

Examining the Future Direction of Electricity Market in Pakistan: The Case of Competitive Trading Bilateral Contracts Market (CTBCM)

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List of Abbreviations

ADB	Asian Development Bank
AEDB	Alternative Energy Development Board
ECC	Economic Coordination Committee
CTBCM	Competitive Trading Bilateral Contracts Market
CPPA-G	Central Power Purchasing Agency-Guarantee
GoP	Government of Pakistan
IPPs	Independent Power Producers
IGCEP	Indicative Generation Capacity Expansion Plan
MoE	Ministry of Energy
MIMG	Market Implementation Monitoring Group
NEPRA	National Electric Power Regulatory Authority
NTDC	National Transmission and Dispatch Company
NPCC	National Power Construction Corporation
PPA	Power Purchase Agreement (also written as Energy Purchase Agreement)
WAPDA	Water and Power Development Authority

Abstract

The sustainability, availability and affordability of electric power are important for economic growth and development. This has significantly created opportunity and appetite for electric power reforms in general, and for electric market reforms in particular. The main aim of these reform measures globally is to enhance the performance of electric power sector. The enhanced performance shall enable domestic, commercial, and industrial consumers to be able to use electric power for their activities in a competitive manner. Pakistan, being a developing country, also faces issues in the electric market reforms that require urgent and immediate attention of the authorities. One of the key reforms in this regard is the Competitive Trading Bilateral Contracts Market (CTBCM). This study aims to analyze the design and implementation phase to ensure the timely and effective implementation of CTBCM in the long run. The main goal must be aim that providing cost-effective electric power to all sectors of Pakistan. The study is based on qualitative data based on the descriptive literature review of the existing cases in the world including Philippines, Turkey, India, Brazil, United States of America and the United Kingdom. The methodology also included qualitative data extracted from discussions with local experts through consultations and semi-structured interviews. Although CTBCM is found to be a well-coordinated initiative involving various public sector and academic stakeholders, there is a need to improve with regard to the inclusion of other stakeholders particularly private sector investors and lessons from international cases.

Keywords: Electric power sector reform, electric utility, power generation, energy access, regulation, Supply adequacy

1. Introduction

The provision of reliable electricity is a prerequisite for the growth and development of economy. When a sustained supply of electricity is not accessible, the private sector bears financial losses due to less productivity and damage to assets; besides households also suffer from poor quality of life (Aklin et al. 2016; Chakravorty et al. 2014). In this scenario, power sector reforms are necessary to enhance the sustainability and maintainability of the economy of a country in a broader sense. One of the ways of reforming the electric power sector is the introduction of inclusive, well-coordinated and regulated electric market reforms (EMRs).

Several countries such as Brazil, USA, Philippines, UK, and India have worked on the regulations for the enhancement of their electricity production and brought about a series of reforms in their power sector market. These reforms included changes in the power value chain in their mechanism of generation, transmission, and distribution. By doing so, they were able to enhance the overall efficiency of their respective electric power systems and, thus the economy. In addition to the obvious economic benefits of the electric market reforms, the Sustainable Development Goal 7 also stresses that an affordable, reliable, sustainable, and modern energy for all should be accessible by 2030. For the achievement of this target, SDG 7 requires building better energy infrastructure and energy models¹.

From a public policy viewpoint, focus on sustainability and energy security is paramount to the holistic performance of a developing country. This will require continued and distinct policy reforms in the electric power sector. The main determinants in the success of initiatives focusing on electric power sector reforms is essential for an efficient and inclusive electric power market (EPM) (Hesary et al. 2022).

Several obstacles, issues and challenges exist with regard to the design and implementation of these reforms, irrespective of the size of economies. The obstacles include the extensive capital investments required for these reforms viz-a-viz the size of the private sector (Nelson, 2020). Another practical implication is the lack of technology to date with regard to energy storage (Zsiboracs et al. 2020).

In the case of Pakistan, electric power sector reforms are essential even if electricity is surplus. It is estimated that by 2025 the electricity demand will increase by 15,000 MW. Around 25 per cent of our population still has no access to electricity. This is in addition to the electric power available to the industrial, commercial, and residential consumers, who face regular power outages and load-shedding. The power sector of Pakistan shows losses, inefficiencies, and theft practices in the transmission and distribution mechanisms. The inefficiencies in the power generation, transmission and distribution, and subsidy-based regime are the main reasons of an increase in the circular debt (Aslam & Nazir 2021).

The circular debt stood at around PKR 2.3 trillion in 2021, which depicts a 6 per cent rise from June 2020. There is an upward trend of circular debt, which is estimated to be around 2.5 trillion till December 2021 (Nepra 2021) and by end of March 2022, the debt of power sector estimated to Rs 2.467 trillion which is around 3.8% of Pakistan's GDP (Pakistan Economic Survey 2022). The transmission and distribution losses are the main reasons for an increase in the circular debt of a country, which presents a bleak picture of the economy. The network of transmission allows only 2,300 MW-Peak with losses of 3 per cent and the generation of 10 GWH is not allowed to be vacated due to limitations set by the system. These losses are because of poor maintenance and obsolete infrastructure of the grid, faults in meters, inaccurate billing system and limited access to recoveries from the distribution companies or Discos.

1.1. Electric Market Reforms: A Historical Perspective

The supply of electricity is considered a building block for the economic growth; its full-time availability can boost the growth of all sectors of a country. When Pakistan came into being in 1947, its congenital power generation

¹ <https://sdgs.un.org/goals>

capacity was only 69 MW. After 12 years of independence, Water and Power Development Authority (WAPDA) originated as an integrated utility with the broad agenda of development in generation, transmission, and distribution of power and additional responsibilities, including irrigation, drainage, and flood control. At this time, the sector was managed to operate by two public sector vertically integrated utilities: WAPDA and Karachi Electric Supply Company (KESC)²³. Owing to an increase in power generation capacity, the government approved the WAPDA's Strategic Restructuring Plan in 1992 for the privatization of generation side of the power value chain.

The strategic restructuring led to the establishment of National Electric Power Regulatory Authority (NEPRA) in 1997 with the aim to regulate the newly-constructed public-private inclusive electric power market. The specific powers and functions of NEPRA include, but not limited to, design of electric power market to ensure sufficient liquidity, provision of standardized procedures for investors, monitoring and performance evaluation of projects and commercial dispute resolution.

NTDC in line with its Transmission License, which was issued by NEPRA in December 2002, created the Central Power Procurement Agency (CPPA) in 2004. With the Article 8 of the license of transmission the functions of payment, billing, and settlement to generation companies (GENCO, IPPs, and WAPDA) was to be organized with the help of CPPA (NTDC 2019)⁴.

NEPRA issued Market Operator Registration, Standards and Procedure Rules, 2015 (Market Operator Rules, 2015) and CPPA-G⁵ was registered as Market Operator on April 14, 2017. The main functions of CPPA-G included, but not limited to, acquiring power as an agent of the DISCOs and acting as a Market Operator to facilitate the transformation from the regime from single player to multiplayer electric power market .

Furthermore, NTDC and CPPA are authorized to settle electric power billing payment and settlement with a representative of the DISCOs and to develop the organizations to transform the power sector into a competitive wholesale bilateral market. The GoP decided in 2009 to develop an independent company to authorize market functions.

For the improvement of EPM in Pakistan, the reforms are required to curtail the losses and inefficiencies that exist in the current market. Hence, NEPRA has approved a thorough design implementation plan of Competitive Trading Bilateral Contracts Market (CTBCM) in 2019. The main purpose behind its implementation is to transform the current power market into a more efficient market by inducing competition in the market⁶.

1.2. Demand-Supply Gap in Energy Sector

Pakistan has been undergoing the energy crisis for almost two decades. The economic cost of power shortages was estimated at around 3 to 4 per cent of the GDP per annum since 2008 (Sattar 2020). In addition, the impact on employment has been severe, especially in the manufacturing sector. Furthermore, we must remain aware of the fact that electricity is analyzed as a basic right and consumers are not eager to pay for it (Burgess et al. 2020). This fact, coupled with our unreliable supply, poor service, and weak infrastructure creates a supply-demand imbalance in Pakistan's energy sector, making it difficult to optimize the efficiency of the system (Sattar 2020).

According to the Asian Development Bank (ADB), the availability of energy is considered the main factor behind the low level of consumption. The overall energy consumption in Pakistan has been enhanced in recent years, like many developing countries, and is expected to follow the same trend (Taren et al. 2020). In the past, the gap that existed between electricity demand and supply has expanded with the shortfall reaching 4500 MW in 2010, 6620 MW in 2012 and remained over 5200 MW in 2013, which, on average, comprised of over 50 per cent of the country's total generating capacity at that time (Zafar et al. 2020).

2 KESC was later privatized in 2006 and is known as K-Electric (Web page)

3 <https://nepra.org.pk/Admission%20Notices/2020/03%20Mar/Detailed%20Design%20of%20CTBCM.pdf>

4 [https://www.nepa.org.pk/Admission%20Notices/2019/09-September/IGCEP%20Plan%20\(2018-40\).pdf](https://www.nepa.org.pk/Admission%20Notices/2019/09-September/IGCEP%20Plan%20(2018-40).pdf)

5 Central Power Purchasing Agency Guarantee (CPPA-G)

6 <https://www.nepa.org.pk/>

The government has succeeded to lessen the power demand-supply deficit by adding 12.2 gigawatts to the national grid from 2016 to 2018 within the accomplishment of power plants with the help of the China-Pakistan Economic Corridor (CPEC) initiative⁷. For the duration of FY 2021, the total electricity generation in the country, comprising the power plants in CPPA-G and KE Systems, was estimated to be around 143,090.6 GWh, equaled to 133,727.2 in the previous fiscal year (Nepa 2021)⁸.

In 2020, “the public and public guaranteed” debt is expected to be increased to \$234 billion, and this weakening was a major financial challenge (Raza et al. 2021). Further, the debt because of the defaulters is another serious problem in present times. In FY-2019, the total receivables from these defaulters were around PKR 572 billion that has added to the already burdened economic sector. A report released by the power division of Pakistan in 2019 mentioned an increase of around 27 per cent in the receivables during the last 18 months (Kiani 2020)⁹.

For the year 2020-2021, the overall installed capacity was estimated to be around 40,606 MW. This indicates a 0.98 per cent of growth as compared to 40,211MW in 2019-20 (Pakistan Bureau of statistics 2022). Now, even in this state, the generation capability is according to demand, but due to poor evacuation capability, the actual generation capacity has mostly remained lower than the installed capacity. The gap between demand and supply is met by blackouts at most of the times and the country lives into darkness for over 12-14 hours in cities and around 18 hours in villages¹⁰.

It is a well-known fact that continuous access to cost-effective energy certainly correlates with macroeconomic profits as it decreases the cost of business to uplift economic activities and creates employment. In Pakistan, the cost of energy is still high even if the power demand-supply gap was covered; the industry is uncompetitive in the international market.

1.3. Current Electricity Market Model of Pakistan

Currently, the transaction of electricity takes place in a single-buyer model whereby the Central Power Purchase Authority Guarantee (CPPA-G), which was formed out of the National Transmission and Dispatch Company (NTDC), purchase electricity from all the producers whereas generation companies (Gencos) or the IPPs as a negotiator of and on the side of power distribution companies (Discos).

The CPPA-G also performs the responsibility of system operator by which it corresponds supply with the demand of numerous Discos. It also performs as the market operator. In this task, it brings out the billing and settlement roles. The long-duration demand forecasting role rests with the NTDC at a macro-level while the Discos are responsible for evaluating the short-term demand for their particular regions (Mahmood 2021).

In the current model, each Disco has one power purchase agreement (PPA)¹¹ with CPPA-G. The costs are equally shared through PPAs between both parties. The monthly power allocation is based on peak demand for each Discos. The PPA enables the purchase of energy and capacity at the same regulated price¹². The wholesale price transferred as a cost to regulated retail electricity tariffs (plus fuel cost adjustments). All Discos have the same system transmission charge. If the electricity supply system of Pakistan works in a system of market structure, instead of keeping the monopolistic structure of government regulation of policies, the transformation into the more competitive market-oriented structure brings many benefits that can be transferred to the consumer end. However, this structure requires multiple factors and institutes to play its role to fully benefit from the competitive market structure.

7 National Electric Power Regulatory Authority. 2020. State of Industry Report 2019. Islamabad. ADB recognizes this member as the People's Republic of China

8 National Electric Power Regulatory Authority. 2021. State of Industry Report 2021. Islamabad.

9 K. Kiani, “Net power sector receivables up 27pc,” 2020

10 Alternative and Renewable Energy Policy 2019, Government of Pakistan

11 In this study we have used Energy Purchase agreement and power purchase agreements interchangeably. Both are referred to as PPA in the document.

12 Presentation on Introduction to competitive trading bilateral contracts market (CTBCM) Central Power Purchasing Agency (CPPA) March 31, 22 https://cpa.gov.pk/DownloadFiles/Webinars/CTBCM%20Webinar_31032021.pptx-210409124417560.pptx

Reforms in the EPM are meant to create a wholesale power market, which will be competitive and would provide benefits to the power sector of Pakistan by introducing the profit incentives and managerial independence with the improvement in management accountability.

1.4. Transitioning Towards CTBCM

The ECC in 2015 authorized a decision to approve the CTBCM model in Pakistan which would promote competition in the wholesale market of electricity. The CPPA-G would perform as the market operator whereas NEPRA would encourage competition in the sectors of generation and distribution. Transitioning towards the CTBCM model includes adaptation of the current working models of NEPRA and CPPA-G (Sattar 2020).

The shift from a single-buyer to a multi-buyer contracts model signifies that the multiple functions that CPPA-G currently performs as a system operator, market operator and agent will be allocated to new entities (Mahmood 2021).

The prevailing power purchase contracts among the producers and the CPPA-G will be designated to Discos which will develop hundreds of new bilateral contracts that will distribute a share of production of each generating entity to the Discos. The elasticity suggested to the eligible consumers and the producers to join into bilateral contracts will displace some of the power demand that is presently included in Disco's forecasts (Mahmood 2021).

This year (2022) is supposed to be a milestone achievement for authorizing or approving the design of Competitive Trading Bilateral Contract Market (CTBCM) and initially the plan by NEPRA and then by Federal Cabinet of Pakistan was to make it functional by May 1, 2022. The CCI approved the National Electricity Policy, which appreciates the pillars of the competitive wholesale market of Pakistan (Shahzad 2021).

The CPPA-G provides the fundamental financial conduct, which incorporates the 105 power related projects on representing the Discos, which means the energy has a worth of Rs753,639 million during the fiscal year 2020-21 (CPPA 2021).

The difficulties of transforming from a single buyer to a multi-buyer system are massive but the subsequent benefits will be in the way of a greatly enhanced quality of electricity facility at far more competitive prices as compared to present¹³.

1.5. Competitive Market Design Objectives

There are principles which are set to achieve objectives to incentivize efficiency for the low-cost generation of electricity: no arbitrage in the power sector, minimum cost for the government for a minimum subsidy requirement, no cost increase for the remaining consumers, including industries and a level-playing field for Discos and wheelers of power is included in the objectives of competitive market design¹⁴.

1.6. Role of Stakeholders Under the CTBCM Model

CPPA is performing the role of a central body and is primarily responsible for coordination among all the stakeholders, including NEPRA, MoE (PD), NTDC, NPCC, DISCO, KE, AEDB, and PPIB. All these entities will perform the role of an independent auction administrator in the implementation of CTBCM¹⁵.

CPPA is working as a service provider. This model can increase efficiency, if implemented with management. Moving towards competitive market is bringing efficiency and fulfilling the 25-years-old dream of the nation.

¹³ <https://www.dawn.com/news/1660904>

¹⁴ https://www.cppa.gov.pk/MarketTrainings/Introduction%20to%20CTBCM_31-03-21.pdf-210402110128031.pdf

¹⁵ Role of each stakeholder is annexed.

1.7. Operationalization of Market Implementation Monitoring Group (MIMG)

The main aim of the MIMG is to examine the execution plan of CTBCM Model and provide information and strategic help to the power sector institutions accountable to accomplish their relevant actions. Several meetings were held in 2021 with the implementing institutes, and entities incorporating the NPCC of NTDC, AEDB, Discos, PPIB, NTDC, K-Electric and CPPA-G. Developments relevant to the CTBCM actions were discussed. In accordance with the instructions of MIMG, incorporating Joint Secretary Power Finance (MoE) PD, Secretary MIMG, a subcommittee of MIMG and DG Licensing (NEPRA) was also formed with the objective of executing development evaluation of the actions of CTBCM with the implementing authorities (CPPA 2021)¹⁶.

For the purpose of a transparent system in the market, it is required to have metering information, which should be done by an automated metering process. It is free of human error for the achievement of a transparent metering process. Secured Metering System (SMS) is implemented by NTDC committee that has completed the common delivering points (CDP) on metering point¹⁷.

The power purchase price on average incorporates 65 per cent of the end user tariff, which is calculated by NEPRA. The highest contribution to the power purchase prices is approached from the capacity charge. Rising capacity payments recently have been the major factor contributing to the consistently high-end user tariffs, deteriorating public financial management.

It is important to note that the tariff notified by the government to subsidize households consuming up to 200 units is even lower than the price at which Discos acquire electricity from the CPPA. T&D losses on average are around 20 per cent of the component of power tariff, which is considered a remarkable share. Rest of the component is majorly shown by the distribution margins of Discos and preliminary period adjustments (Pacra 2021)¹⁸.

The Philippines has taken 20 years and now the country is in the retail market. Many countries such as the US and Philippines have taken time in the implementation of power sector reforms and now they are performing well. So, Pakistan needs to reform the power market as well. While implementing the CTBCM model, it has to carefully analyze the risks, threats, and challenges.

CTBCM would assist in gaining the efficiency goal. It would create a new regime of transparency, predictability, and credibility. In accordance with this model, electricity can be traded or exchanged like any other commodity. This paper would, therefore, focus on the following objectives:

- To compare the commonalities and diversification of EPR in Pakistan viz-a-viz other economies
- To perform a risk assessment of the EPF to enable a smooth and effective transitioning towards CTBCM based on international experiences

2. Methodology

The study while stressing the need for reforms in the electric power sector aligns it with the global best practices. For instance, strategies of well-established goals and policy consistency with other factors relevant to subsidies and political support are adopted by Philippines and proved successful. In Turkey, adoption of renewable energy provided the support in electric market reforms. Keeping in view the ground realities of Pakistan, comparing the practical steps and the successful practices adopted by other countries could ensure effective implementation of the envisaged reforms. In this analysis, qualitative research tools have been utilized to get in-depth information about the CTBCM. A desk review of the in-depth risk analysis of global competitive markets was carried out to analyze the risks, threats and challenges that may come up while implementing CTBCM. With the help of

¹⁶ CPPA annual report 2021

¹⁷ <https://nepra.org.pk/Admission%20Notices/2020/03%20Mar/Implementation%20Roadmap%20of%20CTBCM.pdf>

¹⁸ https://www.pacra.com/sector_research/Power%20Distribution%20Sector%20Jan'21_1611320939.pdf

literature, some preconditions to enter the competitive markets were discussed so that Pakistan could better analyze and assess its position and condition before implementing the CTBCM model. Additionally, a roundtable consultation was conducted in March 2022 with the public and private stakeholders which helped the researcher gather on-ground information and recommendations for the policy way forward. The data was compiled and analyzed in the context of supporting the implementation of CTBCM in Pakistan. After a thorough policy analysis, recommendations were made both at the strategic and tactical levels.

3. Threats and Challenges for CTBCM as Electricity Market Reform

The power sector of Pakistan lived up to the challenge of providing uninterrupted and reliable supply of electricity to all segments of the country, including the industry and commercial and domestic consumers. With the implementation of CTBCM, the problem of inefficiencies can be resolved. However, there are a few challenges that need to be taken care of while implementing CTBCM.

3.1. Electricity Prices and Tariff Structure

According to some estimates, it was observed that the tax revenue received from the energy sector amounted to Rs700 billion in the year 2016-17. The government of Pakistan has greater reliance on indirect taxes for generating revenue. Now, under the IMF extended fund facility (EFF) any reduction in revenue streams is not acceptable. In fact, they have motivated the indirect taxation system by observing the absence of success in enhancing the collection from direct taxes.

In Pakistan, the average industrial tariff rates of electricity are the maximum at PKR18.8 per kilowatt-hour (kWh) as compared to Bangladesh, India, and Vietnam, which fall within the range between PKR6 -12 per kWh (Nepra 2021)¹⁹. In spite of a poor financial situation, Pakistan has somehow accomplished to attract investments, particularly from CPEC where Pakistan has borrowed a large sum of money. These fundings were made available when Pakistan was already troubled with an account deficit and a public external debt of around \$105 billion as estimated by the IMF in 2019.

In Pakistan, the tariff on electricity is not balanced as compared to the petroleum sector (Akhtar 2020). The Value Added Tax (VAT) on electricity in India comes under the domain of provinces with a 6 per cent rate or even lower. Almost a same criterion has been adopted in Pakistan.

There is low-capacity consumption and a huge difference between winter and summer demand. Fixed charges have increased due to the increasing capacity as compared to steady growth in demand. The MoE has announced to decrease the winter tariff and will give some benefits that will increase the demand. Throughout there is a continual underused of capacity, whether it is summer or winter (Akhtar 2020).

In India, there is a decreased night-time tariff allocated for the night-only industries. There is a night-time tariff of INR 2.60 assigned to For night-only industries, it is Rs 2.60 whereas for the general industry, the tariff is Rs 4.25. Some steps can be taken in this direction along with decelerating the generation of new capacity. Tariff structure is a big issue of the power sector; an appropriate method is essential to overwhelm this issue for the better implementation of CTBCM (Akhtar 2020).

3.2. The Cost of Losses

The economy is presently undergoing a serious cash-flow crunch, causing a massive circular debt that weakens the sustainability of the electricity system and a severe threat to secure socio-economic development. Circular debt of the energy sector has been consistently growing due to the consumers defaulting on the commitments, distribution companies, and the government, reaching a disturbingly high point. The circular debt at the end of

¹⁹ National Electric Power Regulatory Authority. 2021. State of Industry Report 2021. Islamabad.

FY2020 grew from 1.6 per cent of the GDP, which is around PKR161 billion in 2008, to 5.2 per cent of the GDP which is around PKR2,150 billion and further improved to PKR2,400 billion in December 2020 (ADB 2021)²⁰.

As of June 30, 2021²¹, circular debt mounted at PKR2,280. 15 billion expanding by 6.0 per cent during the fiscal year (SBP 2021). Unsettled governance problems, operational inefficiencies, and planned increases in installed capacity indicate that the circular debt issue will intensify in the years to come. With a debt-to-GDP ratio of 83.5 per cent in FY2021, Pakistan has no capacity of accumulating more debt and must act fast to stop this debt build-up (ADB 2021).

Spending on public subsidies for the power sector, for instance in FY 2021, PKR139.5 billion or 67 per cent of total subsidies, has declined over the years, but continues at about 0.3 per cent of the GDP in FY2021, adding to high fiscal deficits²².

The cost of losses with the fall of monopoly over power is likely to lead to a cartel-like behaviour of power producers in the wholesale market. This will lead to steep price increases and energy shortages. This was observed in the past in California where retail prices caused large losses to Discos. Take the example of Turkey where state-owned Gencos often undercut market price. We need to consider these examples while implementing CTBCM.

3.3. T&D Losses and Recovery

Owing to poor management (i.e. transmission and distribution losses) by the Discos in the FY 2019-20, a total loss of Rs59 billion was incurred to the national exchequer whereas the revenue loss was around 160 billion in FY 2019-20, which is very alarming and one of the reasons behind circular debt in Pakistan (Nepra 2019)

3.3.1. Transmission and Distribution losses

A total of around 2.65% losses were incurred in T&D reported by Discos that is above the allowed limit set by the NEPRA for the FY 2020-21. As shown in Figure 1, distribution companies (Seeco, Pepco and Qesco) have breach the NEPRA target and leads to the increase in circular debt (Nepra 2021-2022).

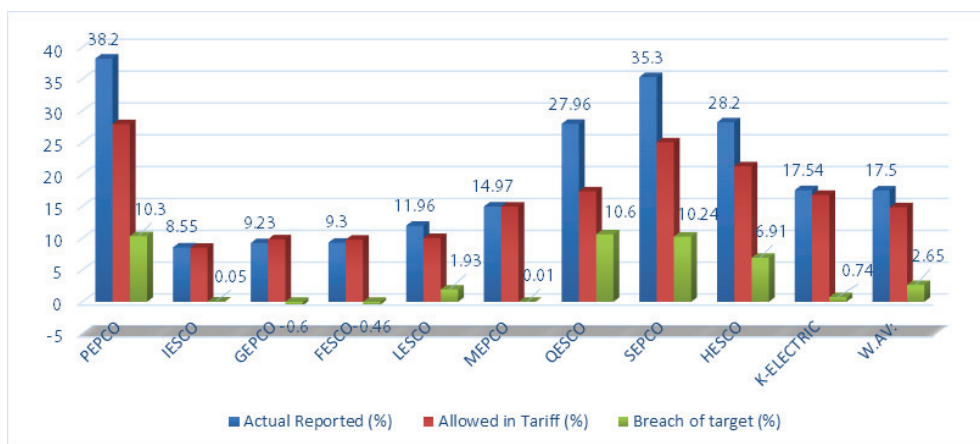


Figure 1: Transmission and Distribution losses (Source: Performance Evaluation Report of Distribution Licensee of FY 2020-21)

The financial analysis of Discos as shown Figure 2 indicates that Pepco remained on top in financial loss as compared to other Discos²³.

20 ADB 2021 Energy Sector Reforms and Financial Sustainability Program (Subprogram 2): Report and Recommendation of the President <http://www.adb.org/Documents/RRPs/?id=53165-002-3>

21 State Bank of Pakistan. 2021. Pakistan's Debt and Liabilities – Summary.

22 Government of Pakistan, MOF. 2021. Federal Budget 2020-21, Budget in Brief. Islamabad.

23 Performance Evaluation Report of Distribution Licensee of FY 2020-21

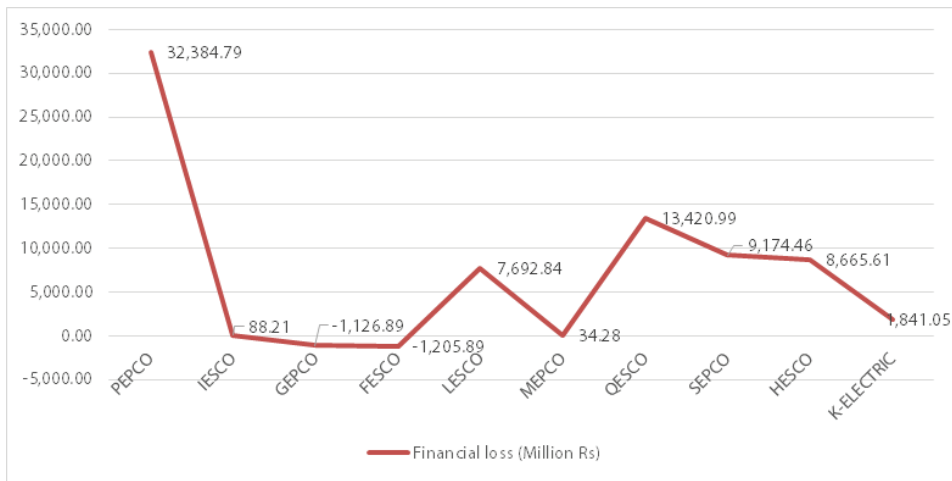


Figure 2: Financial loss (Million Rs) due to T&D Loss source: Performance Evaluation Report of Distribution Licensee of FY 2020-21)

3.4. Role of Power Sector Governance

The political economy of the energy sector is so deep-rooted that its influence is apparent in every facet of the market configured by CTBCM. Their reluctance to forgo their power and disrupt the status has widened the gaps between policy and implementation. The sector’s long supply chain translates into divided incentives. The role of private agendas, rent-seeking and political interventions is bound to reduce the feasibility of the project.

Every decision about a power system generates political benefits and costs that are often as critical as the technical and economic factors of the projects. Foreign aid further upsets the balance as the government agencies receiving aid are able to increase their influence related to other actors in the country thus, the accountability process is compromised.

4. Global Competitive Market Models and Best Practices

Electricity market reforms have taken place worldwide for nearly three decades, however, the competitive power market reform concept varies in each country’s case. In this report, mainly six global examples, i.e. United States of America, United Kingdom, Turkey, Brazil, Philippines, and India have been considered, which will provide a guideline while the selection of the most suitable amongst them will rely upon the current ground conditions and compatibility with the existing power sector set-up of Pakistan. The Philippines, and India are the developing countries, their models, rules and practices can provide support and guidance for Pakistan’s power sector reforms. While Brazil, Turkey, United States of America, and United Kingdom have embraced competition many years ago, both success and failure practices of power sector reforms have been observed in these countries. By reviewing the comparison of the selected competitive markets, Pakistani policy makers can learn lessons and precautionary measures can be taken in implementing competitive trading bilateral contracts market.

4.1. Philippines

The Philippines’ electric power sector brought about successful reforms. The reforms, catalyzed by the severe shortage of supply in 2001 (Bacon. R., 2019), focused on creating competition at the wholesale and retail levels potentially resulting in a more efficient electric power sector and reduced consumer tariffs.

Philippines is considered a success story in the implementation of electric power market reforms. The factors that contributed to the success included, but not limited to, political support, well-designed initial strategy, absence of direct subsidies to the consumers and policy consistency. During the 1990s, the Philippines incorporated deregulations in its oil industry and power sector reforms. The main objectives of reforming the energy sector in

the Philippines were to i) reduce fiscal deficit of subsidies allocated for the energy sector, ii) increase competition in the energy market, iii) enhance private sector participation, and iv) ensure efficient and authentic supply of energy (Mendoza, 2014).

The improvement in the power sector of the Philippines is achieved by transforming the public utility, owning all generation and transmission to the private ownership of this sector and bought the competition between distributors and generators with the help of its political support and well-designed initial strategy. The well-designed programme, along with political pressure from the highest level and absence of subsidies made it possible to be a successful energy reform model in the Philippines (Bacon, 2019).

4.1.1. Elimination of Subsidies in the Philippines

Bacon (2019) analyzed that the power sector received no subsidies from the government, except for cross-subsidies within the residential consumer group. Similarly, Mendoza (2014) analyzed a subsidy programme for the power sector of the Philippines where a one-off cash transfer was given to the marginalized consumers of electricity. Residents consuming up to 100KWh obtain a lifeline discount. With the help of this discount rate, 6.8 million get the benefit and the cost accrued by the government stood around USD 82 million .

Depending on the consumption level of consumers, the discount rate varies from 20 to 100 per cent. Residential customers consuming 1 to 20 kWh obtain a 100 per cent discount; customers who consumes 21 to 50kWh obtain a 50 per cent discount; the customers consuming 51 to 70kWh obtain a 35 per cent discount; and those consuming 71 to 100kWh obtain a 20 per cent discount. This discount obtains funds from a Lifeline Subsidy Charge which is being paid by all other customers of electricity. Customers with age over 60 years also obtain a 5 per cent discount (Bacon 2019).

4.1.2. Elimination of Cross-Subsidies in the Philippines

In 2002 and 2005, the subsidies were removed for inter-grid between Luzon and Visayas and intra-grid within Luzon, respectively. Furthermore, the subsidies were removed in 2005 for interclass (between industrial and residential). This initiative was taken primarily to reflect the true cost of service delivery in the power sector. The removal of inter-class subsidies was done in two phases to allow for smooth adjustment where 40 per cent of the subsidies was removed in 2004 and 60 per cent was taken out in 2005 (Brucal and Ancheta, 2018).

The Pantawid Pamilyang Pilipino Program (4Ps), which is a conditional cash transfer programme, has been initiated in the Philippines. It has been advocated that the electricity lifeline subsidy rates could be well-targeted with the help of the 4Ps programme other than through cross-subsidization within the electricity sector. Cross-subsidization in distribution utilities shows that distribution utilities involving poor zones have a lesser income base and are less capable to provide lifeline rates to the poor in those areas (Mendoza, 2014).

Absence of direct subsidies to the consumers, except cross-subsidies for different groups of consumers and tariffs, haven't decreased even when fuel prices increase in the Philippines. It displays a market structure in which competition is bought in the wholesale market in the absence of subsidies and in the presence of high tariffs, but tariff is slowly declining as the energy market is now shifting from being wholesale to retail (Bacon, 2019). With the creation of PSLAM, they have created a separate specialized agency which controlled the generation and transmission of all the state and, hence, proved successful. Policy consistency was adopted in the Philippines because when reforms are underway, it becomes difficult to change or reverse the process. They followed the initial plan and didn't reverse it. With the help of the political support, well-established strategies, absence of subsidies, regulatory institute and with policy consistency, successful market reforms have taken place in the Philippines.

4.2. India

India has continuously deregulated the energy industry in the past few decades, even though the government also owns companies, which can play as an active participant in the sector. Owing to such transformations, 100 per cent ownership is allowed with the help of FDI (Foreign Direct Investment) in the process of generation, transmission and distribution and trading of power segments, excluding nuclear power.

The main Act which commands generation, transmission, distribution and trading of electricity was the Electricity Act 2003. This law formed the National Electricity Policy 2005 and the National Tariff Policy 2016, which established the Central Electricity Regulatory Commission (CERC), State Electricity Regulatory Commissions (SERCs) and the Appellate Tribunal. Even after that many generation, transmission and distribution companies are in the control of either government or State Electricity Boards (SEBs), but the private sector contribution is increasing, especially in the process of generation and distribution (Ziauddin, 2019). India's political economy factors gave rise to adverse outcomes in the initial stages of reforms.

Anyhow, the policies are not efficient and advantageous for power sector. Not all factors were incorporated in India as the Philippines had adopted. Thus, adverse outcomes occur in the initial stages of electric market reforms (Jamash et al. 2015).

While analyzing the reliance of subsidy for the power sector, regional variation is observed in India. For example, power distribution companies in the north-eastern states and states having agriculture shows that over-reliance on government subsidies and continued reliance on subsidies discourages the power distribution companies from bringing improvements. Delays in getting financial assistance from the government leads to the liquidity strains of power distribution companies²⁴.

4.2.1. Learnings and Best Practices from Electric Market Reforms in India

For regulatory reforms, the Indian government takes the initiative of Direct Benefit Transfer to reform the process of subsidy for the improvement in transparency and decrease leakages. Subsidies are directly provided to the accounts of citizens. The pilot programme, Paani Bachao Paisa Kamao, aims to resolve the problems of overconsumption of agriculture's groundwater by providing the incentives to the farmers to reduce the usage of electricity and water without disrupting the supply of free electricity. Farmers are motivated to utilize less electricity than their free allowance by providing them rebates or discount on the lower consumption in their bills. Electricity is provided only during daytime, which permits farmers to observe their water consumption (Regy et al. 2021).

Enrollment is allocated on a voluntary basis but once enrolled, their agriculture pump is allocated by an automated meter reading (AMR) system. AMR facilitates the power distribution companies to check energy consumption and evaluate savings and incentives. Consumption and saving data are transported to farmers with the help of SMS on a bi-monthly basis. Any incentive amount is credited to farmers through Direct Benefit Transfer mechanism. Success on the first six feeders has encouraged the state to expand the pilot scheme to 250 further feeders (Agnihotri 2019)²⁵.

4.2.2. Provision of Electricity to Rural India

Even though in 2019, India attained 100 per cent household electrification, but still 37 per cent households located in Bihar doesn't have access to authentic electricity. Mini-grids are believed to be the reliable source of power in that state; around 8 per cent of the country's mini-grids have been installed in Bihar. The main objective of the state policy is to further enhance this momentum and install 100MW (Sub 500KW) of mini-grids, which are based on the renewables. Private energy service companies (ESCOs), for instance, Husk Power, have been established in the state

24 https://www.niti.gov.in/sites/default/files/2021-08/Electricity-Distribution-Report_030821.pdf

25 <https://indianexpress.com/article/india/reforming-agriculture-when-power-is-worth-saving-5520945/>

(Regy et al. 2021). Husk Power shows its reliance on building a base demand with the help of anchor loads, such as industrial user or agricultural facilities enhances the utilization rate for mini grid, which reduces the average supply cost²⁶.

Tariffs allocated by Husk Power are cost-reflective and provide no subsidies, permitting for tariff setting as the joint discretion of the developer and consumers. Even though the tariffs are high as compared to the centralized grids, still a maximum number of customers are pleased to pay the premium for a reliable and authentic supply of electricity. For example, in Bihar, 32kW of Husk Power biomass-solar hybrid plant near Piprakothi, assists 250 customers regardless of grid extensions in the area. Hence, despite uncertainties about inadequate regulations and grid's arrival might discourage investment, Husk Power accomplished to raise IRs 20 million in 2018^{27 28}.

Success of Husk Power is also credited to its usage of smart technology, for instance, remote monitoring of mini-grids and mobile-enabled smart prepaid meters with a system of 'pay-as-you-go' appropriate for customers with uneven income flows²⁹.

Prepaid Meters in India

The policy in India focusses on the factor that all new registered connections should adopt the pre-paid meters and all already existing meters should be transformed into the pre-paid form within three years (Ahluwalia, 2021).

Such a system of transparency in the billing system and mechanism of payments can be effective and is already widely utilized for mobile phone services by users who are cost-conscious. Thus, the same diverse options digital-plus physical pre-payment system can be replicated for electricity with the additional advantage of generating decentralized, informal top-up card vendor livelihoods and to the detriment of expensive company employees or agencies in urban areas.

4.3. Brazil

Brazil follows a good model of reforms in the power market of electricity and restructuring has occurred with the help of building an innovative competitive market, which has dominance of hydroelectricity (Ziauddin 2019). The transformation changed the structure of Brazil's power market and adopted the unbundled structure, both vertically and horizontally integrated. In the new model, they adopted both private and government-controlled power companies. Such transformation in the power market causes better-quality service of electricity in Brazil and has enhanced the growth in terms of generation capacity, variety in the sources of energy, energy mix, gains in efficiency, and productivity of labour experienced with the help of reforms in the Brazilian power sector. Tankha & Society (2008) analyzed in the study that privatization initially proved to be phenomenally successful. The positive impact was observed in the initial stages, but later privatization face challenges to deliver to other public service authorities.

4.4. Turkey

In Turkey, power market reforms initiated in 1990s and headed to the privatization distribution retail companies in 2010s³⁰. The Electricity Market Law or EML renovated the legislation of the electricity market in Turkey and formed the foundation to convert the framework for building the design and regulation of the power market. This law helped Turkey attain competition in the market and unbundled the monopolistic market structure, introduced

26 <https://www.seforall.org/system/files/2020-06/MGP-2020-SEforALL.pdf>

27 Alliance Magazine, 2011. Why are they funding Husk Power? Retrieved August 09, 2022, from Alliance Magazine: www.alliancemagazine.org/feature/why-are-they-fundinghusk-power/

28 CSE, 2016. Minigrids: Electricity for all. New Delhi: Centre for Science and Environment. Retrieved from www.cdn.cseindia.org/userfiles/mini-grids.pdf

29 Husk Power Systems, n.d. Husk Power Systems. Retrieved August, 10,2022, from: www.huskpowersystems.com/

30 <https://tribune.com.pk/story/2268234/lessons-from-turkey-pakistans-power-sector-reforms>

https://www.academia.edu/35492237/Presentation_on_TURKISH_ELECTRICITY_REFORM_and_PRIVATIZATION_of_ELECTRICITY_DISTRIBUTION_SECTOR_T%C3%BCrkiye_Elektrik_Reformu_ve_Elektrik_Da%C4%9F%C4%B1t%C4%B1m_Sekt%C3%B6r%C3%BCnde_%C3%96zelle%C5%9Firme_Tebli%C4%9F_Sunumu

competition in the market beyond the threshold level of consumption of electricity and third parties were also permitted to get accessibility to the grid (Ziauddin, 2019).

Political interference became more prevalent in electric power reforms. However, a well-defined goal of environment-friendly generation mix helps Turkey achieve success in the wholesale electricity market. Turkey EMRA, the regulatory authority, was established to overcome negative externalities, but the package of energy policies should incorporate resource efficiency and efficiency should be implemented on a long-term basis in the domestic electricity production. No decrease has been seen in retail electricity prices after the reforms and cost-reflective tariff of electricity affect consumer prices slightly less as compared to producer prices in Turkey (Dinçel et al. 2021).

Overall, the Turkish energy model has led to a significant outcome because of various interlocked measures, which include the legislation relevant to electricity, renewable energy, and the establishment of independent regulatory authority of energy sector. The issue that arises in Turkey energy market reforms is high dependency on imported energy causes the current account deficit³¹. The government of Turkey, however, needs to decrease the payments on its energy imports and can learn from the EU practices (Gokirmak, 2017)³².

4.5. The United States of America

The power sector was controlled by the government in the US at one time. In 1978, the Congress approved the public utilities regulatory act (PURPA) according to which utilities could buy electricity from the power producers involved in small-scale production, which includes both renewable energy sources and projects of cogeneration. Introducing the Act initiates the transformation of the power market having monopoly towards the Independent Power Producers (IPPs). After that Act, an energy policy was approved in 1992 that gave the Federal Energy Regulatory Commission (FERC) the authority or approval to provide the licenses of transmission on request. Owing to the restructuring of the power market, the US electricity market comes up to the demanded merits of Power Market (Ziauddin, 2019).

In the US, reforms take place at the state level with a well-designed goal of low prices in electricity markets. This helps the US in electric power reforms. Prices are low as compared to other OECD countries. Along with the success story of the PJM state, there also exists the example of failure. The PJM policy in California failed because its generation depends on the hydropower plant. Owing to drought, the PJM policy didn't work for California. The rise in the prices of natural gas rendered many plants uncompetitive and destroyed the finances of the merchant generation sector. California faces the failure because of unplanned generating outages. Implementing the policy of PJM in California was unfair. Policies should be implemented according to the right choices of resources. Lesson needs to be learned from the failure of California (Blumsack et al., 2005).

4.6. The United Kingdom

A transformation in the electricity sector in the UK took place in the past. The restructuring resulted in the complete transformation of the industry into diverse segmented types, such as generation, transmission, distribution, and marketing of electricity declared as an isolated operation. The very first but minor action taken by the UK towards reforms in the power market was Electricity ACT 1983, which promotes the IPPs. In July 1989, the law was signed. Owing to the law a change was initiated in the electricity market of the UK in the 1990s³³.

The generation and transmission company of the UK "Central Electricity Generation Board " was divided into four segregated organizations; it consists of two large generation companies of power; one is power while the other is distribution network. Further, the distribution network comprised 12 RECs or Regional Electricity Centers. http://pdf.usaid.gov/pdf_docs/PA00TS62.pdf THE OFFER (Office of Energy Regulation) was developed which regained

31 <https://documents1.worldbank.org/curated/en/249831468189270397/pdf/ACS14951-REVISED-Box393232B-PUBLIC-EnergyVeryFinalEN.pdf>

32 <https://dergipark.org.tr/en/download/article-file/361691>

33 http://pdf.usaid.gov/pdf_docs/PA00TS62.pdf

the authority of the industry regulator. Furthermore, marketing of electricity beyond 1 MW was liberalized at an unmonitored price. The UK made reforms in three phases. The UK electric reform goals are secured future supply of electricity, low carbon and affordable. In the First Phase of Pool reforms in electric market reforms, the electricity prices decreased initially, but after some years prices rose again. The second reform NETTA/BETTA utilizes the bilateral contracts, and it is proved to be a successful reform. ETTA/BETTA has ended the capacity market and transformed the UK's electricity market in the form of pure energy market. In the third reforms phase, renewables have been classified and capacity market was reintroduced. This has caused some controversy in UK, but stability of power system with the aim of low carbon is taken into consideration in the third electric market reforms (Liu, Wang & Cardinal, 2022)

The UK market has attracted foreign investment to a great extent. In the beginning, the prices were low, but increased again after several years during the first reform period. Any policy change will have different effects because at the start prices decline and then increase after the first phase of electric power reforms. Policy makers may also need to incorporate factors beyond technology, such as game theory and consumer psychology (Liu et al., 2022).

5. Economic Risk Assessment of Electric Power Sector Transitioning Towards CTBCM Based on International Experiences

There is no evidence that restructuring has produced any measurable benefit to consumers or to the systems that have restructured. In particular, comparison of industrial electricity price data between restructured and non-restructured states indicates that there is no proof of a substantial reduction in price, or even in the rate of change in price, in the restructured states,(Apt, 2005) and the details on the overall operation costs and thermal efficiencies is mixed. With the help of research, it was shown that no measurable benefit is attained by the consumers of the US when they have induced reforms in the power sector.

A review of betterment in consumer welfare in other deregulated industries concluded that price reductions in sectors resulted from deregulation in airlines, natural gas, trucking and railroads. The review noticed that price reduction in real terms was around 30 to 75 per cent in these industries. No similar reductions have been seen in restructured electricity markets in the case of the United States. The data indicates that prices for industrial customers, who were predicted to be the principal beneficiaries have no statistically shown significant difference between restructured and unstructured states (Blumsack et al. 2006).

5.1. Scarcity Prices Contrast with High Prices Influenced by Market Power

In a well-performing competitive market, the stress is applied on the prices due to scarcity and, thus, the high prices as a result, gave an indication for the better decision related to allocation of resources. Overtime, new adjustments are required in the demand and generation of electricity along with new investment schemes. It doesn't necessarily imply that high prices are due to scarcity, but this phenomenon (high prices) can occur in the absence of true scarcity. If the rise in prices is decided by the one or more dominant agents in the market, then this can prove very harmful for the market to perform its function in a better way. With the type of generation long-term fixed costs show variation in their behavior³⁴.

In a uniform pricing mechanism, the generators manage to bid according to their marginal costs. Generators with the minimum marginal cost are chosen on priority and those generators with the maximum marginal costs are chosen in the last. The selected marginal unit is the most expensive and market-clearing price (MCP) is the price at which all the suppliers do the payments³⁵.

Under this pricing system, generators, without including the marginal unit, receive a price that is above their marginal cost. This difference is called infra-marginal profit. As the marginal costs cover only short-term costs

³⁴ This is taken from Book (Chapter 7) Sioshansi, F.P. ed., 2011. Competitive electricity markets: design, implementation, performance. Elsevier.

³⁵ Uniform pricing, as compared to pay-as-bid pricing, is the dominant pricing mechanism used in most restructured wholesale electricity markets, particularly, in the United States. For a good discussion of these two pricing mechanisms, see Kahn et al. (2001).

related to the production to cover all additional costs, like long-term fixed costs. To sustain investments in generation, infra-marginal profit must be obtained and given as the revenues so that all short-term and long-term costs utilized in the production of electricity might be managed³⁶.

Sioshansi et al. (2011) analyzed that scarcity implies a scenario where the level of generation capacity is required to assist the load and to manage a lowest reserve margin base approaches having capacity, which puts stress on the price level. High market-clearing prices contribute to a high level of infra-marginal profits, which, in return, helps in bringing more investment with additional resources.

The new plants which entered the markets have low level of marginal costs as compared to the existing plants. Once the older plant with the most expensive units is replaced by the new plant with a more efficient level of units, the new most expensive unit will declare the price, with having the effect that prices will decrease over time. If the setters of new market price have marginal costs greater than the new units and the new generators have high revenues, then long-term sustainability will be possible to achieve (Sioshansi et al. 2011).

In the lines above it was discussed how price signals are expected to work in a well-functioning competitive market. However, when prices are driven by the exercise of market power rather than by the scarcity of supply, the price signal is corrupted. Lenders and investors may be uncertain about whether to build or finance new plants if they see an incongruity between high prices and seemingly abundant supply. Prices that are higher and more volatile than the fundamentals of supply and demand would suggest can also be a significant risk factor for new retail suppliers in the electricity market³⁷.

However, when prices are determined by the market power instead of supply's scarcity, then the prices are corrupted. Uncertainty among lenders and investors exist about whether they should participate in building or financing new plants if they observe an inconsistency in high prices and abundant supply. Prices that are volatile and higher than the demand and supply are considered risk factor for the new retail suppliers in the market.

Rudnick and Velasquez (2018) highlight the fact that a majority of the developing countries doesn't fulfil the criteria of having the prerequisites for the wholesale market to be operated and established. Firstly, the most important precondition towards the wholesale market is a stable financial health system of that country. Distribution utilities, which are the main entities involved in the buying process, need to be financially stable and credit worthy.

In many developing countries the end-user tariff is not appropriate and beyond the level of cost-reflective tariff and, thus, brings many inefficiencies and many utilities go into hazardous condition (Huenteler et al., 2017). And the other most important point is that it is impossible for the government to implement market reforms if it is not on a priority basis and doesn't decrease the revenue-cost gap (Jamasp et al. 2015).

Payment integrity is another important factor which is required by unbundled market reforms to do the payments between the distributors and generators. Payment type issues arise in many developing countries where their own customers cause the issues as the distributors don't receive payments from their own customers. Thus, distributors cause issues in their payments to the generators. The circular debt crisis is an example from Pakistan where unbundled market reforms face such issues (Kessides, 2013). The other issue is that the generators had their contracts with the IPPs in foreign currency where devaluation of the exchange rate can cause an unaffordable electric price overnight for distributors whose tariffs are designed in the local currency.

Without taking care of the above-mentioned conditions, power competition can't prove effective and can even deteriorate the power sector instead of improving it. Opening wholesale competition in the presence of non-payment problems can be proved as an example of power reforms mechanism as this happened in Ukraine and also in other countries, including Eastern Europe. In the early 1990s, the Soviet Union faced energy market reforms problems (Krishnaswamy 1999; Krishnaswamy & Stuggins 2003).

36 This is taken from Book Sioshansi, F.P. ed., 2011. Competitive electricity markets: design, implementation, performance. Elsevier

37 This is taken from Book Sioshansi, F.P. ed., 2011. Competitive electricity markets: design, implementation, performance. Elsevier

In Ukraine, lack of payment's enforcement caused a crisis where suppliers received less cash. Even though the ministry provided less cash to the distributors, they weren't able to cover the distribution networks and customer services (Jones 2006)³⁸. The experience of Ukraine suggests that rather than relying on the market size, new generation companies are more important that can enter the market with resources and with the legally enforced contracts with the new or already present buyers (Rudnick & Velasquez 2018).

Furthermore, the structure of generation needs to facilitate competition at the margin of supply. Whenever four or more companies are dealing with generation, there is a dire need to show competition at the margin of supply during peak hours, shoulder and valley seem to be prerequisites for the wholesale competition to be proved effective (Jones 2006).

The potential competition in generation is linked to resource mix and inflexible baseload plants of generation of the given country. It was observed that a few firms with flexible gas or oil generation plants can compete in the margins of supply. These structural issues need to be addressed before going into the wholesale competition with the help of horizontal separation of generation assets.

A balance margin is required between supply and demand for the power generation capacity for better competition. There should be more firms that have the capacity to compete with the help of increasing output (Pittman 2014; Diaconu et al. 2009). If the electricity market is observed to be tight, then it is observed that all the available capacity will always be required, led to declining the extent of competition among all the suppliers (Rudnick & Velasquez 2018). It was observed that with the reserve margin fall below 10 per cent, this can lead to inconsistent wholesale markets and high prices exist even if the actual market is justly competitive (Newbery 2004). Therefore, countries with issues of supply adequacy, which many countries are already facing, should focus on new generation capacity before introducing the wholesale competition.

6. Policy Recommendations

The competitive markets, which were developed due to these reforms, have a number of benefits, therefore, different nations are enjoying the positive impacts of these developments. However, the reforms should be backed by careful design. Otherwise, instead of receiving benefits, they can result in a disaster for the power sector. Owing to these reforms, the quality of electricity service in Brazil has significantly improved and is in accordance with the international and regional standards. Rules have been put in place to separate generation, transmission, and distribution activities to enhance competitiveness of the power market.

Similarly, the performance of the US electricity market is quite good due to these reforms as prices are low as compared to other OECD countries and economic efficiency gains over the past decades have been substantial. As a result of these reforms, the electricity industry of the UK has become clearly more efficient and almost free of political influence. The electricity market has also highly attracted foreign investment.

A summary of the major policy factors noted and reported for the above cited cases is provided in Table 1. The major factors reported during the review include political support (PS), strong design of strategy and goal setting (GS), absence of direct subsidies or asymmetrical incentives to the consumers (DS), creation of regulatory institutes (RI), policy consistency (PC) and other factors

6.1. Macro Level Recommendations

The above table 1 signifies the implementation process. CTBCM needs to have the following characteristics from a macro level perspective.

³⁸ J.E besant jones 2006, p.62

Table 1: Components of success stories and failure stories in electric market reforms

Countries	PS	GS	DS	RI	PC	Remarks
Philippines	Yes	Yes	Yes	Yes	Yes	With the help of political support, they successfully compete in the electric power market
Turkey	Yes	Yes	No	Yes	No	Political interference becomes more prevalent in electric power reforms. No decrease is observed in retail electricity prices after the reforms. Cost reflective tariff of electricity affects consumer prices slightly less as compared to producer prices.
Columbia, USA	Yes	Yes	No	Yes	No	In the USA, reforms occur on a state-by-state basis. This is a successful case in USA and has implemented through PJM ³⁹ Policy.
California, USA	Yes	No	No	Yes	No	Failure case study in the USA. Policies should be implemented according to the right choices of resources. Lessons need to be learnt from the failure of California, as PJM policy applies in this state, which causes failure.
India	Yes	Yes	No	Yes	No	Political economy factors lead to adverse outcomes in the initial stages of reforms ⁴⁰ . Some states gain benefits whereas in some states, no effective outcome is gained from privatization in India. Technical losses of power generation, power theft practices, state level corruption and subsidized tariffs still exist in India.
United Kingdom	Yes	Yes	No	Yes	No	The aim of electric reforms is to secure future electricity supply, low carbon and affordability. Policy makers may also need to incorporate factors beyond technology, such as game theory and consumer psychology.

6.1.1. Inclusivity

Inclusivity can have multiple facets, but all are equally important. First, the inclusion of the potentially impacted or beneficiaries need to be ensured. In the true spirit of CTBCM being an initiative of public domain, consumer rights organizations, think tanks, SMEs, and other small business associations may be included in the planning and implementation of CTBCM.

Another aspect of inclusivity is the topical inclusivity. If a department is dominated by a certain technical trait, they should include the voice of other technical experts as well. In this case, the team seems to be dominated by engineers. It is recommended that economists, social science specialists, and subject-matter experts from other domains may be included in the planning, implementation, and other aspects of the CTBCM.

Another aspect of inclusivity is with regards to all the relevant departments from within the government at all federating levels to be included. The team appreciates the recent meeting of NEPRA with the competition commission of Pakistan (CCP). Similarly, other relevant units should be included in all aspects of CTBCM. This may also include government departments from the provinces which are stakeholders to the concept of CTBCM.

6.1.2. Agility

Based on the track record of long-term initiatives in Pakistan, there should be a strong case for flexibility in the planning. A fixed plan will not work with the volatility in the overall governance environment in Pakistan. It is, therefore, recommended, that agile methodology may be employed for the implementation of the CTBCM process which may be allowed to adapt as we move forward in the process of implementation. This coupled with a robust monitoring and evaluation mechanism will result in a successfully implemented and continuously improved initiative.

39 PJM is a regional transmission organization (RTO) that coordinates the movement of wholesale

50 file:///C:/Users/SDPI/Desktop/Electric%20reforms/Important%20electric%20reforms%20in%20countries.pdf electricity in all or parts of 13 states and the District of Columbia.

6.1.3. Goal-Setting and Strategic Direction

The focus of the initiative should remain on the provision of affordable and sustainable electric power to the consumers. The strategic direction should not be allowed to be changed under any circumstances. Considering the type of micro and macro risks identified in the study, there is a chance of cartelization in this segment as well. This risk may be removed through focus on the goal.

6.1.4. Political Support

Sustainable Development Policy Institute (SDPI), along-with several other organizations and individuals, has been advocating for political boundaries in democracy. The concept led to the debate on a charter of economy before the previous general election. The concept is still under discussion. About long-term initiatives, such as CTBCM, it is imperative to brief the political leadership about the impact of CTBCM. This also correlated with the initial discussion on inclusivity. These political actors can play a significant role not only in supporting the activities under the initiative but also the conceptualization of policy consistency, especially at interfaces of the governments. Think tanks like the SDPI can support the government by advocating that CTBCM should be included in the manifestoes of mainstream political parties.

6.1.5. Policy Consistency

While we discussed policy consistency from the political angle in the previous section, high turnover in the government departments is also something that can reduce the overall institutional memory and result in policy inconsistency. The government should aim at developing a mechanism for retaining institutional memory. One way can be to improve their communication and outreach in terms of inclusivity and reach. The technical documentation released in simple language can really help maintain a public memory of the initiative.

6.1.6. Better Coordination Between Government Departments

Another aspect for successful implementation of long-term public initiatives is the coordination between various departments. NEPRA must be appreciated for maintaining a significant coordination between the energy departments concerned. However, we recommend keeping the same level of coordination with departments that are from other ministries and federating units. This will help create a long-term consensus on the initiative, leading to a better impact.

6.1.7. Regulation and Subsidies

Electric power sector reforms require strict regulations to ensure competition in the power market. This will require a strategic level concern on the powers of the market operator, especially with regards to monopoly control. This will require significant adaptability in the legal structure of CTBCM. While analyzing the cases of different countries such as the Philippines, and India as discussed in this study, reforms in subsidies are required, such as India did in Bihar or removal of subsidies like Philippines removed cross-subsidies and with the help of cash transfer program targeted the poor. Learning from such policies may result in successful implementation of CTBCM in Pakistan.

6.2. Macro Level Recommendations

Some micro-level recommendations for the policy makers are also given below.

6.2.1. Supply Adequacy

The energy policy makers of Pakistan need to keep reserve margin as above 10 per cent and issue of supply adequacy needs to be addressed properly by NEPRA before the implementation of CTBCM for effective

implementation of the goal set for it.

6.2.2. Integrated Planning

Based on Ukraine's experience, process for the inclusion of new generation companies in the national grid may be subject to previous working on the transmission and distribution infrastructure. This will help reduce grid fault losses and curtailment. The IGCEP is a positive step in this direction, but the IGCEP may be fixed for a medium term to increase certainty in the market and allow easy market entry for new global players to ensure goals of CTBCM are met.

6.2.3. Theft and Losses

Another aspect of integration in the energy value chain is the consequent losses and theft in the system at various levels of transmission and distribution. Beyond a certain technical threshold, there is a need to reduce the risk of theft and losses. The paying consumers should not be penalized for a crime they did not commit. A mechanism, such as pre-paid meters, as utilized by India, may be used for making the consumer tariff more cost-reflective. Other solutions may include upgradation of equipment and automation in the infrastructure. Another aspect is the availability of data to independent researchers to ensure a comprehensive and independent analysis.

6.2.4. CTBCM Products

The CTBCM model is currently working only on two products that are energy and capacity, but in future or in the long-run focus should also be on energy emissions as well. All the stakeholders and experts need to start working on this. This may also be reflective in the plan for Pakistan to have 30 per cent electricity generation from renewables.

7. Conclusion

CTBCM is a great initiative which has all the potential to rectify the long-standing problems of Pakistan's energy sector. Through an inclusive, well-coordinated, consistent, and apolitical implementation, CTBCM can make Pakistan competitive in the world through affordable energy availability. In the long run, it can act as a catalyst of change towards sustainable energy systems. With a positive approach, the study aims to summarize the international cases for success and failure of electric market reforms, which may be considered by the policy makers to ensure goal achievement through CTBCM. The analysis of this study is based on global examples such as electric market reforms of Turkey, which utilizes the renewable energy and causes efficiency in their wholesale competitive market whereby in some states of India they adopt the good practices such as renewable energy, prepaid meter and provided the different incentive-based schemes that causes efficiency in their power market. On the other part, the failure of California indicates that one successful policy does not always work for an overall country. Policies should be prepared according to the resources and demand of each province or state of a country. Pakistan can learn from this case and should design policies for every province according to the resources available. This will require a significant effort to select best-fit models or some components of it for Pakistan. The policy makers should thoroughly study these models with special focus on license mechanism, metering mechanism, rules, procedures, tariff structure and issues handling T&D losses to learn reflectively from the other global models.

Limitation of the Study

This study has incorporated data and facts relevant to CTBCM up to April 2022. It focused on the risk analysis, threat, and challenges that Pakistan needs to learn from international experiences. Furthermore, it hasn't incorporated detailed analysis of the role and responsibilities of each stakeholders. This study incorporates the previous year's literature from Journals and books because successful countries had incorporated reforms in their

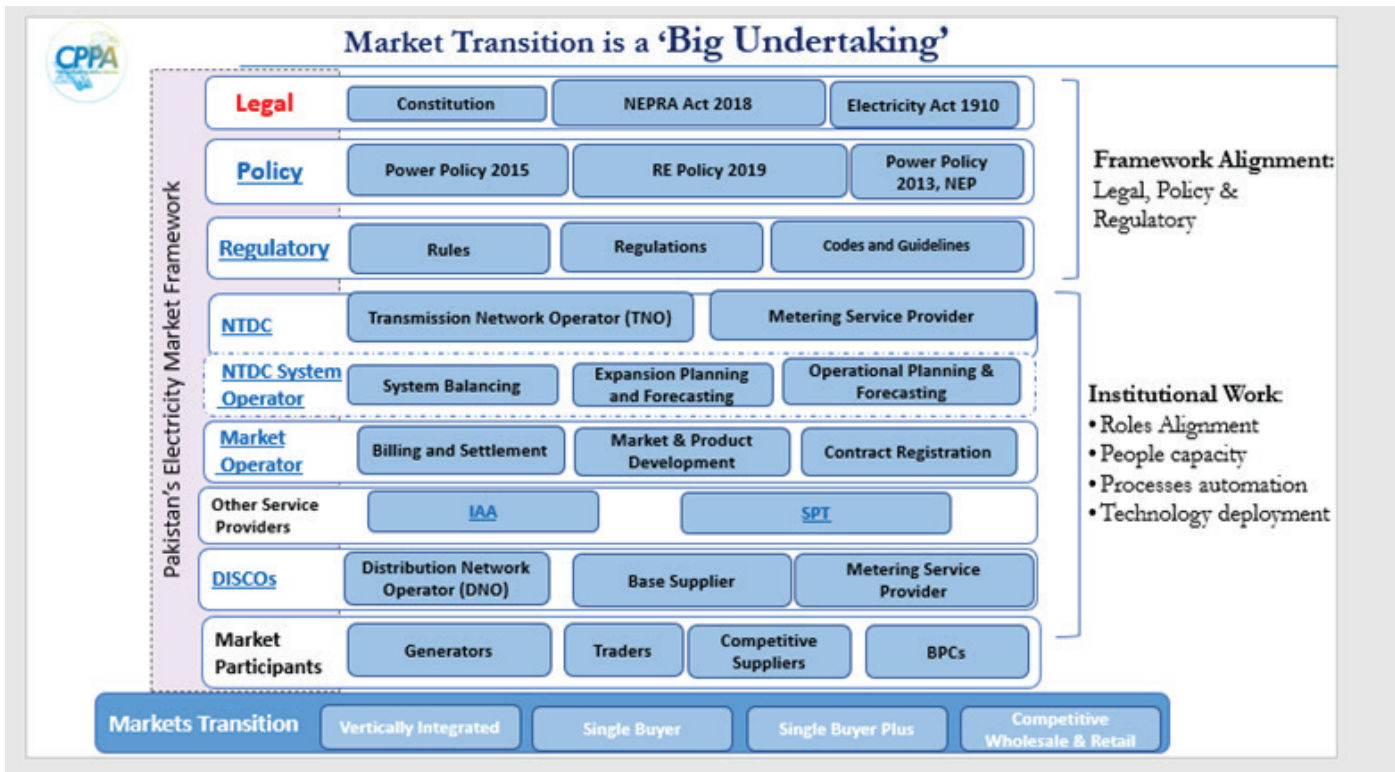
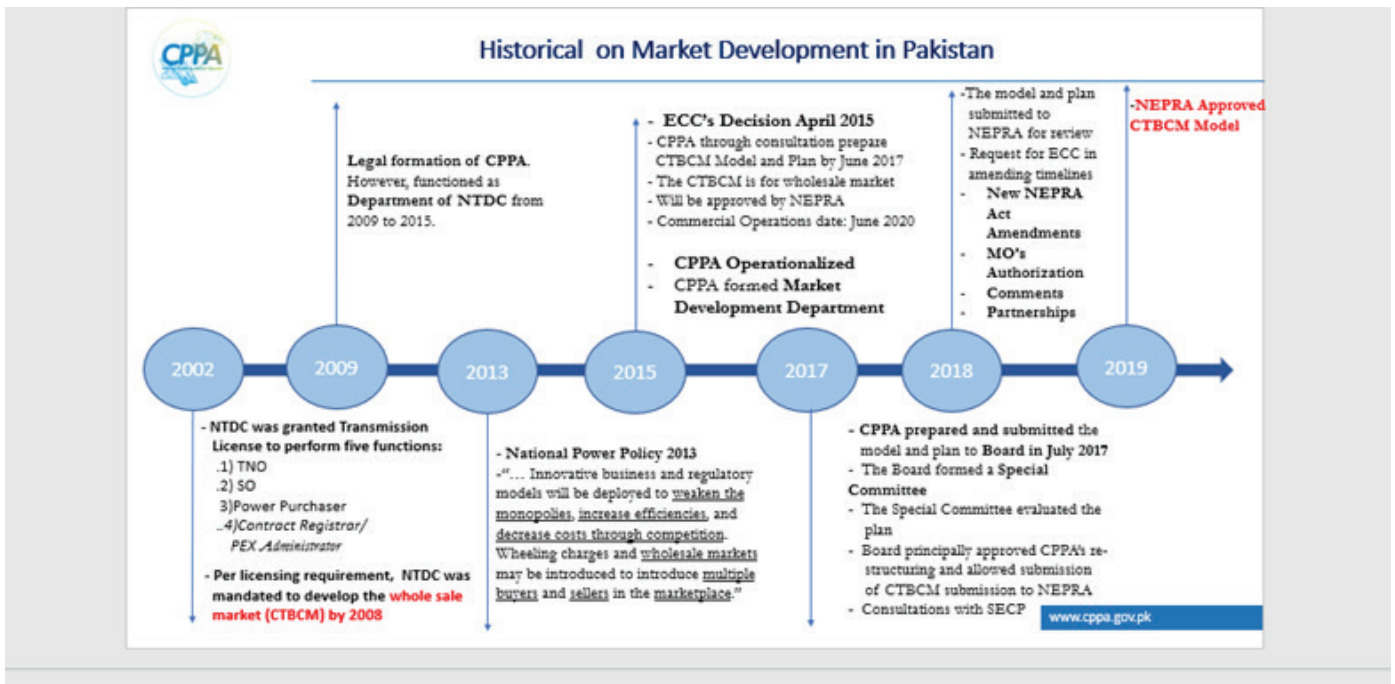
electric power markets many years ago, and now even they have transformed their electric power markets from being monopolistic to competitive and now they are finally in retail. This study mainly focused on the challenges that these selected countries face in electric power reforms and successful strategies adopted by these countries. These have been thoroughly analyzed in this study.

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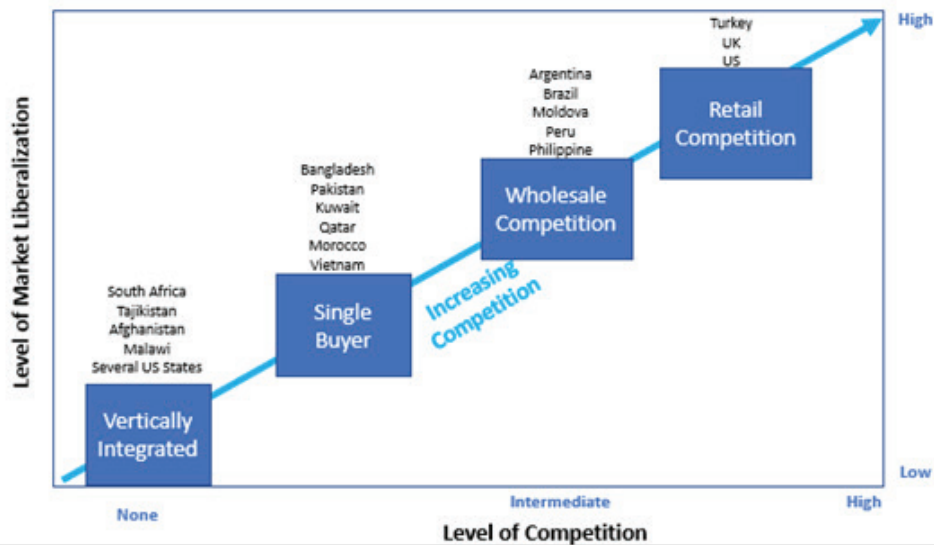
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Annexure: Presentation on CTBCM During SDPI Consultation



Competition = Liberalization

Competition requires liberalization (private participation) to achieve desired results!



Players in the Market

Market Participants

1. DISCOs as Regulated Supplier
2. Competitive Suppliers
3. Generators
4. Traders
5. Eligible /Non Eligible Consumers

Service Providers

1. Wire Business (Transmission & Distribution)
2. Market Operator (MO)
3. System Operator (SO)
4. Special Purpose Trader (SPT)
5. Independent Auction Administrator (IAA)



Players in the Market

Consumers



1. Regulated Tariff Consumers
(all consumers)



2. Eligible Consumers
(large consumers with choice)

Suppliers



1. DISCOs as Supplier
(can sell at regulated tariff only*)

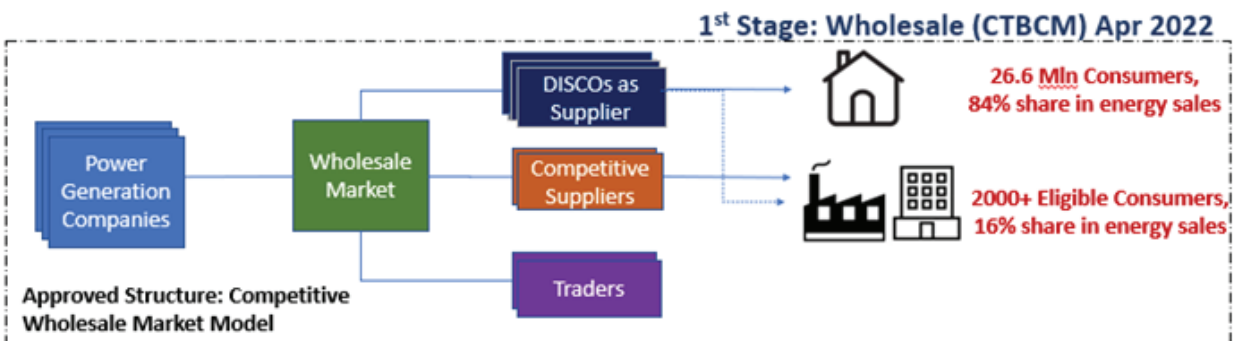
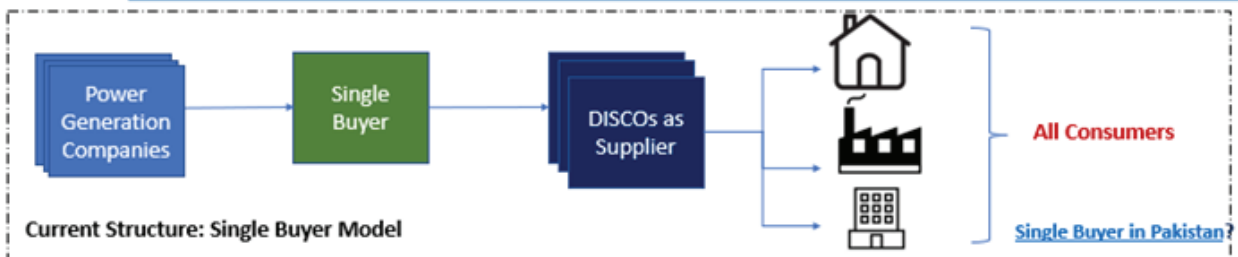


2. Competitive Supplier
(can sell to only eligible consumers at non-regulated prices)

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Single-Buyer Model and Wholesale Competitive Market





Competitive Wholesale and Retail Markets

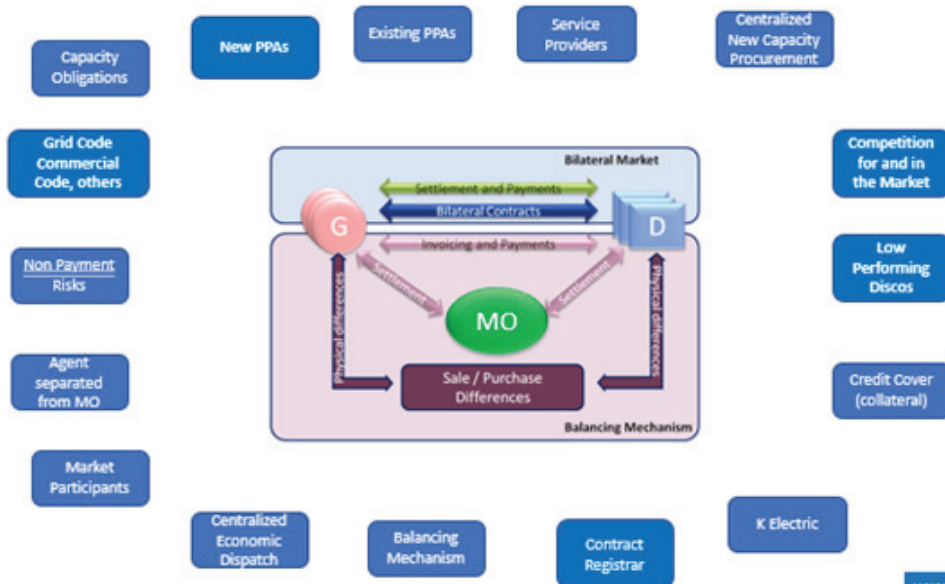
1st Stage: Wholesale (CTBCM) Mar 2022



2nd Stage: Retail



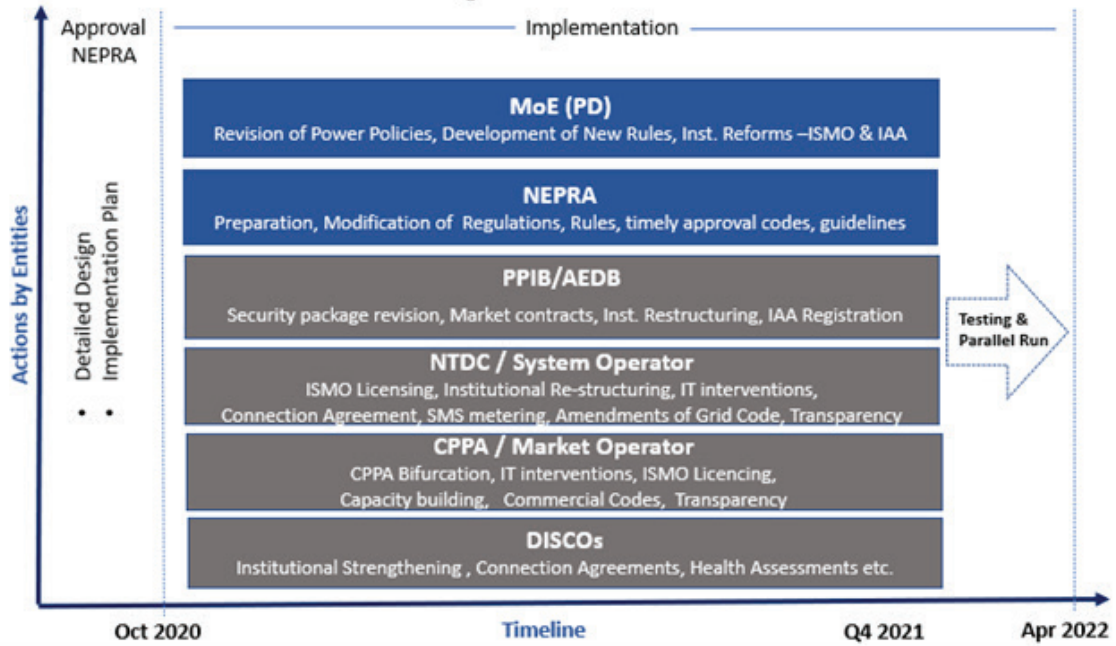
CTBCM – Features



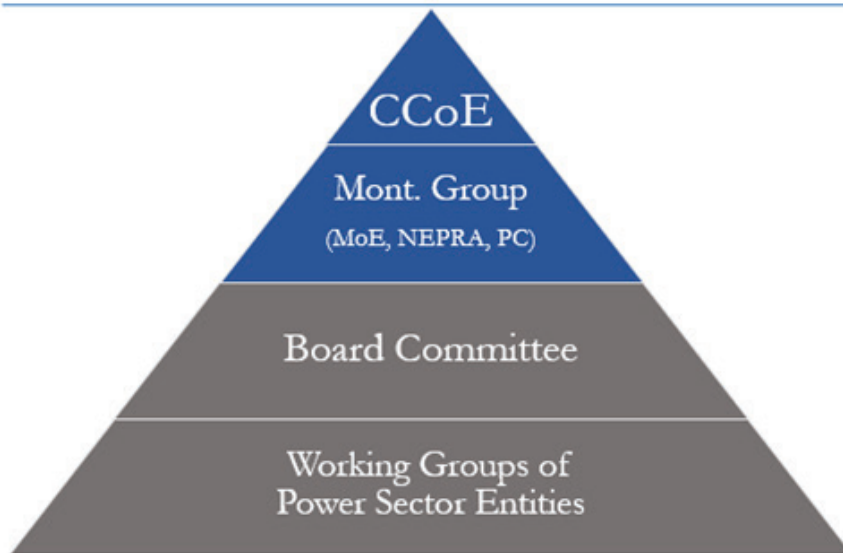
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Plan for Implementation of CTBCM



Monitoring & Implementation



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Role of System Operator

- **Roles:** SO a separate licensed entity with following roles:
 - Real time operations and system balancing within security and reliability constraints
 - Medium and short term planning, forecasting, Day ahead SCED
 - Long term planning and forecasting
 - Administration of Open Access to the Grid and Ancillary Services
- **Transparency:** To ensure transparency in operations, the SO will publish planning reports and real time operational decisions on its website
- **Information Sharing:** Information relating to transmission congestions / network constraints will be published through SO's website on real time basis.

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Role of Transmission Companies

- Provide reliable and stable transmission infrastructure to enable the trade
- NTDC as the NGC to coordinate with other transmission licensees for adequate design and construction of network
- Execute the construction of projects as proposed by the planner in a timely manner
- Allow open access to the participants, sign connection agreements
- Ensure transparency by publishing the status of transmission network and SOPs for granting connection
- Provide metering services in accordance with the provisions of Grid Code
- NTDC as NGC to provide metering services for BPCs across the country through SMS metering
- Comply with the transmission standards set by the Regulator
- **Information Publishing**

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Role of IAA

- To Prepare the **Capacity Procurement Plan** based on IGCEP prepared by NTDC , Energy Gap by DISCOs and energy policies of the government
- To Conduct the **competitive auctions** for the new power procurement.
- To Prepare the **standard bidding documents** and submit to NEPRA for review
- To Prepare and obtain the regulatory approval of **PPAs / EPAs templates** for the centralized auctions
- To Assist the Discos in **finalizing the bilateral PPAs/ EPAs** with each generator that has been awarded in the auction
- To Arrange **Guarantees** for low performing DISCOs through GoP

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Role of SPT

- SPT will Perform the **same functions** as CPPA-G do in agency role today
- **Verification** of invoices sent by Generators for legacy PPAs/EPAs
- **Receiving** of payments from DISCOs and transferring it to Generators
- Calculation of the **capacity and energy transfer rate**, in accordance with the Authority approved transfer Mechanism, for the purposes of invoices against each Distribution Company
- Receiving Payments for **UOSCs** and transferring to NTDC for legacy PPAs
- **Fuel purchases & PPA data verification** of generators for usage in merit order
- SPT ,without any implication, will **honor existing PPAs**, However no new procurement will be allowed to sign by SPT.

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Role of Regulator

- Perform functions as defined in the Law
- **Update** the existing regulatory framework
 - Issues New Regulations and Guidelines as per amended Act
 - Amend existing rules and regulations as per amended Act
 - Approve and issue the updated/new codes
- **Issues licenses** to the Market Participants and Service Providers
- **Monitor and supervise** the functioning of the market (particularly the risk of market power abuse)



MO Functions (1)

- **Contract Registrar** (Admission, suspension and cancellation of Participants)
- Registration of CDPs
- Sign a **Market Participation Agreement (MPA)** with Participants establishing rights, responsibilities and obligations, including the obligation of the Participant to provide credit cover
- Calculate **energy and capacity imbalance quantities** for each Participant;
- Calculate **hourly imbalance prices** for energy
- Calculate monthly **transmission use of system charges and market fee**
- **BME Settlement** on a weekly (provisional) and monthly (final) basis
- **BMC settlement** on annual basis



MO Functions (2)

- Administration of **credit cover/collaterals** for transactions in the Balancing Mechanism, transmission charges and market fee
- Administration of **market payment system** (weekly and monthly)
- Administration of the procedure to **receive and resolve the complaints**
- Administration of a **dispute resolution mechanism** for settlement complaints that have not been mutually agreed and resolved.
- Responsible for Information **disclosure of market results** (made public through its website)

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DISCO as Supplier (1)

- Obtain **Electric Power Supply license** with the defined service territory
- **Supply power** to all non- eligible consumers and eligible consumers (not opted for competitive supplier) on **regulated rates**
- Contribute to the reliability and security of the power system by **full filling capacity obligations**
- **Register as Market participant** with MO and sign MPA
- Obligated to **procure the energy and capacity** needed to supply its consumers through **regulated mechanisms**
- **Procure power** as per the approved **IGCEP** (prepare by SO) and **Procurement Plan** (prepare by IAA)
- **Sign market based Bilateral Contract** with generators as a result of **centralized auctions run by IAA**
- Procure power from CPPA(agent) as per **commercial allocation of existing PPAs**

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DISCO as Distribution Network Operator

- **Develop adequate and reliable distribution networks** in the specified service territory
- Prepare 5 years **network investment plan** and **demand forecasting**
- Prepare, update **Distribution Code**
- Perform **metering services** at the distribution level
- Provide **non-discriminatory connection/open access** to all users
- Sign **connection agreement** with connected users
- Calculate **UoSC** for distribution network and perform billing and invoicing
- Purchase **excess losses** from the BME
- Ensure **transparency** in the operations

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