of the reasons for this increase is a dispute of provincial governments with the federal on their share in NFC award.²⁹

Beyond these receivables, the distribution companies do not acknowledge the mark-up on delayed payments, on the ground that NEPRA do not allow them to claim in their tariff determination.³⁰ Insufficient payments by DISCOs to CPPA further add to circular debt (CPPA, 2019a).

No doubt, the underlying governance problems in DISCOs are mainly responsible for these operational and commercial inefficiencies. The role of existing policies and regulatory practices cannot be ignored.

As reported in (SBP, 2019), delays and disputes over multi-year tariff determination (as discussed in Section 4.2) caused accumulation of losses for DISCOs like IESCO, GEPCO and FESCO. Gross receivables from these three DISCOs increase by about 43 percent from FY2018 to FY2019 (CPPA, 2019a). Similarly, QESCO low recoveries (Table 3) are due to subsidy policy on tube-wells, and delays in tariff notifications.³¹ As more than 75 percent of the electricity procured by QESCO is consumed by agriculture consumers for running tube-wells. While agriculture consumers constitute the bulk of QESCO's defaulters (79 percent), the Government of Balochistan

²⁹Provincial governments do not allow the federal government to deduct the provincial electricity dues at source out of the NFC award amount.

³⁰Rs 110.6 billion are still pending under this head (CPPA, 2019a).

³¹As per the subsidy policy (from 2001 to 2010), agriculture consumers had to pay Rs 4,000 per month; and remaining amount to be paid by QESCO, Baluchistan government and the Federal government in a ratio of 30:30:40, respectively. Subsidy program ceased in 2010; but restored again from December 2012, without any clarification regarding distribution of outstanding dues across the respective entities. In this period of 27 months, consumers were reluctant to pay their share of electricity bills beyond Rs 4000, therefore defaulted on their bills for these 27 months. This outstanding amount (Rs 55.3 billion) affects subsequent billing. So even if these consumers desire to clear their current period liabilities, they were unable to do so without clearing the accumulated backlog. The said notification regarding the proportion and liability of payments is still pending. That's why the average recovery by QESCO has come down significantly (SBP, 2019).

and the Federal Government also collectively owe Rs 59.86 billion to the entity (NEPRA, 2019). In one year from FY2018-FY2019, gross receivables of QESCO increased by 26 percent (CPPA, 2019a)

Over 5.3 million electricity consumers, despite being defaulters, are getting electricity. In June 2018, total outstanding payments from these connections were Rs 404.8 billion. Largely, these defaulters are in QESCO, PESCO, SEPCO and HESCO. In addition to mismanagement in these DISCOs, security conditions and lawlessness, as well as political interference, are playing a major part (for details see SBP, 2019). As per CPPA financial statement FY2019, PESCO is the largest defaulter with gross payables Rs 394 billion, followed by QESCO (Rs 351 billion), HESCO (Rs 275 billion) and SEPCO (Rs. 237 billion).

One more reason cited for low recoveries is the wrong energy billing by DISCOs. The two reports cited in Malik (2012) suggest that power sector is losing more than Rs. 390 billion annually because of mismanagement in these DISCOs.

4.3.3. Governance Issues

Mismanagement and poor governance at various levels are at the heart of circular debt issue. *At the national level*, these can be attributed to political interference, short-sighted and defective policies, ineffective subsidy policy and under-budgeting of subsidies, unnecessary delays in decision making (due to cumbersome bureaucratic procedures) and non-settlement of issues.

The Federal Government is the ultimate decision-maker in all the power sector matters. Final tariff notification is also made by the government. Many times, as a political entity, the government is swayed by both political and socio-economic considerations; undermining commercial orientation of these state-owned companies. For instance, the decision to apply uniform tariff across the country is merely under political considerations. Similarly, other decisions in these companies related to the appointment of managerial staff are also not without government intervention. Their constant interference has often compromised merit-based performance and accountability.

Similarly, as discussed in Section 4.1, policy-makers have caused enormous damage to this sector by approving and sanctioning investments in inappropriate projects or by endangering extremely essential projects for their own interests or because of their incompetency. The power sector has always remained in the limelight because of corruption in financial matters; whether it is an IPP programme, RPPs, LNG power plants, or Thar coal projects under CPEC.

Similarly, the subsidy strategy by the government is creating inefficiencies in the system as benefits of these subsidies go beyond the desired consumer group. Additionally, the financial, accounting, and data systems related to subsidies are also not well-managed (USAID, 2013). Lack of transparency in government decision making has harmed the sector more than anything else.

At the provincial level, even after 18th Amendment, governments are not playing their part in resolving issues related to electricity bills, payment of tube-well subsidies arrears, arrears of provincial departments, and arrears due to court orders. If, for example, the issue of proportion and liability of payments due from agriculture tube-wells in Baluchistan and the tariff rate issue for Azad Jammu & Kashmir (AJK) is resolved, a significant portion of circular debt could be reduced.

Similarly, if provincial governments and law enforcement agencies under them support DISCOs effort to check theft or to catch defaulters in their areas, T&D losses can be reduced and recoveries can be increased significantly.

As far as *corporate governance* in state-owned companies is concerned, GENCOs and DISCOs lack technical and managerial skills to operate independently. The structure of these companies based on corporate governance principles has not been established in a true sense. For instance, DISCOs besides having inferior operational and commercial performance (Section 4.3.1 and 4.3.2), are not aware of their role and need of good governance as a corporate entity (Malik, 2012). Similarly, GENCOs have no incentive to improve their performance (Section 4.1.2).

Bacon (2019) compared corporate governance (using various indicators) between Lahore Electric Supply Company (LESCO) one of the best-performing state-owned company with K-Electric (K-EI) (privatised utility) and some Indian Distribution companies and found corporate governance in LESCO below average³². The state of corporate governance in other DISCOs and GENCOs is not much different.

Weak administrative performance of all the power companies in the public sector is due to constant government interference in matters relating to finance, employment and pricing. There is no incentive to improve performance as there is no penalty associated with weak performance.

The autonomy and capability of board members is important to control the opportunistic behaviour of managers and to protect the interests of share-holders (Zubaidah et al. 2009). But the Board of Directors (so-called independent) in GENCOs and DISCOs either have no ability or no authority to guide and monitor company performance.

It is the lack of capacity and skills in DISCOs management that does not allow them to make efforts to reduce T&D losses or to improve the company's financial positions. Similarly DISCOs have failed to have direct agreement with the generation companies because they don't have capacity and understanding of the concept of 'distributed generation'. Only exception is an agreement between MEPCO and a generation company to carry out the 'wheeling of power'; otherwise DISCOs are resisting NEPRA's regulations (NEPRA, 2020).

On the other hand, good corporate governance indicators in privatised K-EI have so far not translated into good commercial and operational efficiency. That's why K-EI is facing financial challenges associated with payables to and receivables from the government and state-owned companies.

All the distribution companies including K-EI are still unable to recover dues especially from the public sector and provincial government departments, thus causing high losses in the distribution systems. Delay in the payment of subsidies by the government and the lack of discipline in these companies has forced them to default; significant arrears in payments to generation companies have resulted in the upsurge of the circular debt problem.

³²The composition of the board until 2016 was not in compliance with the Securities and Stock Exchange Commission of Pakistan (SECP)'s Public Sector Companies Corporate Governance Rules of 2013, which it is supposed to follow.

Cash injections by the successive government have impeded the efforts of power companies to improve their governance, efficiencies and reduce their losses. Whenever the power companies faced problems, the government extends financial help either through subsidies or by increasing tariffs, resulting in more inefficiencies and system losses.

Although the federal government encourages DISCOs to borrow directly from commercial banks to finance their working capital needs; but 47 percent of the guarantees are used to balance cash flow constraints originating from circular debt. Parking of money in PHPL is only supportive in the short-term; for sustainable functioning of the sector, a massive overhaul is needed (SBP, 2019).

Government intervention and market competition cannot go together. As often their different objectives clash with each other. The restructuring has been done in Pakistan but without proper commercialisation and induction of professional management to bring about improvements in the system (Malik et al. 2009).

4.3.4. Regulation

The weak administrative governance in NEPRA takes the form of a lack of autonomy, resulting in the overall institutional inability to carry out the desired function effectively. NEPRA is either lacking in professional expertise or they don't have authority to supervise and control the power sector and establish a rational pricing regime (Malik, 2007 and USAID, 2013).

NEPRA is often been accused of most of the problems in the power sector including system losses, increasing costs and high tariffs. Besides other reasons, method of tariff determination is considered responsible for the circular debt issue. NEPRA lacks the authority to make DISCOs accountable for their performance, whether it is related to operational and commercial inefficiency or related to over-billing to consumers. Similar is its role with reference to the accountability of generation companies (whether in public or private sector). In particular, the enforcement of service quality is weak. A mechanism to incentivise for good performance or penalty in case of poor performance is not in place.

NEPRA has been unsuccessful in developing and pursuing a regulatory framework to guarantee reliable, efficient and affordable electricity to consumers. It is in NEPRA's mandate to attract investment in the power sector but no significant addition has been made in projects that are generating electricity from renewable sources. All the decisions/ activities are under the government's influence and without due competitive procedures. Unnecessary delays in market entry regulation are discouraging renewable projects (Bacon, 2019).

Furthermore, a lack of uniform regulation in the energy sector as a whole creates distortions between the gas and electricity sectors. Inconsistent regulation between the National Electric Power Regulatory Authority (NEPRA) and the Oil and Gas Regulatory Authority (OGRA) sends confusing signals to investors and creates disharmony in pricing strategies between gas and electricity (FODP, 2010).

5. CONCLUSION AND WAY FORWARD

In Pakistan, our energy sector is caught in an acute energy crisis in the form of circular debt for more than a decade (cumulative loss of about Rs. 5 trillion, roughly 12 percent of current GDP). Distortions on both the demand and supply side as well as

governance issues are so much absorbed in the system that even the decline in oil prices in 2015, increase in tariffs (many a time) along with several surcharges did not help in eliminating the debt. Successive governments have attempted to rescue the system by paying part of the debt, however, without taking care of structural inefficiencies in the system.

It is difficult to understand with so many years of energy crisis why the government is still carrying the burden of prevalent inefficiencies in the system through the uniform pricing policy and subsequent subsidies. The government is reporting to have brought down the average monthly rate of arrears accumulation in the last six months. But all that has been done is by putting an extra financial burden on consumers, who are paying their bills regularly. Now the government has agreed with the IMF to recover the stock of circular debt from the current consumers through surcharges over the next five years. This amendment, if approved, by the parliament would increase tariffs for all consumers by 50 percent.

There is no serious initiative (taken or planned) towards improving system inefficiencies. No incentive or penalty mechanism is in place, to overcome shortcomings in the generation and distribution systems. The result is financial losses are increasing continuously.

5.1. Way Forward

5.1.1. Integrated Planning

Integrated planning is an important policy tool to reach Sustainable Development Goal 7 of clean and affordable energy besides reducing the financial burden for the government.

Lack of integrated planning since 1985, has cost Pakistan dearly. Not only frequent demand and supply imbalances; it has led to costly generation fuel mix, uneven swapping of costs between gas and power sectors, and an imbalance between idle generation capacity and network availability. Without an integrated energy sector approach, Pakistan cannot realise an optimal power generation mix from imported fuels and indigenous resources (PIDE, 2020; ADB, 2019b; IRENA, 2018; and Alahdad, 2012).

5.1.2. Reduction in Generation Costs

To reduce costs, reliance on expensive imported fuels (whether it is furnace oil, RLNG or imported coal)³³ should be reduced. Again we need a coordinated approach to incentivise and increase the share of hydro and other renewable sources in our fuel mix.

Hydroelectric power stations are classified as the most efficient power plants as they can have an operational efficiency of up to 90 percent given the availability of water. Unlike Neelum-Jhelum, all hydropower projects (under construction) should be completed in time to avoid cost escalation and to enhance cheap electricity generation capacity.

Similarly, renewable energy including wind and solar is now the cheapest form of electricity generation. By increasing reliance on renewables and hydro energy, Pakistan

³³ For instance, the import of liquefied natural gas (LNG) since 2016, no doubt helped in dealing with gas shortage, but it is expensive.

can reduce the cost of electricity generation, thereby reducing energy price component in electricity tariffs.

5.1.3. Revision of Generation Contracts

Given the liquidity crunch power sector is facing, it is high time to review the contractual terms of our IPPs for the future to make tariffs consumer-friendly rather than producer friendly. If the capacity payment structure remains unchanged, the desired objective of providing affordable energy to the public is unlikely to materialise.

No doubt, part of our problem of capacity payments would be resolved with the retirement of nearly 4,000 MW of thermal power plants (IPPs who came in the system under 1994 Policy), as the power purchase agreements (PPAs) of all these plants are going to expire by 2024. For the rest, NEPRA must certify that all the IPPs are operational in compliance with technical benchmarks of their respective generation licenses. An independent forensic audit of all the IPPs is necessary for reviewing their actual capacity, fuel intake to change the capacity payment structure in our tariff determinations.

Competitive bidding should take place for all the new projects to ensure that the market determines the tariff.

5.1.4. Cost-effective Pricing

Separate tariffs for each distribution area and elimination of tariff differential subsidy—for decreasing financial burden on the government. It will have an automatic impact on the end-consumer price for the efficient distribution company. It will also force the other distribution companies to improve their recovery position and minimise line losses and become efficient.

Similarly, there is a need to *re-visit the policy of imposing surcharges*. Besides increased costs to compliant consumers, surcharges can also result in more inefficiency in the distribution system. It reduces DISCOs incentives to improve and control costs. And in the case of the Neelum-Jhelum project, surcharge shifts utility business risks away from investors and put extra pressure on consumers.

Electricity subsidies should be re-evaluated as a means of providing social protection. There are alternative policy instruments, like direct cash transfers for energy use. Need-based/targeted subsidy approach besides reducing fiscal burden, improves the welfare of the weak segments in society (Khalid and Salman, 2020; Awan et al. 2019).

There should be fair pricing, where each consumer to pay according to their amount of consumption on a progressive trend, i.e., the more per unit energy is used, the more it has to pay on average. And there are no 'free riders'.

A national consensus is required for the formulation of a coherent energy price policy.

5.1.5. Improved Transmission and Distribution System

To bring down T&D losses, heavy capital investments are required to phase out unreliable low-voltage transmission and distribution lines. Currently, given their weak financial positions, most of the DISCOs are not in a position to undertake the needed up-gradation.

The amount government allocates for tariff differential subsidy should be used for the improvement of transmission and distribution infrastructure in DISCOs especially in PESCO, SEPCO, HESCO and QESCO.

An effective crackdown against defaulters in high-security risk areas like PESCO with the support of law enforcement agencies is a must. Here the role of provincial governments is significant. They can facilitate their respective DISCOs in bill recovery, theft control and protection of utility staff.

Effective implementation of legislation to improve governance and reduce theft is necessary. So far it is the weakness from the side of government (both provincial and federal) to implement such decisions effectively.³⁴ Theft can easily be reduced by applying technical solutions (i.e., replacement of meters with modern metering technology and digital AMR systems) and managerial methods (such as regular inspection and monitoring). The technological innovations cannot be successful in the absence of corporate culture, managerial skills and desire (Smith, 2004).

5.1.6. Improved Governance

Active participation of provincial governments is needed. Currently, provincial governments even after the 18th amendment are not effectively participating in the resolution of issues related to electricity bills, payment of tube-well subsidy arrears, arrears of provincial departments, and arrears due to court orders. If provincial governments actively deal with the recovery issues a significant portion of the receivables could be reduced.

Effective coordination between Federal and Provincial Governments is required to resolve all the outstanding issues between the two as well as for resolving the pending issues of DISCOs.

Improved corporate and operational governance of power sector companies is important for the sustainability of the sector.

Unless all distribution companies are made accountable for all their decisions and finances, it would not be possible to bring in efficiency in the power sector. Too much emphasis is on the privatisation of DISCOs. It is not the solution. All that we need is an independent corporate company. We need to learn from countries like Norway who have efficient and competitive electricity markets without privatisation.

There is a need to restrict the role of the government in the decision making of power sector GENCOs and DISCOs. The government should only be responsible for legislation.

NEPRA needs to re-examine its policies and functioning (in the light of good governance practices). For instance, unnecessary delays in tariff determinations often lead to cash shortfalls for DISCOs. The authority also needs to improve its executive powers to check the over-billing and performance of companies in compliance with their licenses. NEPRA must assert its authority to enforce penalties for non-compliance.

³⁴An antitheft campaign was started with the formation of special task forces in Punjab and KPK in October 2018. Government claims remarkable progress, but its impact on circular debt growth is yet to be seen (Syed and Yasin, 2019).

Transparency at every stage of an energy supply chain is necessary to do away with inefficiencies in the system.

We need a complete overhaul of the system accompanied by commercialisation and professional management without government intervention. Appointment of managerial staff and board members in state-owned companies should not be on the basis of political affiliation but merit-based (professionals), and contract must have a clause of perform-or-exit.

5.1.7. Energy Efficiency

In Pakistan, the idea of energy conservation and demand management has not remained popular because of government neglect and because of lack of public awareness of its overall benefits. According to one estimate, we can reduce 20 percent to 25 percent of energy demand only through its productive use in various sectors. For instance, in agriculture instead of subsidising, we can encourage them to use efficient water pumping and avoid wastage of water resources. But certainly, before this, the pending subsidy issue should be resolved on an urgent basis with the support of the provincial government.

We need a clearer and targeted approach to increase the productive use of energy in all the sectors.

5.1.8. Competitive Electricity Market

The development of a competitive electricity market is the ultimate solution to all problems in the power sector. In 2015, Market Rules and Commercial Code were approved by NEPRA that guides the CPPA to move towards the competitive regime. Similarly, in April 2018 some major modifications related to competitive market have been made in the NEPRA Act (for details see Lodhi, 2019). However, due to the obvious lack of capacity and understanding of DISCOs, they have failed to have direct agreements with the generation companies. Their diffidence to adopt the change has further promoted centralisation of activities at CPPA (NEPRA, 2019).

‘Distributed generation’ is a norm in electricity markets globally. However as reported in NEPRA State of Industry Report for 2019, DISCOs are creating hurdles in allowing ‘wheeling’ and ‘net-metering’ regimes, which are supposed to bring competition in the sector.

The draft of National Electricity Policy 2020 also called for sustainable and competitive power sector with efficient and liquid markets. But one thing should be kept in mind that government intervention and market competition cannot go along together given their different objectives. In competitive markets, all should be treated fairly, with no preferential treatment. Consumers should not be asked to pay for the inefficiencies of other entities (Aziz, 2020). Charging to bulk supply consumers or captive power plants for the availability of backup supply should be unbiased and avoid double payment to make our export-oriented sector competitive (Fichtner, 2020).

In brief, when inefficiencies in the system are removed and we move towards a competitive market in a true sense, the problem of circular debt (power sector deficit) would resolve automatically. Otherwise, its impact on the liquidity of the entire energy chain would continue to haunt.

REFERENCES

- Abro, A. A. (2019). Circular debt: Disease or symptom? *National Herald Tribune*, <https://dailynt.com/story/57100>
- ADB (2019a). *Proposed programmatic approach and policy-based loan for subprogram islamic republic of Pakistan: Energy sector reforms and financial sustainability program*. (Project Number: 53165-001), Report and Recommendation of the President to the Board of Directors, Asian Development Bank.
- ADB (2019b). Pakistan: ADB's support to Pakistan energy sector (2005-2017). *Sector Assistance Evaluation Program*, Asian Development Bank.
- Ahmad, S. (2006). Issues restricting capping of tube well subsidy and strategy for introducing the smart subsidy in Balochistan. *Water for Balochistan Policy Briefings*, 2(1). TA-4560 (PAK) Project for "Supporting Implementation of IWRM Policy in Balochistan—Government of Balochistan—ADB and Royal Government of Netherlands.
- Alahdad, Z. (2012). *Pakistan's energy sector: From crisis to crisis-breaking the chain*. (PIDE Monograph No. 6). Islamabad: Pakistan Institute of Development Economics.
- Albouy, Y. and R. Bousba (1998). *The impact of IPPs on developing countries—Out of the crisis and into the future*. (Note No. 162). Public Policy for the Private Sector, The World Bank.
- Awan, H. S., G. Samad & N. Faraz (2019). *Electricity subsidies and welfare analysis: The perspective of Pakistan*. (PIDE-Working Paper 2019: 164).
- Aziz, R. (2020) *Implications of imposing additional wheeling costs and capacity charges on captive power, on the economy, key sectors and consumers*. Background Report prepared for NEPRA.
- Bacon, R. (2019). *Learning from power sector reform: The case of Pakistan*. (Policy Research Working Paper No. 8842), The World Bank, Washington, DC.
- Bhutta, Z. (2018). Circular debt of Rs 1.1tr passed on to new government. *The Express Tribune*, August 18, 2018.
- BR (2013) New power policy: Old wine in new bottle? *Business Recorder*, August 26, <https://fp.brecorder.com/2013/08/201308261224999/>
- Burgess, R., M. Greenstone, N. Ryan & A. Sudarshan (2020). The consequences of treating electricity as a right. *Journal of Economic Perspectives*, 34(1), 145–169.
- Cheema, T. B. (2020). *Circular debt*, presentation at the PIDE Roundtable Meeting on "Circular Debt—An Unfortunate Misnomer", June 25, 2020.
- CPPA (2019a) Achieving excellence through passion, innovation & integration. *Annual Report 2019*, Central Power Purchasing Agency, Islamabad.
- CPPA (2019b) *Power purchase price forecast*, Central Power Purchasing Agency, Islamabad.
- Faraz, S. (2018) Circular debt: Issues and solutions. *Report of the Special Committee on Circular Debt on Components of Circular Debt, Measures Taken & Required to Reduce the Same*. Senate of Pakistan. Islamabad.
- Fichtner (2020). *Wheeling framework in Pakistan. International best practice for wheeling and recommendations for Pakistan*. Report conducted on behalf of Fatima Energy Limited, Pakistan.

- FODP (2010). *Integrated energy sector report and plan*. Report prepared by Friends of Democratic Pakistan (FODP), Energy Sector Task Force, Asian Development Bank and Government of Pakistan.
- Haqqe, N., Sattar, S. & Abbas, A. (2020). Issues in energy for development. *Business Recorder*, <https://www.brecorder.com/2020/02/575195/issues-in-energy-for-development/>
- Hasan, M. H. (2010). Pakistan power sector challenges and the way forward. *Policy Perspectives*, 7(2), 205–113.
- IISD (2018) Improving and refocusing electricity subsidies: Options for optimization in Mexico. International Institute of Sustainable Development. Available at https://www.energypartnership.mx/fileadmin/user_upload/mexico/media_elements/reports/ElectricitySubsidies-MEX.pdf.
- IMF (2013). *Case studies on energy subsidy reform: Lessons and implications*. International Monetary Fund: Washington, DC.
- IMF (2019). *Pakistan*, (IMF Country Report No 19/380), International Monetary Fund, Washington, D.C.
- IRENA (2018). Renewables readiness assessment— Pakistan. International Renewable Energy Agency (IRENA), Abu Dhabi.
- Khair, S. M., Culas, R. J., & Mushtaq, S. (2012). *Evaluation of the financial impact of electricity subsidy on the returns of tube-well owners and water buyers under declining water-tables in Balochistan, Pakistan*. Available at https://www.researchgate.net/publication/267826694_Evaluation_of_the_financial_impact_of_electricity_subsidy_on_the_returns_of_tubewell_owners_and_water_buyers_under_declining_watertables_in_Balochistan_Pakistan.
- Khalid, A. (2019). Why are power tariffs in Pakistan consistently high? Special section I, *The State of Pakistan's Economy*, The State Bank of Pakistan.
- Khalid, S. A. & Salman, V. (2020). Welfare impact of electricity subsidy reforms in Pakistan: A micro model study. *Electricity Policy* 137, Issue (February).
- Lodhi, A. B. (2019). Future of competitive electricity market in Pakistan, ICMA, Pakistan.
- Malik, A. (2007). *Effectiveness of regulatory structure in the power sector of Pakistan*. (PIDE Working Paper No. 25). Pakistan Institute of Development Economics, Islamabad.
- Malik, A. (2012). *Power crisis in Pakistan: A crisis in governance?* (PIDE Monograph No. 4), Pakistan Institute of Development Economics, Islamabad.
- Malik, A., Mahmood, M. A. and Ahmad, A. (2009). Power sector reforms in Pakistan: A critical review. *Middle East Business and Economic Review*, 21(2), 1–29.
- NEPRA (2014). *State of Industry Report*, National Power Regulatory Authority
- NEPRA (2018). *State of Industry Report*, National Power Regulatory Authority.
- Nicholas, S., and Buckley, T. (2018). *Pakistan's power future: Renewable energy provides a more diverse secure and cost-effective alternative*. Institute of Energy Economics and Financial Analysis. http://ieefa.org/wp-content/uploads/2018/11/Pakistans-Power-Future_December-2018.pdf
- PIDE (2020). *Framework of economic growth*. Pakistan Institute of Development Economics, Islamabad.

- Report on the Power Sector (2020). *Prepared by committee for power sector audit, circular debt resolution and future roadmap*, Ministry of Energy, Pakistan.
- Saeed, K. (2013). Pakistan power crisis: Challenges and the way forward. *Criterion Quarterly*, 8(4).
- Sattar, S. (2020). *Circular Debt*, presentation at the PIDE Roundtable Meeting on “Circular Debt_ an Unfortunate Misnomer”, June 25, 2020.
- SBP (2014). *Annual Report 2013-14*, State Bank of Pakistan.
- SBP (2015). *Annual Report 2014-15*, State Bank of Pakistan.
- SBP (2019). Evaluating the fiscal burden of state-owned enterprises in the power sector, Special Section 2, *The State of Pakistan’s Economy*, State Bank of Pakistan.
- Smith, T. B. (2004). Electricity theft: A comparative analysis. *Energy Policy*, 32(18), 2067–2076.
- Syed, R. and Yasin, M. (2019). Electricity losses continue in the country caught in electricity crisis, *Daily Times*, <https://dailytimes.com.pk/347354/electricity-losses-continue-in-the-country-caught-in-electricity-crisis/>
- Trimble, C., Yoshida, N. and Saqib, M. (2011). *Rethinking electricity tariffs and subsidies in Pakistan (policy note)*, (World Bank Report No. 62971—Pk), The World Bank, Washington, DC.
- USAID (2013). *The causes and impact of power sector circular debt in Pakistan*. Study commissioned by the Planning Commission of Pakistan and Funded by United States Aid for International Development, Islamabad.
- Walker, T., Canpolat, E., Khan F. K. & Kryeziu, A. (2016). *Residential electricity subsidies in Pakistan: targeting, welfare impacts, and options for reform*. (Working Paper No. 7912). The World Bank, Washington, D. C.