

***“Impact of Local Vs Imported Coal on Circular Debt:
Case of Pakistan Power Sector”***



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FALL-2022

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S.No. (F-8)

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FINAL PROJECT/THESIS APPROVAL SHEET

Viva-Voce Examination

Viva Date 06/02/2023

Topic of Project: Impact of Local Vs Imported Coal on
Circular Debt: Case of Pakistan Power Sector

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Acknowledgement

In the name of Allah, the Most Gracious and the Most Merciful.

First and foremost, I would like to praise Allah the Almighty, the Most Gracious, and the Most Merciful for His greatness and for giving me the strength and courage to complete this project. May Allah's blessing goes to His Final Prophet Muhammad (peace be up on him), his family and his companions.

Secondly, I offer my sincere gratitude to my supervisor, Mr. Abdullah Hafeez, Senior Assistant Professor, BUIC, who has supported me throughout this project with his patience and expertise. I attribute my master's degree to his encouragement and effort and without his support this project would not have been completed. It has been a great pleasure and honor to have him as my supervisor.

I would like to thank my family members specially my Parents, Brother and Sisters. This journey would not have been possible without their support. Finally, I would like to thank everybody who was important to the successful realization of this project including but not limited to university management, university fellows, office leaders and colleagues.

Abstract

The importance of the power sector in the country's economic prosperity has always been accepted as a universal truth. The globe has recognized the importance of the electricity sector for any country and regards it as the backbone of the economic structure.

This project report examines the differences in electricity generation from domestic and imported coal, as well as the influence on circular debt. The article explains Pakistan's electricity sector before delving into why local coal is more significant than imported coal and how it affects circular debt. Circular debt must be handled to alleviate supply restrictions. However, given that the outstanding stock of circular debt must be paid off, the process is challenging.

It has had a long-term negative influence on the sustainability of Pakistan's overall electricity system, in addition to producing financial concerns. According to the report, a number of factors contribute to this financial liability, including governance issues, operational and commercial inefficiencies in the system, a lack of efficient planning and bad policies in the generation, transmission, and distribution sectors, distortions in energy pricing strategy, and, most importantly, the use of imported coal rather than local coal.

The purpose of this research is to uncover the fundamental causes of existing circular debt and the steps that must be taken to not only pay off the debt but also keep the reform process moving forward. The research also suggested a number of mitigation strategies to address the issue of circular debt in Pakistan's power sector, including but not limited to the use of local coal. The study is founded on evidence/data gathered from numerous studies, research projects, and other sources.

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Abbreviations

AMR	Automated Meter Reading
AJ&K	Azad Jammu and Kashmir
BoD	Board of Directors
CPP	Capacity Purchase Price
CPPA-G	Central Power Purchasing Agency (Guarantee)
DISCO	Distribution Company
EPP	Energy Purchase Price
EPTL	Engro PowerGen Thar Limited
FCC	Fuel Cost Component
FESCO	Faisalabad Electric Supply Company
FDI	Foreign Direct Investment
GoP	Government of Pakistan
GENCO	Generation Company
GEPCO	Gujranwala Electric Power Company Limited
HESCO	Hyderabad Electric Supply Company Limited
HSR	Huaneng Shandong Ruyi Energy Private Limited
IESCO	Islamabad Electric Power Company Limited
IPP	Independent Power Producer
KESC	Karachi Electric Supply Corporation
KPI	Key Point Indicator
LESCO	Lahore Electric Power Company Limited
MEPCO	Multan Electric Power Company Limited
NEPRA	National Electric Power Regulatory Authority
NTDC	National Transmission and Dispatch Company

PHL	Park Holding Company
PESCO	Peshawar Electric Supply Company Limited
QESCO	Quetta Electric Supply Company Limited
SEPCO	Sukkur Electric Power Company Limited
SIR	State of Industry Report
TCB-1	Thar Coal Block-1 Power Generation Company PVT Ltd
T&D	Transformation and Distribution
TDS	Tariff Differential Subsidy
WAPDA	Water and Power Development Authority

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Chapter 1

Introduction

1.1 Background

One of the key drivers of a nation's economy's sustainable growth is the availability of dependable, secure, efficient, and inexpensive energy. Electricity availability, accessibility, and affordability for inhabitants across the country are critical for economic success and social uplift. The power industry's rapid technical improvement and unique economic dynamics present a significant challenge for policymakers and planners in developing a sector capable of ensuring energy security and affordability for all sectors of society. The complexity of the electricity sector necessitates thorough planning that is adaptable to changing technology and commercial realities. It goes without saying that successful planning is impossible without thorough data on operational performance.

The purpose of this project is to investigate Pakistan's cyclic debt problem in the electricity industry as a result of high fuel prices, particularly from imported coal. The causes and implications of cyclic debt in the financial industry, as well as solutions for minimizing it. When a company's cash flow is disturbed, it withholds payments to its suppliers and creditors, resulting in circular debt. When a payment is lost or delayed, the supply chain suffers, resulting in operational issues and a liquidity crisis for all industry players. As a result, none of them can fully execute their duties. This lack of liquidity eventually impacts the "chain supplier," who is unable to withhold payments. and, as a result, the company either ceases acquiring and providing or defaults. As a result, problems with one entity's cash input might affect other portions of the payment chain. (Faraz, 2018).

This issue has plagued Pakistan's energy sector for many years. This has a lot of economic consequences. In Pakistan, several entities use the word "circular debt" in significantly different ways. In essence, "circular debt" refers to the amount of cash that the CPPA-G is unable to pay to Power Plants. This shortage is the result of:

- i) The difference, including subsidies, between the actual cost of delivering electricity and the DISCO's revenue from customer sales.
- ii) A greater emphasis on imported fuels rather than local coal.

1.2 Industry Analysis

Pakistan has also recognized the significance of the electricity industry, and appropriate reforms have been implemented to bring about continual development as and when required. Pakistan's power industry evolved, with an actual generation capacity of 60MW at the time of independence in August 1947. However, as time passed and in order to fulfil the expanding demand of the industrial sector, the power industry hastened its capacity expansion. Since 1970, the country's installed capacity has been increased to roughly 600 MW. Following that, with the installation of further generating capacity, primarily based on hydel generation, the installed capacity of generation was expanded to almost 9000 MW by the end of 1990. To address the increasing need for generation power, independent power producers (IPPs) were introduced into the system through the 1994 Power Policy, which was followed by the 2002 Power Policy, the 2006 Renewable Generation Power Policy, and the 2015 Power Policy.

1.3 Generation Mix and Installed Capacity

As of now, the national grid has an installed generating capacity of around 43,000 MW.

	As on 30-06-2021	As on 30-06-2022	Variation	
			Capacity (MW)	(%)
A. CPPA-G SYSTEM				
WAPDA Hydel	9,443	9,443	0	0
IPPs Hydel	472	1,192	720	152.54
Total: Hydel	9,915	10,635	720	7.26
GENCOs	4,881	4,731	-150	-3.07
IPPs	17,276	18,750	1,474	8.53
SPPs/CPPs	340	340	0	0.00
Nuclear	2,475	3,620	1,145	46.26
Total: Thermal including Nuclear	24,972	27,441	2,469	52.47
Wind	1,248	1,838	590	47.28
Solar	430	530	100	23.26
Bagasse/Biomass	369	369	0	0.00
Total: CPPA-G System	36,934	40,813	3,879	10.50
B. KE SYSTEM				
KE Own	2,084	2,345	261	12.52
IPPs	366	366	0	0.00
SPPs/CPPs	151	151	0	0.00
KANUPP	137	0	-137	-100.00
Solar	100	100	0	0.00
Total: KE System	2,838	2,962	124	4.37
Grand Total:	39,772	43,775	4,003	10.06

Figure 1: Installed Capacity

(Source: NEPRA SIR Report 2022)

The table above shows the total installed generating capacity as of 30th June 2022. This table includes both the systems, CPPAG and Karachi Electric. CPPAG is responsible for the purchase and delivery of Electricity to all the cities of Pakistan except Karachi as Karachi’s electric supply is privatized and the same is being looked after by Karachi Electric as a whole.

4 Players and their relation:

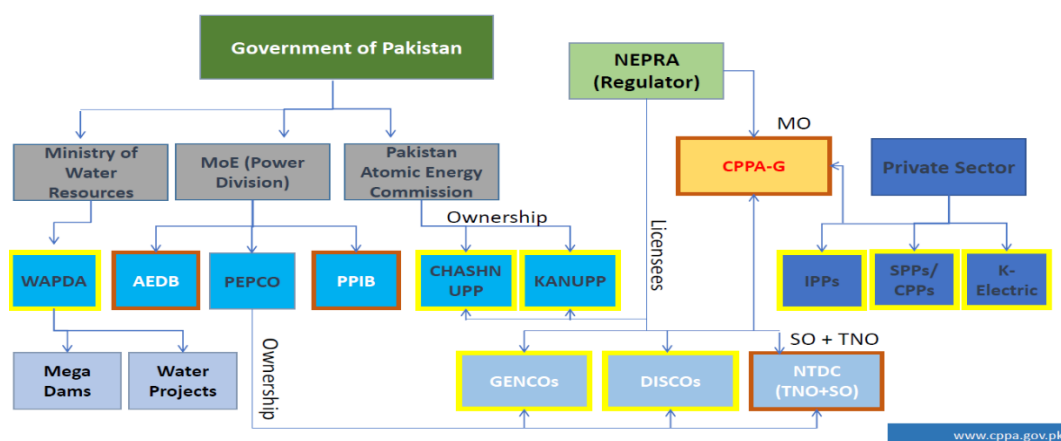


Figure 2: Entities in Power Sector

The figure above shows the main players in generation, transmission and distribution of the electricity in Pakistan. Starting with the Government of Pakistan as a whole which regulates all the works being looked after by different departments of government. For this project the main key players are CPPAG, NTDC and NEPRA where CPPAG being a market operator purchases the electricity and pays to power producers. NTDC main works include maintaining and operating of the transmission lines and dispatch of the electricity to the distribution companies. NEPRA works as a regulator and has the authority to keep a strict check on the Tariffs and also has the authority to issue Tariffs for generation, transmission and distribution networks and also to determine the consumer end tariffs.

1.5 Power Purchaser Introduction (CPPA-G):

The Central Power Purchasing Agency (CPPA-G), founded under the Companies Ordinance of 1984, is owned entirely by the Government of Pakistan (the "GOP"). CPPA-G was founded in 2009 as a power firm to take over the CPPA and market development activities from NTDC, as indicated in the 2002 NTDC License. The commercial operation of CPPA-G commenced in mid-2015, when the transfer of functions between NTDC and CPPA-G was formalized and completed. (CPPAG-Annual Report)



Figure 3: CPPA-G Logo

1.5.1 History of CPPA-G:

By the time Pakistan won independence, the primary portfolios were state-owned enterprises, including the electricity industry, which had a vertically integrated structure. The Water and Electricity Development Authority (WAPDA) was established in 1959 as an integrated utility with a multi-pronged development strategy that includes power generation, transmission, and

distribution, as well as irrigation, drainage, and flood control. WAPDA and KESC, two vertically integrated state utilities, were in control of the sector at the time (Now Known as K-Electric). The Karachi Electric Offer Firm (KESC) commenced operations in 1913 as a privately held company to supply power to Karachi and its neighboring regions. After Pakistan's independence in 1952, the Pakistani government took over KESC and ran it until it was privatized in 2006. During the next few decades, WAPDA will adopt a variety of initiatives to expand the producing transmission and distribution infrastructure, including the development of large hydroelectric projects like as Tarbela and Mangla, as well as increased thermal generation. The capacity of power generation has increased to almost 7000 MW by the end of 1990. The Government of Pakistan authorized WAPDA's strategic reorganization plan for privatizing Pakistan's electricity industry in 1992, with the following goals: (CPPA-G, 2020)

- i) Increasing capital formation
- ii) Improve efficiency and pricing uniformity.
- iii) Over time, provide competition to the power industry by granting the largest potential role through privatization.

1.5.2 Debundling

WAPDA was de-bundled into generating, transmission, and distribution entities in the year 2000. As a result, the National Transmission and Dispatch Company (NTDC) was formed to take over the high-voltage transmission network, and eight (08) distribution companies were formed to perform the distribution function and sell electric power to consumers, which were later de-bundled into ten (10) distribution companies.

By July 2009, the NTDC was obliged to provide a strategy to transition from a single buyer model to a singer buyer plus model, as well as to a competitive trading bilateral contract market, as required by its license. For a number of reasons, this project was never completed, and the competitive market prevented it from being deployed on time. Previously a subsidiary of NTDC, CPPA-G was legally separated in 2009 and began functioning on its own in 2015. CPPA-G was entrusted with designing the idea and strategy for the transition, as well as getting regulatory permission, during the same year that the cabinet's economic coordination

committee decided to transition from the present system to a municipal competitive market. In line with the mission of the Economic Coordination Committee and the regulations of market operator. With the assistance of international consultants MRC group, the firm prepared a high-level conceptual design describing the principles and structure of the market in 2015, which was presented to the regulator for approval in March 2018 and was authorized in 2019. (CPPA-G, 2020)

CPPA-G received its registration certificate from NEPRA in November 2018 and was legally awarded a license to operate as a market operator in Pakistan in May 2022.

Chapter 2

Problem Definition and Requirement Analysis

2.1 Circular Debt:

Profitability has always been the primary issue of the power sector's sustainability. Due to a lack of accessible resources on the side of the state, it is assumed that all key agencies should be capable of meeting their expenditures on their own. Otherwise, it may impose an extra financial burden on the state, leading to sovereign guarantees from the state for existence or portfolios. Such assurances eventually lead to a weak governmental posture in front of financial institutions, and therefore an economy subject to the financial institutions' strict conditions.

As of now, the government of Pakistan is dealing with similar concerns in the electricity sector portfolios in the form of circular debt, which has amassed to around Rs 2.46 trillion (as of July 2022). The Economic Coordination Committee of the Cabinet (ECCC) of Pakistan officially defined circular debt as follows;

“The circular debt is the amount of cash shortfall within the Central Power Purchasing Agency (CPPA) which it cannot pay to power supply companies. The overdue amount is the result of: (a) the difference between the actual cost and the tariff determined by the National Electric Power Regulatory Authority (NEPRA) which is the distribution company’s loss over and collections under that allowed by NEPRA; (b) the delayed or non-payment of subsidies by government; and (c) delayed determination and notification of tariffs. It is the government’s policy to reduce, limit to a certain amount which would be reduced over time and eliminate the causes of circular debt.” (Bacon, 2019)

Because of this shortage, CPPA-G is unable to pay electricity generation/service businesses. These are some examples:

- i) Oil Marketing Companies
- ii) Gas distribution Companies
- iii) Independent Power Producers (IPPs)
- iv) Nuclear Power Plants

v) WAPDA Hydel Power Plants

vi) GENCOs

Between fiscal years 2005 and 2010, Pakistan's cost of generation grew by 148% and its power tariff increased by 33% due to rising import costs, international oil prices, a bigger percentage of furnace oil in the country, currency depreciation, and other factors. To eradicate it, successive governments utilized significant financial support and quasi-fiscal financing, but the measures merely addressed the symptoms, not the underlying causes.

Large cross subsidies and high tax incidences are leading to industrial defection, which may speed solarization by those with higher power use, such as commercial and high-end home customers. To prevent the accumulation of circular debt on accounts, there is an urgent need to streamline regulatory processes and strengthen federal administration and coordination. Policymakers have worked for years to find a solution to the problem of circular debt, and they continue to do so. When one party does not have adequate cash flow to meet its obligations to its suppliers, the supply chain suffers. This produces operational issues and a liquidity crisis for all players in the value chain, making any of them unable to function properly. This financial deficit eventually affects the chain's supplier, who is unable to delay payments and, as a result, either ceases purchasing from and supplying the chain or defaults. (Faraz, 2018)

2.2 Emergence of Circular Debt

Circular debt first appeared in the electrical sector's statistics in the 2007 fiscal year. This occurred over time, against the backdrop of the transition from low-cost to high-cost generation (Hydel Power) (Thermal Power). Thermal Power's market share is predicted to rise more in the coming years. The table below shows the installed capacity of Pakistani power plants by source.

Table 1: Installed Capacity difference from 2021 to 2022

	As on 30-06-2021	As on 30-06-2022	Variation	
			Capacity (MW)	(%)
A. CPPA-G SYSTEM				
WAPDA Hydel	9,443	9,443	0	0
IPPs Hydel	472	1,192	720	152.54
Total: Hydel	9,915	10,635	720	7.26
GENCOs	4,881	4,731	-150	-3.07
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Total: Thermal including Nuclear	24,972	27,441	2,469	52.47
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SPPs/CPPs	151	151	0	0.00
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Solar	100	100	0	0.00
Total: KE System	2,838	2,962	124	4.37
Grand Total:	39,772	43,775	4,003	10.06

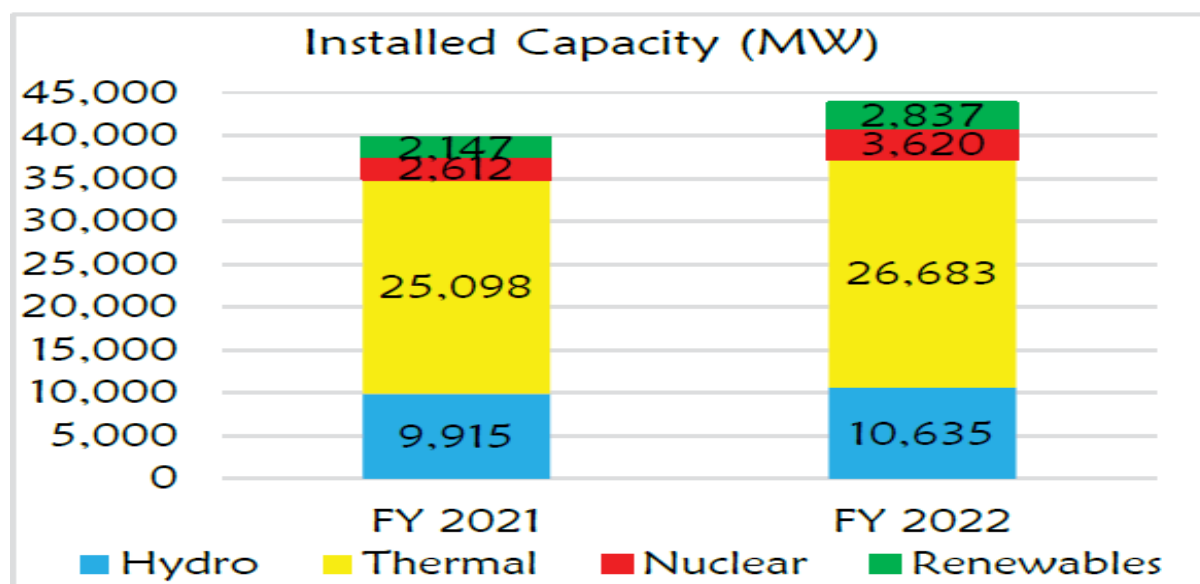


Figure 4: Installed Capacity in MWs

Furthermore, the price of imported fuels surged in 2007 as a result of both a rapid increase in the price of imported fuels and a sharp devaluation of the Pakistani rupee, which began at 60 rupees per US dollar in 2006 and is expected to reach about 155 rupees by 2021. The following graph depicts the trend of the Pakistani rupee's appreciation or depreciation.

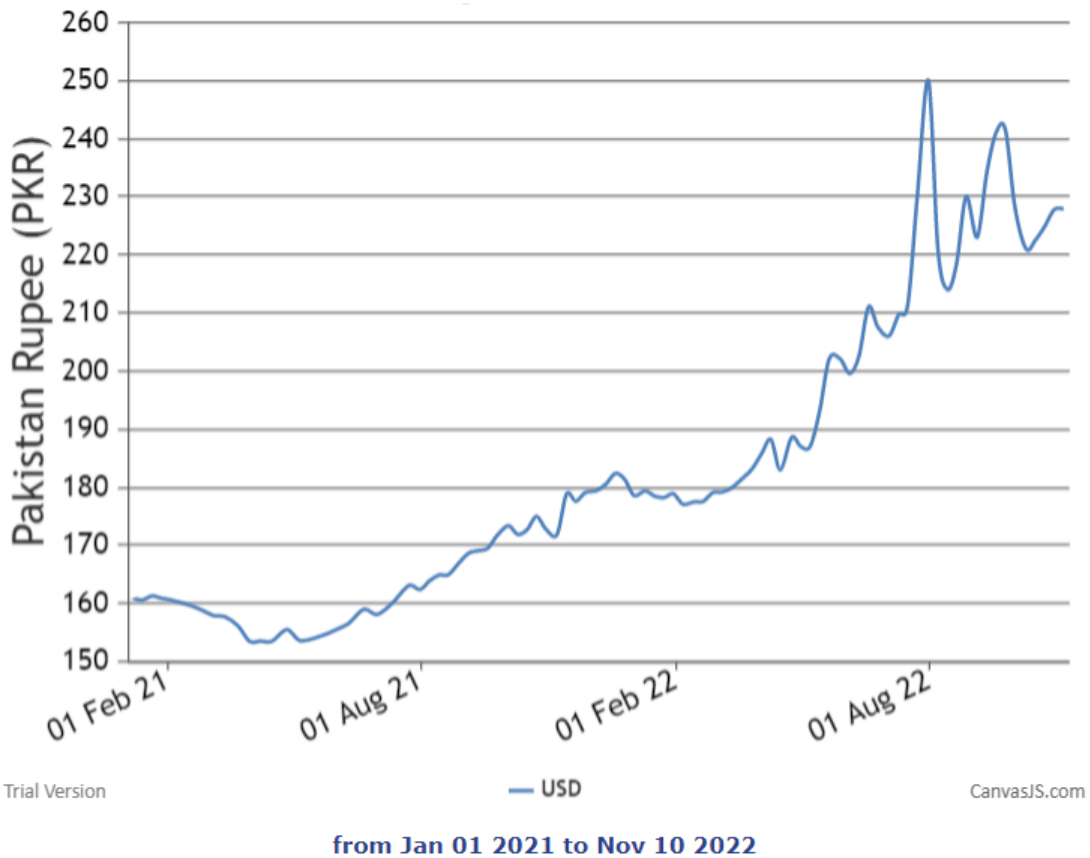


Figure 5: USD to PKR Trend

(Source: Forex.pk)

The Pakistani government did not completely pass on the cost rise to end users, resulting in the formation of the cyclical debt behemoth. The table below highlights the differences between NEPRA-determined rates and tariffs notified by the Government of Pakistan from 2007 to 2010.

Table 2: Tariff Differential

Tariff	NEPRA Determined (Rs/kWh)	GoP Notified (Rs/kWh)	Difference (Rs/kWh)
Feb-2007	5.14	4.25	0.89
Mar-2008	5.60	4.78	0.82
Sep-2008	8.42	5.58	2.84
Feb-2009	8.42	5.63	2.79
Oct-2009	8.42	5.96	2.46
Jan-2010	10.09	6.67	3.39

(Source: Circular Debt, Issues and Solutions Report by Senator Shibli Faraz)

Each unit that is lost or not paid for by the customer has a higher generation price, resulting in greater financial loss and, eventually, more cyclical debt. The cost of pricey power and imported gasoline also has a direct influence on the degree of circular debt. (Faraz, 2018)

Due to the grounds of increased Thermal Share in installed capacity, depreciation of Pakistani Rupee, increase in Fuel Prices, and import of the same, the Circular Debt continued to grow as no solid efforts were made to determine the fundamental cause and rectify it. The table below illustrates the annual level of circular debt.

Table 3: Circular Debt Volume

Financial Year	Circular Debt (Billion Rs)	
	Closing	Additions
2006-2007	0	0
2007-2008	105	0
2008-2009	149	44
2009-2010	225	76
2010-2011	221	(4)
2011-2012	603	382
2012-2013	170	(433)
2013-2014	354	184
2014-2015	419	65
2015-2016	497	78
2016-2017	702	205
2017-2018	1,152	450
2018-2019	1,612	460
2019-2020	2,150	538
2020-2021	2,280	130
2021-2022 (up to 31 st March)	2,467	187

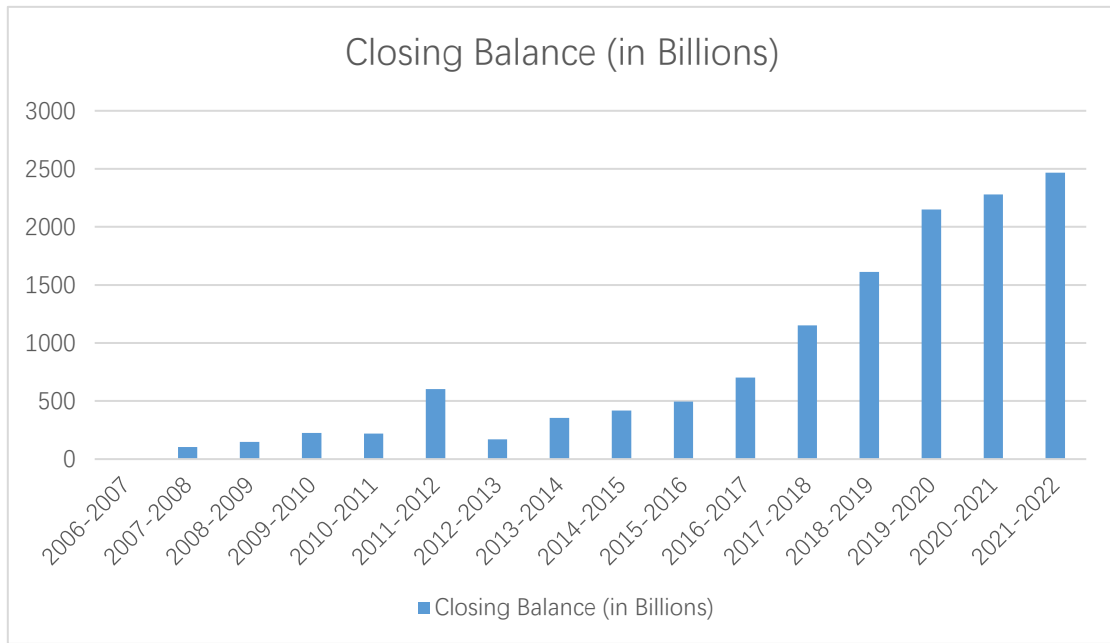


Figure 6: Closing Balance of Circular Debt from 2006 to 2022

Understanding the electrical supply chain (from generation to transmission and then to distribution) is essential for understanding how cyclical debt occurs and viable solutions to prevent or reduce it.

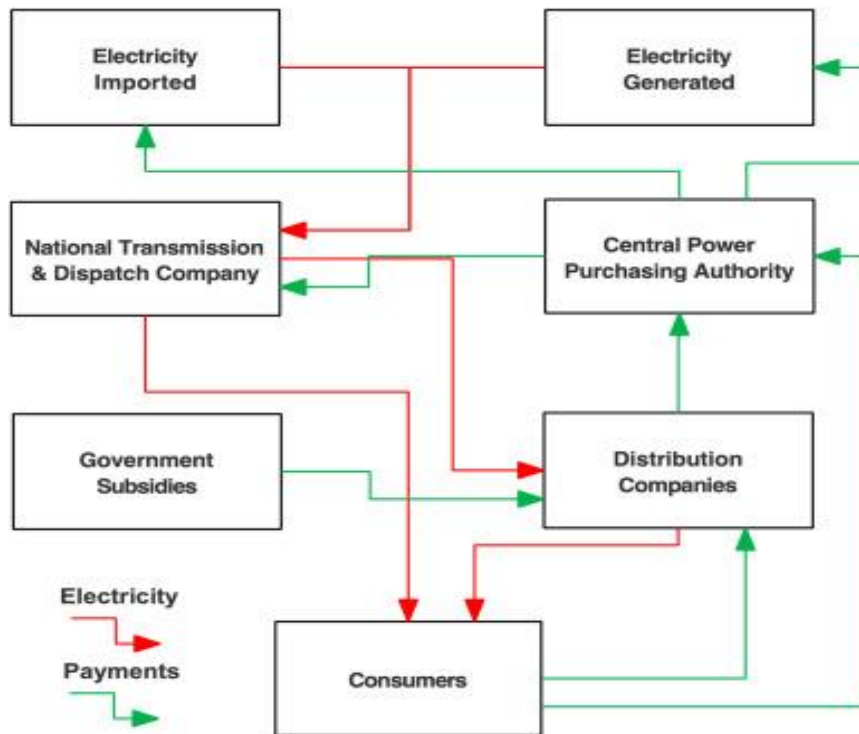


Figure 7: Energy and Payment

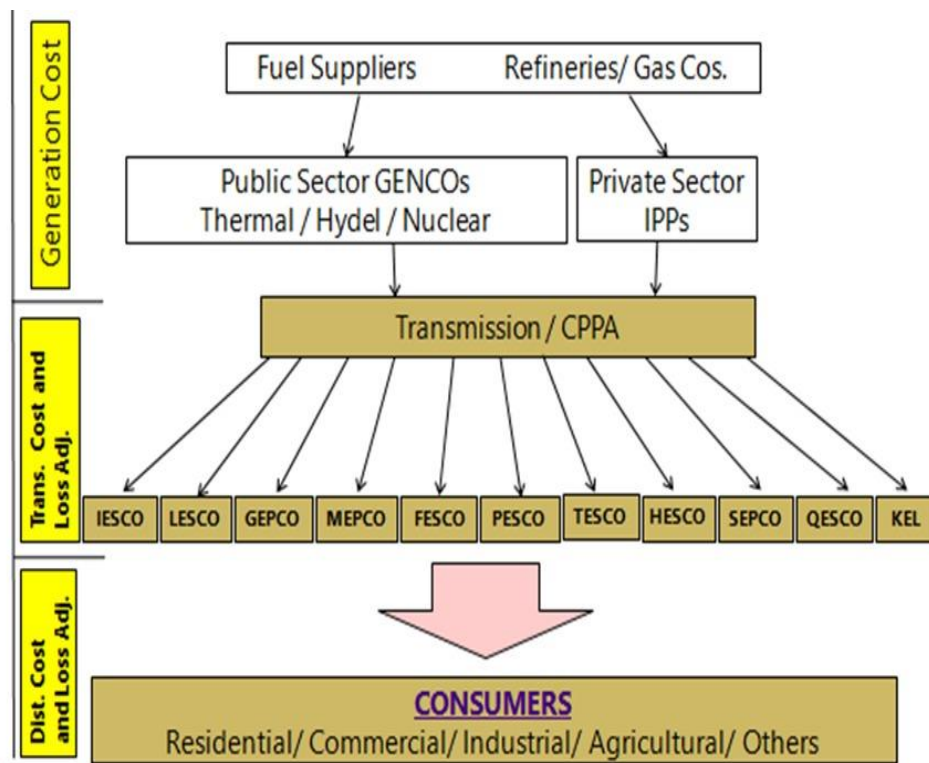


Figure 8: Energy Flow

Failure of distribution businesses (DISCOS) to pay the CPPA-G in full causes cash flow issues across the energy supply chain. As a result, power production businesses face a fuel scarcity, lower capacity, and restricted investment to keep the system working. Significant load shedding in the past was caused by decreased ability to create and deliver power, as well as already existing supply/demand imbalances and frequent infrastructure breakdowns. The problem of circular debt is driven by governance failures at the federal, commercial, and sectoral levels. Political meddling, short-sighted and faulty government policies (or a lack thereof), under-budgeting of tariff differential subsidies (TDS), and non-resolution of intra- and inter-company conflicts can all be blamed, as can inter-government difficulties. Furthermore, the government has failed to enact legislation to prevent theft, improve energy efficiency, and safeguard conscientious workers. At the business level, poor governance and the ineffectiveness of DISCO BODs in guiding and monitoring firm performance are significant challenges. Furthermore, the government has failed to enact legislation to prevent theft, improve energy efficiency, and safeguard conscientious workers. At the business level, poor governance and the ineffectiveness of DISCO BODs in guiding and monitoring firm performance are significant challenges. The table below depicts the energy value chain and the

money supply chain. According to the World Bank, the inefficient functioning of the power industry, combined with a pricing system that did not fully cover expenses, resulted in high circular debt values at times. (Bacon, 2019)

2.3 Components and Breakup

The table below provides the real circular debt data as reported by the Ministry of Energy (Power Division).

Circular Debt Report (Jul-Oct 21)

Circular Debt Details as of	2018-19	2019-20	2020-21	2020-21	2021-22
				Jul-Oct	Jul-Oct
Payable to IPPs	708	1,038	1,245	1,216	1,420
Payable by GENCOs to fuel Suppliers	95	105	105	97	91
Amount Parked in PHL	810	1,007	930	996	908
Total	1,612	2,150	2,280	2,310	2,419
Increase/ (Decrease) in Circular Debt		538	130	159	139
Break-up of Increase/ (Decrease)					
Unpaid Subsidies			57	73	2
Unbudgeted Subsidies	135	15		10	33
IPPs Interest Charges on Delayed Payments	55	75		30	47
PHL Markup	70	30		28	7
Pending Generation Cost (QTAs+FCA)	270	51		90	133
Non Payment by K-Electric	77	82		28	48
DISCO Losses Inefficiency	42	67		18	49
DISCO Under recoveries	199	27		36	64
Other Adjustments (Prior Year Recovery, etc)	(309)	(108)		(142)	(222)
Sub-total (a)		538	296	170	161
Payment through Fiscal Space					
PHL Principal Repayments			(77)	(11)	(22)
Stock Payments			(90)	-	-
Sub-total (b)			(167)	(11)	(22)
Total (a+b) PKR Billion		538	130	159	139

Figure 9: MOE Circular Debt Detail

2.4 Major Contributions

DISCOs, among other important issues in power sector portfolios, are causing issues and contributing to the accumulation of circular debt. Major issues include law and order, overstaffing, deteriorating networks that result in excess Transformation & Distribution (T&D) losses beyond the NEPRA permitted maximum of 1617%, and corruption that results in revenue collection from industrial and household clients. Thus, all of this adds up to an accumulating load on the state's own portfolios, which further complicates negotiations between the state and financial institutions in the form of sovereign guarantees.

Simply said, T&D losses refer to the variation and lower energy that enters their network, which was distributed and transported by the relevant DISCO and transmission network due to

system defects and limits. These inadequacies and limits might be the result of losses (comprising of technical and non-technical). However, when it comes to the real cost incurred against the provided or obtained energy from the generating units, the power purchaser, which now exists in the form of a government-owned organization known as CPPA-G, must pay for each unit supplied by individual generation stations.

NEPRA reported DISCO receivables of \$1,265 billion for fiscal year 2020-2021. Furthermore, losses resulting from other carelessness, such as late connection losses and non-recovery of invoices, are added to T&D losses. (NEPRA, 2021)

The regulator-approved transmission losses for NTDC are 2.8% per year. The transmission network operator must run its facilities within a certain time frame. NEPRA establishes T&D loss targets for each DISCO through consumer-end tariff assessments. Each DISCO is liable for paying any losses that exceed the allowable goal value. T&D losses that exceed the allowable amount result in increasing circular debt.

The table below compares T&D losses in each DISCO for fiscal years 2020-21 and 2021-22:

Table 4: T&D Losses of DISCOs

DISCO	FY 2021-22 (Units in GWh)			Target Losses (%)	Actual Losses (%)		Amount of Actual Units Lost (Rs. in billion)
	Purchase	Sold	Lost	2021-22	2020-21	2021-22	2021-22
PESCO	16560	10355	6205	20.73	38.18	37.47	153.80
TESCO	2284	2071	213	9.31	9.58	9.33	3.70
IESCO	13027	11961	1066	8.15	8.54	8.18	21.90
GEPCO	12678	11528	1150	9.2	9.23	9.07	24.70
LESCO	28334	25070	3264	9.08	11.96	11.52	72.70
FESCO	17512	15918	1594	9.34	9.28	9.10	33.40
MEPCO	22548	19202	3346	12.79	14.93	14.84	75.10
HESCO	6010	4034	1976	19.07	38.55	32.88	45.00
SEPCO	4489	2890	1599	17.41	35.27	35.62	43.70
QESCO	6716	4831	1885	14.49	27.92	28.07	46.30
Overall Average	130158	107860	22298	13.41	17.95	17.13	520.30

2.5 Requirement (analysis) for mitigation:

To achieve Pakistan's long-term economic growth, public value creation, and poverty reduction goals, national stakeholders must focus on tools and techniques for supplying end-users with

dependable, efficient, and cost-effective energy. In order for system logic to arise among the many components of the value chain, the whole value chain of the electricity system must be highly integrated, responsive, and efficient.

The electricity sector absorbs a significant part of budgetary resources that could be used for other development projects. Regardless of the many actions taken by past governments, financial losses in the electricity sector are increasing. These affect not just available capacity, but also the country's/creditworthiness sectors in the eyes of investors. Above all, it has a detrimental influence on the country's economy. Circular debt has been a persistent problem in Pakistan, where it has existed since 2007. Our financial managers will continue to be tormented until the root issues are carefully examined and addressed. The goal of this project is to perform a thorough examination into the fundamental causes of constantly increasing debt while receiving considerable financial support over the years, which necessitates a full understanding of the sector on both the supply and demand sides. (USAID, 2013)

The supply chain for energy and finance is depicted in the table below:

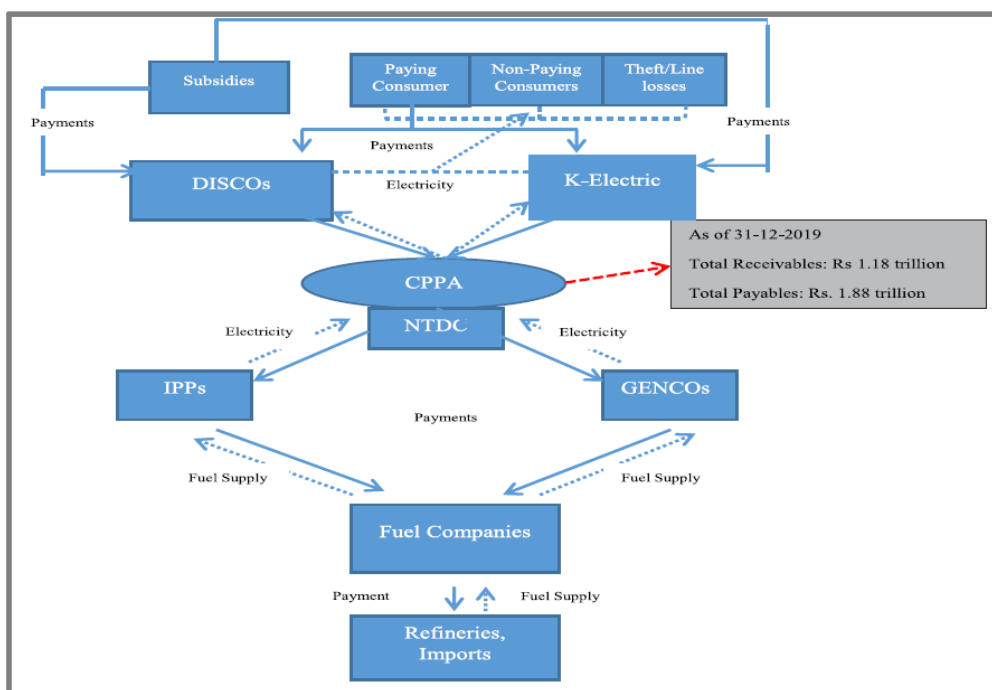


Figure 10: Flow of Payments and Electricity

2.6 Impacts of Circular Debt

Circular debt has an economic impact, which includes the following:

1. Payment delays to suppliers of critical primary energy and replacement components for power plants, forcing power plants to run at a fraction of their full capacity.
2. The cash reserves of DISCOs, GENCOs, and IPPs were significantly depleted, resulting in operating inefficiencies.
3. Captive electricity is utilized by bigger industrial units and smaller generators used by families and retailers, which is expensive, inefficient, and hazardous to the environment.
4. Commercial banks are unable to provide additional operating capital or longer-term loans due to their overexposure to the industry.
5. Private-sector investors and financiers are concerned about the increased exposure of government guarantees that underpin the creditworthiness of IPPS power purchase agreements, which will result in lower long-term investment in generation, exploration, refining, and other aspects of the broader energy sector.
6. In order to pay liquidity assistance and subsidies, governmental debt has increased significantly, resulting in a high debt load when compared to other nations.
7. The rise in the demand-supply mismatch has resulted in a decrease in the country's potential GDP growth.

2.7 Issues

The key concerns associated with the building of circular debt are outlined below. (USAID, 2013)

1. Governance
2. Cost of Electricity
3. Use of Imported Coal
4. Increasing Consumer End Tariffs
5. Recovery of Billed amount in Discos
6. Time Barred Tariff Decisions by the Regulator
7. Fuel Price Adjustments
8. High T&D Losses of Discos
9. Non-Payment of Subsidies on Time

10. Pending New Connections
11. Thermal Inefficiencies of Generation Companies
12. Least measures taken for Energy Conservation
13. Least Focus on Demand Side Management
14. Least priority on deployment of Renewable Energy Power Plants
15. Power Holding Company Limited Markup
16. IPP Markup
17. Non-Payment by K-Electric
18. Privatization

Chapter 3

Design and Implementation

This chapter discusses about the design and Implementation details of measures taken to reduce/mitigate circular debt. There are several primary and secondary causes that needs readdressed for eliminating circular debt.

Power Holding Limited (PHL) was founded in 2009. Power Holding Limited is owned entirely by the Government of Pakistan and is administered by the Ministry of Energy (Power Division). The company was created with the purpose of minimizing the liabilities of the power sector as a result of the government's unpaid subsidies from 2004 to 2009. It obtained loans from financial institutions FIs. In addition to supplying equity, the government procured commercial loans from financial institutions through PHL and injected the funds into DISCOs to clear the circular debt. If the money borrowed through PHL from commercial sources had been used to improve infrastructure and put in place better mechanisms, the electricity sector would have seen a considerable improvement and reduction in circular debt. However, the government continued to invest in underperforming DISCOs. (Faraz, 2018)

3.1 Time Horizon & Timeline for Implementing Strategies

The practical financial implementation of the subject notion will have a significant influence on the overall performance of the power industry, which might be favorable or bad. As a result, as an underdeveloped nation with limited resources, it is advised that as the sole alternative for surviving a flawed public sector portfolio, policies should be adopted phase by phase. The state must identify its priority list based on short-, medium-, and long-term goals before proceeding to privatize its distribution industry. Following an examination of the real benchmarks met by the state on specific portfolios at each level, it is necessary to proceed; otherwise, a counter strategy should be established, which may also be accomplished by partial privatization of each portfolio.

3.2 Issues and Remedial Measures

The primary challenges involved in the building of circular debt, as well as the possible solutions, are outlined below. (USAID, 2013)

3.2.1 Governance

Governance is one of the primary causes of escalating circular debt. The financial and technical condition of power sector companies might be enhanced by properly inducting specialists on merit for higher positions and adhering to the imposed legal and regulatory framework. For good administration by sector professionals, the role of political influence must be limited. Furthermore, regime continuity is required. There must be a framework in place that allows top-level strategic roles in the power sector to be held by a single professional for an extended period of time, as opposed to Additional/Stop Gap agreements or short-term appointments.

3.2.2 Cost of Electricity

NEPRA determines the consumer end power pricing in accordance with the terms of the NEPRA Act. The cost of energy has risen dramatically due to a variety of factors, including but not limited to attractive rate of return, depreciation of local currency, and rise in fuel prices.

This problem might be solved by enacting Power laws that demand low-cost competitive bidding. This way, the burden under this heading might be avoided.

3.2.3 Use of Imported Coal

Pakistan's coal-fired power stations mostly import coal from South Africa and Indonesia. Due to a variety of variables, including but not limited to the present Russia-Ukraine crisis and COVID-related logistical challenges, the world economy has been undergoing a commodities super-cycle. Coal is one of the commodities whose prices have risen dramatically in the recent year. During the previous year, the delivery price of South African coal jumped from US\$ 177/tonne to US\$ 407/tonne.

As a result, the per unit cost of energy generated by imported coal grew from Rs. 10.17/kWh to Rs. 29.12/kWh, whereas the per unit cost of energy generated by indigenous Thar Coal stayed at Rs. 7-9/kWh during FY 2021-22.

Given the rise in the price of imported coal and the lack of foreign cash, power plants have been looking for alternative cheaper supplies of coal. NEPRA has approved the import of coal from Afghanistan on the condition that the supplied price per MMBTU of Afghanistan coal is lower than its current coal imports and payment is paid in Pakistani rupees.

However, there are concerns with the coal from Afghanistan. Afghanistan's present coal market capacity is insufficient to match the demand for power plants. Furthermore, there is no published pricing index for Afghanistan coal that is liquid, transparent, and market-reflective.

Taking all of this into account, a proposal is being considered to convert imported coal-based power facilities currently in place in the country to Thar Coal. PPIB is in charge of the procedure. PPIB informed that, based on preliminary findings, imported coal power stations may use Thar Coal to a certain extent without modifying their power plants. As a result, optimum usage of domestic coal should be encouraged in order to decrease dependency on imported fuel. Further commissioning of Thar Coal-based power stations must be hastened. Furthermore, the task of developing coal mines in Thar must be accelerated in order to fulfil the country's demand for coal.

3.2.3 Increasing Consumer End Tariffs

The invoiced tariff consists mostly of the costs of generating, transmission, and distribution. The consumer end tariff is shown to be on the rise.

This problem might be rectified by properly monitoring and enforcing NEPRA-mandated objectives.

3.2.4 Recovery of Billed amount in Discos

DISCOs' recovery position for billed amounts is poor. Regulators may keep an eye on DISCOs in order to enhance their recovery position. DISCOs must demonstrate yearly improvement in recovery with the help of the provincial government. DISCOs that fulfil recovery objectives may be rewarded by regulators.

3.2.5 Time Barred Tariff Decisions by the Regulator

The tariff determinations of the regulator are typically time barred. This is due to the petitioners' delayed or incomplete tariff applications. The regulator might solve this issue by directing petitioners to file petitions on time so that timely processing can take place.

3.2.6 Fuel Price Adjustments

Gasoline price modifications are permitted by the regulator on a regular basis due to rising fuel prices. Fuel price modifications might be lowered by properly projecting power costs so that the difference between actual and reference costs is kept to a minimum.

3.2.7 High T&D Losses of Discos

High transmission and distribution losses of transmission and distribution corporations, respectively, are one of the key concerns of escalating circular debt. This problem might be handled by adhering to the benchmarks/targets established by regulators. This would result in a decrease in T&D losses as well as a reduction in consumer and tariff costs.

3.2.8 Non-Payment of Subsidies on Time

Non-payment of subsidies by the government is another issue that may be solved by properly budgeting the subsidies in the annual budget and distributing them to stakeholders on time.

3.2.9 Pending New Connections

When studying the regulator's State of Industry Report, it is discovered that there are numerous pending new connections awaiting distribution company permission. The regulator might resolve this issue by requiring the appropriate DISCO to execute its

contractual and legal duties by installing new connections within the timeframes specified in the consumer service handbook.

3.2.10 Thermal Inefficiencies of Generation Companies

State-owned generating businesses' thermal inefficiencies contribute considerably to the building of circular debt. GENCO's tariffs are calculated using the heat rates of producing units. The quantity of fuel used per unit of kWh generated is described as the heat rate. As producing unit efficiency has deteriorated, heat rates have increased over time. As the heat rate of the plant grows, so does the quantity of fuel consumed per unit of electricity generated. Fuel theft has been reported at GENCOs, resulting in lower efficiency. For tariff reasons, NEPRA, on the other hand, uses a lower heat rate than the real GENCO heat rates. As a result, GENCOs' power distribution prices are low since they do not represent the entire cost of generation.

3.2.11 Least measures taken for Energy Conservation

Although there are provincial and national energy conservation authorities in Pakistan, they have taken very few actions to preserve energy. It is critical that relevant concerned departments take up the topic for improved energy conservation measures since the cost of energy savings is less than the cost of energy produced.

3.2.12 Least Focus on Demand Side Management

It is highlighted that demand side management receives the least attention. It is critical to put in place the policies outlined by the National Energy Efficiency and Conservation Authority in order to improve demand side management.

3.2.13 Least priority on deployment of Renewable Energy Power Plants

The previous administration prioritized fossil-fuel-powered power facilities. Given the recent increase in energy prices and disruption in supply chain management, the government should now focus on alternative renewable energies such as solar, wind, hydro, and bagasse, where no imported fuel is required and reliance or dependence on indigenous energy resources can be made, resulting in a reduction in consumer end tariff.

3.2.14 Power Holding Company Limited Markup

The major function of power holding company limited is to borrow money from the local banks and discharge its commitments. This problem may be solved if electricity producers were paid on time. If the government must borrow money from private banks, every effort should be taken to cut financing costs, which would benefit end users.

3.2.15 IPP Markup

The issue of IPP markup adds considerably to accumulation of circular debt the issue may be handled by timely payments by the central power purchase agency to the independent Power Producers. Power producers are allowed to compound interest on late payments; power purchasers may renegotiate power purchase agreements to change this condition from compound to simple interest.

3.2.16 Non-Payment by K-Electric

Due to the lack of a Power Purchase Agreement with K-Electric, the company frequently delays payments under one pretext or another. The problem can be solved by entering a power purchase agreement with the central power purchasing agency guarantee limited. In the event of nonpayment, the utility may be punished by the power purchaser.

3.2.17 Privatization

Another concern raised throughout the research is the privatization of state-owned electricity firms. Longtime champions of the private sector have maintained that it may cover the gap in service delivery and aid in overcoming their financial issues. The wording of this sentence is a little different from the one used in the video. Policy measures that enable the operational structure of state-owned firms taken over by renowned private sector to utilize available resources in an effective and efficient manner may be included as corrective measures.

Chapter 4

Testing and Deployment

This chapter describes the testing and implementation of one of the previously proposed corrective solutions in this project. The privatization of DISCOs is the specific goal. Since the independence of Pakistan on August 14, 1947, there were identified numerous regimes during which the state is seen to move its attention from nationalization to privatization and vice versa. However, being cognizant of the restricted resources of the state and its dependency on the foreign financial institutions from onward 1985, the state has been discovered continually selecting the policies which may generate easy for private investor in electricity sector. The idea was to entice private investors while also meeting the country's energy needs, which would otherwise be impossible to achieve given the country's limited resources. In the overall methodology, the state was found to be capable of meeting the requirements of privatization in the form of a regulatory framework, a competitive trading environment, disciplinary actions, and the protection of the interests of all concerned stakeholders in order to achieve a win-win situation. Subsequently, the state was discovered poorly exposed in form of unsecured policies which finally lead to more financial disruption in the environment.

4.1 Privatization in Pakistan

Munir and Naqvi examined the reasons behind the failure of privatization, which had shown to be quite beneficial in other nations during the same time period. The authors assert that many successful late emerging nations, like Taiwan, Korea, Singapore, and China, have bragged and profited from a significant state-owned sector or nationalist strategy throughout their rapid growth phases. However, due to limited resources, many countries, including India, have adopted the practices of the Washington Consensus, which calls for a regulated free market environment in which everyone can trade but under the rules and regulations of the state to protect the interests of all concerned stakeholders. However, Pakistan was unable to fulfil the pre-requisite requirements of privatization and instead adopted a neoliberal current strategy that requires market-oriented portfolios without governmental control to establish a barrier

environment for business. Furthermore, in order to gain investor confidence, the government goes above and beyond the intensives that place additional strain on the economy. (Dr. Kamal Munir, 2018).

The finish of the exploration was to make acknowledgment of the way that no-question neoliberalism being a contemporary methodology has been demonstrated extremely productive in most evolved nations like in USA. Nonetheless, the overall states of Pakistan were not insusceptible to the equivalent. In this manner, the Washington Agreement strategies which were picked by comparable nation like India could be demonstrated more reasonable to continue for privatization of express own elements. Further, it has been featured that the pre-requirements in type of further developing contest and firm effectiveness, working on the assignment of assets, decreasing debasement, and prompting expanded generally financial development, disciplinary activity and so on should be guaranteed for positive result of privatization which else caused disappointment and against the ideal targets.

4.2 Forms of Privatization

The power of Privatization can change in light of the necessity and ability to keep the control and on the business portfolio. Following are routes through which privatization can be practiced in state possessed portfolios. (Brooks, 2004)

4.2.1 Complete Privatization:

The by and large selling of government resources for the confidential area is known as complete privatization. A public recorded organization can select a few choices to handle the liquidity issues looked by the organization. The sole necessity for the action is to raise capital or income to meet the liquidity needs of organization. Issuance of stock in the securities exchange is one of way by which an organization raise incomes by sharing the property freedoms with public and to create incomes. Privately owned businesses get resources, yet additionally the related commitments of possession because of this kind of privatization. Most of government-possessed organizations and resources have been auctions off to the confidential area.

4.2.2 Selling the Assets of Portfolio:

Selling the assets of portfolio may be done on deeply analyzing the effectiveness of assets. The assets may be in form of land, equipment or manpower so that the additional and unrequired resources in idle form may be thrown out which could provide benefits if cash properly. Usually this method is undertaken through auctions.

4.2.3 Vouchers Privatization:

This is the source vide which either for exposure or consideration, the vouchers containing part responsibility for or resources conveyed to the crowd for minimal price or through limited plot which brings about mindfulness and allure of portfolio in esteem chain reason.

4.2.4 Privatization of Operations:

It is the type of privatization wherein a portfolio is initialed by an administration through confidential divisions instead of to entertain itself and contribute its assets. The executives and functional obligations are moved from public to private area organizations as a feature of privatization exercises. This game plan permits the confidential area organization to bring in cash by charging expense from clients.

4.2.5 Contract out

Contracting out is the act of entrusting the arrangement of explicit administrations to a privately owned business in return for an expense. Utilizing this situation, the public authority pays the confidential area venture straightforwardly for its administrations. Assessments and client charges gathered by the public authority are utilized to pay for these administrations.

4.2.6 Franchising

Contracting out is the act of entrusting the arrangement of explicit administrations to a privately owned business in return for an expense. Utilizing this situation, the public authority pays the confidential area undertaking straightforwardly for its administrations.

Expenses and client charges gathered by the public authority are utilized to pay for these administrations.

4.3 Privatization of Electric Distribution Companies in Pakistan

Long-lasting promoters of the confidential area have contended that it can fill the hole in assistance conveyance and assist arising countries with defeating their monetary difficulties. The boundless agreement is that there is minimal motivator for state-claimed utilities to move along. They can't work successfully because of political imperatives and lease looking for activities. Political strain is utilized to recruit administrators as opposed to justify, which lessens the dissemination utility's capacity to actually make due. In this manner, it is guessed that private organization and proprietorship with a benefit driven objective will bring about expanded proficiency and lower costs notwithstanding better help.

Energy changes all through the 1980s and mid 1990s included, in addition to other things, the privatization of electrical utilities all over the planet. The business suitability of the help areas and the nearby political environment impact the privatization decision. Enormous urban communities with more prominent business and modern interest were chosen by the confidential area. The ineptitude of legislatures in settling issues in the power area is shown by privatizing income creating metropolitan regions as opposed to country regions with additional issues. The proof from various countries proposes that unrivaled administration and sound organization administration are a higher priority than possession. While this is going on, the board works best when there are areas of strength for a system, including prizes and disciplines, as well as empowering metropolitan elements and administration structures.

Water and Power Development Authority (WAPDA) and Karachi Electric Supply Corporation, two in an upward direction coordinated utilities, have generally possessed Pakistan's power industry (KESC). In 1992, the Pakistani government (GOP) made a smart course of action to rebuild the power business and lift efficiency, quality, and administration. In 1998, the GOP split the in an upward direction coordinated Power Wing of the WAPDA into discrete age, transmission, and dissemination organizations. Eight distinct dispersion organizations were the end result, which were then additionally partitioned into ten (10) dissemination organizations.

The Saudi Al-Jomaih Group of Organizations, Kuwait's NIG, and Hassan Associates bought 73% of KESC's portions from the GOP in December 2005 for an expense of US\$264.90 million. Through proficient administration, expanded venture, innovation, and worker benefits, the organization guaranteed more prominent administrations.

The principal privatization drive for all conveyance utilities was sent off with the privatization of KESC (presently K-Electric). In any case, because of K-subpar Electric's presentation, the idea was subsequently deserted. Yet again with an end goal to increment effectiveness in the appropriation business, the privatization of DISCOs was talked about in 2013. One of the essential parts of the Circular Debt Planning Plan for 2015 was the privatization of DISCOs. The cash made by privatization should be utilized to take care of roundabout obligation. However, again, the arrangement was deserted. As indicated by data on the Privatization Commission of Pakistan's website, all state-owned organizations, except for TESCO, are potential contender for privatization, no matter what their monetary and business execution.

DISCOs in Pakistan come up short on regulatory and specialized aptitude important to work all alone. They are additionally denied from doing as such. These organizations' corporate administration based authoritative designs have not actually been framed. Valuing, business, and monetary choices all include government (political) activity. (Malik, 2022)

4.4 Use of Local Coal Instead of Imported Coal

Keeping in view the current demand of electricity in winters and summers instead of using imported fuels, local coal should be considered and existing imported fuel power plants like Coal based imported power plants should be converted into usage of local coal.

4.4.1 Power Generation

As shown in the Figure 10 below, the total installed generation capacity in the country will reach 34,501 MW by the end of 2021, with 34% remaining RE comprised of hydro-electric, solar, wind, and bagasse-based technologies and 66% thermal plants comprised of natural gas, local coal, imported coal, RFO, and RLNG-based technologies. (IGCEP 2021)

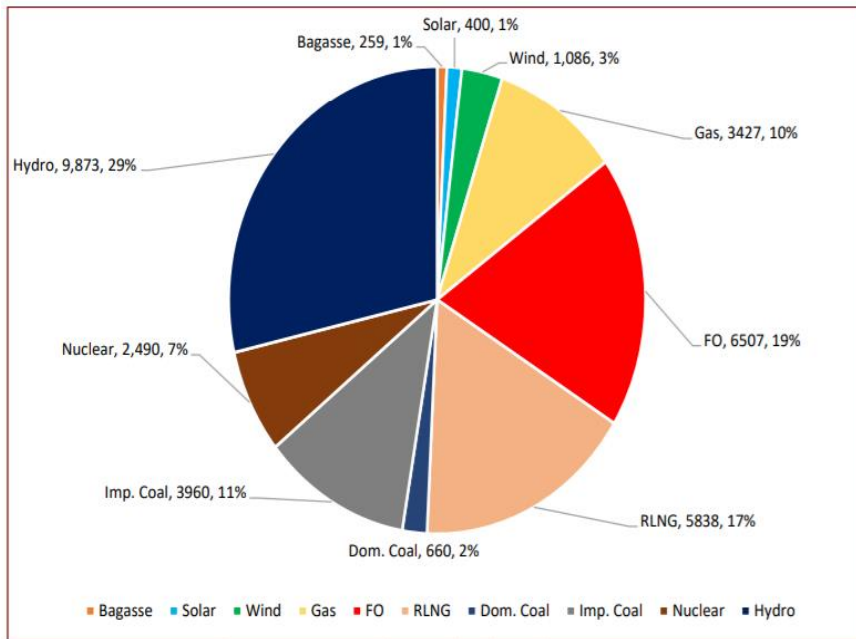


Figure 11: Installed Capacity (MW) as of May 2021

During the fiscal year 2019-20, the energy produced by the power generation fleet totaled 121,691 GWh, with hydroelectric plants contributing approximately 32%, thermal plants contributing 57% (natural gas, local coal, imported coal, RFO and RLNG based technologies), nuclear plants contributing 8%, and renewable energy power plants contributing 3% (solar, wind, and bagasse based technologies).

Due to higher fuel cost components, existing imported coal-based projects will be provided a minimum dispatch in accordance with their contractual obligations/bindings (Take or Pay contracts), up until the expiry of their respective contracts.

4.4.2 Tariff Modeling and Pricing Mechanism

Capital cost, variable O&M cost, and fixed FCC and fixed O&M cost for local and imported coal power plants shall be obtained from the most recent NEPRA determined tariff for respective technologies.

Year	Energy Purchase Price (Rs./KWh)						Total EPP	Year	Energy Purchase Price (Rs./KWh)					Total EPP
	Var. FCC	Water Charges	Ash Disposal	Lime Stone	Var. O&M Foreign	Local			Fuel Component	Ash Disposal	Lime Stone	Var. O&M Foreign	Local	
1	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	1	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
2	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	2	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
3	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	3	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
4	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	4	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
5	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	5	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
6	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	6	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
7	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	7	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
8	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	8	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
9	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	9	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
10	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	10	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
11	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	11	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
12	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	12	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
13	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	13	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
14	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	14	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
15	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	15	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
16	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	16	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
17	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	17	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
18	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	18	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
19	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	19	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
20	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	20	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
21	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	21	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
22	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	22	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
23	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	23	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
24	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	24	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
25	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	25	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
26	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	26	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
27	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	27	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
28	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	28	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
29	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	29	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408
30	2.1223	0.3597	0.0000	0.0000	0.1245	0.0576	2.6640	30	4.9135	0.0000	0.0000	0.0763	0.0510	5.0408

Table 1

Table 2

Table 1 on the left shows the Energy Purchase Price of Engro PowerGen Thar, whereas Table 2 on right shows the Energy Purchase Price of Huaneng Shandong Ruyi Private Limited (Sahiwal Coal Power Plant). If the data on both of the tables is compared, it is clearly evident that Total EPP of Sahiwal more than double of Engro PowerGen. The only reason behind this huge different is usage of imported coal instead of local coal. There are various costs included incase if the Coal is imported from South Africa and Indonesia form which some of the costs are Transportation from abroad and within local. Taxes, freight charges, custom duties etc. In case of Thar coal none of the cost are paid as Thar Coal is locally available and plants are constructed in Thar District of Sindh Province.

4.4.3 Fuel Cost Components

Fuel cost component is the fuel price paid for each unit of electricity produced. In case of imported coal, it includes many costs due to which per ton cost of coal will increase due to variation in exchange rates. However, in case of Thar Coal as it is locally available and payments to IPPs are made in rupees so there is no burden of foreign exchange reserves getting low and also of foreign exchange risk.

4.4.4 Electricity Generation for HSR on Imported Coal

Huaneng Shandong Ruyi Energy (Private) Company Limited
Schedule of Fuel Cost Part of Energy Charge
Adjustment on Account of Coal Price Variation for the Month of November 2022

Description	Quantity	Net CV	Coal Price		Exchange Rate
	Ton	kCal/Kg	US\$/Ton	Rs/Ton	Rs./US\$
Consumption from Stock:					
Consumption from Local Purchase (PSL 35)	1,426	5,658	341.82	75,988	222.30
Consumption from Local Purchase (PSL 36)	2,873	5,778	349.51	77,696	222.30
Consumption from Local Purchase (PSL 37)	566	5,545	337.83	75,099	222.30
Consumption from Local Purchase (Awan 20)	8,153	5,538	345.72	76,853	222.30
Consumption from Local Purchase (Awan 21)	7,050	5,315	341.19	75,846	222.30
Total Consumption	20,068	5,503	344.17	76,509	222.30

Description	Unit	Reference	Previous	Revised
Avg. price of stock consumed during the month	Rs./Ton	13,605	75,393	76,509
Avg. net calorific value of stock consumed during the month	kCal/Kg	5,990	5,733	5,503
Avg. net calorific value of stock consumed during the month	BTU/Kg	23,768	22,751	21,836
Net Heat Rates	BTU/kWh	8,584	8,584	8,584
Revised Fuel Cost Component	Rs./kWh	4.9135	28.4462	30.0764

Note: The above adjustment of fuel cost component on coal shall be subject to verification by a consultant/Independent third party to be appointed for the purpose by the Authority. In case the verified delivered coal price is different, the fuel cost component shall be revised accordingly.

Figure 12: Fuel Cost Component of Sahiwal Coal Power Plant

As evident from Figure 11, the coal price per ton has increased very much due variations in exchange rate. The per ton price of the coal imported from South Africa costs around US\$ 350 which means the government also needs to pay the same to IPPs importing such fuels and it creates a huge burden on the reserves as the payments need to be done in dollars. The fuel cost component per unit of Huaneng Shandong Ruyi for the month of November is Rs/kWh 30.0764. As per the Tariff approved by NEPRA, the net generation of HSR is 1243MW/day. If the plant gets 100% dispatch, this means 1243MW will be generated so the calculation will be:

$$\text{Net Generation} = 1243 \text{ MW}$$

$$\text{Generation in kW} = 1243000 \text{ kW}$$

$$\text{Fuel Cost Component per kWh} = 30.0764$$

$$\text{Energy Purchase Price for 24hrs (Rs)} = 1243000 \times 30.0764 \times 24 = 897,239,164.8$$

The payment for 24hrs Energy purchase price will be Rs. 897,239,164.8

4.4.5 Electricity Generation for Engro PowerGen Thar

Annex - I

Engro Powergen Thar (Private) Limited
Schedule of Fuel Cost Part of Energy Charge
Adjustment on Account of Thar Coal Price Variation for the month of November 2022

Variable Fuel Price				
Description	Quantity	Variable Coal Price*		Exchange Rate
	Tons	US\$/Ton	Rs./ Ton	Rs./ US\$
Coal Consumption:				
Consumption from Purchases During October 2022	191,982	16.88	3,864.68	228.95
Consumption from Purchases During October 2022	22,576	16.88	3,736.39	221.35
Total Consumption:	214,558	16.88	3,851.18	228.15

*Variable Coal Price including transportation of US\$ 1.45/Ton

Fixed Fuel Price				
Description	Invoiced Price	Fixed Coal Price		Exchange Rate
	Rs.	US\$/ Ton	Rs. /Ton	Rs./ US\$
Fixed Fuel Price For 316,666.667 Tons	2,152,591,858	30.71	6,797.66	221.35
Total	2,152,591,858	30.71	6,797.66	221.35

Fuel Cost Component					
Description	Units	Reference		Revised	
		Variable	Fixed	Variable	Fixed
Avg. price of stock consumed/Fixed Fuel Price	Rs./ Ton	1,393.44	3,528.12	3,851.18	6,797.66
Heat Rate	Btu/kWh	9,222.49	9,222.49	9,222.00	-
Heating Value of Thar Coal	MMBtu/ton	11.005	11.005	10.71	-
Capacity for the month	Gwh	-	-	-	432.4320
Fuel Cost Component		Rs. 1.1677/kWh	Rs. 2.5132/kWh	Rs. 3.316/kWh	Rs. 4.9779/kWh

Reference heating value as per TCEB determination for years 1 - 8 is 11.30 MJ/KG (LHV)

Reference heating value shall be indexed annually as per TCEB determination

The Coal Consumption 214,558 Tons is for the period of 21st October to 15th November 2022.



Figure 13: Fuel Cost Component of Engro PowerGen Thar Power Plant

Comparing Engro PowerGen Thar fuel cost component, it is evident from the table above that the FCC is Rs/kWh 3.316 which as compared to HSR 10 times lower where for HSR, it was around Rs/kWh 30. Also to calculate the charges for equal category i.e. 1320MW for HSR and 660MW for EPTL, we can consider 2 units of another project under construction in the same Thar district of Sindh province which has same category of 1320MW just like HSR. The calculations for EPTL will then become:

$$\text{Net Generation} = 660\text{MW}$$

$$\text{Generation in kW} = 660000 \text{ kW}$$

$$\text{Fuel Cost Component per kWh} = 3.316$$

$$\text{Energy Purchase Price for 24hrs (Rs)} = 660000 \times 3.316 \times 24 = 52525440.$$

The payment for 24 hrs generation will be Rs. 52525400. This payment is for half of the capacity than that of HSR because of single unit of EPTL of the capacity 660MW whereas

Sahiwal has 2 units of 660MW each. Considering Thar Coal Block-1 Power Plant here and using same FCC and taking 1243MW as dispatch same like HSR i.e. 100% the calculation will then become:

Net Generation=1243MW

Generation in kW= 12430000 kW

Fuel Cost Component per kWh= 3.316

Energy Purchase Price for 24hrs (Rs) =1243000x3.316x24= 98922912

Difference in HSR vs TCB-1= 897239164.8-98922912= 798316252.8

This difference above is just in EPP i.e. 798316252.8, there are other costs too which also needs to be paid in case of imported coal so all together will be huge payments needed to be paid by government and this also increases the circular debt.

4.5 Financial and Statistical Valuation

Monetary Valuation prompts recognize genuine cost and presumptive worth of property or resource or portfolio with the goal that one might have the option to determine the destiny of individual property or resource or portfolio, explicitly taking into account whether a privatization of public own substances ought to be started etc. This might require thorough comprehension of the budget summaries so one might have the option to connect the suitable outcomes.

Accordingly, under the extent of this venture, just valid data which is reflected by concerned portfolio at its true site is taken on. To proceed in the monetary valuation of state-possessed conveyance organizations, an experiment of Faisalabad Electric Supply Company (FESCO) is assessed and dissected. This cycle can additionally be applied on some other firm according to the need request for privatization. Monetary boundaries will be taken on to reason the outcomes to connect any genial choice which wouldn't just be powerful for the organization's drawn out direction however can likewise assist the state with lessening its liabilities and centered around other related matters.

4.6 FESCO

Faisalabad Electric Supply Company (FESCO) is an electric distribution organization consolidated under organizations' mandate 1984 that provisions power to the purchasers in its space of ward. FESCO administration domain incorporates areas of Faisalabad, Sargodha, Jhang, Toba Tek Singh, Jhang, Bhakkar, Khushab and Mianwali. FESCO ward covers around 47,000 Sq. kilometers region of these areas. The company has been coordinated into various divisions, including Activity, Development, and Grid



Figure 14: FESCO Logo

System Operation (GSO). Inside operations, there are Specialized and Business arrangements. The organization was established in 1998 considering de-packaging of upward coordinated utility WAPDA. FESCO was consolidated as a non-recorded public restricted organization under Organizations Mandate, 1984 on Walk 21, 1998. Testament of Beginning of Business was given on March 26, 1998. (FESCO, 2019)

4.7 Analysis

The analyses' major subject is to solve the present issue of Circular Debt to which Pakistan's electricity industry is vulnerable. Despite the government of Pakistan's enormous efforts through its subordinate ministries and sectors, the matter remains unsolved and is worsening by the day. With the passage of time, governments have attempted to implement several power policies (1994, 2002, 2013, 2015, 2021, RE 2006, RE 2019) in response to the electricity shortfall, which have reflected some remarkable attractive incentives for interested or willing investors in order to control the situation through collaborative efforts. Without a doubt, the government has been able to overcome the shortfall of energy due to ongoing efforts and improvement in the power sector's power policies. On the other hand, the administration is

concerned about the country's continually expanding circular debt, which has gone unresolved and untreated despite its very damaging and frightening repercussions on the broader economy. Furthermore, the increase in circular debt is causing severe limitations, including sovereign guarantees, to which the government is already exposed in its existing agreements with Power Producers, resulting in a weak position when negotiating with financial institutions, including the IMF, for financial aid.

Despite all attempts made and begun by relevant parties to uncover the core cause of Pakistan's acute financial crisis in the form of circular debt, shortcomings in the distribution sectors of Pakistan have remained ignored. The reason for this is that the education sector or researchers have not been found to be interested in the basic concerns to which the entire country's economy has been exposed for a long time.

None of the ten (10) power distribution businesses have shown sufficient performance, allowing the government to produce income on line with their expectations. As a result of these public bodies' incompetence, the government is suffering significant financial difficulty, which is manifested in the form of continually expanding circular debt. As a result, the scope of this project stays focused on the necessity of deciding the fate of these distribution firms by thinking outside the box. Furthermore, the financial evaluation of one of the distribution businesses, FESCO, has been included in the scope of this job so that any choice may be made with complete knowledge. The financial review includes profitability ratios, liquidity ratios, and leverage ratios for the readers' convenience.

Table 5: Financial Ratios for FESCO

Sr. No	Ratio	Formula	2020	2019
1	Quick Ratio	$\frac{\text{Current Assets} - \text{Inventories}}{\text{Current Liabilities}}$	$\frac{75,425,069,734 - 3,131,729,876}{78,528,257,784} = 92\%$	$\frac{59,297,235,094 - 2,709,681,081}{59,268,808,041} = 95\%$
2	Current Ratio	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$	$\frac{75,425,069,734}{78,528,257,784} = 96\%$	$\frac{59,297,235,094}{59,268,808,041} = 100\%$
3	Asset Turnover	$\frac{\text{Net Sales}}{\text{Total Assets}}$	$\frac{148,742,330,349}{173,429,711,065} = 85.7\%$	$\frac{116,391,973,408}{154,029,762,151} = 75.5\%$
4	Gross Profit Margin Ratio	$\frac{\text{Gross Profit}}{\text{Sales}}$	$\frac{13,264,484,676}{148,742,330,349} = 8.9\%$	$\frac{-18,518,410,650}{116,391,973,408} = -15.9\%$
5	Net Profit Margin	$\frac{\text{Net Income}}{\text{Sales}}$	$\frac{-16,681,460,375}{148,742,330,349} = -11.2\%$	$\frac{-48,373,379,870}{116,391,973,408} = -41.6\%$
6	Return on Capital Employed (ROCE)	$\frac{\text{Net Income} *}{\text{Capital Employed}}$	$\frac{-16,681,460,375}{173,429,711,065 - 78,528,257,784} = -17.6\%$	$\frac{-48,373,379,870}{154,029,762,151 - 59,268,808,041} = -51\%$
7	Debt Ratio	$\frac{\text{Total Liabilities}}{\text{Total Assets}}$	$\frac{215,991,640,265}{173,429,711,065} = 1.25$	$\frac{180,358,133,335}{154,029,762,151} = 1.17$

(Source: FESCO Annual Report 2019-2020)

Improving the above Ratios either by privatizing whole FESCO or improving only the ratios will help this Disco in getting full recoveries which will result in full payments to the Independent Power Producers. The methods to improve the above ratios are described below:

4.7.1 Quick Ratio:

In general, the Quick Ratio or Acid Test Ratio reflects a company's capacity to satisfy its short-term liabilities without relying on its inventory. It is mathematically described as follows.

$$\text{Quick Ratio} = (\text{Current Assets} - \text{Inventory}) / \text{Current Liabilities}$$

The greater the value of the Quick Ratio, the greater the company's capacity to pay down its creditors in a timely manner. As a result, the value should constantly be positive in order to ensure the company's longevity in order to manage the business portfolio within the restricted available resources. On the other side, a company's policies may be represented in the criteria chosen to determine a company's rapid ratios to lead specific judgements. For your convenience, inventory may or may not be considered worthy by various portfolios when calculating their Quick Ratio.

According to Table 5 above, the firm is experiencing a decrease in its quick ratio when compared to prior performance, which is a worrying condition for the portfolio and indicates that it will lose its ability to fulfil its short-term obligations in a healthy manner. When studying the Company's balance sheet, it is clear that its liabilities are rising over time, making it impossible to maintain a Quick Ratio value larger than one (unity). Policy measures permitting the company's operational structure takeover by reputable private sector through effective and creative policies to utilize the available resources effectively may be included as corrective remedies.

4.7.2 Current Ratio:

In general, the Current Ratio reflects the company's capacity to cover its short-term liabilities, or liabilities predicted within a year of time, through its current assets. It is evident that it only evaluates the link between current assets and current liabilities of a certain portfolio to describe a company's liquidity condition. A lower Current Ratio rating weakens a company's ability to fulfil its current liabilities in due course on its current assets. It is mathematically described as follows;

$$\text{Current Ratio} = \text{Current Assets} / \text{Current Liabilities}$$

The ratio is decreasing, according to the data in the table 5 above. Increasing the value of its current assets through new ideas, technical skill enhancement, and smart policy decisions may result in a rise in current assets while decreasing current liabilities. Policy measures enabling the company's operational structure to be taken over by reputable private sector and thus

utilizing its effective and creative policies to utilize the available resources effectively may be included as corrective remedies.

It is proposed that an impartial and exclusively performance-based review be implemented in order to discover system gaps and implement appropriate corrective measures, including the privatization of the FESCO portfolio, for better and more effective outcomes.

4.7.3 Asset Turnover:

In general, asset turnover refers to a company's capacity to utilize its existing resources or assets efficiently and effectively in order to create income and satisfy its responsibilities. Its worth should constantly be positive in order for the firm to be shown useful and productive in order to persuade its business; otherwise, it will remain a financial hit or burden on the owner's part. The asset turnover relationship is expressed mathematically as follows;

$$\text{Asset Turnover} = \text{Net Sales} / \text{Total Assets}$$

The information in Table 5 above revealed that FESCO's asset turnover is slightly growing due to a rise in net sales of the firm related to an increase in the number of consumers. However, there are a number of additional aspects that may need to be addressed that may be disguised in the tabular data. For example, one must determine if the receivables listed on account of net sales will be completed successfully soon or whether the same may be enlisted due to losses or theft suffered by the organization. Thus, in all of these cases, a corrective action is to assure efficiency via the optimal use of installed equipment and the recovery of the company's outstanding sales. A privatization of the portfolio is one option among several to hold the firm accountable for everything. It may be used to improve FESCO's asset turnover and get it back on track.

4.7.4 Gross Profit / Loss Margin:

In general, the gross profit or loss margin ratio is the amount at which a corporation is described or classified as profitable or losing based on the revenue it earns versus its operating and operational expenditures. For the long-term operation of a business portfolio, the larger the positive value of a company's gross profit margin ratio, the more lucrative it is, and vice versa. The function may be stated mathematically as follows.

$$\text{Gross Profit / Loss Margin Ratio} = \text{Gross Profit or Loss} / \text{Net Sales}$$

The above Table 5 shows that FESCO's gross profit or loss margin ratio is displaying a positive sign, as the number has changed to positive over the year.

If FESCO is transferred to some private stakeholders, it will finally be directed in the direction that a crystal clear recovery mechanism is developed to make the firm viable rather than under loss due to flaws or mismanagement from the relevant authorities.

4.7.5 Net Profit / Loss Margin:

In general, the net profit or loss margin ratio is the amount at which a firm is labelled or classified as profitable or losing based on the net revenue it earns from the net sales of its product or electricity. For the long-term operation of a business portfolio, the larger the positive value of a company's net profit margin ratio, the more lucrative it is, and vice versa. The function is stated mathematically as follows:

$$\text{Net Profit / Loss Margin Ratio} = \text{Net Profit or Loss} / \text{Net Sales}$$

As a result of the mathematical formulation, the value of the net profit or loss margin ratio should be on the positive side to guarantee that the firm is maintaining its profitability ratio in relation to the sale of products within its portfolio.

The above Table 5 data shows that FESCO's net loss margin ratio is displaying a positive trend, as it has improved over time. However, the value remains on the negative side, casting doubt on the company's long-term viability. The present limited accessible resources should be used to create the most income feasible in order to boost system revenue. If the FESCO is given over to some private stakeholders, it is one of several choices. It will eventually be steered in the direction of maintaining balance in order to reduce expenditures through remedial actions that may appear harsh or bitter at first glance but will have unquestionably favorable impacts on the total business portfolio at the end of the day.

4.7.6 Return On Capital Employed:

Return on Capital Employed (ROCE) is a profitability ratio that allows you to analyze the relative profitability of a company portfolio while keeping in mind the real capital invested in that firm. Mathematically,

$$\text{ROCE} = \text{Net Income} / \text{Capital Employed or Net Asset}$$

Whereas,

$$\text{Capital Employed} = \text{Total Assets} - \text{Current Liabilities}$$

The above-mentioned Table 5 information shows that FESCO's ROCE is positive, since this ratio has improved over time. It is proposed that the company's total costs be minimized in order to improve the general efficiency and dependability of the system. Furthermore, the present limited accessible resources should be used optimally so that the highest feasible income is created to improve system revenue. We believe that transferring the department to some private stakeholders would eventually lead to the creation of an adequate balance between income and costs, allowing the total company portfolio to be managed on net profit margin rather than losing profit margin.

4.7.7 Debt Ratio:

In general, the Debt Ratio demonstrates a company's financial structure based on the debt component of its investment. As a result, the ratio represents the magnitude of obligations on the company portfolio in the form of debt that must be handled in a timely manner for short- or long-term survival. The debt ratio expression is defined mathematically as follows;

$$\text{Debt Ratio} = \text{Total Liabilities} / \text{Total Assets}$$

More of this ratio leads to a highly leveraged portfolio, which is particularly dangerous for the long-term functioning of a corporation. Furthermore, a company with a high debt ratio is vulnerable to restrictive circumstances with external organizations when negotiating its future financials due to its existing liabilities.

The following table shows that FESCO is unable to keep its net profit and is running short of revenues due to inadequacies in its current portfolio. Furthermore, the company's financial leverage is expanding as its debt ratio rises. As a result, it is exposed to high risk in its business operations unless it can increase revenue within its limited available resources. Thus, a company's current situation calls for some initiatives that can help control the overall situation and get the company back on track. It is believed that if FESCO is transferred to certain private stakeholders, it will ultimately be directed in the direction of creating a suitable balance between income and costs, allowing the total company portfolio to function on net profit rather than loss. Furthermore, employing some modern financial instruments can aid in bringing about some beneficial improvements in the financial structure and stability of a company's financial structure.

4.8 Recommendation:

Based on the foregoing discussion and analysis, we provide the following suggestion for DISCO privatization. To decrease the enormous circular debt, it is advocated that state-owned DISCOs be privatized, citing the following benefits:

- (i) The privatization process will enhance the operational and financial performance of distribution networks, which are currently underperforming while held by the government.
- (ii) Through increasing investment, the process will expand distribution capacity.
- (iii) The procedure will lessen the public sector's financial restrictions and diversify state-owned (distribution) firms to generate revenues.

The proceeds from the privatization of state-owned DISCOs might be used to pay off circular debt. The Power Sector Regulator (NEPRA) is recommended to have set the essential enabling circumstances, and only after a policy dialogue with all key stakeholders to assure political acceptance of the decision, can private sector participation in distribution be considered.

Each DISCO may carry out the privatization approach in stages. Starting with the privatization of activities, a change in management and hence policy is required.

Employees may be provided separation packages or simply laid off or dismissed as a cost-cutting measure in this manner. These personnel can be accommodated in other areas of government. A proper privatization contract must be in place with clearly defined duties and obligations, failing which legal action may be taken by interested parties.

Chapter 5

Future Recommendations/Enhancements

This chapter outlines our recommended future suggestions in light of the previous chapters. Our proposals include action plans from the government, regulatory agencies, and the private sector. The GOP's main mission is to alleviate the present cyclical debt load on the electricity industry and to prevent it from happening again. The present level of debt prevents government-owned enterprises from attracting the necessary investment to encourage sector development and improved services, as well as funding to support management and system operations upgrades. (USAID, 2013)

5.1 Role of Government

Significant sector changes and governance improvements are necessary to halt the buildup of circular debt. To address these concerns, the GOP must do two things:

- Remove circular debt from the accounts of energy sector firms and accept responsibility for bad management of the power sector reform process. Move the circular debt amount to government debt, change consumer tariffs, or tax consumers to encourage progressive payback.
- Implement specific policies and initiatives to improve the management and performance of entities in the energy sector in order to cut costs, increase cash flows, and ensure the industry's operational and financial integrity. (Faraz, 2018)

Because of the high level of TDS, the GOP is forced to cut funding for many other competing demands while spending a significant amount of budgetary funds from limited resources. Prudence dictates that numerous measures be explored in order to reduce TDS and make it as manageable as possible. This demands both urgent and long-term reforms at the ministerial, regulatory, DISCO/corporate, and functional levels. Specific reforms include the following:

The GOP must ensure the effective administration and operation of the power sector, as well as its long-term financial stability. To do this, it must shift from primarily functioning as owner and operator to formulating regulations and monitoring the industry. In terms of policy,

government must yield to governance. Although this role change will take time, the development and execution of the reform measures listed above must begin immediately. A promise with the people of Pakistan and major participants in the energy business is also required to accomplish meaningful sector transformation for the benefit of all. It is critical to remember that the power sector reform effort is a comprehensive plan with both short- and long-term implications on all components of the power industry. Because improvement in one sector of the business, such as increased revenue collection by DISCOs, necessitates growth in others, an all-encompassing GOP strategy is required for the programme to be effective (e.g., legislation to make power theft a crime).

Specific reform components at the GOP level include:

- NEPRA's ability to transition from a single-buyer to a more competitive market structure must be reinforced; its power to enforce regulations must be increased; the makeup of its technical team must be examined and updated; and a large capacity-building and training effort must be initiated.
- Discussions between provincial governments, CPPA-G, and DISCOs are required to resolve tariff and subsidy conflicts.
- Legislation makes power theft illegal and punishable by penalties and jail time. Special tribunals should be formed to promptly address and handle incidents of energy theft.
- The selection criteria and technique utilized to appoint DISCO's BODs must be improved. Members of the BODs must possess strong professional and technical qualifications, be free of political influence, and have complete decision-making authority at the DISCOs in order to properly supervise performance and impose responsibility of DISCO's management and personnel.
- Renewable energy should be prioritized in order to lessen dependency on foreign fuels. Because renewable energy sources are practically scattered throughout the country, small to medium-sized power plants may be built near load centers while also being ecologically friendly.

- Provincial and federal government receivables must be paid in accordance with other customers, and there is a procedure in place to address billing issues within three months, with no right to sue for the following five years.
- Put in place a strong demand-side management and energy-saving programme.
- With mutual accord, the government may prioritize tariff reductions for public and private sector power plants.
- The privatization of the Guddu and Nandipur Power Plants, as well as the closure of low efficiency thermal power plants (GENCOs) with a capacity of about 4221 MW, may also be launched.
- In order to optimize the utilization of its efficient generating portfolio and the associated socio-economic advantages of increased industrial demand, the Pakistani government has implemented a subsidy scheme for industrial users.
- Budgeting for the essential power sector subsidies.
- Converting ageing markup stock and PHL loans to public debt to reduce interest expenses away from the power industry.

5.2 Role of Regulator

- The method for establishing yearly tariffs for all firms must be changed (DISCOs, NTDCs, and GENCOs). Time delays in tariff submission and decision, a delay in recovering cost increases, and variation in tariff determination scheduling for different areas of the business all exist. To address these issues and provide NEPRA more time to focus on other regulatory responsibilities, NEPRA should develop a multi-year tariff scheme.
- It takes a long time to calculate and apply the fuel adjustment fee. NEPRA should adopt an expected fuel price mechanism in order to set tariffs more precisely and quickly.
- For the power industry, NEPRA requires the ability to gradually transition from a single buyer model to a multiple buyer/seller/open access model. FPA systems for DISCOs should be upgraded to reduce the time lag between FPA determination and invoicing to customers.
- Vigorously monitor power company activities to verify that license/tariff conditions/decisions are followed.

- Tariffs and their terms and conditions must be restructured.
- Innovative commercial governance techniques. The utility sectors have access to a variety of commercial governance measures that have changed loss-making businesses into successful ones.

5.3 Role of DISCOs

- Because DISCOs are government-owned, they do not function commercially and are extremely subject to political meddling. To remedy this issue, the DISCOs should be corporatized and eventually privatized. Although privatization is a long-term goal, the policies and processes necessary to achieve it must begin now. It is critical that the privatization process be open and transparent, and it should be overseen by a qualified international consulting company.
- On a corporate level, each DISCO should be overseen by suitably appointed senior management. This team's JDs and KPIs must be quite detailed. The DISCO's management demands a crystal-clear company strategy and verified business strategies.
- Top management must set achievable goals and timelines for operational management. Such objectives should be translated into KPIs and included in the annual performance evaluations of the operational officers (APRs). APRs should be on a sliding scale that recognizes and commends exceptional employees while condemning mediocre or inferior ones.
- DISCOs should define realistic targets for losses, recovery, quality, quantity, safety, and customer service.
- Incorporate a comprehensive energy loss reduction programme into every DISCO, particularly PESCO, HESCO, QESCO, and SEPCO, where distribution losses are comparably high. Depending on the available funds, this programme should focus on decreasing technical losses to allowable technical operating limits while first reducing non-technical losses to NEPRA's defined objectives.

- Develop and implement programmes that stress demand-side management and energy efficiency through usage-based tariff invoicing.
- Enforce power supply agreements by instantly disconnecting defaulting customers.
- Implement a comprehensive revenue collection and theft prevention programme in each DISCO, particularly in HESCO, SEPCO, PESCO, and QESCO, where revenue collection is lower than in FESCO, GEPCO, LESCO, MEPCO, and IESCO. The application should have, but not be limited to, the following features:
 - Reengineering business processes to improve management control and customer service.
 - Electromechanical metres will be replaced with modern metering technology and digital AMR systems.
 - DISCOs must have greater visibility programmes through better information technology solutions such as emails, better database administration, AMRs, and real-time data of critical commercial aspects such as billing and recovery. There is a lot of technology on the market. All that remains is to bring it in.
- Load shedding must be recognised and given commercial importance across all DISCOs. The 11KV feeder losses and recovery % should be used as a guideline.
- Increasing DISCO's recoveries, reducing T&D losses, and addressing the K-Electric non-payment issue
- The MoF's reconciliation and settlement of K.E arrear subsidy claims resolves the K-Electric non-payment problem.
- Addressing the non-payment issue at Quetta Agri-Tube-Well by metering these customers and asking that the Southern Command/CM Baluchistan disconnect non-paying consumers.
- Establishing a NEPRA-licensed DISCO in AJ&K will allow recovery from the state at the GoP-approved pricing. The government can directly fund AJ&K's budget to fill the revenue deficit.
- Higher DISCO recoveries and lower T&D losses.

Conclusion

Given that the electricity sector is the backbone of the country's economic activity, a fast and balanced response to any mounting problem that may otherwise result in unwelcome or damaging results is required. Electricity is a widely used kind of energy that, when used constructively, may play a critical role in a country's economic and social well-being. However, significant technical and financial flaws in Pakistan's power industry have been recorded throughout the last few decades in the form of electricity shortfalls and circular debt, among other things. As a result, not only the Pakistani electricity industry but also the Pakistani government have been adversely exposed as a result of mismanagement, the absence of timely and suitable judgements, and the selection of alternatives in order to find a solution by thinking outside the scope.

There is always the potential of both virtues and drawbacks to any proposal's application. One must determine their priorities and then analyze the direction that will produce the most value results. The bullet cannot be reminded once it has been shot. Similarly, certain decisions are so crucial in nature that, once made and implemented, their consequences, which can be either constructive or destructive, can lead to a scenario in which there is no way out. As a result, among other choices, the subject project recommends privatization of Pakistan's distribution industry. It is hoped that the notion will be emphasized, and that more study will be done to foresee the effects of this proposal's application.

This can not only lead to a reduction in circular debt by privatizing the DISCOs, but it can also produce valuable cash flow by privatizing the distribution companies from bottom to top in the list of the most financially distressed portfolios, allowing the necessary cash to be used for other purposes rather than exposing the existing portfolios to additional risks. Based on the foregoing, it is highly suggested that government-owned organizations, including DISCOs and GENCOs, be privatized as soon as possible; staff can be accommodated in other government-owned entities such as WAPDA hydel and NTDC, among others.

Considering all the factors mentioned in this report if improved, they will have a huge impact on the improvement of circular debt. Only the usage of local coal instead of imported coal will

save around Rs. 500 Billion per month which will save huge reserves of the country and will enhance energy security.

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