ADDRESSING PAKISTAN POWER CRISES THROUGH PRIVATIZATION AND REGULATION: A COMPARATIVE STUDY

by

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ABSTRACT

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Key words: Power crises, policy reforms, regulation, lessons

Power crises in Pakistan up until now have seen no end, affecting the country's economy and population severely. This research is focused on a comparative analysis of the policy reforms for privatization and liberalization of power sector in Pakistan and India along with regulations resulting in progress in power sectors in both countries. The aim of this research is to offer solutions for the power crises of Pakistan through policy reforms which lead to privatization and liberalization of power sector. The government of Pakistan has few funds to invest in new projects and improve publicly owned power utilities. In Pakistan, policy reforms since 1994 have suggested the involvement of the private sector as a solution to growing crisis at that time. Private investments created a need for regulatory authority to control the power sector efficiently and promote competition in power sector. However, regulatory authority which was established in 1998 could not produce satisfactory results. Privatization and liberalization improved generation capacity in Pakistan, but inefficient policy reforms and regulations raised new problems with increasing supply demand gap after 2005. In contrast India started privatization of the power sector due to growing demand and the inability of government to address it in the 1990s. A comparative analysis of policy reforms and regulations shows that India was quite successful in solving its problems after 2003. Pakistan can learn from the privatization and liberalization experience of India because India has faced similar problems to those Pakistan now faces.

ÖZET

PAKİSTAN'DAKİ ENERJİ KRİZLERİNİN ÖZELLEŞTİRME VE REGÜLASYON KANALLARI ÜZERİNDEN İNCELENMESİ: KARŞILAŞTIRMALI BİR ÇALIŞMA

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Anahtar Kelimeler: Enerji krizleri, politika reformları, regulasyonlar, dersler

Ülke ekonomisini ve nüfusunu ciddi şekilde etkileyen Pakistan'daki enerji krizleri şimdiye dek son bulmadı. Bu çalışma, Hindistan ve Pakistan'daki enerji sektörlerinde özelleştirme ve serbestleştirmeye yönelik yapılan politika reformlarına ve her iki ülkede de söz konusu sektörde ilerleme sağlayan regülasyonların karşılaştırmalı analizine odaklanmıştır. Çalışmanın amacı, Pakistan'daki enerji krizleri için, sektörün özelleşmesini ve serbestleşmesini sağlayan politika reformları kanalıyla çözümler sunmaktır. Pakistan Hükümeti yeni projelere yatırım yapmak ve kamuya ait işletmeleri iyileştirmek için az miktarda fona sahiptir. Pakistan'da, 1994'ten bu yana politika reformları büyüyen enerji krizine çözüm olarak özel sektörün enerji piyasasına dahil olmasını önermektedir. Özel yatırımlar, enerji sektörünü kontrol etmesi ve rekabeti teşvik etmesi için düzenleyici bir düzenleyici kurum ihtiyacını doğurmuştur. Bununla beraber, 1998 yılında kurulan düzenleyici kurumu tatmin edici sonuçlar üretememiştir.. Özelleştirme ve serbestleştirme, Pakistan'daki üretim kapasitesini arttırmıştır, ancak etkin olmayan politila reformu ve düzenlemeler, 2005'ten sonra yükselmeye başlayan arz-talep açığıyla beraber yeni sorunlar yaratmıştır. Enerji sektörünün özelleştirilmesi çalışmalarına Hindistan da Pakistan gibi 90'lı yıllarda artan talep ve hükümetin buna cevap vermede yetersiz kalmasından dolayı başlamıştır. Politika reformlarının ve regülasyonların karşılaştırmalı analizi; 2003'ten sonra Hindistan'ın enerjiyle ilgili sorunlarını çözmede oldukça başarılı olduğunu göstermiştir. Bu bağlamda Pakistan şu an yaşamakta olduğu sıkıntılara benzer sorunlarla yüzleşen Hindistan'ın özelleştirme ve serbestleştirme deneyiminden faydalanabilir.

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TABLE OF CONTENTS

Introduction

Energy plays a vital role in the economic and social development of a country. Electricity is the most widely used forms of energy. For a developing economy with high population growth rate and industrialization it is essential to keep a balance between supply of energy and increasing demand. Developing countries are facing electricity problems and according to IEA "*1.6 billion are in the dark and by 2030, when Earth's population will likely top 8 billion, 1.3 billion people will still lack electricity. Of those, 700 million will be in Africa, and 490 million in South Asia."* (IEA, 2012)

Pakistan and India are biggest countries of South Asia which points the fact that industrialization and high population growth rate can lead to severe power crises in these countries if investment does not keep up with increase in demand. Indeed, Pakistan is currently facing severe power crises.

During the early twentieth century most of the countries owned electricity as vertically integrated public monopoly. Infrastructure required huge investment for electricity projects which makes supply of electricity expensive and riskier due to high sunk cost. It was a wide spread belief that the governments can only provide these utilities to its consumers effectively to achieve social optimality which requires supply of electricity at affordable rates to all and it cannot be achieved by private ownership because private ownership is more focused on earning profits than to achieve social optimality.

In past few decades this opinion changed, because the governments were unable to build infrastructure as fast as demand was growing due to industrialization and urbanization. Publicly owned utilities were not efficient anymore due to a number of reasons such as low labor productivity, poor service, transmission losses due to theft and meter tampering, billing corruption, insufficient investment and revenue shortages which created the need of private participation.

Private sector intervention was also necessary for the application of new

production methods, efficiency and services improvements. However, there were also some risks under private participation which required institutional reforms and the establishment of a regulatory body. Regulations were required for the efficient functioning of competitive markets. The government's willingness was necessary for privatization reforms and successful implementation of reforms which depended upon the establishment of strong judicial and independent regulatory system. (Lamech and Saeed 2003).

Developing countries like Chile, Brazil, Argentina and Philippines started privatization of power sector following the example of UK and US. Privatization in Pakistan started with privatization of small power plants, unbundling of public sector utility WAPDA (Water and Power Development Authority), and sale of KESC (Karachi Electricity Supply Company) shares. Privatization and liberalization in Pakistan followed many reforms causing private participation in generation and policies also encouraged private participation in transmission and distribution network. Privatization of generation can create competition through open access of transmission, while the distribution remains a natural monopoly but competition can be introduced in retail services to end consumers. (Joskow, 1998).

The privatization of power sector is not only increasing productivity but it can also be a source of other economic gains. For Instance, UK privatization not only solved the problem of shortage but also resulted in economic gains through trade of electricity. Developing country India also got economic benefits through liberalization and privatization causing excess generation capacity where excess of electricity is exported to its neighbor countries (Bangladesh and Nepal). In Pakistan, increase in future expected demand of electricity in 1990s led to reforms in 1994. However, Pakistan power sector is struggling to fulfill the power generation requirement because of increased demand supply gap since 2006 (Ministry of Planning, 2015).

The power outages have been going since several years and are getting worse. The long hours of load shedding are creating problems for small businesses and markets especially for those having high voltage machinery which cannot run on small generators or UPS. The current government of Pakistan had put electricity as their top priority. The existing generation capacity led to demand supply gap of up to 4500-5000 MW (Kugelman, 2015) and at peak hours particularly in summer this gap rose up to 7000MW (Ministry of Planning, 2015). The failure of the government or the private sector to invest in electricity is part of the problem while existing power plants are not

in good health. On top of that the government does not pay power companies on time which makes it difficult for companies to pay for fuel used in production of electricity and thus cause circular debt.[1] Lack of supply of fuel made thermal power generators produce electricity at less than full production capacity. Pakistan is producing 68.9% of its electricity through thermal resources such as oil and gas, which is the reason that under payment of fuel and uncertain supply is affecting whole sector and its performance.[2]

The price and cost of production is also critical in Pakistan. Privatization and liberalization started in 1994 and increased generation capacity but due to pricing, high tariff and non-recovery of cost it was difficult for IPPs (independent power producers) and public utilities to work at sustainable levels. High tariff rates and subsidy with huge transmission and distribution losses are the reasons for low recovery rate because the government was not able to pay full amount through its budget. Pakistani circular debt reached to four billion dollars in 2014 (Roberts and Sattar, 2015) which the government of Pakistan paid in 2015 but new debt piled up again (DAWN, 2016) which made government incapable to cover the problem and certainly this burden made the government relying more on IMF loans and financial aid. High prices of electricity made it difficult for consumers to afford electricity and it became economically inefficient for industries to pay for electricity.

Pakistan power sector is facing multiple problems. Energy experts also hold the view that policy, planning and implementation is weak in Pakistan. The bad policies along with poor planning and implementation has worsened the crises. The policy and regulatory reforms did not produce any fruitful outcomes until now.

WAPDA and KESC were two vertically integrated publicly owned monopolies to manage power sector of country. KESC is now K-E (Karachi electrics) which provides electricity to Industrial city of Karachi and WAPDA was unbundled in 1998 by separating thermal power plants, transmission and distribution sector and it owns only hydel power generation currently. PPIB (Pakistan Power and Infrastructure Board) was established in 1994 for facilitation of private firms as one window facility and is used for the provision of same services. NEPRA (National Electric Power Regulatory Authority) was built in 1998 as regulatory authority for the promotion of competition in

[1] Circular debt occurs when government is not paying public distribution companies full amount which distribution companies needs to pay to private generators for the electricity private generator sell to distribution companies.

[2] MIT technology review, Sep 28, 2015, Demystifying Pakistan's energy crisis

electricity sector through efficient pricing. WAPDA and PEPCO (Pakistan Electric Power Company) are owned by the government currently where as KESC was privatized until 2005.[3,4] With all the necessary institutions and policies for privatization and liberalization, electricity sector is not able to attract good enough private investment and to use already built plants at their full capacity to close demand supply gap.

India and Pakistan started liberalization and privatization of power sector after 1990s and introduced policy reforms along with new institutions. In the beginning India was not successful in its policies but after 1998 regulatory framework and 2003 act of electricity India experienced a boom in its generation and decline in transmission and distribution losses. It is well stated fact that population growth is high in Pakistan and India along with growing industrialization which increased the consumption of electricity in previous decades. Both countries are making several polices to address growing demand problem.

Pakistan has provided access to most of the population but there are long hours of blackouts. Huge circular debt (as explained earlier in introduction), distribution and transmission losses, subsidies, underpricing and governance problems, all have contributed to the current situation of Pakistan. India is also facing problems but severity of problem is high for Pakistan and the government of Pakistan has been unable to solve it since 2006-2007.[5] Pakistan power crisis had put obstacles in the growth of country. Lessons can be learned from the success and failures of privatization, liberalization and regulations in India to reap out benefits of new policies and regulations.

Earlier studies on Pakistan Electricity industry

Increased development and industrialization is the reason of increase in demand of electricity all over the world. Pakistan is facing severe crises as supply demand gap is increasing every year due to increased industrialization, urbanization and population growth. The shortage of electricity has adverse impacts on the economy. According to

[3]75% share of KESC which is now Karachi electrics were sold out to private owner.

[4] PEPCO are thermal generation companies owned by government of Pakistan which were unbundled from WAPDA in 1998. PEPCO consist of three GENCOS (Thermal generators).

[5]Pakistan government solved the problem of expected demand supply gap by implementing power policy of 1994 which initially produced surplus amount of electricity and until 2005 there was no demand supply gap which again rose in 2006 (PPIB)

one estimate power shortages have resulted in an annual loss of about 2 percent of GDP in Pakistan [Abbasi (2011)]. Another recent study reports that total industrial output loss ranged from 12 percent to 37 percent due to power outages [Siddiqui, et al. (2011)]. An economy can work better if country has no shortage of power because for industries and businesses to grow electricity is essential.

The generation capacity of Pakistan is not able to fulfill the demand supply gap; government policies are not bearing fruitful results as problem is persistent from a long time period. Limited generation capacity, transmission and distribution losses, pricing and circular debt due to revenue shortage were the challenges that Pakistan electricity was facing in 2015 (Faheemullah et al, 2015).

Liberalization and privatization took a start as a result of 1994 policy when power sector expected supply shortage of 2000MW due to increase in demand.[6] The policy was successful in attracting good amount of foreign investment but there were problems with liberalization of power sector in Pakistan such as very high tariff rates.[7] High tariff rates also induced some industrialist to generate their own electricity which contributed in the decline of demand by 200 MW.[8]

Abdul Ghafoor and John Weiss in the article of "Privatization of Power Sector in Pakistan: Some Important Issues"; pointed to some of the problems with privatization.[9] According to this research 1994 policy reforms gave short term solution but in long term problem was expected to persist more due to inappropriate planning and related organizational and institutional constraints. WAPDA and KESC were not able to address growing demand and growth of the sector was slower than growth in demand. Institutional constraints along with organizational constraints were the main reasons of poor financial performance and the inability of power sector to expand. Partial privatization was adopted in 1998 as transmission and distribution stayed with public while generation sector was opened to private sector. WAPDA was unbundled and stayed as public utility for hydro generation and KESC stocks were sold to private sector in 1998. Privatization happened to promote competition but author holds the view that it could not promote competition because the generation share of IPPs was less than

[6]Pakistan: Doing Business and Investing in Pakistan: Strategic, Practical Information, Regulations, Contacts, page 86

[7] High tariff rates occurred due to cost plus regime followed in the policy reform and government was unable to pay during early stages of liberalization due to low recovery of revenues with less budget available to finance this amount. After 1996 oil prices in world market started rising at high rate which further burdened government because private firms kept on renegotiation of prices and thus increased tariff rates.

[8]Pakistan: Doing Business and Investing in Pakistan: Strategic, Practical Information, Regulations, Contacts, page 86

[9] Privatization in the form of new entry into generation of electricity occurred.

public and most of IPPs were producing through gas or oil which made competition difficult with already established public hydel power which was more economical.[10] Long run marginal cost was not included in tariff which gave investor incentive to earn more profit than required through renegotiation of prices with the government before 1998. Political interference through pricing and subsidies were affecting decisions of public enterprises and private investments were supposed to decrease the level of intervention but due to regulatory authority and institutional weaknesses political intervention was not completely eliminated. The article was written in 1999 and after 1999 policy reforms came with new regulations but the scenario was quite similar.

Power policy 1994 allowed private entry of power firms in the market and produced electricity to end supply demand gap. The critiques of privatization were holding the view that IPPs were not working to their full capacity and were producing expensive electricity. The performance of IPPs was crucial for the efficient production of electricity in Pakistan. Anjum sidiqiui in the article of "IPPs: The real Issue" did a performance analysis of IPPs and compared it with publicly owned utility. This study focused on how pricing was done and what were the reasons of increase in prices. In this article, author mentioned a number of risks which private investor were considering while investing in power sector of Pakistan. Economic, market, political, country, currency and financial, completion, cost infested and performance risks. Economic risks as Pakistan was developing country and inflation and currency problems could put investors in difficult situation. Political instability was a real problem because new leadership was taking over every two year or military rulers were changing the policies which could in turn affect the investor as they have made investments and won't be able to regain invested sunk cost. WAPDA and KESC were sole purchasers of electricity and government was guaranteeing this purchase agreement, government stopped backing this guarantee in 1997. The tariff rate charged by IPPs was depending upon capacity purchase price which was kept fixed and energy purchase price which was kept variable. Capacity purchase price included debt payments, return on equity, fixed element of operating and maintenance cost, insurance cost and foreign exchange risk cost while energy purchase price was dependent on fuel prices and variable component of operation and maintenance cost.

Most of the fluctuations in the prices were due to inflation and rupee devaluation

[10] It was difficult to compete because oil prices went up and in 1998 regulatory authority of Pakistan was rigid in following tariff rates. Thermal power became expensive than hydro power.

which was under the control of government except fuel prices because it also depended on international market situations. Here authors compared the price of electricity produced by public utilities with IPPs through fuel prices and comparison of production cost showed that cost of production of IPPs was less than public utilities. Through cost analysis author come to the result that private sector was more efficient and was producing electricity at cheaper rates than public. But there were claims that policy reforms put power sector relying more on oil and gas which made system unsure about pricing and tariff. Until today Pakistan power sector is facing problem of tariff and pricing due to uncertain prices of oil in international market.

It was claimed that power sector reforms could not create competition as the share in initial privatization and liberalization was 10% and IPPs were selling the electricity to WAPDA and KESC so it was not possible to compete with two monopoly powers when private sector was dependent on them. To promote competition and regulate power sector NEPRA was introduced. There is not much literature about the performance of NEPRA. One of the working paper (Malik, 2010) measures the performance of NEPRA. In this paper author used different approaches to measure the performance of NEPRA for the claim that there are problems with institutional and organizational structure as well as functioning of regulatory authority which contributed to severe power crises. NEPRA was established in 1998 with the vision of increasing competition in market and improve efficiency. Power sector was facing institutional and organizational weaknesses. The article explains that NEPRA was also liable for the poor performance of the power sector after 1998. The attributes of good regulation are used to measure the performance of NEPRA which are regulatory autonomy, accountability, transparency, participation, predictability and clarity of functions. Determination for tariff structure is the most problematic part for NEPRA and government as there occurred many disputes on this issue between both entities. Prices are not fully transmitted to end consumer due to subsidies. Tariff structure is hurdle for the privatization of distribution companies because NEPRA and government are not coming to a final decision on tariff. According to results of this research transparency, accountability and independence of NEPRA is low which are translating into efficiency problem of power sector. Other attributes are also not satisfied fully. Political intervention is occurring through tariff structure and subsidies in power sector. KESC was not performing well even after the transfer of 73% of stocks to private owner. Distribution companies were not competitive making the system of distribution

inefficient as the companies performing well would have to share their profits with the those which are showing unsatisfactory performance because government owed the distribution companies in every region. NEPRA was performing poor not only due to external environment but internal environment which made functioning of NEPRA difficult. Internal environment means it do not possess good expert staff to take efficient decisions for effective regulation and competition. Pricing and tariff were the main drivers of the crises according to this study which were contributed by NEPRA.

The problem of Pakistan power sector was related not only to generation capacity but to transmission and distribution losses according to Kessides analysis of Pakistan power crisis. Policies were proposing privatization of distribution but there has been delays in its implementation. He discussed that energy policies are not addressing issues efficiently. The article mentions that energy mix encouraged in policy reforms made Pakistan power sector produce expensive electricity. There is a problem of underpricing on consumer side and also regulatory authority is not setting efficient tariff which reflects cost. Kessides mentioned that it is necessary to restructure tariff to generate adequate revenues and cross subsidization also needs to be addressed. Subsidy is required but it is not targeted well and non-payment of subsidized amount has burdened the government. The government is not able to remove subsidy due to opposition by political entities. Transmission and distribution losses are due to publicly owned inefficient system. Regulatory system is not efficient for private investor which makes it difficult for private investors to trust regulation and get good returns on investment.

Power sector had not been privatized completely because it includes public monopolies in the form of WAPDA/PEPCO and private monopoly in the form of KESC which hinders competition in the sector. There seems to be need of privatization of distribution to lessen the burden of losses, good energy mix is required in Pakistan. Author used tables and figures from energy data from different resources to support his arguments. Kessides summarized the problem of Pakistan by looking at results of the policies and is discussing the article before the policy of 2012.

A report on Pakistan power crisis (Aziz and Ahmad, 2014) also highlighted problems with electricity and discussed power policy of 2013 and proposed that 2013 policy if followed will be able to solve the problems.

The study is based on observational data collected by different resources to support his argument. The problems mentioned in this report are supply shortage with

excessive demand growth which stayed unaddressed. Report stated that power companies were not able to produce at full capacity due to lack of fuel supply and delays in completion of contracted projects. The reason of less capacity utilization and delays in completion of projects was lower revenue collection. Public utilities were not performing well especially hydro power projects of WAPDA required increment in tariff to finance its increase in capacity of dam but NEPRA did not allow increase in tariff. Distribution companies were not performing well and in some areas political interference was hindering better performance of distribution companies. The government was not implementing NEPRA's determined tariff on consumer end by providing subsidy at consumer end. Less competitive sector was mentioned as a problem and reason for less competition was government intervention through renegotiation for some politically preferred projects. In 2013 policy decrease in subsidy level and privatization of GENCOs and distribution companies were on agenda. Report suggested that Pakistan can learn from Indian successful reforms to improve its power sector performance. Report did not take into consideration all previous policies and discussed briefly only 1994 policy reform.

Brief Discussion On This Research

My research includes evaluation of Policy reforms, regulatory authority and regulation through the standards set in the literature, in particular Kessides "Reforming Infrastructure". This research is based on policy evaluation from the beginning of privatization up-to 2015. A comparison to Indian policy and regulation is being done to gain a comparative perspective and to offer solutions for Pakistan's growing problems. India has successfully attracted private investors with better pricing policy than Pakistan which can be seen from the first policy reform of both countries. India was giving 16% return on equity in 1991 policy reform whereas Pakistan offered 18% returns on equity in 1994 policy reform which made electricity of Pakistan expensive than electricity of India from the beginning of reforms.

Discussion in above sections is pointing to some problems in Pakistan with privatization and regulation. What were the problems with policies and regulations which made power crisis severe? What lessons Pakistan can learn from privatization

reforms happened in India?

Considering the above questions, the study is focusing on problems with privatization/liberalization and regulation of Pakistan which benchmarked with Indian privatization and regulation because most of the problems in both countries are similar. Previous studies are focused on either privatization or regulation for a specific time period. Comparative analysis of privatization and regulation from 1994-2015 through power policies and regulation is being done to answer the above mentioned questions. This research will be useful for further policy planning and implementation in Pakistan.

Chapter 1 will discuss power policies of both countries briefly from the beginning of privatization, liberalization and structure of electricity is discussed here as well. In the end of this chapter there is comparison of models of electricity adopted by Pakistan and India. The evolution of policy shows how the problems got addressed and which problems were the focus of policy reforms. Results of policy are useful to develop understanding of how the policy contributed to the situation of today and how successful each reform was. Structure of electricity involves models adopted for privatization of electricity in both countries. Comparative analysis is being done here to throw light on if the problem is related to model adopted because both countries had done liberalization in the beginning and proposed privatization through sale of publicly owned assets of electricity in later policies. This chapter shows how policy reforms and electricity restructuring played their role in development of power sector in both countries.

Chapter 2 will address detailed analysis of the effects of reforms in both countries. To discuss effects in this chapter Kessides effects of reforms are being considered. This will elaborate most of the facets of reforms. Effects of reforms for both countries are covered separately for each country to understand the difference clearly. In the end of this chapter, a comparative study of reforms effect has been done to understand which country had successfully privatized/liberalized and progressed toward success. The difference is important for benchmarking India and to know where Pakistan lagged behind due to policy and India made progress. Up-to this chapter privatization policy and implementation problems will be captured.

After developing the understanding of reforms and their effects it becomes important to know performance of regulatory institution. Well performing regulatory institutions will affect performance of private sector by introducing and promoting competition through effective regulations. Chapter three is discussing regulatory

institutions performance based on Kessides' standards on regulatory independence and commitment. In the beginning of chapter there is an elaboration of structure of regulatory authority and prerequisites for effective regulations where prerequisite conditions are taken from Kessides Book "Reforming Infrastructure". Then comparative analysis of regulatory institutions of Pakistan and India is done. Comparative Analysis of regulatory institution is being done by keeping standards set by Kessides in reforming infrastructure which make clear evaluation of performance. This discussion will make reader evaluate regulatory body which will help understand problems in regulation particularly in pricing as its effectiveness is based on these institutions. For complete understanding of Pakistan regulatory institution, I also discussed regulatory commitment of NEPRA at the end of this chapter.

Chapter four discusses the most important regulation as it stayed the focus of discussion from both producers and consumer side for Pakistan and India. Pricing of electricity is important to discuss as it is considered an important problem of Pakistan electricity sector. Policies made by governments and tariff declared by regulatory institutions both are elaborated here. Prices has affected producers through returns on investment and thus determined supply of electricity. On consumer side intervention of politics through subsidy is discussed. Pricing is important to determine the performance of power sector because prices will signal returns on investment. This chapter will demonstrate that privatization in both countries got affected by pricing. It will shed light on what India did for pricing strategy which made it better and cost efficient than Pakistan.

After analyzing policy reforms and regulation chapter 5 will summarize the challenges of the Pakistani power sector. This chapter will address all the problems that occurred due to ineffective policy and regulations. Challenges which are out of the scope of policy and regulation are also discussed. This discussion will help evaluate system and draw conclusion out of it.

After addressing all the challenges, chapter 6 will conclude the research and will narrow down the discussion towards answering the research question made in the being about the problems with policy reforms and regulation of Pakistan that contributed to today's power crisis. I also discussed lessons learned after conclusion as these lessons can help in developing new policy which can address the problems effectively. Last sections will give extra recommendations which were not being addressed through lessons learned.

I have used books and policy document as my primary resources to address the research which are mentioned in bibliography. It is a comparative study where I included discussion on Indian policy and reforms. Secondary resources include articles, online available data, news, interviews and reports by World bank, IMF and other international organizations.

CHAPTER 1

Evolution of Power Policy and Structure of Power Sector in Pakistan and India

This chapter will provide an overview of policy reforms adopted for privatization and liberalization of Pakistani and Indian power sector. The results of each policy is explained under its terms and conditions to see what happened due to reforms and whether the reforms of each time period has reached its goals. Those problems which were not addressed in policies will be clarified. To make the picture clear about Pakistani privatization and liberalization reforms, overall results are explained though data at the end of Pakistani power policies' discussion. This is followed by a discussion of the policy reforms of India, where the same procedure is followed to demonstrate what India has done through privatization and liberalization reforms. The policies of India started from 1991 with a brief explanation of the 1948 act at the beginning, and the 2003 act is also explained briefly with later policy plans. The models of electricity adopted during these reforms by Pakistan and India are explained in the next section. A comparison of the models in the last section of this chapter explains whether, the model adopted by Pakistan was helpful for privatization and liberalization of power sector. The models adopted by India are explained as a benchmark which can throw light on what is necessary for Pakistan to adopt in terms of structure of electricity.

1994 Policy background:

Pakistan was following a monopolistic model before 1994 policy reforms where WAPDA and KESC two publicly owned companies, were responsible for the power sector of country. The installed capacity was 10800 MW which was considered insufficient to fulfill the future demand. The reason was that, generation of electricity depended on hydel power which had seasonal changes in water level during summer

and winter. At peak hours consumers were expected to bear blackouts due to the shortage of 2000 MW of supply. Electricity was available to 40% of the whole population and most of the villages were not electrified and electricity consumption per capita was 300KWH with expected increase in demand of 8% per year at that time. Additional capacity required for the year of 1995-96 was 900MW and the expected increase in demand until year 1999-2000 was 1300MW.

Public sector was not able to finance new projects to fulfill increasing demand due to ceilings on public sector development programs. Power development program required 102 billion dollars in total from which 86 billion dollars in foreign currency and 16 billion dollars in local currency were required.[11] Government was not able to finance such a huge amount of investment. Policy was designed to attract new foreign and domestic private investors to participate in power generation.

1994 policy:

This policy induced liberalization by adding new private generators to increase generation capacity and started privatization of small publicly owned power plants such as a thermal power plant KAPCO (Kot Addu Power Company) was privatized under this policy. The government of Pakistan followed single buyer model where transmission and distribution stayed under the control of public and generation was opened to private investors.

The government of Pakistan made PPIB (private power infrastructure board) to provide one window facility to IPPs (independent power producers). PPIB functions were: preparation of document for private investment contracts, evaluation and execution of bids, implementation of policy, recommendation of policies, coordination with government and private investors and among agencies.

Terms and conditions:

Investors were motivated to choose any fuel and technology to build a thermal power project and companies were also allowed to start hydro power project or conventional/non-conventional energy power projects on any location other than the Indus River. Indus river is biggest river of Pakistan and due to flood protection and water flow from Indus rivers the government of Pakistan had not allowed projects on it.

11 1994 power policy document

Solicited and Unsolicited proposal were invited from private investors. Procedures for unsolicited was that the owners would pay registration fee and would mention the amount of electricity it could produce under this policy with details about finance and production. The project would be assessed on technical and financial grounds and if accepted, a letter of interest and a letter of support would be issued. For solicited projects pre-qualification were advertised before the invitation of bidders and then bidders were ranked according to the bid criteria. A time period of 15 days was provided to complete financial obligations.

Pipe lines for gas fired power plants would be built by the government of Pakistan or by private investors on a Build Operate and Transfer (BOT) basis. Pipe lines projects were offered on bids, these private projects followed the same procedure as mentioned above for generation and after the issuance of letter of support, a letter of acceptance was issued after which company needed to complete all financial obligations to start the project.

The government also gave a list of preferred locations for the projects, any project in those locations was accepted for bidding while other suggested location by company were assessed and were considered on the basis of their feasibility, transmission and environmental aspects. Power was purchased by WAPDA and KESC at the outgoing terminal and private owner had to bear the cost up to outgoing terminal. From outgoing terminal WAPDA and KESC were obliged to manage transmission and distribution to end consumers.

Independent private investors were supposed to sell electricity to WAPDA/KESC under a long term contract which included the concession period of ten years where private power producer was exempted from income taxes and production taxes. Purchase was done on bulk power tariff rate which was US 6.5 cents/kwh and was to be paid for the first ten years in Pakistani Rupees.[12] A levelized tariff of US cents 5.9/Kwh over the life of project was suggested as final parameter of acceptance.[13] The power companies which were producing more than 100MW of energy were paid by WAPDA and KESC a premium of US cents 0.25/KWH for first ten years. The bulk power tariff was applied to all projects thermal projects, 20MW Hydel and conventional/non-conventional projects. Levelised tariff was applied on hydel for only

[12] Bulk power tariff is the tariff applied to bulk purchase of power during concession period with amount fixed before the contract was being made.

[13] Levelised tariff include all variable costs, levelised tariff were open for negotiation and were supposed to change after the government reviews over the life of projects.

30 years of project life. Sponsor were provided with annual tariff over the life of project and annual base tariff was limited to US cents 8.3/KWH in first ten years while for next years it was limited up-to US cents 6.5/KWH.

The bulk power tariff mentioned in 1994 policy was applicable for the projects which executed agreement between January1 - December 31st, 1994. Premium was applicable for the project commissioned before the end of 1997. The bulk power tariff was suggested to be revised on an annual basis. Capacity price per month was 19 US dollars/KW which was 569.8 rupees/KW at that time.[14] Tariff paid by WAPDA was depended on the total hours purchased. If WAPDA purchased larger hours of electricity CPP would be fixed and average cost would decrease because CPP (capacity purchase price) would spread over more units of purchased power (Siddiqui, 1998).

Results:

The 1994 policy was successful in attracting foreign investment from Europe, Arab, US, and Japanese firms along with international banks such as Asian development bank and World Bank, because of attractive tariff rates (Ali and Beg, 2007). 1994 policy encouraged thermal energy which included gas and oil fired power plants. The power policy of 1994 was recognized as best policy of Pakistan by US energy secretary.

All documentation required for contract and issuance of letter of interest and letter of support were done by PPIB. 1994 policy was attractive to investors because it offered satisfactory rate of return on cost plus basis and it added one third of generation capacity of 2010 (PPIB, 2010). The government approved projects more than 9000MW and 19 companies with production capacity of 3500 MW met financial close (PPIB, 2003).[15] Out of 19 companies four were not commissioned accounting for 500MW. Expected demand was 2000 MW whereas increase in demand was less than expected and by the operation of 15 new generation companies 1000MW of surplus energy was produced. 1994 policy attracted USD 3 billion of investment without the inclusion of HUBCO (Hub company) and privatization of KAPCO (Kot Addu Power Company).[16]

The bidding did not help in the increase of competition because projects were

[14] 1994 Power policy document

[15] Financial close refers to all financial requirements to start a project were being met by 19 private firms (PPIB success story 1994-2010)

[16] Kot Addu power plant was thermal power plant held by the government before 1994. After the implementation of this policy it was privatized.

also contracted on a non-bid based system. The government negotiated tariff rate with non-bidders as well as bidders and declared final tariff rates as bulk power tariff for 10 years, levelised tariff over the life of project and annual base tariff for sponsors of projects. The critiques of IPPs opposed bulk power tariff because it was high and was not encouraging IPPs to control cost of production due to the government guaranteed purchase with cost plus tariff which companies were able to renegotiate (Ali and Beg, 2007).

Tariff payments were determined in US dollars and were paid in Pakistani currency, currency devalued after 1994 from 30RS per dollar to 60RS/dollar which made tariff payments expensive for WAPDA. The government of Pakistan was not transferring fluctuations in tariff rate due to fuel or currency devaluation to end consumer rather it was paying the difference in the form of subsidy which burdened the government budget and WAPDA was not able to pay to private producers. Another factor which burdened the government of Pakistan and WAPDA was that the government guaranteed return on equity and purchase regardless of the demand of electricity.

Almost all of the Independent power producers were using oil or gas for production and in 1996 the prices of oil increased to four times of the price charged in 1994 (Ali and Fatima Beg, 2007). Prices of oil increased in international market, taxes increased, rupee devalued and PSO (Pakistan state oil) was selling oil to power producers at much higher prices due to its monopoly power (Malik, 1998).

There was a political influence in the selection of private investors which also points on inefficient selection. For example, AES (Independent power producer set up in 1994) was connected to Shahid Hassan Khan who was the chairman of energy task force in 1994 (Saleem, 1998). Such allegations made selection system of IPPs non-transparent and inefficient.

World Bank was advising the government of Pakistan on 1994 policy and tariff rates were negotiated by the government with World Bank's suggestions. World Bank claims that it advised the government of Pakistan to offer financial concessions that were unnecessary. For example, tariff rate which included a return on equity of 25% after tax was advised by World Bank to the government of Pakistan on hydel power plants (World Bank, 2001). 25% return on equity for hydro power plants was an expensive choice for hydro power generation because hydro power generation was carried out by WAPDA at cheaper rates than on the suggested rate of World Bank.

Transmission and distribution losses were 24% of total production which had not gained any place in the policy document. Investment as a result of this policy produced surplus of electricity but WAPDA had to pay all private firms their contracted amount.

1995 Transmission and Hydel Policy background

The projects which were implemented as an outcome of 1994 policy required transmission network for connections with grid stations to come online. Newly contracted thermal power plants were the main reason for the construction and extension of new transmission lines. Policy of 1994 had not included expansion or construction of transmission lines but the government of Pakistan was not able to manage funds for this expansion and construction. To liberalize the construction and expansion of transmission lines 1995 transmission lines policy was formulated.

The government of Pakistan was expecting demand of electricity to increase due to industrialization and had also realized encouraging response from domestic and foreign investors on thermal power plants. The success of 1994 policy reform in attracting private investors for thermal power plants made the government propose liberalization of hydro power plants in 1995 hydel power policy because Pakistan has huge hydro power generation capacity and it was economical to produce through hydro. Hydro power generation was encouraged for private investment because oil was thought to be expensive for production and 1994 policy reform made Pakistani power sector dependent on thermal power plants. This shift of resource increased overall level of prices.

1995 Transmission policy:

Due to huge private investment as a result of 1994 policy, the government of Pakistan in 1995 suggested policy to expand and improve transmission lines. The government of Pakistan invited private investment bid based proposals for EHV (extra high voltage) transmission lines. Extra high voltage is defined as transmission line of 220kv or more.

Terms and conditions:

Project bids were invited from independent private investors for EHV on build,

operate and maintain basis.[17] Transmission lines package involved EHV, overhead transmission line and grid stations. Technology and equipment standards were mentioned in the policy reform such as OHL (overhead line) was specified to be optical fiber shield wire and associated equipment were also mentioned. Private investors were free to adopt any or all of the packages. PPIB (Pakistan private infrastructure board) was liable to assess the proposal and issue LOI (Letter of Interest) and LOS (letter of support).

Proposal which were considered from ITCs (independent transmission corporation) would own and operate the system at least for three years with minimum transmission line length of about 3000km and grid station of 380kv or more. ITCs were fully responsible for availability and maintenance of the system along with system security, voltage control and generation dispatch. The government of Pakistan was determining the route of transmission lines and location of grid stations and was providing access and legal rights to use the lands from where transmission lines would pass and grid station would be constructed. ITCs were responsible for maintaining environmental standards during construction. A nominated local sub-contractor was supposed to be the part of team. Equipment and machinery was suggested to be new.

There were no financial guarantees available for these projects in the form of loans and the risk of returns was fully borne by investors. Policy recommended that investors of the project and lender should evaluate the revenue earned by the sale of transmission services for their returns on equity and debts service.

Power would be transmitted by WAPDA/KESC over the lines under a long term contract of about 30 years. ITC would be paid with service charge which included capital and maintenance cost. Tariff payments were different for different locations based on demographic and geographic conditions. ITC would be penalized on transmission losses more than specified limits.

Results:

New policy of 1995 was about liberalization of transmission lines, to build EHV (extra high voltage) of above 220v of transmission lines. The policy was being implemented at provincial level by the provincial government. Transmission lines were liable to transfer electricity to WAPDA /KESC on long term contract of 30 years. This policy was not quite successful in attracting investment. There was no new investment

[17] It was a type of Built operate and transfer where the government of Pakistan changed this term to Build, operate and maintain while ownership rights will stay with the government of Pakistan

happened in transmission lines due to this policy (PPIB, 2010).

1995 Hydel policy

The government of Pakistan in the policy document of 1995 hydel power policy mentioned that it has attracted huge amount of independent private investment for thermal power plants by implementing 1994 policy. The 1994 policy increased uncertainty about prices because it made country dependent on oil and gas which were imported for the production of electricity. Oil prices started increasing and companies started renegotiation of tariff rates with the government. To ease high tariff rates, the government of Pakistan tried to attract private investment for its cheap hydel power projects. This became the reason for 1995 hydel policy and it should be mentioned here that the online capacity at the time of implementation of 1995 hydel policy was same as that of 1994 policy because new projects were under construction in 1995.

Terms and conditions:

Hydro power plants construction with reservoirs were not allowed on Jhelum, Chanap, Ravi, Sutlej and Indus River. Only those projects with up to 300MW of generation capacity were allowed for construction which would not interrupt the downstream flow. Detailed feasibility studies were required keeping in view acceptable international standards and were carried out by either public or private sector. Provincial governments were obliged to use their own resources to carry out feasibility study in their own province.

Finance policy was similar to transmission line policy where no grantee of returns was assured by the government. Only 2% custom duty on imported machinery was applied. Life of hydel power plant is long and policy stated that private hydel project would be transferred to the government after 25 years free of charge with operation and maintenance responsibilities under the control of private investor.

Companies were evaluated by PPIB and on completing the process of selection, companies were likely to enter power purchase agreement with WAPDA. WAPDA was responsible to buy power from these projects as it was buying from private thermal power plants.

Bulk power tariff was applied to all hydro power plants which was US cents 6.1/KWH and was valid for concession period of 10 years and levelised tariff was US cents 5.7/kwh for 25 years was to be paid in Pakistani currency to those plants which

would produce power up to 20MW. The government made it compulsory for every hydro power plant to shift ownership rights to the government 25 years after the end of concession period. Tariff was determined in US cents and payments were done by converting them into Pakistani rupees.

For the plants with production capacity of 21MW-300MW, bulk tariff was US cents 6.0/kwh and levelised tariff was US cents 4.7/Kwh for 25 years. The price of water usage was US cents 0.233/kwh and was included in bulk power tariff. These water charges were to be paid to the provincial government where hydro power plant would be constructed. Take or pay basis was also followed in this policy as in the 1994 policy reform, where all of the produced electricity would be purchased by WAPDA regardless of demand.

Payments were to be done on monthly basis and were based on actual energy sold to WAPDA during a month. WAPDA was supposed to deduct water usage charges from the payment at 0.233/kwh and would pay water charges to the provincial governments.

Interconnection policy was similar to 1994 policy where companies had to bear cost for transmitting electricity to interconnection points from where WAPDA was bearing transmission charges.

Results:

Hydel policy of 1995 was not as much attractive as 1994 policy and new projects were mostly thermal power projects. In the province of Punjab as a result of 1995 policy reform 330 potential sites were identified and 8 project were issued letter of interest and letter of support with 1699MW. One of the projects was under WAPDA and 5 were under the control of Punjab government but project which was under WAPDA started construction. Each province was liable to handle projects in their regions and later hand them over to PPIB. Hydel policy in 1995 attracted investment of 132 MW in total just one project reached financial close from total 13 projects from all provinces (PPIB, 2010).

The failure of 1995 policy and success of 1994 policy reasoned increase of thermal share in production mix. Oil prices kept increasing and due to dependency on thermal power plants overall level of prices were rising. Increased prices induce the government to provide subsidy on power prices to ease the burden of consumer, price fluctuations were not transferred to end consumers.

Transmission and distribution losses were also high under this policy era which were not addressed in this policy. Private investors were facing low recovery rate which was due to non-payments of subsidy, corruption on billings and transmission and distribution losses. Policy has not addressed the issue of low recovery rate and WAPDA went bankrupt due to burden of payments.

1998 policy:

Pakistan started liberalizing its generation in 1994 to fulfill its future increasing demand of electricity. Policy document of 1994 suggested privatization whereas sale of one publicly owned utility KAPCO happened in 1994 and private investors were allowed to enter generation and construction of transmission lines only as independent entity. The government of Pakistan was regulating power market but private participation due to 1994 necessitated the establishment of regulatory authority to promote competition in market through pricing. Pricing became a serious issue until 1998 as thermal power plants were producing expensive electricity due to high oil prices in international markets. These high prices surfaced the way to renegotiation of prices for private thermal power plants. 1998 policy was aimed at shifting tariff responsibility from the government to regulatory authority. Previous policies were based on bulk power tariff which was determined by the government with the option of negotiations. 1997 regulatory act suggested that tariff setting would be on competitive basis where private investors would be invited to offer lowest tariff per KWH to deliver energy and NEPRA would be responsible entity for regulation rather than the government. This was done to lower political intervention and increasing competition through pricing.

The government of Pakistan also suggested restructuring and proposed privatization of WAPDA and KESC in 1998 because WAPDA and KESC were bearing losses. The actual privatization started here where the government started selling shares of KESC to private owners. The government of Pakistan restructured WAPDA by separating thermal power plants to three GENCOS collectively named as PEPCO. Transmission system was also separated and became one public limited utility NTDCL (National Transmission and dispatch company limited). Distribution companies were separated from WAPDA into 9 DISCOs and all DISCOs were also publicly owned. The government of Pakistan planned to privatize thermal power plants PEPCO and distribution companies DISCOs whereas transmission was proposed to stay under

public control. WAPDA controlled hydel power projects, construction and maintenance of dams and worked as publicly owned hydro power company.

NEPRA act was approved by parliament and became a part of law in the end of 1997. According to this law NEPRA was autonomous independent regulatory authority with the power to issue license for generation, transmission and distribution along with responsibility of tariff determination.

The government of Pakistan was intended to help private investors to encourage investment in power sector through efficient pricing under 1998 policy. Demand was expected to rise due to more domestic use of electricity, industrialization, urbanization and climate change. Electricity projects started and proposed in 1998 were expected to come online until 2002-2003. The government of Pakistan was expecting shortage of supply from 5000MW to 8500MW until 2005. The expected demand and other factors contributed to this policy where the government was intended to increase generation to meet future demand.

Considering the future projection of demand the government stated in policy document that hydel and coal fired power plants for which feasibility studies have been done should be started as soon as possible because they would take much time for completion. New policy was encouraging hydro and coal fired power plants which was complete shift from oil and gas fired power plants. Policy of 1994 gave tax exemption on imported equipment which made domestic manufacturing industry in unequal position because domestic manufacturers were less competitive. Policy of 1998 removed those tax exemptions to make domestic manufacturer better off.

Term and conditions:

1998 policy invited independent power investors for hydel on Build Own Operate and Transfer (BOOT) and coal fired plants on BOO basis. International competitive biddings were invited for lowest possible levelised tariff to generate electricity. Levelised tariff (variable tariff) was proposed for the life time of project. Competitive tariff included capacity purchase price and energy purchase price.

NEPRA would approve power tariff before the issuance of letter of support by PPIB. NEPRA was authorized to advise PPIB, provincial governments and AJK (Azad Jammu and Kashmir) government for tariff limit acceptable for any power project. Provincial and AJK government were providing one window facility for the projects in their territories up-to 50MW. PPIB was the sole responsible for the issuance of letter of

support to investor after being evaluated by provincial and AJK government. The bid with lowest levelised tariff was ranked 1st.

Power was purchased by NTDC a public limited utility through power purchase agreement at a specified grid. Transmission lines from the power complex to the grid was the responsibility of power generator. Tariff was supposed to be reviewed on annual basis by regulatory authority. The companies would be penalized if decrease in generation would be due to any reason other than low water level. No grantee against the supply of fuel was provided except coal.

Results:

1998 policy was failed to attract any investment (Power policy, 2002). The 1998 policy was not attractive for new investment and no fresh investment occurred during 1998 policy period (Business recorder, August 2013). One reason for the failure of policy was political situation of country, there was a military coup in 1999. In 1999 the government was taken over by coup, the power policies and projects under the previous government were not implemented. Another reason for no investment in generation during this time period could be that there was no demand supply gap in 1999 which means no immediate need to invest.

1.1 Hubco brief case study: Hubco (Hub company) was oil fired plants which was proposed to produce 1292 MW of energy. Construction of HUB company started in 1992 by signing power purchase agreement. Later in 1996 power prices went up which called for renegotiation of tariff which was decided in 1992. Hub company started operation in 1997 when the government of Prime minister Nawaz Sharif forced HUBCO to sign another contract with power capacity purchase price. This happened due to allegation on HUB company of increasing unnecessary prices by bribing the previous government. WAPDA and HUBCO had dispute on prices which was taken to high court. High court was not able to solve the problem due to influence of the government in 1998 on judiciary. In 1999 military coup took over the country and the case was closed and price increase were admitted to be just. No allegation of corruption was proved.

NEPRA was established and it started regulating already built power Plants. NEPRA had not reported annually until 2002-3. In 1998 when there was the government of Prime minister Nawaz Sharif, **HUBCO** and some other projects were accused of corruption with no evidence being provided against them in front of high courts. Private investor lost their confidence due to poor handling of dispute between WAPDA and HUBCO which got settled in 2000 (Fraser, 2005). Hubco case study is discussed in box 1.1. These allegations were not proved in court by

the government and made private investors reluctant to invest in Pakistan power sector. NEPRA was not able to solve the dispute until 2002 where the quick solution of dispute was also responsibility of NEPRA. Such disputes and forced contracts during 1998 HUBCO case were discouraging to private investment.

Lack of trust on the government policies and political instability declined investment of new projects. NEPRA was not independent and the government of Pakistan continued to intervene in the decisions of Power sector. NEPRA was not able to implement tariff on consumer side due to intervention of the government through subsidy on power prices. Subsidy which was added in 1994 was not removed from the billings of consumers. Transmission and distribution losses were 24% in the year of 1994 which increased to 31% of total production until 1997-1998 (trading economics).

Policy of 2002

The power policy of 2002 was to increase the generation capacity of the country due to expected increase in consumption of electricity. The generation capacity was approximately 14000MW in 2002 (PPIB, 2006) and expected increase in demand was 1000MW until 2005-2006. Karachi was bearing power shortage in 2002 where KESC was in its initial stages of privatization. The government intended to attract private investment by keeping the prices at affordable limits. The government was aware of high prices due to 1994 policy and energy mix adopted in 1994. Regulatory authority was responsible for tariff structure of electricity. Pakistan was following single buyer model and was privatizing its power sector through sale of KESC shares along with liberalization of generation under this policy. The government removed income tax exemption for thermal power plants along with guaranteed purchase of electricity from thermal power plants to promote competition through this policy and encouraged participation in hydro or coal fired power plants for which this policy gave huge incentives.

Demand of electricity rose because of rapid industrialization and growing population. Half of the population was not having electricity according to world bank indicators. Privatization was necessary because the government was unable to invest improvements of old public utilities and public utilities were bearing huge losses. Decentralized system was suggested with separate generating transmission and distribution companies with the involvement of private sector in generation and distribution. Policy was based on promoting private sector projects, public sector

projects, public private partnership projects and projects developed by public sector and then divested to private investors. Bids were invited for new hydel power and coal fired power plants where produced electricity would be sold to NTDCL through power purchase agreements.

Terms and conditions:

The projects were opened to private investment on BOOT for HYDEL and BOOT/BOO for coal power plant based on the details of project. The government guaranteed power purchase agreement, fuel supply agreement and water use license during the time of project under private sector of the projects producing more than 50MW. The government allowed duty free import of machinery for hydel and thermal power plants under this policy.

NEPRA was regulating tariff structure and was issuing license for generation. PPIB was evaluating bids, providing coordination services between private investors and government and different agencies involved in the private production. PPIB continued to provide one window facility to private investors for implementation and monitoring of the project contracted and issued letter of support.

Successful bidder would bid for minimum levelised tariff where minimum levelised tariff was proposed over the life of project but annual reviews by regulatory authority were also suggested in this policy.[18] Regulatory authority was allowed to change the tariff by reviewing it after 3-4 years. Tariff rate were to be paid and recorded in Pakistani rupee but was indexed with US dollar. Feasibility studies were emphasized for hydel and indigenous fuel based or renewable based projects. Projects were also accepted on tariff declared by NEPRA.

Power would be purchased by public utility NTDC at either the bus bar or specific location on the grid. If the transmission line up to the power complex would be built, operated and maintained by power purchaser, tariff would be dependent on energy price and capacity delivered to power purchaser. Private companies were also offered 'BOOT' for transmission lines which were connecting power plants with grid stations. Those companies which followed the 'BOOT' system for the transmission lines from power complex to grid station would quote the cost in tariff which was being bid on competitive basis for the selection of projects. Tariff would be paid in Pakistani

[18]Successful bidders were those who got selected for bidding on the basis of proposal and financial assets they had declared for power projects.

currency and was indexed with dollar. Capacity purchase price was supposed to be recorded in Pakistani currency. Energy purchase price included water use charges adjusted annually and were fixed at RS 0.15/kwh.

Results:

Power policy of 2002 included incentives for new generators to enter the market to meet future needs of the electricity. The policy tried to address the higher tariff rates by encouraging hydel and coal power plants through competitive bidding for minimum levelised tariff and removed guaranteed payments for thermal power plants which was 'take or pay' approach. The policy covered reforms of 1998 in some of its section like tariff rates, financing etc. Policy was successful in attracting satisfactory amount of investment of about 10000MW from which about 2000MW got in operation until 2010 whereas 8000 MW of power projects were under construction (PPIB, 2010). It could be seen here that implementation of projects was very slow because until 2010 very less capacity was added while contracts had been finalized since 2002.

The bulk tariff was removed and levelised tariff was the basis of selection. Bulk tariff was a type of contract being done for huge amount of electricity at fixed rate for specific period of time which is not changing over the time of contract for bulk amount of electricity. Levelised tariff was variable tariff where it could fluctuate over the life of project and as mentioned above regulatory authority was authorized to review it every 3-4 year. Tariff indexation with US dollar caused expensive electricity due to rupee devaluation. The government tried to phase out subsidy at consumer end and it was the first time this problem was addressed. Under this era, government faced political opposition for removing subsidy.

Pakistan started expanding its distribution networks and more population was able to consume electricity thus increased demand of electricity occurred for domestic use. Rapid industrialization after 2002 also increased the demand of electricity.

Hydel plants and indigenous fuel were cheaper source of production than oil which government promoted in this policy. Water availability was the responsibility of WAPDA for plants producing electricity more than 50 MW (GOP, 2002). Power policy of 2002 was able to attract investment in power sector which showed that it offered good conditions to attract private investment but the emphasis was given to cheaper

electricity through competitive bidding (Ali and Beg, 2007).[19]

Distribution companies were proposed to privatize since 1998 which could not occur under this policy. Privatization of KESC was being done successfully as 75% of shares of KESC were being sold out to private owners until 2005. PEPCO was not privatized even though privatization was proposed for all three thermal power plants when these plants were unbundled in 1998.

According to NEPRA 2003-2004 reports investors alleged NEPRA of charging too low rate of return and the tariff was not cost reflective but NEPRA gave the argument that it was following a transparent mechanism for tariff and investors could cut cost to earn profits until the next review which increased the regulatory Lag (NEPRA, 2003-2004). NEPRA also alleged government had not made enough policy reform to cover all of the population which required introduction of new innovative technology in distribution sector and involvement of private sector through liberalization of distribution (NEPRA, 2003-2004). There were no major policy changes occurred after the policy of 2002 until 2013.

National Policy of 2013:

The policy was formulated to address the issue of increasing supply demand gap which was 5000-6000MW (PPIB,2010)**,** highly expensive generation of electricity (12RS/kwh), inefficient and limited transmission and distribution system and underpricing at producer end. Clear goals were squeezing demand supply gap, affordability, efficiency, financial viability and governance of the system. Generation capacity in 2013 was approximately 16000MW and demand was about 21000 MW (PPIB,2013).

According to this policy document NEPRA priced the produced electricity at 14.70RS/kwh where generation prices estimated by NEPRA were 12RS/kwh which means NEPRA was charging 2.70RS/kwh more over generation cost. Whereas Ministry of Water and Power estimated the generation cost to be more than 15.60RS/kwh with the inclusion of transmission and distribution losses. The government wanted NEPRA to include these losses in tariff rates where as NEPRA was rigidly following the tariff it has decided.

[19] The problem was not only prices through competitive bidding but it was dependent on energy mix adopted which this policy tried to address but the projects which got started until 2010 added only 2000MW of capacity and share of thermal was very high. High share of thermal was influenced on prices.

New generation capacity would be added by attracting private investment through competitive bidding for the minimized cost of generation. 2002 policy frame work was proposed to be continued. It was proposed that the subsidy would be phased out in three years and the existing capacity would be utilized fully by paying circular debts. Coal projects were proposed at BOT with PPP (public private partnership). PPP was also proposed for run on river projects. Whole sale market was also proposed where public and private generators would sell electricity to DISCOS, NTDC and private distributors.

Upfront tariff would be used for low fuel cost and competitive bidding would be done to decrease the cost further.[20] Projects would be selected through competitive bidding for lowest leveliesed tariff whereas NEPRA had set benchmark to limit tariff rates and company which suggested lowest possible tariff would be ranked 1st. Tariff structure was proposed different for different times for off peak and peak hours. True economic cost was proposed to be transferred to end consumer in 3 years by the phasing out of subsidy. Energy conservative technology would be used and inefficient technology would be banned such as the appliances consuming excessive energy were banned by setting standard for imported technology. The option to adopt upfront tariff was also available for new projects. Tariff was indexed with foreign currency.

Privatization or leasing of GENCOS (Generating companies) on operation and maintenance was proposed with immediate privatization of two GENCOs. Privatization of distribution was also proposed with some discos to be privatized immediately after the implementation of power to lessen distribution losses.

Results:

The power policy was designed to eradicate the supply demand gap by 2017 where as it increased during 2015-2016 and was 6361MW in 2015 (NEPRA, 2015). CPEC (China Pakistan Economic Corridor) measured the shortfall of demand in 2015 at 7712 MW at peak hours (The Express Tribune, October 2015). The privatization of DISCOs is still under way. Privatization of distribution was proposed because of high distribution losses and low recovery of bills, distribution losses accounted for 31 billion rupees (Dawn, September 2015)**.** Whole-sale competition has not been created until 2016. Pakistani government phased out 250bn of subsidy from power sector during the FY 2015. This happened due to lower oil prices and lower tariff which government

[20] Upfront tariff is variable tariff declared tariff by NEPRA.

decided that it will remove subsidy by that amount and will keep the tariff at same level for end consumer. (Dawn, May 2015). Electricity billing includes peak and off peak charges separately which was also the clause of this policy. The government payed the circular debt by the amount it has reduced the subsidy mentioned above. But transmission and distribution losses were continued and subsidy was not completely phased out which was piling up circular debt again. CPEC mentioned that electricity shortfall will rise up to 10844 MW by 2020 as demand is rising at 7.8% rate (The Express Tribune, October 2015). Pakistan electricity sector is still dominated by oil fired plants which cause higher prices. Hydel and conventional/non-conventional power projects have lower percentage of contribution in production mix.

The capacity of GENCOs (Publicly owned) increased from 41% to 45% in 2013-2014 but until now GENCOS are not privatized. Independent power producers increased in 7% of generation capacity which was far less than planned and expected. Low prices offered to producers with low recovery rate hindered the new investment in power sector. Coal fired plants were proposed but the management and exploitation of domestic coal showed no progress. Investment in this plan seemed to be low which couldn't mitigate the problem of blackouts in 2014-2015 rather it has increased.

Transmission and Generation Policy 2015

Power transmission policy 2015:

Power generation was proposed to be expanded to decrease supply demand gap and coal was proposed to be cheap source of electricity. Coal plants were located near coal mines of Thar which were far from places where transmission network and already built grid stations were located.[21] This necessitated construction and expansion of transmission lines to connect coal fired power plants with power grids. The government of Pakistan decided in this policy to invite bids from private sector for extra high voltage transmission lines, sub stations and converter stations.

Terms and conditions:

The project would be offered to private investors on 'BOOT' basis with the concession period of 25 years and then projects would be transferred to national

[21] Thar is a place where there are mines of lignite in the province of Sindh, Pakistan

transmission and dispatch corporation limited for extra high voltage, converter station and sub stations. International competitive bidding would be done based on lowest levelised tariff for the award of project those project would be given priority which will offer lowest levelised tariff bid. Bids of only those sponsors would be evaluated who would fulfill pre-qualification terms of project. Projects could be processed on NEPRA upfront tariff (fixed tariff) declared by NEPRA.

Legal rights and land acquisition would be the responsibility of NTDCL (national transmission and dispatch center). National transmission and dispatch would purchase power from generator. NTDCL would be obliged to pay ITC (independent transmission companies) on monthly basis which include revenue times monthly power transmitted through that line. This payment would be paid regardless of usage of transmission line in that month. Power generators would transmit electricity through transmission lines under long term contract of 25 years.

Power Generation Policy 2015:

The policy focus was to increase generation capacity of Pakistan Power sector by encouraging hydel and coal power projects. These sources were thought to be essential for closing the supply demand gap through cheap resources. To address the shortfall of 6000-7000MW electricity, government has adopted a new power policy in 2015 which was aiming to attract private investment for coal fired plants. Coal was proposed to be a cheap source of energy because previous policies were not able to address the shortfall, expensive energy mix and price uncertainty because thermal power plants held larger share of energy mix than hydro or any other source. Share of oil and gas was 70% of total production in 2013.The government wanted to increase share of hydro and coal in energy mix because both were economical. The government was intended to provide attractive investment rates towards private domestic and foreign investor and also kept delay in payment under consideration.

Terms and conditions:

Hydro power projects were encouraged for private investors for ‘run on river’. Hydro projects were allowed on international competitive bidding for the lowest possible levelised tariff rate where feasibility reports were provided by the banks. Small power projects up to 50MW under provincial control would follow upfront tariff which was declared by NEPRA. Provincial government could also determine tariff rate for

these small power plants on the directions of NEPRA. The hydro power projects would be 'BOOT' with a concession period of 30 years after which project would be transferred to the government of Pakistan at rupee 1. Water usage charges were RS 0.425/KWH and would be reviewed after every five years. Risk of availability of water was borne by power purchaser which would be included in CPP (capacity purchase price) of power tariff.

Thermal power projects were also encouraged on some separate terms and conditions. Projects would be allowed through international competitive bidding. Bids were evaluated on lowest possible levelised tariff. Thermal projects would be established on 'BOOT' and 'BOO' basis. Public private partnership projects were also encouraged.

Tariff was based on two parts energy purchase price and capacity purchase price. Energy purchase price included variable cost such as fuel, variable operation and maintenance and variable component determined by NEPRA. Energy purchase price would be paid at the point of delivery of fuel. CPP included fixed cost and would be paid on monthly basis when company would start dispatching as per PPA (power purchase agreement). Tariff would be dominated in Pakistani rupee. Indexation of tariff was allowed and would be done in July, October, January and April each year with foreign currency (US Dollar, Japanese Yen, British Pound, Euro).

Results:

Investment in 2015 increased generation capacity from 19499MW to 21701MW which is also mentioned in table 1.2 in later sections. As a result of this policy coal fired plants have been contracted such as 1320 MW imported coal based Power Project (Huaneng Shandong Ruyi (Pakistan) Energy (Pvt) Limited) is expected to be completed in 2017(PPIB,2016). Another power plant which is also based on imported coal is expected to be completed in 2018 and is under construction with generation capacity of 1320MW (PPIB,2016).

One important fact about proposed tariff under this policy was indexation with foriengn currency which would not mitigate the risk of higher tariff due to devaluation of Pakistani currency. Another important factor here is the projects were selected on minimum levelised tariff and upfront tariff which doubts the promotion of comeptition through pricing because NEPRA may declare very high upfront tariff where as bidding will offer lower tariff or vice versa which will not introduce competition in power sector

and thus higher prices will continue to prevail.

Overall Results of the policies:

The Policies were mainly aimed at increasing generation capapcity to address expected supply demand gap until 2005. But policies after 2005 which are 2013 and 2015 policy were aimed at closing supply demand gap and were focused on increasing capapcity of generation.

The policies of power sector after 1994, privatised and liberalised the power sector to reach its goals. Liberalization started in 1994 whereas privatization of small power plant was also done in 1994 with privatization of KAPCO power plant. These reforms introdcued private investors to power sector because government was unable to fund new capacity. Privatization of KESC happened until 2005, its 75% of shares were sold to private ownership where as privatization of WAPDA, PEPCO and distribution companies has not happended yet. Privatization of PEPCO and distribution companies had been planned since 1998 policy but could not happen up until now. Privatization was suggested as a solution by many resreachers such as Kessidess is supporting privatization of ditribution to end distribution losses.

Table 1.1 shows share of IPPs from 2003-2015 for hydro and thermal power plants because production mix of electricity in Pakistan consisted mainly of these two resources. The data in table 1.1 was not available prior to 2004 on NEPRA, PPIB or any other source website.

Table 1.1: IPPs share in Hydro power and Thermal power generation

Years	IPPs Hydro Share	IPPs Thermal Share	IPPs Total Share
2004	0.15%	30%	30.5%
2005	0.15%	30.49%	30.6%
2006	1%	30.72%	31.3%
2007	1.65%	31.27%	31.4%
2008	1.65%	32%	32.3%
2009	1.68%	47%	46%
2010	1.72%	53%	48.9%
2011	1.9%	58.4%	52.44%
2012	3.1%	56%	53.94%
2013	3.02%	55.1%	52.99%
2014	3%	58.3%	53.72%
2015	3%	54.5%	53.61%

Source: NEPRA state of industry report

In table 1.1 it can be seen the hydro share increased slightly from 0.15% in 2004 to 3% until 2015 whereas the share of thermal increased from 30% in 2004 to 54.4% in 2015.

Although share of IPPs increased after 2005 specifically in thermal power generation, supply demand gap also apeared and was continoustly rising after 2006 which can be seen in next table. This gives a reason that there must be some other problems with power sector which reasoned this gap and share of IPPs was not enough to address this gap.The policies after 1998 tried to shift the energymix to hydro because it was cheap resource but implementation of polcies showed that this could not happen and thermal share increased overall in generation mix making the electricity expensive.

The next table 1.2 is about supply demand gap which is mentioned here to evaluate if generation capacity increased as it was proposed and clossed supply demand gap which was the main aim of these policies. Looking at the table and policies it is well understood that increase in generation capapcity had occured at slower rate than increase in demand which could not help in closing supply demand gap.

Table 1.2: Supply-Demand Gap: Actual generation and Actual demand

Years	Generation MW	Demand MW	Supply-Demand gap MW
2003	14336	13071	+1265
2004	15046	13831	+1215
2005	15082	14642	+440
2006	15072	15483	-404
2007	13292	15138	-1846
2008	12442	16838	-4396
2009	13637	17852	-4215
2010	13662	18122	-4460
2011	14618	20873	-6219
2012	16320	22459	-6139
2013	16000	21000	-5000
2014	19499	25918	-6419
2015	21701	28062	-6361

Source: NEPRA State industry report and PPIB
Table 1.2 is showing data from 2003-2015 to measure supply demand gap. It can be seen from this table that supply demand gap had been continued since 2006 whereas until 2005 there was excess of supply because demand was low. Supply was not increasing as planned which resulted in supply demand gap after 2006. Positive signs in supply demand gap column are for surplus and negative signs are for deficit.

The policies until 1998 did not gave importance to distribution losses. All the policies were focused on increasing generation capacity. The 1998 policy suggested privatization of distribution after unbundling of WAPDA. Privatization was also proposed for these unbundled distribution companies but was not implemented. Next table summarized transmission and distribution losses from 1994 to 2010 because the data is not available

after 2010 but transmission and distribution losses are still at 18.73% in 2015 (NEPRA, 2015).

Table 1.3, Transmission and distribution losses

Years	Transmission and distribution losses %
1994	20%
1995	21.05%
1996	22.41%
1997	23.72%
1998	29.85%
1999	28.12%
2000	24%
2001	27.94%
2002	26.6%
2003	25%
2004	27%
2005	26%
2006	24%
2007	20%
2008	22%
2009	20.4%
2010	20%

Source: Trading economics

This table 1.2 is showing that transmission and distribution losses showed increasing and decreasing trends overall and huge losses occur during 1998,1999,2001,2002,2003 and 2004. From 2006 to 2010 transmission and distribution losses showed a decline but still they require attention of policy makers because 20% of total production is wasted which is not ignorable.

Above table mentioned distribution losses of whole system but NEPRA reports are suggesting that some distribution companies have less distribution losses and some have higher. There is regional effect on transmission and distribution losses which is explained though next table.

Table 1.4: Transmission and Distribution losses of all DISCOs

T&D Losses %	IESCO	**FESCO**	**PESCO**	**MEPCO**	**GEPCO**	**LESCO**	**SEPCO**	**HESCO**	**QESCO**
2012-13	9.5	10.8	28	15	10.5	12	28	22	18
2013-14	9.47	11.26	33.49	15	10.97	13.44	38.56	26.46	21.93
2014-15	9.41	11.03	34.81	15.50	10.72	14.10	38.29	27.08	23.10

Source: NTDCL and NEPRA State Industry Report
Table 1.4, IESCO: Islamabad electricity supply company, FESCO: Faisalabad electricity supply company, PESCO: Peshawar electricity supply company, MEPCO: Multan electricity supply company, GEPCO: Gujranwala electricity supply company, LESCO: Lahore electricity supply company, SEPCO: Sukkur electricity supply company, HESCO: Hyderabad Electricity supply company, QESCO: Quetta electricity supply company.

Losses are measured in percentage and are provided from 2012-2015. IESCO has minimum amount of losses and SEPCO has highest level of losses. KESC distribution data is not included here because it was privatized and these losses are from public utilities.

Although all are public but except IESCO, FESCO, GEPCO and LESCO other companies have huge amount of losses. These losses were the average of area losses under these regions whereas NEPRA stated in this report that some areas under these distribution companies even bear 90% of losses which is evidence of the fact mentioned above that different distribution companies have different amount of losses and there are regional effects on distribution losses.

The reason mentioned were corruption, theft, inadequate and old technical system, metering and Human resource problems. IESCO is region of Islamabad which is capital city of Pakistan and its surroundings. This region is given more attention because it is capital and overall area covered under this distribution company is not huge and is mostly consisted of cities and towns where work can be done on distribution lines with ease. However, SEPCO and HESCO are in province of Sindh where most of population lives in villages and there is lack of modernized infrastructure. These places are not developed and old distribution, metering and billing system is prevailing in these regions.

These different amount of distribution losses cannot be used against privatization argument of distribution because looking at their yearly losses it is clear, those companies which are bearing less losses have not completely ended the problem. Privatization is required to decrease losses, increase technical efficiency, eradicate corruption and increase collection of revenue. If distribution losses will be controlled

and revenues will be collected, then power sector will be more attractive for private investors and circular debt will decline.

Evolution of the Power Policy and Structure in India

1948 Act of electricity:

India started following 1948 act from 10th September 1948 just after it got independence from British empire. This act was named as 'Electricity Supply act of India' where the focus was on the development of electricity through production and supply of electricity with other necessary measures for development. This act was dealing with central electricity authority, state electricity broads and generation companies.

Central electricity authority was working under the ruling of central government of India. Its responsibilities according to this act was to formulate the national power policy along with short and long term plans for development of power sector. Central electricity authority acted as advisory to state and central governments, generation companies or other agencies engaged in generation or supply of electricity. Central government was authorized to appoint the chairman of central electricity authority. The central electricity authority was also obliged to make regulations provided under 1948 act of electricity. The central government would pass the regulation through parliament and would implement those regulations made by central electricity authority.

The second important entity involved in power sector under this act was state electricity boards. The state electricity boards were responsible for coordination with generation companies which were owned by the state governments. Transmission and distribution of electricity was also the responsibility of state electricity boards along with collection of demand data for planning and the policies. The state government was allowed to lease out its generation or transmission network on operation and maintenance basis to private investor. The state electricity board would purchase electricity from those leased generation plants. The state governments were responsible for the issuance of license to new private investors after the amendments made in 1990s which allowed private generation companies to enter the power sector. State electricity

board was authorized to close a power stations under this act.

Private generation companies were allowed to enter into contract for the sale of electricity with state in which they would be producing electricity or another state in which it would be carrying its output. Tariff had to be determined by central government which would include plant load factor such as rate of return and rates of depreciation. If the generation plant was present in specific state, state was responsible to buy electricity and pay tariff determined by central government.

Due to lack of investment before 1990s and inability of government to address shortfall of 2000MW, 1948 act of electricity was amended in 1990s and liberalization of generation was adopted to address the shortfall. Distribution and transmission losses, low efficiency, subsidy and tariff reforms were long awaited which reasoned amendments and the policy reforms to attract private investment. Performance of state electricity boards was very poor due to many reasons such as political intervention in decisions, huge financial losses because of inefficient transmission and distribution, agricultural subsidy which involved zero charges for electricity usage in agricultural areas. The burden was transferred to industrial and commercial users through higher tariff rates on them. This subsidy involvement politicized the power sector. These problems piled up making SEBs produce less electricity and burdened government's budget until the 2003 act of electricity was implemented.

1991 Policy:

The policy was formulated to attract new independent private investment in power generation transmission and distribution. The government opened power sector towards independent private participation to initiate new generation projects. The policy was formulated to attract new investment in generation of electricity to fulfill shortfall of 2000MW.

Terms and conditions:

Private companies were allowed to produce through thermal power, hydro power or renewable power plants. Generation was allowed on build, own and operate (BOO) basis. Two- part tariff was suggested in 1992 which included variable and fixed cost for the independent power producers making the policy attractive for private investors. Plant load factor of 68.5% with 16% return on equity for thermal plants and 90% availability factor for hydro power plants was also an attractive option for private investors. Private generators were allowed to enter power sector by signing an

agreement after fulfilling pre-requisites set by government.

Price regulation adopted for private generators was cost plus with rate of return of 16% on equity. SEBs (State electricity boards) were obliged to purchase generated electricity by paying the settled tariff in agreement. Each SEB was responsible for the transmission and distribution of electricity in its assigned region. Return on equity was to be paid in dollar rather than local currency. The tariff rate was higher for SEB to pay because state electricity boards were earning only 12% returns from end consumers.

The government of India gave a huge incentive to investors by allowing them to invest in coal, hydro or non-conventional resources with automatic approval on the condition of having 100% percent foreign equity. Approval of such projects would have been taken from Reserve Bank of India. The policy permitted projects free for choosing their capacity and type. The government also proposed liquid fuel power plants in specific areas to fulfill the immediate needs of country considering that coal based or hydro power plants would take time for completion.

The government started renovation and modernization of projects and allowed private investors to complete this task. These projects included life extension of thermal and hydro power plants. Public sector was not having funds which gave reason for the entrance of private investment in the form of lease, rehabilitate, operate and transfer, sale of plants, and SEB-private joint participation.

Results:

Higher rate of returns and high demand made participation in generation attractive under this policy. For foreign investors India allowed license free entry where approval could be taken form Reserve Bank of India based on condition that equity would be 100% foreign. In this way foreign investors were encouraged to invest in private generation. The 1991 policy increased private participation and thus investment increased and closed demand supply gap of 2000MW until 1995 through liquid fuel power plants. Demand was on continuous increase and made power sector of India capable of absorbing more investment.

The return which was supposed to be paid in dollar which made the payments riskier for state electricity boards because of currency devaluation. Lack of competitive bidding let firms seek rent because projects were started by signing an MOU with government with agreement on price which was negotiable. The government gave grantee to 8 projects out of 189 proposed projects. Transmission and distribution losses

put the burden of payment on SEBs which were not able to recover the revenues of IPPs. State electricity boards were able to earn 12% return from consumers due to high transmission and distribution losses and the government provision of subsidy for agriculture and household. Subsidy was partly being paid by cross subsidization of industrial and commercial consumers and partly from the government budgets. Lack of payments due to huge burdens on the state governments reasoned default on returns of generation companies.

IPPs production cost was also high because of high equipment cost as the prices of gas turbines rose up due to competitive bidding in international market. Projects were based on negotiation rather than on competitive bids which was the reason of higher fixed cost. The need of SEBs and lack of funds forced SEBs to renegotiate with private investors which reasoned high fixed cost. However, from renovation and modernization under this policy 7864MW additional capacity was generated which was success of this policy reform.

1995-1999 Policy plan:

The 1991 policy was able to attract private investments from foreign and domestic private generators and demand of electricity was kept on rising which necessitated further addition in generation capacity. In 1995 a new policy was introduced named as mega power policy 1995. It was named mega power policy because in this policy the Indian Government Invited huge investments in power sector that could supply electricity to more than one state. The projects were invited through competitive bidding for 1000MW of energy. The policy was focused on coal based huge power plants because India had huge reserves of coal and was able to produce cheap electricity through coal.

These projects were intended for private investors because public sector was not able to finance such huge projects. CEA was authorized to identify the location and national thermal power corporation a public generation company was responsible for feasibility study. These projects were free from custom duties which made them cost efficient as they can import high quality equipment in lesser prices.

State electricity boards consisted of generation, transmission and distribution of electricity. In 1996 state electricity boards were proposed to be unbundled by separating generation, transmission and distribution to separate entities. Privatization of state electricity boards was also proposed. State electricity boards were not able to pay

generation companies for electricity it was buying due to unpaid subsidy from the state governments and transmission and distribution losses.

Terms and conditions:

In the previous policy there were good enough incentives for foreign investors whereas this policy did not give incentives as given in the previous policy. Competitive biddings were invited for final tariff rates where as in the previous policy tariff rates were being decided by the government of India. Tariff was recorded in local currency rather than dollar. Demand risk would be guaranteed by the buyer of electricity. Agricultural subsidy was decided to be lowered by 50% as after 1996 agriculturist had to pay 50% of the cost of supplied electricity. In 1998-1999 tariff was 80% of average cost of production of electricity because of cross-subsidies (Vishwanath, 2009).

Ministry of power reduced legal obstacles to attract more private investors. For this process ministry reduced number of clearances required before setting up of a project. Thermal power projects required five clearances after 1996 and hydro required 4 clearances which were 13 before the 1996 reform.[22]

During 1996 chief minister's conference in India a common minimum national action plan was formulated which proposed regulatory body for the power sector. With increased liberalization of generation through IPPs and unbundling of state electricity board their rose up the need of regulatory body. The pricing of electricity was proposed to be regulated by state regulatory commissions and central regulatory commission which were required to set tariff rates for intra state and interstate electricity transmission respectively. To establish these regulatory commission an electricity regulatory commission act 1998 was passed for independent regulatory body.

Function of CERC (central electricity regulatory commissions) were to regulate tariff structure of companies which would come under the central government control and for the companies which were selling electricity to more than one state. Central regulatory commission was responsible for regulating interstate transmission of energy and its tariff, promotion of competition, efficiency, for advising the central government toward fair tariff policy for consumers and investors, promotion of environmental regulations and dispute resolution.

Functions of SERC (state electricity regulatory commissions) were also clearly

[22]Centre for Monitoring Indian Economy, op. cit. n. 12, p. 20

mentioned in the electricity regulatory commission act of 1998. The main responsibility was to regulate tariff structure for the companies working in that specific state. SERC was supposed to measure tariff for wholesale, bulk power purchase, and retail sale. SERC was also regulating power purchase agreements, generation cost, transmission charges, sale of electricity and supply. It was responsible for promotion of competition and efficiency of power sector in particular state. Each state regulatory commission was responsible for regulating its own state. According to this act the state government could notify state regulatory authority for more function like issuance of license, dispute resolution, and regulation of power system in state etc.

Due to inefficiencies in the working of SEBs (state electricity boards) the government planned unbundling of SEBs. SEBs was unbundled due to example set by successful unbundling of Orissa state electricity board. State electricity boards in each state was unbundled to GENCOs, DISCOMs and TRANSCOs and privatization of these wings was also proposed.

1998 electricity law amendments also suggested separation of transmission from state electricity boards and opened it to public and private participation. Private participation was allowed only in the form of operation and maintenance of the transmission lines. Transmission lines were intended to stay under the control of public. The projects were supervised by central and state transmission utility, private projects were being selected by STU/CTU and were forwarded to CERC/SERC for issuance of license.

Results:

The real problem of Indian electricity was not the less generation but the distribution and transmission losses which burdened SEBs though low recovery of revenues. The low recovery rate of revenues has led to inefficient working of generation companies. Private companies were not willing to produce more power due to state electricity boards non-payments of revenues in 1996-1997 (Vishwanath, 2009).

Unbundling involved separation of distribution units, DISCOMs which were not privatized because of lack of clarity of return and high losses and financial liabilities on DISCOMs. GENCOs which were unbundled from state electricity boards and they got privatized successfully through competitive bids. Transmission and distribution losses of Orissa state were lower than other states in 1996 because of privatization of distribution company in ORISSA electricity board. Orissa was the main reason behind

unbundling and privatization of state electricity boards

There was political involvement in the sector through the subsidy and tariff calculations. The agricultural subsidy was huge burden because there were no meters and the agriculturist were using electricity free of charge for pumping water or for other domestic use. The old machinery for pumping water was consuming huge amount of electricity putting a lot of burden on the budget of the central and state governments. In CM conference of 1996 there was suggestion to remove agricultural subsidy up-to half but it was not implemented until the implementation of 2003 act. Gross subsidies in 1998 accounted for rupees 30,345 billion (US dollar 7 billion) and 74% of these subsidies were on agriculture use of electricity although in 1996 the government proposed lowering of subsidy (The Economic Times Mumbai, 2000).

Before the implementation of 2003 act, regulatory authorities followed the tariff setting methods listed in 1948 act which was based on cost plus tariff regime. Tariff structure was fixed and SEB were supposed to pay it but the state governments were continuously interfering in tariff decision through subsidies. The state governments were not able to pay subsidized amounts to state electricity boards for the repayment to private investors (Vishwanath, 2009).

Added generation capacity during 1995-1998 was 46% lower than expected additional capacity in this plan and share of hydel power also decreased from 34% to 25.5% (Government of India, 9th five-year plan). This policy gave more incentives to thermal power plants than hydro power plant which led to increased thermal share compared to share of hydro power in production mix.

1999-2003 Policy plan:

The government was providing subsidy to agriculture and household as mentioned in above sections. It was cross subsidization where industries and commercial consumers were paying high prices than agricultural and household users. Cross subsidy induced industries to produce from their own plants which was cheaper than electricity they were buying and industries were demanding huge amount of electricity which became difficult to manage. This policy was introduced due to high industrial demand for electricity. The government encouraged captive power plants which were started by industries to meet their own demand.[23] Industries were allowed

[23] Captive power plants are those which can be built near the user of electricity which has very high demand and it is a kind of distributed generation (clarke-energy).

generate their own electricity through captive power plants and were allowed to sell the excess electricity to grid on agreed rates between captive power producers and state regulatory commissions. Captive power plants were also proposed to IPPs (independent power producers) for one industry or group of industry without competitive bidding. Where IPPs would build a captive power plant to provide electricity to one industry or group of industries.

Terms and conditions:

The government gave tax exemption for five years on these projects. Projects with the capacity smaller than 25MW were handled to ministry of non-conventional energy resources. For projects production capacity of 25MW or more CEA was responsible to regulate. Surplus was sold to state on negotiated power purchase agreements. As these projects had no bidding requirements all the fixed cost and variable costs were compensated. Fuel cost was included along with transportation charges in variable cost. Power purchase agreements were backed by the government of India for the payments.

The government of India encouraged investment in hydro power plants by independent power producer and by joint ventures. Mega projects had been proposed for hydro to increase hydel capacity. CEA reduced the availability factor for hydro stations from 95% to 85% to make investment attractive for private investors (The government of India, 1999-2000). Private participation in transmission had been allowed by passing the transmission bill (Shodhganga, 2014). Two mechanism were assured independent power transmission company and joint venture.

For independent power transmission company tariff rate would be decided through international competitive bidding and for joint ventures private investor would hold 26% equity and cost plus tariff would be applied. Both types of projects needed approvals of CERC (The government of India, 2002).

Results:

Deficit of electricity declined due to implementation of captive power projects from 11.5% in 1998 to 1.4% in 2002.[24] Thermal power station showed improvements due to renovation and modernization of power plants. The state governments financed

[24] Excess demand of electricity due to huge industrial demand caused supply demand gap. This excess demand was 11.5% of total demand supply gap.

the renovation and modernization of projects in states through which 63 distribution companies were renovated and modernized. Plan was quite successful in attracting private investments and distribution losses were also a bit controlled. Despite all of these improvement the distribution losses were not addressed well which became a reason to privatize distribution in the next act of electricity. In the budget of 2001-2002 finance minister emphasized the need of commercialization of distribution.[25] The government of India proposed privatization of the state electricity boards as 20% of electricity was not billed due to non-metering and illegal use of electricity or corruption in billing where as 25% accounts for technical losses in distribution and transmission.[26]

2003 act of electricity:

The 2003 act of electricity was introduced to set new reforms in power sector to make it efficient keeping in view the power crises of past. It was a legal framework for next years' policy planning and implementation. This act changed the laws related to generation, transmission and distribution of electricity from the laws mentioned in 1948 act of electricity to promote competition in power sector more efficiently. Laws related to central electricity authority and regulatory commissions were changed. A new entry of institution named 'Appellate Tribunal' was also made.

According to this act each state government was responsible to unbundle the state generation units and planned to privatize it along with privatization of distribution while transmission was supposed to stay with public. Major step for making generation attractive to private investors, the government permitted generation without getting techno-economic clearance for any project other than large hydro projects. Large hydro projects needed to get clearance from central electricity authority and would follow the technical standards set by central electricity authority. Captive generation plants were redefined as a project set up by an association and they were provided with the open access to transmission with no regulations for its prices. Except captive power plants all other power plants needed license from regulatory commissions for generation, transmission and distributions according to the area where they were performing activities.

Regulatory commissions were independent and were responsible for tariff

[25]Government of India, Budget 2001-02 Speech of Finance Minister

[26]Mantra news analysis: Privatization of distribution should be the starting point in power sector reform

determination, regulation, setting performance standards, issuance and revoking license, and setting grid standards. Regulatory funds were created on central and state level where regulators were accountable to parliament for these funds. The government made it the responsibility of regulators to phase out cross subsidies.

To introduce competition in distribution sector government proposed multiple distributor system but distributors and retailers were same entity chosen by the state government for a particular area with the choice of people of that area. Independent private distributors were allowed to operate at 'BOOM' (build, own, operate and maintain) with tariff rate determined by regulatory commission under which it will operate. Distribution and retail in a specific area were assigned to one distributor licensee. Whereas consumers having electricity usage of more than 1MW were free to choose their generators directly.

Agriculture sectors were not metered and were using electricity in agricultural areas at 100% subsidized rate which this act removed by metering all consumers. The state government were not allowed to give any subsidy of power without paying it before the implementation of subsidy program. If state would offer a subsidy without paying it electricity regulatory commission would be free to charge the same tariff which was determined before the subsidy program.

Formation of appellate tribunal to deal with the cases of theft and illegal use of electricity which means stopping or slowing of meters. Disputes between companies had been supposed to get resolved in these special courts. Regulatory commissions did not come under the control of this authority and their decisions or matter related to regulatory commission could be challenged in high courts. The decisions of 'Appellate Tribunal' would be finalized by supreme court and would come under the limit of electricity regulatory commissions.

According to the rules of this act central government was obliged to make five-year policy plan the first plan came in 2005. In 2005 according to World Bank, India's 44% of population was having no access to electricity.

National Electricity plan 2005-2010

The plan was aimed at providing electricity to all residents of India, industrial units and service sector at competitively reasonable rate. Rural electrification was considered important and was done without putting the burden on industrial and service sector consumers through cross-subsidies. Electricity industry is capital intensive which

made clear that it requires a lot of time for the completion of projects with huge infrastructure requirement for which modernization of old plants was suggested and energy sources were not distributed efficiently in power sector of India.

Terms and conditions:

Rural electricity was on the agenda as access to electricity in rural areas was low as mentioned above. The policy proposed rural electrification by establishing rural electrification distribution backbone (REDB) and was allotted with 33kv or 11kv block on each state network. Multiple distributors were allowed in villages to provide electricity to each household on demand.[27] Rural electrification corporation was set at the central government level which functioned for expansion and provision of electricity to villages.

Additional generation capacity was proposed to be 100000 MW until 2012. From 100000 MW the policy emphasized the need of 50000MW from hydro power plants in states which have hydro potential keeping environmental and debt constraints under consideration. Thermal power mostly was dependent on coal which was to be imported, domestic or lignite. Liquid fuel plants were proposed to be changed to gas fired plans where gas was imported in the form of LNG or through pipelines. This involved medium to long term fuel supply contracts keeping in view the supply security and demand of fuel. The policy also emphasized generation through captive power plants. The policy also suggested renovation and modernization of old plants which were not working efficiently.

The policy suggested the establishment of national grid for which state transmission utility and central transmission utility will coordinate with each other and expansion by STU and CTU would not require any agreement with the private licensees which were operating and managing the transmission lines. State regulatory commission would be responsible to specify grid code until September 2005. Non-discriminatory open access of transmission line was provided with only wheeling charges applied for transmission.

Indian power sector was facing huge crisis of distribution losses of 30% in 2002. Multiple distribution licenses were the main step towards the competition through

[27]Each area had its own distributor with the choice of people of that area and approval from regulatory authority. Multiple distributors were provided licenses in very few areas on parallel basis for whole sale competition but it could not be practiced and distribution sector was privatized and liberalized.

privatization of distribution sector which could not be translated in practice because of expensive setup. Previous liabilities were shed off by the state governments and distributors were accountable for their own functioning.

The policy phased out a part of subsidies by making all the villager and poor consumers to pay the cost of supply of electricity and those who cannot afford to pay full cost would pay 50% of the cost of supply. The state government would pay to poor entities the amount it wants to subsidize before the implementation of subsidy program.

According to the policy CERC and SERC were responsible to restructure tariff rate for attracting investment and would be fair for investors and consumers. Distribution licensees will purchase electricity from generators through tariff biding. Return on investment can be given on cost of capital approach or cost of equity approach. These distributors were following tariff declared by regulatory commission to sell its electricity to end consumers whereas on buying end distributors were buying through competitive bidding. regulatory commission were setting a benchmark for Capital costs. Foreign exchange risk would be borne by investors and would not be included in tariff. All the tariff rates were restructured as multiyear tariff with review of 3 to 4 years. When the regulatory authority would finalize tariff then cost of inputs would not matter for regulatory commissions according to this policy.

For generation two-part tariff was introduced which included variable and fixed component of price for long term contracts. Time charges for peak and non-peak hours were introduced as fixed charges. For off peak, there were fixed charges which would be multiplied with units consumed and peak charges were also fixed and followed the same procedure to be included in tariff. Power purchase agreements would be done but if there would be default on payments then generator were free to sell to another entity. Transmission lines were liberalized through operation and maintenance contract and for that transmission tariff needed to be regulated. Generation tariffs were based on competitive bidding whereas distribution tariff rates were declared by state regulatory commissions.

Transmission tariff would be based on flow quantity, direction of flow and distance. CERC was obliged to determine operational and capital cost based on various voltage level. Investment projects were allowed on competitive bids based system and after every five years the STU and CTU would repeat bids. CERC would specify tariff and SERC would follow the decision. Average transmission losses would also be added to tariff.

Distribution companies would follow multiyear tariff structure and distribution losses would be either paid by funds of government or would be included in the tariff. SERC was determining tariff without involving the state governments and recovery of receivables was time bounded.[28] Tariff for agricultural areas was different and considered the ground waters usage and its cost. Metering was set mandatory for electricity supply. All the tariff rates were calculated and paid in Indian currency and foreign bidder would bear the risk of currency exchange rates.

Results:

The policies of India made it relying more on imported fuel like gas, oil and coal. India was rich in coal but the production level required coal more than produced in India. Tariff structure by CERC and SERC was rigid due to political considerations (IEA INDIA 2012).[29]

Prices of fuel were not passed on to final consumers because tariff was supposed to be reviewed after fixed period of time. When price in international market increased there were less fluctuations in the tariff rates which hurted incentives of investors. For example, gas prices increased in international market in 2009 but prices were to be reviewed in 2014 (IEA,2012) which made it difficult for investors to earn reasonable profits through gas fired power plants.

Transmission and distribution losses declined from 31.25% in 2004 to 23.97% in 2010 (International Business times, 2014) which were still high as a result of this policy plan. Privatization of these sectors lead to improvements in transmission and distribution networks but investment in transmission was lower than planned (Working group on power 12th plan).

Legal and political barrios were still high specially in case of land acquisition for setting up generation, transmission and distribution projects (IEA, 2012). Competition at distribution level was not possible due to high infrastructure cost and technical aspects. Distribution losses in some states stayed at 30% level. Distributors and retailer of particular area had monopoly power in that area.

[28] If a distributor is not paying tariff for a specific time generator was allowed to cancel the contract with that distributor and was free to supply to another distributor.

[29]CERC and SERC were not changing tariff for 4 to 5 years and were strictly following it because political entities from time to time tried to force regulatory commissions to compensate some areas where they had voter bank though subsidy but amount of subsidy were never being met before which made regulatory commissions rigid for 4-5 years.

Rural electrification was on the agenda but in 2011 Indian population of about 300million people had no access to electricity (world bank,2014). People or villages which get electrified were having no electricity for about 6 to 8 hours per day and delays in implementation of project was also observed (working group, 12th plan). Distribution system lacked recovery of total cost over the period of the policy due to lack of cost reflective tariff setting (Policy brief, 2012).

National electricity plan 2012:

This electricity plan was focused on increasing the production capacity of electricity. According to the Ministry of Power, India required 100,000 MW of energy at that time. India was growing economy and for consistent growth it required sustainable energy production. Until 2011 a lot of people had no access to electricity. Indian electricity demand was expected to increase because of increased in household consumers and industrial consumers.

The growing concerns of environmental pollution also affected the Indian policy plan in 2012 because India was producing most of its electricity through coal which raised pollution through high carbon emission. Due to environmental constraints renewable energy which consisted of hydro, nuclear, wind, small hydro, solar and bio gas generation were proposed to be utilized more to reach the estimated goal. Peak loads were proposed to be shared through combined cycle plants which included both hydro power and gas fired power plants.

Terms and conditions:

This policy introduced renewables to energy mix. Private investors were invited to add generation capacity of about 42131 MW of energy through any renewable source. Renewable energy was also attractive because it could be installed at the places where it seemed difficult to build a grid or was not a feasible location for a grid station. Old plants which had completed 30 years of life were proposed to retire with the payment of an interest subsidy and new plants were suggested to enter in place of old plants.[30] Captive generation capacity was expected to increase up to 13000MW until the end of policy.

India started renovation and modernization approach in 1990 and in this policy it

[30]Working group 12th plan

had been proposed to increase capacity through renovation and modernization of existing power generators because new generation would take huge investment as well as time for completion. Life extension though renovation and modernization of thermal and hydro projects was proposed and it was decided to include those projects also which were part of previous plan.

Subsidy was not phased out completely where industrial consumers had to bear higher prices to provide subsidized electricity to agricultural consumers. Basic rate of return on equity was 15.5% and projects which would complete in time specified in contract would be provided with 0.50% more return on equity. Cost plus tariff was applied to renewable power project with normative financial and technical parameters (CERC, 2013-2014). For thermal power plants fuel prices were adjusted in tariff rate through monthly weighted average price and heat value of fuel. Different generation units exhibit different tariff rates based on their capital cost, fuel price and gross calorific value (CERC, 2013-2014).

Results:

The policy was focused on increasing the production capacity though renewable energy. Studies on renewable energy had been done and evaluated the projects before the implementation of this policy. Renewable power projects came online until the end of the policy but capacity added through renewables was very low. There were some institutional problems such as the lack of coordination between institutions, ministries and agencies which reasoned delays in implementation of renewable projects. There was no comprehensive policy for renewable energy (Khare et al, 2013). Feed in tariff for renewable was changed to reverse auctions causing an increase in capacity of 17.8 MW in 2010 to 1440MW in 2013 through solar power (World Bank, 2014).[31,32] The generation and transmission of Indian power sector showed drastic improvements but the distribution sector could not show much improvements (world bank,2014). The reason here was competition could not be produced by privatizing distributors. One area had one retailer and one distributor which was private, public or private-public partnership. The loses continued but at lower level than before.

[31] Feed in tariff of India was done for long term and includes cost of generation and was different for different renewable resources or technologies it declines with time to give investors incentive of reduction of costs.

[32] Reverse auction is where buyer compete for higher prices to obtain goods.

Coal is still contributing as the biggest share of production mix of electricity which has raised problems because now the coal available in country is not enough to fulfill the demand of power sector. India is importing coal where the prices of imported is higher than domestic coal. The prices of imported coal are not reflected in consumer prices and made the thermal power projects inefficient because of lower cost recovery.

In 2015 a new policy was suggested but the policy document is not available online. An important information about this policy was that it increased retail competition where retailers are buying from generators by paying wheeling charges for transmission lines and cost of supply to distributors. This is done to control distribution losses which were occurring at consumer end. In 2014 distribution losses accounted for about 23% which was less than losses of previous year but still it was a huge amount.

Electricity Restructuring in Pakistan and India

Pakistan and India were producing electricity following monolithic structure in which single entity was doing all the functions like generation, transmission and distribution until 1990s. The power sector has some unique characteristics that put limitations on decentralization (Joskow, 2003a). Specially transmission and distribution network holds the property of natural monopoly due to huge amount of investment or sunk cost required to build them up.

According to Kessdies electricity is a real time product that it is being produced and consumed at the same time and cannot be stored in huge amount for future use. In Pakistan and India liberalization and privatization of electricity sector happened due to inefficiencies in publicly owned utility and their inability to fulfill future expected demand. These inefficiencies produced the need for investment in infrastructure and the policies were also required with good governance for efficient planning of present and future electricity problems. There were other important issues like underpricing, lack of innovation, fuel mix and cost of production which put these countries on the path of reforms. Electricity can be restructured in four forms that are monopoly, single buyer, wholesale competition and retail competition (Kessides, 2004).

Pakistan was following monopoly before reforms where two vertically integrated entities WAPDA and KESC were controlling all of the functions of power sector including generation, transmission and distribution. KESC was providing electricity to industrial area of Karachi while responsibilities of electrification in other

regions of the country was on WAPDA. After the reforms of 1994, the government promoted private entry in generation to increase the generation capacity where IPPs (Independent power producers) were selling electricity to WAPDA and KESC which were selling it to end consumers. The government of Pakistan guaranteed the purchase of electricity from power producer on take or pay basis.[33] WAPDA and KESC were owning transmission and distribution lines. This means that there was a single buyer model followed in the policy of 1994 as WAPDA and KESC were buying electricity from all independent power producers where the government was single buyer.

The policy of 1995 attracted private participant to build transmission lines on built, operate and maintain basis while ownership stayed with the government. Hydro projects were promoted in this policy where each hydro power plant was supposed to work following 'BOOT' (built own operate and transfer) approach. Transmission lines were planned to expand to reach these new hydro power projects and thermal power projects of 1994 by private investors. Here again the government guaranteed purchase of electricity from private power producers as transmission and distribution lines were working under WAPDA and KESC which were two public utilities.

In 1998 the government started unbundling of WAPDA by separating thermal power generation, transmission and distribution from WAPDA and making each of them a separate publicly owned corporation. NTDC (National transmission and dispatch company) was incorporated as publicly owned transmission utility. Power purchase, exchange and the operation of transmission network were the functions of NTDC. WAPDA was no more responsible to control transmission and dispatch of electricity. NEPRA was responsible to regulate all projects under NTDC. The government was buying electricity but through NTDC instead of WAPDA or KESC. The model stayed as single buyer model under this policy.

WAPDA was owning hydro power production and was responsible for the operation and maintenance of hydro projects whereas unbundling of WAPDA in 1998 separated thermal power plants into three GENCOs and were collectively named as PEPCO which was also publicly owned utility. KESC was using thermal power generation only. The public power producers and independent power producers were selling the produced electricity to transmission lines which was publicly owned. There

[33]Take or pay basis means government do not have any choice of not to pay, it had to pay for electricity even it does not have demand of electricity.

were eight publicly owned distributors each was allotted a specific area such as LESCO (Lahore electricity supply company) is operational in the city of Lahore and side by areas.

The policy of 2002 invited private investors to build new hydro power projects on 'BOOT' basis. Power was supposed to be bought through NTDC (National Transmission and Dispatch) by the government. Public generators were also used, whereas distribution also stayed under the government control. The government added capacity through new independent power generators but transmission and distribution were public entities. The model followed was the same as in the previous policies which was single buyer.

In 2005 KESC was privatized and all the distribution and transmission lines under KESC were privatized by selling shares to private owners. In the city of Karachi KESC was responsible to manage electricity system. KESC owned generation, transmission and distribution where there were also private power producers. KESC was buying electricity from independent power producer and was using its own transmission and distribution lines to reach end consumer. This means KESC had monopoly in Karachi. The model followed under this policy was single buyer where single buyer was a private monopoly.

In the policy of 2013 there was suggestions of whole sale market where there would be multiple distributors with open access to transmission lines but it has been delayed. In 2015 the government again announced privatization of distribution and the process is under progress according to the government officials but until the mid of 2016 the system followed single buyer model.

India followed 1948 act of electricity where electricity was public utility and the government was responsible to provide electricity to its resident through publicly owned generation, transmission and distribution. Private ownership was not allowed under this law. In 1980s Indian power sector faced electricity shortage problems which led to amendments in the law to liberalize generation in electricity market. The system before 1991 was pure monopoly of state owned power utilities.

India started privatization and liberalization of power sector in 1991 under the regulation of the state and central governments. India was holding publicly owned monopoly where electricity was generated, transmitted and distributed by state or central system. Transmission and distribution were under the control of the government. The government guaranteed purchase of electricity from independent power producers

and state electricity boards were obliged for transmission and distribution of electricity. The model followed under this policy was single buyer m55odel where publicly owned state electricity boards were buying electricity in each state from independent power producer.

The policy of 1995 was also focused on generation of electricity to increase generation capacity and invited more private owners to invest. Under this policy time period 1998 regulatory commission act was passed which made state and central regulatory commissions to determine tariff rate. The central and state government were owning transmission and distribution network and were buying electricity from private generators. Electricity produced from private producers and public producers was sold to end consumer through state and central transmission and distribution companies. The model followed under this policy was single buyer model where the governments were responsible for the payment to private producers.

Due to high transmission and distribution losses of state electricity boards, the government decided to privatize and liberalize distribution sector in 2003. The state electricity boards were privatized completely where public generation companies were also privatized which were producing electricity under the control of state electricity boards before 2003 act. In 2003 act of electricity, the state governments and the central government was owing state transmission unit and central transmission units. Non-discriminatory access to transmission lines was provided with wheeling charges. The distribution network was liberalized but each area had different distributor which had monopoly in that area with one retailer. The distributors were buying electricity directly from generators where generators were providing electricity through open access of transmission. There was competition at generation level due to multiple generators. Distributors were not competitive in selling electricity as private distributors were having monopoly in area assigned to them. India follows 2003 act of electricity in all the policies but competition in distribution was not promoted due to privatization and liberalization of distribution where private, public or private-public distributors could distribute electricity to one area. In 2015 retail competition was proposed where there were multiple retailers in an area and people were free to choose retailer of their own choice. The policies of 2005 and 2012 were following the same model as before with liberalization of distribution which was single buyer model. There is competition in generation and retailer now whereas transmission is under public control completely and distribution is privatized with non-discriminatory access. Now retailers are free to

choose the generator and customers are free to choose retailers.

Contrasting single buyer and Retail Competition in Pakistan and India

The privatization and liberalization of distribution to create whole sale market can cause reduction in the prices. Retail competition can also cause reduction in prices but it may be costly due to increased marketing, advertisements, settlement and transaction cost. (Joskow, 2000b).

The Indian power sector followed two types of models, single buyer and retail competition. However, in Pakistan single buyer model has been practiced since 1948. In single buyer model transmission and dispatch stays under the control of the government. The single buyer was state owned transmission lines that were buying all of the generated electricity and was selling it to end consumers through publicly owned distributors in India until 1998. This means the governments were responsible for financial liabilities as it guaranteed the purchase of power from producers and sale of electricity in India until 1998. In contrast WAPDA was single buyer in early reforms and when it was unbundled in 1998, NTDC was single buyer for Pakistan power sector. Both were publicly owned utilities which means the government was the actual buyer and was responsible for the sale, through public distribution companies in Pakistan. In 1996-1997 due to guaranteed purchase agreement, Pakistani government had to pay for the produced electricity even there was no demand of it because generators produced more than demanded by the market.

Another model suggests that buyer do not decide on how much and from whom the electricity should be bought rather it depends on demand of distributors and bears no risk of credit or market risk, which occurs when distributors directly buys from generators with open access of transmission lines (Barker, Mauer, and Storm van Leeuwen 2003). In this single buyer is not guaranteeing that it will buy a specific amount and it depends on demand of electricity according to which buyer will buy the electricity from generator. Generator bears the risk of market as demand could be high or low in different times or on different days and generator needs to advertise or gain market share. Single buyer has an advantage that it provides generation companies a competitive ground to enter an agreement of purchase on long term which mitigate risks faced by generators. The Pakistan power sector followed single buyer model whereas

Indian power sector was transformed to the model suggested above after 2003 where credit and market risks were borne by generators. The Indian power sector privatized and liberalized distribution sector where generators were competing for market share and distributors were provided open access to transmission lines with wheeling charges only. Multiple distributors were buying electricity as demanded by their region from competitive generators. Each distributor was owing one region where retailer and distributors were under the control of same entity.

Single buyer approach followed by both countries showed that it is not the generation alone which requires competition and private investment as huge distribution and transmission losses are also responsible for the shortfall of electricity. India privatized and liberalized the distribution sector in 2005 which created distributors monopoly in each particular area assigned to that distributor. This was done to control distribution losses but monopoly was not helping in lowering of prices and competition at consumer end. The distributors were being selected through competitive bidding but due to monopoly power in an area distributors did not lower their prices and was thus unable to increase efficiency of distribution companies. The privatization and liberalization of distribution reduced the burden of losses from the state and central government of India but could not produce effective results. In 2015 to create competition at end supply, the government changed the system to retail competition. The retail competition occurs when multiple retailers buy from generation companies with non-discriminatory access of transmission and distribution. The retail competition is more competitive than single buyer because consumer have the choice to buy from any retailer which will create competition and thus lower prices with good quality service. Competition at retailer end has also some draw backs such as retail competition can cause difficulty for new entrant and may act as barrios for new entrants because of the limited demand and switching cost (Defeuilley, 2008). Active participation is also required to make short and long term power purchase contracts with strong regulatory authority.

The power sector of Pakistan adopted single buyer because it seemed easy to adopt and it was also lacking effective regulations. In the beginning WAPDA was obliged to transmit and distribute electricity to end consumer which could be thought of as a risk (Kesides 2004), that if transmission owned by the one of the supplier than it may not select bids from its competitor generator. Another issue can arise when single buyer is the government, then financial risk will be on the government edge which will

affect financial performance of the government.

In 1998, NTDC was formed which was public utility and the government kept the risk of finance. The distribution companies were also under the control of the government which made it riskier as transmission and distribution networks were facing losses. A problem faced by distribution companies was that, there was corruption on billing end and also there were huge defaulter of bills which made it difficult for DISCOs to pay NTDC and caused circular debt problem. Poor revenue collection contributed Rs86.9 billion to the circular debt in 2012 (USAID, 2013). Pakistan distribution companies were supposed to be privatized but the process had been delayed until now. If the example of India would be considered, then only privatization of distribution will not solve the problem as it did not solve the problem of losses in different states of India. It created private monopoly in each area which affected whole power sector because distribution company would choose cheap generators but would sell electricity at higher rates to end consumer. If regulatory authority will have strong control over prices still distributor can bargain generators for lower prices in this way monopoly of distributor in area with no retail competition cannot solve problem of distribution losses completely. If distribution sector would be privatized with retail competition, then due to competition on retailers' side distributor cannot charge high prices because retailers will be able to bargain. If retail competition occurred with open access to public transmission and distribution, then competition on producer and consumer side will increase and thus reduction in prices with improvements in quality is possible in Pakistani power sector.

CHAPTER 2

Effects of Privatization reforms in Pakistan and India

This chapter is explaining effects of the policy reforms in both countries. The results in the previous chapter includes effects on investments due to policy reforms. However, other effects of reforms will be discussed in this chapter which are: operating efficiency, financial sustainability and distributional equity. Effects of reforms in India are also explained for comparative analysis to evaluate what Pakistan needs to learn from Indian power sector policy reforms to address power crises.

Effects of Reforms in Pakistan

Effects on operating efficiency:

Operational efficiency means firm will deliver product in most effective way keeping high quality of product. The extensive literature on privatization shows that, over time, private firms become more productive and more profitable (Megginson & Netter, 2001).

The government of Pakistan started the privatization of electricity sector because it was not able to finance the projects and efficiency of publicly owned companies was not satisfactory. Involvement of IPPs as a result of the 1994 policy made the power sector performance better but the public utilities were over staffed, poorly managed and showed no improvement as they were not privatized under this policy except one thermal power plant KAPCO.

IPPs were alleged of producing expensive electricity and putting WAPDA bankrupt but cost analysis showed that IPPs were cost efficient than WAPDA which was public utility in 1994 (Siddiqui, 1998). This showed that IPPs had more operational

efficiency than public utilities because operational efficiency requires firms to deliver quality product in cost efficient way. The prices of electricity production increased due to high international oil and gas prices and high oil prices increased the cost of production of these new independent private power producers. Private companies were following cost plus regime in 1994 which made the production less cost efficient as they did not need to cut cost to earn profit. Investment in Extra High Voltage made transmission lines more efficient as a result of the 1995 policy and due to efficient transmission lines, projects started in 1994 got connected with grid which facilitated these plants to come online easily. The 1994 policy and the 1995 policy brought operational efficiency to power sector through private investments.

The 1995 policy did not help in lowering of transmission and distribution losses which increased financial burden on WAPDA as losses were 24% in 1994 which increased to 31% until 1998.[34] Private participation was low in response of the 1995 transmission and hydel policy (PPIB, 2010). The 1998 policy was also not able to attract new investments and thus no improvements in operational efficiency occurred at that time. The policy of 2002 brought new private investments in hydro power plants which were cheap source of production but these plants got completion in 2010 which shows that these plants could not cause any improvements in operation efficiency. Supply demand gap increased in 2006-07 because most of the IPPs were not producing at their full capacity (Ali and Beg, 2007). IPPs were not able to collect enough revenues to pay for its fuel consumption which made them operate less than their full capacity after 1998 which means over time operational efficiency of private generation firms declined in Pakistan.

The policy of 1998 and 2002 proposed privatization of publicly owned utility DISCOs, GENCOs and KESC. KESC was privatized by the sale of its shares until 2005. DISCOs and GENCOs privatization had been delayed due to opposition from public, the argument was that privatization would led to higher tariff rates and the government would be responsible to provide electricity to its citizen at cheap rates (Ali and Beg, 2007).

The efficiency of publicly owned companies declined with increased transmission and distribution losses and less generation capacity. WAPDA generation system was not improved because it was using machinery from more than 40 years

[34] World Bank Indicator

where as estimated life time of a hydro power plant is 30-35 years. Old turbines made WAPDA less competitive with Independent private producers. Technical losses of a WAPDA accounted for 21% of total production which declined from 42% recorded in 1997-98 (Dawn, 2002). Overall there was increase in efficiency of WAPDA but compared to independent power producers, efficiency was low. NEPRA is silent on the issue of WAPDA, annual reports are not evaluating performance of WAPDA whereas NEPRA evaluates KESC in each report. Evaluation of private and public firms showed that WAPDA is less cost efficient than private firms (Ali and Beg, 2007). Private plants are more fuel efficient than public powered plants (NEPRA, 2010).

The policies of 2013 and 2015 were also focused on increase of generation capacity by inviting more firms to invest in private sector through coal and hydro power plants to produce cheap electricity. There were no measures taken for the improvement of efficiency of old power plants. KESC was privatized by sale of about 75% shares to private investors. The system efficiency of KESC improved by 22% in 2013-2014.[35] IPPs became cost efficient and produced more efficiently than public utilities as an example, KESC became profitable in 2014 after being privatized (Khan, 2014). The policy of 2013 suggested privatization of GENCOs to improve it in terms of production which shows that the government itself recognize that public utilities are not working efficiently. The privatization of distribution was also emphasized in the 2013 and 2015 policies whereas their implementation has seen delays up until 2016. Distributional companies are also less efficient and are causing huge losses.

Effects on Financial sustainability:

Financial sustainability can be achieved when the marginal benefit of product comes equal to marginal cost and a competitive market are financially sustainable because competition derives efficient firm to earn sustainable returns. Competition in Pakistan power sector was low from the beginning of reforms in 1994 because there was partial privatization and liberalization until 2016. There were public generation, transmission and distribution utilities working with independent power producers in earlier reforms and then in later reforms the government of Pakistan privatized some of its utilities such as KESC was privatized until 2005. KESC (k-electric) has monopoly in the region of Karachi where it is buying electricity from independent power producers

35 Asian development Bank report, October 2014

and is distributing it to end consumers. This shows lack of competition in power sector.

Most of the private producers were producing electricity from the beginning of reforms through thermal power plants and most of hydro power production is owned by WAPDA. Some small hydro power plants were also initiated as a result of the 2002 policy reforms but hydro power sector is monopolized by WAPDA as out of 30% hydro share in production mix 27% is produced by WAPDA and 3% is being produced by IPPs in 2015. According to the scenario mentioned above it can be seen that Pakistan power sector lacks competition because thermal power production is costly than hydro power production.

The 1994 policy was attractive for private investors as the government followed cost plus regime and price was profitable for IPPs. According to critiques of privatization IPPs were producing expensive electricity as a result of the 1994 policy. Generation increased more than demanded for that time, which means surplus was generated in 1996-97 and surplus continued until 2005. The government was responsible to pay for the unused electricity which burdened budget of the government. The government was selling electricity to end consumer at low price than actual through the provision of subsidy which further burdened the budget resulted in the inability of the government to pay revenues of independent power producers. This lack of payment made independent power producer financially less sustainable because marginal cost of production was higher than marginal benefit. Later in 1998 prices of fuel increased further in international market and thus thermal power plants were buying expensive oil and gas for the production of electricity. Thermal power plants were buying oil from Pakistan state oil company which held monopoly in Pakistan oil market. Due to its monopoly power it was selling oil at higher prices than international prices which means thermal power plants were buying oil at very expensive rate. These increments in prices were not translated into higher tariff rate because NEPRA did not accept the high tariff request of independent power producers in 1998. This was another reason for decline of financially sustainability and private power producers lowered their production. Fuel prices also made private producer produce expensive electricity which was not affordable for end consumer and made the government pay subsidy on electricity.

The 1995 policy tried to increase investment in hydro power plants which was not a successful experience and the 1998 policy was also not able to attract investment due to less cost efficient prices and liberalization experience such as HUBCO which

was forced to do power sale contracts in 1998 by the government which is explained earlier in the section of the evolution of power policy. The 2002 policy was based on international competitive bidding. Supply demand gap was expected to rise which means there was an increased expected demand for more electricity. The 2002 policy attracted some of the investment and as it was based on hydro and coal power plant which were cheaper sources than oil and gas. It contributed reasonable prices for power sector. The 2002 policy was successful in attracting private investment but due to circular debt and transmission and distribution losses, the policy could not promote financial sustainability of power sector.

Pakistan electricity crises were severe in 2005-2006 due to increase in supply demand gap as a result of less new investment and high transmission and distribution losses. Pakistan also had power plants which were not working up to their full capacity at that time because of circular debt. Lack of financial sustenance can be observed here because marginal cost was much higher than marginal benefit during 2005. Due to higher marginal cost IPPs were not able to produce more to fulfill demand of electricity and supply at that time was not enough to meet demand of 2006.

In the policy of 2013, the government clearly stated that tariff declared by NEPRA were not cost reflective (National power policy, 2013). The government was keen interested in producing cheap electricity through hydro power plants and coal power plants. Demand was very high and supply was low which created supply demand gap of approximately 5000-6000MW in 2013. Privatization of two thermal power plants along with privatization of distribution lines was proposed. There were huge distribution losses causing increased circular debt every year. Cost of production declined for public thermal power plants as well as private thermal power plants because fuel prices dropped in international market in 2014. But these lower prices could not solve the problem of finance due to higher distribution losses even the government also paid distribution firms their previous payment and thus distribution companies paid to generation firms. The problem occurred again due lower recovery of revenues and subsidy which piled up circular debt again in 2015. The policies failed to address financial sustenance until 2016.

Effects on Distributional equity:

Equity refers to equality, and distributional equity refers to equal and fair distribution of services to all the citizen. In power sector distributional equity would be

possible when each and every person in the country would be able to receive electricity on fair or affordable rates. Distributional equity calls for universal service provision. The power policy of 1994 only worked on the increase of generation capacity. WAPDA and KESC were buying the produced energy from Independent power producer where transmission and distribution lines were publicly owned. Half of the population was having no access to electricity. The government planned to expand transmission lines in 1995 but expansion of distribution lines was not included in the policy which means the 1995 policy had not promoted distributional equity. The 1998 policy focused more on generation than on transmission and distribution network. Transmission and distribution network was publicly owned and was not operating efficiently due to low collection of billing and unpaid subsidy. The policy of 1998 had not resulted in improved distributional equity.

The 2002 policy increased generation capacity and also expanded distribution network because distribution network was separated from WAPDA and 9 distribution companies were working separately in their own areas. The provincial governments made expansion easier by providing help in land acquisitions for transmission and distribution network. Most of the villages and urban areas were electrified until 2010. This policy increased distributional equity and made availability of electricity to all of the population at cheaper rate due to provision of subsidy on it. The policy of 2002 increased distributional equity of Pakistani power sector.

This expansion increased demand of electricity, leading to supply-demand gap in 2006. Supply demand gap raised the issue of inequality in distribution because the government was prioritizing industrial and urban areas to be electrified more than villages. This created a difference in availability of service between villages and urban areas and also between big and small cities. People living in big cities were facing less blackouts than in small cities and villages. If people living in cities got more electricity it means they were enjoying subsidy more than poor. Electricity was available on affordable rates but to rich people more than the poor. Almost all of the villages and urban areas were electrified until 2010 but due to supply demand gap villages were facing more blackouts causing less distributional equity.

The 2013 policy worked on increasing generation capacity to supply electricity to all at cheap price. The goal of this policy was not achieved as demand supply gap increased further to approximately 7000MW at peak hours in 2015. Villages were bearing more electricity shortage of 18-20 hours per day. Electricity was not provided to

all on equal basis which means this policy had not promoted distributional equity.

The policy of 2015 was also to increase the generation capacity and there was proposition of privatization of distribution. Subsidy involved in power sector was decreased and was planned for further decrease. Decrease in subsidy could raise distributional equity issue again because poor would not be able to afford electricity. The privatization of distribution could also cause less distributional equity because privatized firms would not consider it suitable to supply electricity to difficult areas where there would be possibilities of less recovery of revenues.

Effects of Reforms in India

Effects on Operating efficiency:

Infrastructure facilities are very important for the development of power plants as it will increase the productivity. Operational efficiency requires better infrastructure facilities to deliver quality product in most efficient ways. Indian power sector was dependent on state electricity boards which were working under the state governments. These electricity boards were not able to fulfill demand because of their inefficiencies due to lack of funds.

1991 policy was focused on increasing generation capacity by introducing new private investments to power generation sector. In this policy reform, India also started renovation and modernization of old infrastructure. New generation plants by private investors used efficient technology and 63 old power plants owned by state electricity boards were renovated and modernized which increased the operational efficiency of power sector.

1995 policy proposed mega power projects which the government was not able to finance and raised the need of private participation of firms. Investors of these mega projects were allowed to import equipment without paying any import duty. Private sector did not participate in these projects because of non-payments of state electricity boards to previous private firms. This policy could not contribute to increased operational efficiency.

1998 regulatory act made private investor trust the power sector again because of independent regulatory commissions and in the plan of 1998-2002, the government initiated captive power projects. Captive power projects attracted industries to invest

and raised operational efficiency of power sector by increasing better infrastructure. Renovation and modernization of old distribution companies also raised operational efficiency of power sector under this policy.

2003 act of electricity proposed complete privatization of distribution companies to control distribution losses. The state electricity boards were proposed to be privatized in next policies except transmission lines. Open excess without any discrimination was provided to generation companies with wheeling charges. The 2005 policy improved transmission and distribution because of its privatization which means operational efficiency was increased as privatization led to improved facilities. But higher prices with multiyear tariff reduced additional new generation power plants and already built plants had to produce at very high prices which were not cost reflective. These high prices led to less productive generation and thus lack of operational efficiency.

The 2012 policy emphasized renewable energy power production which increased during this policy era, generated electricity from new technological efficient plants. In contrast to renewable power plants, coal power plants were not working efficiently due to high fuel cost. It was a mixed scenario where renewable power plants were highly productive and high prices of coal made thermal plant less productive and thus less efficient.

Effects on Financial sustainability:

Financial sustainability as discussed above occurs when marginal cost equals marginal benefit, which include efficient pricing and efficient resource allocation. First policy reform in 1991 increased generation by inviting investors to invest in new generation plants. The cost plus regime gave companies incentives to earn profit and return on equity was 16% which was high enough to earn good revenues. This means that companies were enjoying higher tariff rates. Due to this high tariff rate and involvements of subsidy, state electricity boards were not able to pay revenues back to independent power producer which led to lack of financial sustainability because marginal cost increased more than marginal benefit. Plants had to produce at low recovery of revues.

In 1995 policy, less private investments occurred because private investors were not able to earn revenues due to financial inability of state electricity boards. This means firms were producing at higher rates and additional capacity was not beneficial for them which reasoned financial problems as a result of this policy. Until 1998 state

electricity boards were not able to recover full amount of revues which was the reason state electricity boards were privatized in 1998. Transmission stayed as public entity whereas generation and distribution were privatized and liberalized in 1998.

In the 2005 policy privatization and liberalization of distribution became the reason of less distributional losses. Due to less distribution losses and reduction in subsidy as a result of implementation of 2003 act, private generators and distributors were able to earn good enough revenues. This led to efficient pricing and thus efficient allocation of resources. But the regulatory commissions changed the tariff policy to multiyear tariff policy and investor were not attracted to it as fuel prices were changing but tariff was staying same for 3-4 years which reduced financial sustainability of private and public firms. The government of India retired old plants, replaced them with new and some of the old power plants were renovated and modernized which increased efficiency of these plants and thus they were producing electricity at efficient price due to decreased maintenance cost. Overall there was an increase of financial sustenance due to this policy because firms were able to produce at efficient cost and thus were earning good revenues.

In the 2012 policy India started producing electricity by encouraging private investors to invest in renewable power plants. Although response was not encouraging but private investors contributed to renewable energy at low rate. ‘Multi-year tariff rate’ was changed to annual based where regulatory commissions were supposed to review it every year, this was an encouraging incentive for investment. The policy also encouraged investment through reverse auction for renewable power plants which caused higher prices. Prices were signaling private plants, where it became profitable for firms to generate and distribute more electricity which led to efficient production at financially sustained level.

Effects on Distributional equity:

Equal and fair distribution of service is important for a sector to grow and in overall development of economy. The Indian policies were focused on generation capacity and transmission and distribution losses before 2003 act of electricity. In 2010 according to world bank 33% of Indian population had no access to electricity in villages. This was a clear indication that power services were not equally distributed among its national.

1948 act of electricity made it mandatory for the government to make electricity

available to all the nationals of India and state electricity boards were responsible for the electricity sector. Until 1980s there was no problem of electricity but more than half of the population was in dark. The 1991 policy was formulated to remove supply demand gap of 2000MW energy from power sector. The government took initiatives to privatize and liberalize electricity generation which resulted in increased generation capacity but at higher rates than produced by the generation plants of state electricity boards. For universal service provision the government of India gave subsidy to household and agricultural areas to make it affordable. But cross subsidy was applied, which means industrial and commercial sectors were using electricity at higher rates than households and agriculturalists. Cross subsidy violated the assumption of distributional equity, because industrialist/commercial consumers were paying very high tariff rates to finance cross subsidies.

The 1995 policy was also to increase generation capacity and in 1996 there was a proposal of lowering subsidy for agricultural sector but this decision was delayed due to political interventions. This policy neither addressed equal distribution nor universal service provision of electricity. Until the act of 2003 neither cross subsidy was removed nor the village electrification was on agenda. Half of the population had no electricity access and most of them were living in villages.

In the policy plan of 2005 rural electrification came on agenda with the huge government funded program. The government also encouraged private distributors to invest in these projects for expanding distribution network by providing licenses to private distributors of a specific area. This step was taken to provide electricity to huge population which had no access to electricity. The government also gave subsidy to the people who were very poor, to pay only the cost of supply of electricity and remaining payment would be paid by the government to distributors. Because of such program many villages got electricity and percentage of people with no access of electricity declined to 33% in villages in 2010. But in those electrified villages there were blackouts for 5-6 hours. The policy intended to increase distributional equity and was relatively successful in achieving its goals. Subsidy was decreased by 50% for agriculturalist and household in this policy but half of the subsidy was applied which burdened industrialist and promoted unequal distribution of resources.

The policy of 2012 emphasized electricity for all and rural electrification process increased its pace and in 2015 20% of the Indian population from villages has no access and thus the policy is increasing distributional equity. Cross subsidy is still a problem

which is proposed to decline further. Renewable energy power plants are located in areas where it was difficult to construct a grid, this was done to increase availability of electricity for those difficult areas. In this way India is moving towards improved distributional equity through its policy reforms and implementation.

Comparative Analysis of privatization and liberalization between India and Pakistan

Privatization and liberalization reforms were started in 1994 in Pakistan and in 1991 in India. The reason behind the reforms was that both countries were facing increase in expected future demand of electricity. India made amendments in 1948 act and opened power sector for private participation in generation for independent power producers though the addition of new generation plants. Pakistan started reforms in the same time period where it was also allowing private sector to enter generation by establishing new generation plants with privatization of small thermal power plant of KAPCO. Both countries were able to attract private investors for generation in the beginning. Indian and Pakistani power sector were following same regulation for prices which was cost plus approach. Returns on equity in India was 16% whereas in Pakistan it was 18%. Thermal power plants increased in both countries but in case of India coal was the biggest source of generation while private power sector of Pakistan was producing mainly through oil and gas. The government of Pakistan agreed to pay more returns on equity which means it was producing electricity at higher costs than India.

Investment increased in 1996-97 in Pakistan and additional generators created surplus of electricity in country because investor got approval of the capacity more than required. However, investments in India increased as required because the government had not approved projects more than the required capacity. The government of Pakistan had to pay for the generated electricity regardless of demand due to ‘take or pay’ agreement. This shows that the government was reaping less revenues because demand was low and was paying high revenues which created extra burdens on budgets. The government was also providing subsidy on consumer end through less prices than it was paying to producers. The subsidy increased the burden on budget of Pakistan.

The policies until 2002 in Pakistan and 2005 in India tried to attract investments for hydro power but both countries were not successful, because of non-payments to private investors. In India state electricity boards were not able to pay back to production companies and in Pakistan WAPDA failed to pay back to independent power

producers. Another problem that came as an obstacle for investment in Pakistan, was foreign investor lost the trust in the Pakistani policies due to forced contract done by HUBCO power plants which is mentioned in earlier sections. There were allegations of corruption on state electricity boards of India as an example DABHOL power project was selling electricity expensive than actual and the state government was involved in this corruption which was proved after 1998.[36] When corruption was proved on this project the central government took control of this project and closed it. In India, the government tried to make system transparent and promoted investment by dismissing corrupted project such as DABHOL whereas in Pakistan, the government made investments difficult for private investors through bureaucratic involvement.

Both countries had the problem of transmission and distribution losses for which the government of India started privatization and liberalization of distribution after 2003 act of electricity was passed while Pakistan unbundled WAPDA and privatized KESC completely until 2005. The Pakistani power policies proposed privatization of DISCOs and PEPCO since 1998 but it was delayed until 2015. However, the privatization has not been implemented after 2015. Indian power sector is following an act for each policy such as 2003 act of electricity which can be challenged in court if it would not be implemented. India followed its policies and law up until now which can be one reason India has less problems than Pakistan in generation, transmission and distribution of power sector.

Both Pakistan and India were providing subsidies on electricity. India was providing subsidy for agricultural use and household in the form of cross-subsidization. Commercial and industrial sector paid higher taxes to finance the subsidies given to household and agricultural areas. The amount was decreased by 50% in the 2005 policy of India for agricultural. The poor who could not pay higher rates, were obliged to pay cost of supply. Subsidy rules were changed where if a state government wanted to give subsidy it would be required to pay full amount before subsidies would be implemented otherwise state regulatory authority would not allow it. Subsidy is still high but it is not implemented if the government could not pay which decreased the burden of amount payable to distributors. Subsidy is not targeted well in India because agricultural user can be those who are earning millions and do not require subsidy.

The government of Pakistan was providing subsidy to all in the past by

[36] Dabhol power project with its main share holder ENRON crop Texas made maharastra state electricity board a defaulter of 1.1 billion rupee

including fix amount of subsidy by charging all consumers with lower prices. After 2002 subsidy was applied to lesser units consumed. This subsidy is being enjoyed by rich more than poor because after 2005 there had been long hours of blackouts and villages bear more blackouts than urban areas. The government tried to reduce the subsidy by 50% but those who would use up to 300units can enjoy subsidies cost. Poor do not get electricity for 20 hours and for up to 5 hours the consumption stays under 300 units. However, Pakistani middle income groups are also enjoying subsidized rates as they bear blackouts for 12 to 16 hours in cities. People has tampered meters which cause consumption of electricity to be less than 300 units while they are consuming more than 300units and are using subsidized amount of electricity. NEPRA is not independent on consumer end prices and NTDC is not able to pay generators because the government is not paying subsidy fully.

Pricing is a key to attract investment in electricity sector, Kessides mentioned underpricing to be a reason for less private participation. In Pakistan NEPRA is regulating prices of electricity where as in India state regulatory commissions are regulating pricing of electricity. Every state is setting their own prices according to energy mix and production cost in each region in India. In Pakistan NEPRA declares same tariff for all provinces whereas hydel power in some provinces of Pakistan can be built at low cost than in other provinces. Thermal power plants use fuel such as oil and gas, when prices of oil and gas rose in international market they were not translated in to tariff rates offered by NEPRA because of review time period which did not change until 2016. In India coal and gas are imported for production which reasoned uncertain prices. Regulatory commission of India showed rigidity in past for multiyear tariff. The problem of underpricing occurred because of 4-5 years review period. Regulatory commissions changed tariff to annual based tariff in 2012.

The Pakistani government was allowing negotiation on tariff rates and Indian power sector was also allowing negotiation on prices until 1998. After the formation of regulatory commissions, India had overcome the problem of tariff because commissions included expert professional staff who could determine tariff without political intervention. Regulatory commissions were provided more independence in 2003 act of electricity. However, NEPRA staff could not determine tariff efficiently and NEPRA was not independent in case of tariff on consumer end which the government was declaring by including subsidy in it and the process continued until 2016. NEPRA is declaring upfront tariff for some power projects and some are selected on bid based

tariff which hindered competition in power sector because two different tariff rates are applied which can cause difference in pricing.

Before the formation of regulatory authorities both countries were facing political intervention which made state electricity boards in India and WAPDA in Pakistan work inefficient but the establishment of regulatory authorities in India has overcome political intervention by providing regulatory commissions of India more independence in decisions after 2003 act of electricity. Political intervention through subsidy is controlled by Indian regulatory commissions while NEPRA cannot control subsidy on electricity which underpriced electricity at consumer side.

Pakistan is indexing tariff rates with foreign currency since the 2002 policy reform. Before the 2002 policy reform tariff rates were measured in dollars rather than local currency. India is not indexing tariff rates with foreign currency which is the reason power purchasers do not bear any currency fluctuation risks. Pakistan power policies are not providing any protection against such risks. Prices also rose up due to currency devaluation of Pakistan.

Technology is essential part of electricity infrastructure and directly affects efficiency and cost of production. The polices of India included renovation and modernization of old plants whereas the Pakistani polices barely give it any importance. New plants were bringing new technology but the old plants were needed to be renovated to decrease cost of operation and maintenance. This renovation and modernization caused cost efficient production in India while in Pakistan old publicly owned power plants produced expensive electricity through high maintenance cost. Technical efficiency of publicly owned power plants in India was better than plants in Pakistan. The policies of 2013 and 2015 of Pakistan has not mentioned renovation and modernization. The previous policies tried to address this issue but less emphasis was given to this option. However, India offered renovation and modernization to private investors in each policy and India also has retired some of its old power plants under the 2012 policy.

The distributional equity of Pakistan electricity sector served better than India because most of the villages had electricity in 2010 according to world bank estimates, where as in India distributional equity in terms of access is low because 33% of the population had no connection of electricity. In term of provision of service to those who have connection India is better than Pakistan because Pakistan has demand supply gap of 7000 MW whereas India has no shortage of electricity. Those who are not able to pay

for electricity in Indian villages, bear blackouts of 6-7 hours per day which is equal to blackouts in big cities of Pakistan.

India choose good energy mix in their policy which made Indian power production cost efficient whereas energy mix chosen by Pakistan made it produce expensive electricity. India chose coal because India has huge reserves of coal whereas Pakistan chose oil and gas which was imported. India had chosen liquid fuels but the ratio was much lower for immediate solution of problem in 1999. Pakistan has increased the share of oil and gas more than hydro or other sources available in its power production mix. The current policy of Pakistan is addressing energy mix by encouraging coal, hydro and renewable but no clear policy on renewable has been formulated and less incentives for such investment are provided in Pakistan. Domestic coal had not been exploited until 2016 while it was proposed in the 2002 policy as cheap source of production for Pakistan.

CHAPTER 3

Regulatory Institution

Previous chapters discussed the policy reforms, privatization, liberalization, structure of power sector and their effects to address power crises of Pakistan through the policies. This chapter will start regulation section of the research. In the beginning of this chapter a brief discussion on the structure of regulatory authority is explained. The structure of regulatory authority includes the explanation of centralized and decentralized system with the brief description of the structure of Pakistani and Indian regulatory authorities. Next to this sub-heading is the explanation of pre-requisite for independent regulatory authority. The Pakistani and Indian regulatory authorities are evaluated based on pre-requisites set by Kessides in reforming infrastructure. This explanation will provide with the understanding of how regulatory authority could work efficiently in Pakistan according to the circumstances being provided to it. The section after this discussion will evaluate the regulatory authorities of Pakistan and India based on institutional requirements. Institutional requirements are discussed separately for Pakistan and India. At the end of this discussion, the comparison of the regulatory authorities of both countries explains the problems with Pakistani regulatory authority which Indian regulatory authority had lessened through new laws and regulations. Last section of this chapter is the evaluation of the performance of regulatory authority by looking at its contribution to the power sector of Pakistan. In this section, commitment of regulatory authority is being discussed through types of regulatory commitment and NEPRA is evaluated under each type of commitment. This chapter will help reader understand why the regulatory authority of Pakistan could not address the power crisis through effective regulation. Effective regulations could have resulted in better investment opportunities and the solution of severe power crises but it could not produce satisfactory results due to ineffective regulation which requires improvement of regulatory authority of Pakistan by fetching lessons from Indian regulatory authority.

Structure of regulatory authority:

A well-structured regulatory body can contribute effective and efficient regulations for power sector. Power sector can adopt centralized and decentralized regulatory structure but different countries have different conditions of judicial system, rule of law and economy etc. which affects the choice of regulatory structure. Centralized means the regulatory services are provided at national level through one common regulatory body. Decentralized regulatory authority requires regulator to be at state or provincial levels. There are pros and cons of centralized and decentralized regulatory structure which are as follows:

Centralize structure is effective when it is a small country to have effective control but when there is a huge country decentralization can build up effective control as there will be many political, economic and regional differences to influence regulation. Decentralization is good for industrial countries because institutions are not weak whereas in developing countries institution are weak which calls for centralization (Litvack et al, 1998).

Decentralization is advantageous in huge countries as it will divide – responsibilities to lower level (Kessides, 2004) and availability of information will make system work better. But the other way around is it will cause more political involvement which will make things complex and the solution in such a situation can be centralized system. In decentralization country will require more resources as their will be multiple regulators and regulatory function will require more funds whereas centralization can use less resources to finance its regulatory functions effectively. Decentralization operates at state/provincial level and industries at state or provincial level can influence decisions of regulator more easily by bribing or using political support. Centralization will involve many political players and industries which will make it difficult for a firm or political party to influence decisions of regulatory authority.

Regulatory structure can regulate different sector differently, some sectors can follow centralized structure based on its characteristics and others can follow decentralized system (Kessides, 2004). Electricity sector has generation, transmission and distribution which can be regulated differently because of their characteristics. Transmission mostly operate nationally whereas generation and distribution services can work at state level. Distributional services can be regulated at national level but when there is a huge country then for better networking, distribution should be decentralized.

Generation can adopt both but in developing or small countries centralization is better to keep efficient control. But for promotion of competition decentralized regulated generation can be a good technique because there will be multiple generators at local/province/state level which can exploit resources at state level better and will be aware of demand of their regions. Companies will be aware of their competitors and will produce at cheap rates and will compete with each other to gain more market share.

If generation and distribution are decentralized then decentralized authority will control the system better because it will be aware of minute details of state level generation, transmission and distribution. If centralized regulatory authority will control decentralized system, then there will be problem of lack of information and even if regulatory authority is fully informed it has to make regulations for all sectors equally otherwise regulation will be considered biased.

Pakistan power sector is regulated by NEPRA which is centralized in its structure. Pakistan has four provinces and an independent territory of AJK (Azad Jammu and Kashmir). NEPRA is regulating the power sector of all provinces. There is one member from all four provinces as representative of their province. Form four representative one of the member can become chairperson of NEPRA and other three act as vice chairman. In decisions related to power all four members participate. NEPRA is accused of using political influence in its decisions because the members and the chairman of NEPRA are being selected from bureaucrats or from retired army officials. NEPRA is not working efficiently whereas structure of NEPRA is feasible because Pakistan is developing country and centralized system is better for developing countries. But there are certain problems with the centralized power of NEPRA. Its decisions have political influence even in the presence of multiple veto players. It can be said that when there are more veto player politics can not affect decisions because each player will have their own interest.

Transmission is at national level but DISCOs (distribution companies) were decentralized and there had been political interference in the functioning of DISCOs since they were unbundled (Aziz and Baseer, 2015). Politics is involved in the form of billing corruption and provision of more hours of electricity to those areas where the party has vote bank. NEPRA is not able to regulate these decentralized distribution companies efficiently which is obvious from the reputation of distribution companies. Lack of minute information can be a reason for inefficient control on DISCOs. DISCOs are under huge losses and are alleged to be corrupted on the billing end.

If Pakistan starts decentralization of regulatory body and all transmission and generation, then due to weak institutional power and bureaucracy it will have adverse effects. Indian power system followed both centralized and decentralized approach. There is central regulatory commission with generation, transmission and distribution on the central government level. There are also state regulatory commissions and each power sector entity like generation transmission distribution are at state level too. Central regulatory authority is also responsible for power trade between state levels and set regulations for it. Regulatory commissions are strong in India because of strong support of 2003 act of electricity. If Pakistan improves its legal institution performance, then the system followed by India is good for Pakistan because it will give control of power sector and can cause more competition.

Pre-requisite of effective Regulation

There are some institutional pre-requisites for effective regulation (Kessides, 2004). These pre-requisites include separation of power, condition of economic institutions, legal system for private ownership, rule of law in country, enforcement of contract laws and professional staff.

Separation of power requires that judiciary should not intervene in the process of decision making but it does not mean that decisions cannot be challenged in courts. Judiciary should have power to give notice to regulatory authority if their decision is not appropriate but it cannot dictate regulatory authority. Political and economic institutions should support regulatory authority for effective regulations. Political credibility is important as it will increase the welfare of a nation and will not intervene in the decisions of regulatory authority. Economic institution will help power sector to grow and regulatory authority to work effectively in implementing regulations.

A strong legal system that protect the rights of investors and do not let regulations of country curb the rights will encourage and enhance the trust of investors. Regulations of regulatory authority also requires a strong legal system to implement their decisions. For this purpose, the laws and judicial system both are required to be strong. Laws should be made that can support independence of regulatory authority. If authorities will not be independent regulation would not be transparent and will decrease the efficiency of power sector. Legal system should also be able to enforce contracts in efficient timing and should resolve disputes between contracted parties in

minimum time.

Professional staff is required for the good functioning of regulatory authority and to implement regulations. Regulatory staff should have economic, accounting and legal knowledge, experts from each field are essential for effective regulations.

A developing economy has to practice these necessary points but it will take time to apply these steps. Pakistan and India both are developing economies which means both requires these steps to be taken for effective regulation. Pakistan and India stated privatization and liberalization after 1990s and built regulatory authorities in 1998. Pakistan made its regulatory authority independent from ministerial in 1998 regulatory act whereas Indian regulatory authority was not independent before 2003 act of electricity. Indian regulatory commissions are working more independently than Pakistani regulatory authority. Their roles are similar but power to regulate and effectiveness of regulation is different.

Separation of power:

NEPRA started its operations in 1998 to regulate generation transmission, and distribution of electricity. According to NEPRA 1997 Act NEPRA has its own functions which do not requires intervention of judiciary. There is possibility that firms or institution can challenge NEPRA decisions in judiciary but the judicial power can only address NEPRA to look upon its decisions and correct it. Judiciary do not have any power in enforcing or changing decisions of NEPRA. Power was separated between judiciary and NEPRA from the beginning until now. NEPRA recently did not followed the court order to review tariff rates on the request of the government (Business recorder, 2016). The government of Pakistan was proposing NEPRA to revise tariff structure as it underpriced the current production cost. The government set an appeal against NEPRA current tariff structure. Court ordered NEPRA to revise tariff but NEPRA did not review the tariff structure following court order.

India's central Regulatory commission hold quasi-judicial status and state regulatory commissions are also quasi-judicial.[37] The judiciary has no power in influencing decision and this is being possible through 2003 act of electricity which is currently followed. Decision can be challenged in supreme court and CERC and SERCs

[37]Quasi-judicial means an entity which has power similar to court and process of taking decisions also involve procedure similar to court of law.

can look up the decisions again on the orders of court.

Performance of Economic institutions:

Economic institutions are organizations that deals with the money or distribution of goods and services in an economy (Cambridge dictionary). It involves public and private sector organization like banks and other financial organization which has an effect on economy of country.

Pakistani banking system was nationalized in 1973 and after 1990s the government started privatization of banks due to their inefficient financial performance. Before the formulation of NEPRA the government was obliged to regulate the financial matters of power sector. There had been political influence in decisions due to direct involvement of bureaucracy in decision making. Along with it the institutions involved in power sector decision making were not efficient. Banks were inefficient because nationalized banks were over staffed due to bureaucratic involvement it was lacking expert staff and private market started emerging in 1990 (Arif, January 2012). Researches are showing that public ownership created problems in the effective functioning of banks (Karim and Tariq, 2009). IPPs were also not working efficiently (Ali and Beg, 2007) because the government had not expertise to deal with private firms in 1994.

The policies were not made by the expert policy makers, it involved bureaucrats who had their own political interest. In the era of first policy for privatization and liberalization of Pakistan, there were proposal for a regulatory authority which came to establish as a result of 1997 regulatory act. NEPRA was established to increase efficiency and competition in power sector of Pakistan (Malik, 2007). Financial matters like pricing and regulations turned out to be functions of NEPRA. Banking sector of Pakistan became better due to privatization of banks after 1990s. WAPDA and KESC were main functioning bodies of power sector in early privatization era. Public utilities worked inefficiently and burdened the government with financial liabilities.

Privatization started in India in 1990s and the policies seemed attractive to private investment. SEBs were obliged to control and regulate the power sector. There arise financial problems as burden of account receivable increased during 1996-2000 (Indian Express, 2000) and also some issues such as Dabhol power project which proved SEBs corrupt. The state governments were not working efficiently and judiciary

of India was not making decisions freely as bureaucracy was always being involved.

Later the act of 2003 made things in control and made institution more transparent and strong than before by giving legal rights to regulatory commissions that they were not obliged to the rules of the state governments and in case of subsidy the government needs to pay before the implementation of subsidy. Indian banking and financial sector was also state dominated before 1990s and gradual privatization and well-developed financial markets seemed to have contributed to Indian success in privatization and regulation after 1990s (Sathye, 2005).

Legal system for private ownership:

Legal system involves laws and courts of a country which are necessary for effectiveness of regulation. Power of judicial system is important for efficient and smooth ruling of laws. If a country has strong legal system regulations would be implemented and followed easily by country national. Legal system as mentioned above should be able to protect rights of investors.

Pakistan legal system is following British law of India which is currently law of England and wales. Legal system before reform was allowing private property rights through the law of 1973. 1973 is the most followed constitution by the democratic governments whereas dictators do not follow 1973 law. The government of Pakistan before 2009-2010 followed series of dictatorship in Pakistan which suggested that there was a control of army on legal system. Privatization and liberalization in Pakistan started in democratic era and 1973 law was active at that time under the ministry of Benazir Bhutto.

In the Article 24 of 1973 constitution of Pakistan, it is clearly stated that no property will be acquired without compensation and procedure of compensation will be according to law. If the government will violate the law, there is option to challenge it in court but the judicial system was not strong enough because there was dictatorship and unrest in country system which made legal and economic institutions weak in authority and power.

Judiciary of Pakistan failed under military coup due to excessive intervention and extra constitutional changes (Khalid, 2012). For the regulation to be implemented in Pakistan power sector judicial system was not a good support because of the government intervention in decisions of courts. Like every country Pakistan had laws

but due to weak judicial system there was always a window for corruption. NEPRA had to formulate and implement regulation to deal electricity matters of country but due to less power of judiciary NEPRA was seeing some obvious obstacles for the implementation of its regulation.

Indian adopted legal system from colonial era and it is still active with some amendments. Legal system is important for implementation of regulation made by regulatory authority. Private participation will be encouraged if there will be a strong legal system to support its rights. Legal system is important for implementation of regulation and for protecting legal rights of private owners. Strong legal system is required to support private property which in turn will strengthen possibilities of privatization. India has given people little freedom on this issue the property rights are not strong which makes India not friendly to business investment.

When it comes to assure private investors of their ownership rights Pakistan and Bangladesh are providing more private property rights but Indian legal system and law both contribute in less property rights. According to the ranking of the easiest place in Asia to do business, India is ranked 29 out of 36 countries but according to world bank India is at 130th and Pakistan is at 138th number in ease of doing business.[38]

Legal system for regulatory authority in India was not strong before regulatory authorities were built but it was better than Pakistan. The reason is India made a law about how the policies will be formulated and regulation were set in 1948 act of electricity whereas Pakistan never made a law for power sector rather it is making the policies and regulations without any support of Law behind it. Regulations are easy to implement when there is a law backing it which can be challenged in court. Regulatory act defines duties of regulatory authority but the power comes from legal and judicial system.

Rule of law in the country:

It requires the government to abide by the law and make decision by staying in the lawful limits. In Pakistan overall from the beginning of independence until now rule of law is weak. Rule of law in Pakistan was affected by military rule which took control of Pakistan for most of the time in history (Shah, 2009).

[38]World bank group

Before privatization and formation of regulatory authority there were bureaucratic involvement because electricity sector was publicly owned. Bureaucrats work for their political interest. The government of Pakistan started privatization and liberalization in 1994, but there were allegations of corruption in privatization reforms. It was not proved in 1998 however, the power projects involved politician such as Asif Ali Zardari (Saleem, 2007). Judiciary was not strong because of bureaucratic interventions, the government of Nawaz Sharif tried to prove corruption in 1998s but evidences could not be collected (Ali and Beg, 1998). Institutions were weak because military was intervening in the political system and was derailing constitutions. In 1999 another military coup took over. In this coup era there were a lot of judicial casualties (Faez Isa, 2007). The case is different now and judicial system has showed some improvements after 2005 (USAID, 2008).

India on the other hand was following same legal system as Pakistan. Rule of law situation is quiet complex in India as in some states, the government is following legal restrictions but in other states the government may go out of legal boundaries to take decisions. The situation is bit better in India than in Pakistan because of the reason India was never ruled by military which made institutions stronger than Pakistan and due to many veto players in political system as each state is not ruled by the same government. When there is weak rule of law regulatory authorities cannot implement and make decisions independently. According to worldwide governance indicator India is at 50-75th percentile for the government abiding of law whereas Pakistan is on 10th percentile.

Enforcement of Contract laws:

Enforcement of contract laws are important for improvement of electricity sector. For privatization and liberalization, it is an important factor. Enforcement of contract laws require independent and qualified judiciary.

Before establishing NEPRA, the government was liable to control power sector of Pakistan. It started privatization and liberalization in 1994 and the response to the policy was positive by domestic and foreign investors. But there was lack of control of the government on implementation of these projects which made the system less efficient. The projects which were completed, took more time than contracted. Before NEPRA there was enforcement problems which give rise to the need of regulatory

authority and also lack of competition was the main reason of delays in completion of projects because power producers had not competed for market share. There arose a dispute between WAPDA and HUBCO for tariff rates in 1998 which was resolved in 2000 which proved that laws were not strong enough to settle the dispute in minimum time. Contracts delayed under the 2013 and 2015 policy which means NEPRA and legal system are not able to enforce contracts in time.

Indian power sector was regulated by SEBs state electricity boards until the formation of state and central regulatory commission. SEB was successful in attracting investment and enforcing contracts which helped in increase of generation capacity of India but not as much as it was mentioned in contracts and was planned. Less than planned capacity can be due to lack of enforcement of projects this means India was also not so successful in the enforcement of contracts. The enforcement of contract ranked India at 7th and Pakistan at 3rd in South Asia.[39] This ranking is evidence that Pakistan was better in enforcement of contracts.

Professional staff:

Professional staff is necessary for effective regulatory decision and implementation. Pakistan power sector was not provided with the professional staff due to involved bureaucracy. Political and dictatorship both did not improve the system before regulatory authority. WAPDA and KESC were lacking professional staff and were over staffed. It was not the past scenario because even after regulatory frame work was established NEPRA always had bureaucracy influence and lacked professional staff.

India was lacking professional staff in the beginning of privatization era but later SEBs were unsuccessful and regulatory commissions were established for efficient control. Indian power sectors started appointing professional staff due to increase of privatization and liberalization of power sector. Every position was mentioned to be for specific field specialist. India had higher literacy rates than Pakistan and experience of privatization and liberalization also became the reason of availability of professional staff in india. In Pakistan Literacy rate is quite low and privatization was not so rapid causing less experienced staff available for institutions involved in Power sector (Afia Malik, 2007).

[39]World bank group

Regulatory authority of Pakistan:

NEPRA is making power sector regulations in Pakistan, started its operation in 1998. Main purpose of autonomous regulatory authority was to develop competition in power market to break monopoly and make efficient supply of electricity. NEPRA was established as a result of NEPRA Act No. XL of 1997, An Act to provide for the regulation of generation, transmission and distribution of electric power. NEPRA was initially funded through the government grants and it was expected to meet its expenses from licensing fees and application fees etc. Just like any regulatory system, the most important regulatory functions of NEPRA are grouped in the following main categories: determination of tariff rates and terms and conditions, grant of licenses, approval of power acquisition programs, setting and enforcement of quality-of-service standards, approval of operating codes and investment standards, consumer rights and obligations, complaint redress and promoting competition

Performance evaluation of NEPRA until now is very important as regulatory institutes have the responsibility to promote competition which requires strong regulation and thus affects investments. Dizdarevic (2008) concludes that the successful economic gains from electricity privatization depend on the regulatory framework, which in turn is affected by political and social norms and standards. The performance of regulatory institutes can be evaluated through institutional requirement listed by Kessides in “Reforming Infrastructure”.

According to Kessides institutional requirements for efficient privatization include coherence, independence, accountability, transparency, predictability and capacity. Keeping in view these institutional requirements, efficiency of NEPRA can be observed and in turns its effect on investment and performance of investors can be judged.

Institutional Requirements (Pakistan)

Coherence:

Regulatory coherence requires that regulator must have clearly defined goals, same regulator should always make decisions involving specific state of affairs, continuity in people taking decision and methods used to make decisions (Kessides, 2004).

Looking at NEPRA'S function and law that defines NEPRA work, functions of NEPRA are clearly stated in NEPRA act of 1997. Issuance of license was clarified in NEPRA act about what kind of projects NEPRA could issue license of.

NEPRA has hired staff without any professional background and the position they were holding do not define which type of function they can perform like tariff, accounting or public administration. An amendment has, therefore, been proposed to add ‘public administration’ among the list of criteria for the qualification of members and chairman of NEPRA (Khaleeq Kiani, 2015).

Another important function of NEPRA is regulating electricity prices but pricing is not in full control of NEPRA, Ministry of Water and Power is setting end user prices of electricity. According to the regulatory act of 1997, Ministry of power can change vice chairman every year and rotation is allowed in appointment which satisfy one condition of coherence that is continuation of people. NEPRA is not fulfilling most of the criteriaS of Coherence. It was also mentioned in Kessides reforming infrastructure according to 1999 report that Pakistan Regulatory authority which is NEPRA is not coherent.

NEPRA is suggesting tariff for producer and is also responsible for consumer tariff which ministry of power is finalizing. The issue of pricing is also related to fuel prices which are determined by OGRA. There is lack of clarity on pricing of electricity and thus lack of accountability. The government of Pakistan always blame NEPRA for inefficient prices while prices are not in full control of NEPRA which makes it less coherent.

Independence:

According to Kessides effective regulation requires that regulators be largely independent from any political influence in decision making but should be careful about the policy goals set by elected administration which may cause compromise. Independent regulator can provide assurance to investors that prices, outputs and inputs will not come under the pressure of ‘regulatory capture’ and pressures from economic

and political interest groups Stigler (1971). [40]

Firstly, the government is dictating NEPRA about many of its matter and now NEPRA is a part of cabinet which is big obstacle in the independence of NEPRA. NEPRA held disputes on tariff determination with the government (Dawn News, 2012). Cabinet is passing out laws for NEPRA every year regarding tariffs, fees and other regulations. A lot of amendments happened in the ruling of NEPRA after coming under the control of cabinet.

Kessides mentioned that independence requires regulatory body to have means to raise funding by fees or levies on service providers to keep regulatory authority safe from political intervention. NEPRA act states that operations of the authority would be funded from grants from the federal government, including an initial grant of one hundred million rupees; and fees and fines collected by it as prescribed from time to time.[41] From 1997 NEPRA was dependent on the federal government for funds and an amendment in NEPRA act in 2012 which is that any deficit payment would be paid by the federal government and all fines and penalties would be credited to the federal government, made NEPRA more dependent on the government funding.

Professional staff is also necessary for independence as they would be able to develop effective control. NEPRA act mentioned that professional staff will be selected but do not have specific positions for specialist of required fields and no criteria is mentioned for the selection of members. NEPRA comprises of nominees from bureaucracy of the four provincial governments (Afia Malik, 2007). An example from current chairman of NEPRA is Brig. (R) Tariq Saddozai who is not a professional rather a retired army officer. Most of retired bureaucrats are nominated from each province for one year which is not enough to make them understand complexities of power sector. NEPRA retirement age is 65 whereas overall in all sectors of Pakistan it is 60. By practice it is clear that NEPRA is not an independent authority and has a lot of political influence in every of its decision.

Accountability:

A regulator's independence should be submissive with its accountability; regulatory body should be accountable for its actions (Kessides, 2004). It can be made

[40]Regulatory capture occurs when regulatory body starts to work for political interest or for an industry it is regulating.

[41]Nepra ACT NO. XL OF 1997

possible by stating clear goals with specific reasoning. Accountability requires written rulings that specify the rights and responsibilities of regulatory agency and distinguish between primary and secondary goals when there are multiple goals, courts and non-political entities should be able to review decisions. Annual reports of regulatory activities should be published and performance should be reviewed by independent auditors.

NEPRA is publishing its decision and is doing public hearing of its decisions which shows that NEPRA is accountable for its action and decisions but until 2003-04 NEPRA had not published any report. According to NEPRA's annual report it is allowing stakeholder to participate in regulatory decisions but while in practice most of the firms like WAPDA and IPPs are not satisfied with tariff determination techniques and are not given any chance to suggest any acceptable technique**.**

Public hearing is also an important aspect of accountability**.** Public hearings happen in NEPRA according to the NEPRA Act 1997. Industrial consumers are given priority over domestic consumer in public hearings which makes NEPRA less accountable (Humayun and Anjum, 2000).

Transparency:

Infrastructure regulation is an important policy issue, and in a democracy all citizens need transparent information about it. Transparency requires a regulatory firm to publish its decisions, the policies and should be transparent in dealings. Lack of transparency cause lack of trust on regulatory authority and thus less private firms will enter the market.

NEPRA is not as transparent as it seems by its law. The reason can be as bureaucratic members are involved in decision making authority and NEPRA is not autonomous by its practices. Transparency international Pakistan had put allegation of illegal grant of revision of about 32% to 37% in tariff of solar power plants by collusion of NEPRA and few officers of the government of Pakistan. Additional benefit of over Rs 100 billion at the cost of general public were provided to solar companies. (Transparency international, 2016). Such matters are in practice but are not publicly held which is evidence of lack of transparency.

Capacity:

A regulatory agency must match its financial and human resources. Regulatory body should be free to hire quality staff having economics, accounting and legal skills, regulatory body which must have strong base for financing. High quality staff is necessary to monitor performance, cost analysis and behavior analysis of firms.

NEPRA was not hiring expert staff, members from provinces are mostly selected from retired army or retired bureaucrat. NEPRA is employing ex-WAPDA employees with no experience of regulatory functions or are drawn from a sector which has no relevance with the functions of regulatory body which makes limited capacity in terms of staff. It also caused 'revolving door' problem where ex-WAPDA become a part of NEPRA which makes NEPRA biased against WAPDA reputation. Annual reports of NEPRA do not evaluate WAPDA.

Financially NEPRA was allowed to finance its functions from application processing fees, fines etc. The government was also liable to fund NEPRA through budget. Later an amendment in NEPRA act stated that fines money will be transferred to the federal government which put limits on funds.[42] Only applications' processing fee is not enough to finance functions of NEPRA.

Lack of capacity in terms of finance and staff is causing many problems. Finance problem is the reasoning of NEPRA dependence on the government funds. Staff problems are causing in efficient tariff determination which has always been the issue for WAPDA and other power entities.

Institutional Requirements (India)

Coherence:

Regulatory coherence includes clearly defined goals of authority, continuity of power of authority and its member to make specific decisions and process of taking decisions should stay same. India established regulatory authorities in 1998 through amendments in 1948 act of electricity. Two types of regulatory institutions were proposed; central regulatory commission and state regulatory commissions.

Objectives of both types of commission were mentioned clearly in electricity

[42]Legislation, Nepra 1997 act, nepra.org

regulatory commission act of 1998. This supports one of the condition of coherence which was clarity of goals. Process of taking a decision was according to act of 1948 which was also consistent from a long time and after the act of 2003 new procedures to take decisions were mentioned in the act of 2003 which every policy and decision was following, this made regulatory commissions of India more coherent because there was clarity of process through which decisions are being made.

Hiring of staff is based on the criteria mentioned in 1998 regulatory act. Specific positions are reserved for specific field experts. Indian regulatory commissions have high professional staff and by looking at the organogram it can be seen clearly that each position requires specific field experts with clear criteria mentioned for selection. It is clear from 2003 act of electricity and 1998 regulatory act that a person will be removed from its position due to certain mentioned reasons. The government is allowed to appoint high official and can also remove them, there is no ambiguity on this subject.

Price determination is responsibility of regulatory commissions where the government was suggesting consumer end prices by including subsidy at consumer end but after 2003 act of electricity regulatory authorities were solely authorized to make price decisions. This shows that commissions became more coherent after 2003 act of electricity as they gained more power. Power of decision for pricing and other regulations stayed with regulatory commission with no government intervention. According to Kessides reforming infrastructure a report of 1999 Indian regulatory commissions were not coherent. But after the act of 2003, regulatory commissions showed progress towards betterment due to more authoritative power of regulatory commissions.

Independence:

Effective regulation requires more independence for taking decisions. Independence of regulatory commissions is linked to all other properties such as coherence, transparency and accountability. It has core importance.

Indian regulatory commissions were not independent until 2003 act of electricity came in practice. The reason of lack of independence was that the governments were intervening in the decisions of pricing. Subsidies were included for political gain on agriculture and household billings and non-payments of subsidy affected efficiency of state electricity boards. After the act of 2003 more independence was provided to regulatory commissions where regulatory commissions were free to decide price and if

the government wants to give subsidy it has to pay before the implementation of subsidy program.

Criteria for the selection of staff was being followed strictly from the beginning when regulatory commissions were established. Highly professional staff was hired because specific positions were allotted to specific field experts. This made the staff act more independent for making decisions.

Accountability:

Accountability requires authority to stand accountable for its actions which is possible when decision taking power will be clearly mentioned and reason to take decisions will be provided. Decisions should be open for review from all affected entities.

Indian central and state regulatory institutions were not independent in their early stages making their accountability doubtful. As it is mentioned above price regulations were intervened by the state governments because it was in 1948 act of electricity and 1998 regulatory act that the state and the central governments will be involved in pricing decisions. But after the implementation of 2003 act of electricity regulatory commissions were more independent and stayed more accountable for their action. In the period of the government intervention, it was not clear about who is taking the final decision whereas after being more independent in 2003 regulatory commissions became more accountable as responsibility of decisions was clearly on regulatory commissions.

Annual reports are being published online since regulatory commissions were established. Decisions are open for reviews and private investors or other entities affected by decisions are allowed to participate in making decisions. With increased independence regulatory commissions of India became more accountable.

Transparency:

Transparency help in efficient regulation and is interlinked with independence as if regulatory authorities are corrupt they are less transparent. Regulatory authorities are taking inefficient decisions due to involvement of political entities and non-professional biased staff. The problem will worsen when judicial system will be weak. Indian

judicial system is not strong as it is 59th of 102 countries for rule of law ranking.[43]

When regulatory commissions started its functions it was not so efficient as according to Kessides reforming infrastructure regulatory body of India was not transparent. There was political intervention due to lack of independence which made regulatory system corrupt and thus transparency before 2003 act of electricity was low.

Electricity act of 2003 made regulatory body more accountable and more independent which improved transparency of the regulatory commission because now regulatory body was responsible for its actions and the government was not a part of decision making process with highly professional experts. The government can also accuse regulatory body of its decisions in high courts of India which made them work transparently. All regulatory commissions are not at same level of transparency but overall system became more transparent due to the implementation of 2003 act of electricity.

Capacity:

Financial independence and professional staff are necessary for regulatory capacity. Regulatory body should be able to finance its functions through independent fund because it will make its functioning more independent as their will be no influence of funding body on decisions. Professional staff will be able to make efficient decision and are considered as human resources for regulatory body.

According to 1998 regulatory act state and central regulatory commissions will be funded through the government budget which made regulator more dependent on the government, lack of financial capacity and thus influence on decisions of regulatory body.

2003 act of electricity took notice of this dependency and addressed it through consolidated fund of India.[44] Usage of funds were restricted in this act which made accurate measurement of funds and thus more transparent usage of funds. All the fees and sums of money received by commissions were allowed by this act to be used for regulatory functions. These assurances increased financial capacity of regulatory commissions.

Human resources capacity is important for effective regulations and their

[43]Rule of Law Index 2015, Us world justice project

[44]Consolidated fund of India is the fund where all tax and revenues are collected and government make its expenditures through it without the approval of parliament (The economics times)

implications. Regulations are important for the progress of power sector. As mentioned in above sections regulatory staff was highly professional and had expertise in the field involved in regulations such as accounting, economics and engineering.

Comparison of Regulatory Authorities of Pakistan and India:

Before 1990 electricity production was public utility and system was monopolized. Reforms in both countries started an era of privatization and liberalization of this sector by promoting competition. A key element of reform was regulatory framework which helped facilitate competition in the markets. Effective governments are needed to build the legal, institutional and regulatory framework without which market reforms cannot be successful, and will badly affect the poor (Kirkpatrick and Parker, 2004).

Electricity in Pakistan is regulated by NEPRA whereas India has two regulatory authorities that are; State electricity regulatory commissions (SERC)[45] and central electricity regulatory commission (CERC). Both countries started privatization and liberalization in almost same years with different amount and types of resources available on both sides. NEPRA was created in 1998 in Pakistan and CERC was also created in the same year along with SERC.

NEPRA worked as independent regulatory authority in beginning but now it is part of cabinet whereas SERC and CERC are quasi-judicial government agencies. Responsibilities of these regulatory authorities are similar that is tariff determination, granting license, setting standards and regulation of system to promote effective competition. Difference lies in the authority as CERC and SERC are working at central and state levels respectively where as NEPRA has members from each province with no separate regulatory institution at province level.

Keeping Institutional requirements of Kessides, performance of both countries' regulatory authorities can be compared. Institutional requirements include coherence, independence, accountability, transparency and capacity which are necessary for efficient functioning of regulatory authority.

Important aspect of coherence is clarity of goals and decision maker. CERC and SERC have clearly defined goals after the introduction of 2003 act. CERC is not intervening in any of the SERC and as it is already the government agency there is set

[45]Every state has its own regulatory commission and total number of states is 29.

of rules through which CERC and SERC are taking decisions without excessive intervention of third party. Organization structure of CERC shows that there is clarity in roles as each member has specific field and chairperson is taking decision with the coordination of top members. Same ruling applied to all of the state commissions. CERC and SERC were partially coherent before 2003 act of electricity because authority was not able to make decisions without the government approval whereas after 2003 act of electricity responsibility was fully transferred to regulatory commission.

NEPRA is not coherent observing the practices of NEPRA. The policy changes are directly affecting the decisions. PPIB is also issuing licenses which means these two bodies have similar function which is not being clarified. Chairman is supposed to take decisions with the consent of members from four provinces. There are problems with coherence but it cannot be said that NEPRA is non-coherent, it has low level of coherence.

Effective regulation requires that regulators must be independent from political influence, especially on a day-to-day or decision by decision basis (Kessides, 2004). Regulatory independence has many aspects; regulatory authority must be independent from any political influence in decision making or in appointment of members of agency, no ministerial control and there should be a proper procedure of replacement of board member by their successors. Complete independence for regulators is not possible or even desirable (Khan, 1996).

CERC and SERC are the government agencies and are under the control of ministry but staff requirement is mentioned clearly and specific position are assigned for field specialist. Selection criteria is efficient as high skilled professional are only selected for specific posts. But fitting it with Kessides definition these regulatory institutions were not independent before 2003 act of electricity due to the government intervention in decisions specially pricing decisions. After the implementation of this act regulatory authorities became more independent.

NEPRA was created as independent body in 1998 but there were certain factors that made NEPRA take influence of political party such as the government funding. NEPRA was not independent in appointing its staff. Decisions seemed independent but as staff is from retired bureaucrats there is political influence on decisions and also members from each province are mostly selected by ruling political party. NEPRA is not independent regulatory authority by all means.

Regulatory body should be accountable for its decisions. Accountability has

close ties with independence, transparency and coherence. It should be clear who took decision so that he can be made liable for decisions. Deals should not be done secretly; every deal should be open for review from non-political entity or media.

CERC is keeping its doors open for reviews and assessment of its decisions as deals amendments and decisions of CERC are published at its online website. All State commissions are not working at same level but overall state regulatory commissions are also keeping their decisions public. CERC and SERC have clearly identified decision makers who can be made liable but still it was not sure who is actually taking decisions like pricing which after 2003 act of electricity was clear responsibility of regulatory commissions and it can be accountable for its decisions on pricing because the government intervention from regulatory decisions were excluded through this act.

NEPRA is independent regulatory authority but is following a complex way to make decisions. It is not clear that either chairman of NEPRA or vice chairman will be liable for decision related to tariff rate. Public hearing is being held but industrial consumers are entertained more than domestic consumer. NEPRA is not treating public and private companies in the same way which is an evidence of its less accountable system.

High profile staff and financial independence are necessary for efficient working of regulatory system. Financial independence makes easy handling of regulatory actions. Regulatory authority must generate enough money to carry out its functions. Professional staff can make effective regulations and can handle regulatory work more efficiently then a non-professional staff.

CERC and SERC have very high quality staff. Looking at their current staff and the requirements for specific position one can easily observe that staff is professional and have work assigned according to the field they are specialized in. This makes regulatory commissions of India work efficiently. Financially, the government is funding regulatory commissions through its budget and finance is also earned from application fees and fines etc. Before 2003 act of electricity, the government was able to change findings and influence decisions taken by regulatory commissions whereas situation changed after 2003 act of electricity where consolidated funds were suggested for funding of regulatory commissions. This was done to make regulatory commission more independent and fees and fines collected by regulatory institutions were in complete control of regulatory body. Financial capacity increased through 2003 act of electricity.

NEPRA act is showing clear dependence on the government funding but there is also fine and application fee used to finance the functions. An amendment in the act of NEPRA by cabinet ordered NEPRA to transfer fines money in the government funds. This amendment puts further limits on funds of NEPRA. NEPRA lacks professional staff chairman and vice chairman are from retired army officials and bureaucrats. Other working staff from ex-WAPDA employee having no skill required for regulatory agency. One reason for in efficient way of tariff determination is unskilled staff.

Transparent working of regulatory body is essential for effective regulation. Transparency will help agency to build trust of consumers and investors. In a free system public needs transparent information about regulation and dealings to evaluate regulatory authority (Kessides, 2004).

CERC and SERC are publishing their deals and all information related to projects and tariff structure. Transparency is interrelated with independence because when their will be political influence on decisions there will be allegation of corruption and thus less transparent system. Political influence made things unclear and questioned transparency of these institutions in 1999 and ranked transparency of regulatory commissions of India at lower level (Kessides, 2004). Whereas now as regulatory commissions are more independent there is less political intervention and thus more transparency. The government is also not backing any decisions of regulatory commissions which made these commissions more responsible for their actions and thus more transparent.

NEPRA states in each year report that it is working transparently. NEPRA is measuring performance standards and monitor it well. Looking at performance of IPPs and state owned utilities as they are producing lower than their capacity due to old ways of electricity production. NEPRA is not accusing or issuing any warnings to improve the standards. NEPRA also revised tariff on IPPs demand without taking into account their efficiency. These deals are not shown up publicly but NAB and transparency international are putting allegation for violation of law.

Regulatory commitment

Importance of Regulatory commitment:

Regulatory commitment requires from the regulator to be committed to fair, consistent and sustainable policies and procedure by following credible and clear regulations (Kessides, 2004). Electricity sector requires huge infrastructure with high sunk cost. An efficient regulatory firm decides prices of services which can cover these cost but in developing countries price hikes always meets opposition from public and political parties. When the sunk cost is being made now investors cannot leave the ground and the government can intervene to keep price for service less than cost reflective price or impose taxes on capital investment which makes this huge infrastructure investment very much risky. In such situation a committed regulatory authority can ensure such regulations which can save interest of consumer and producer of services (Spiller 1992).

States regulatory commitment can be a problem for those countries where judiciary is not strong and country is not politically stable as the governments are changing frequently. In some cases, foreign investors or multinational companies have stronger bargain power due to country's need of foreign investment. Here again a committed regulator can handle the situation by making credible regulation. Three types of commitment are given in Kessides reforming infrastructure: commitment through concession contracts, commitment through substantive economic restraints and commitment through administrative procedure. NEPRA regulatory commitment can be discussed viewing these three types of commitment

Types of commitment

Commitment through concession contracts:

Concession contract is a kind of partnership between the government and private owners for a specific period of time. In these contracts most of the time the government sign a contract with a private participant on the condition that after a fixed time private participant will hand over the project to the government. Fixed time is given to operate for recovering the cost of project. Properties of certain services require public ownership in developing countries like electric transmission and distribution lines, where huge population stays under poverty. In Pakistan power policy 2015 stated BOM built operate maintain of high voltage transmission lines with the regulation and

financing power constrained to NTDC (national transmission and dispatch) and the government partnership was also available (Power policy, 2015). NEPRA was liable to issue license and determine tariff rate which restricts the government to intervene and give project to in-efficient participant but there are two problems with the policy reform where performance standards will be checked by NTDC and competitive bidding would be done on PPIB front. NTDC and PPIB are under the authority of ministry of power which can have influence on the decisions and make regulators take less efficient decisions. When bidding will not be competitive there will problem of productive and allocative efficiency (Demsetz, 1968).

Commitment through Substantive Economic Restraints:

Economic restraints mean economic restrictions which are required for efficient regulatory commitment. Kessides mentioned number of restraints which should be ensured. Some of them are common in developing countries which will be discussed keeping NEPRA and Pakistan target of evaluation. One of the restraints is about pricing which can be challenged if increase in price is not just or cause high revenue, price cap regulation can be used to control excessive increase of price.

The 1994 power policy of Pakistan brought huge investment for thermal power projects which were not cost efficient because of high fuel prices and uncertain supply. Pakistan power sector is dependent highly on thermal power energy. This cause increase of prices and huge opposition from public against this increase. NEPRA revealed in the report of 2014-2015 that public and private sector power companies sent high rates of bills to consumer than actual bills.

Another restraint which states that regulatory body should not impose the policy that undercut investment value. NEPRA is liable to determine prices but according to several critiques the tariff rate NEPRA is following is not reflecting the actual cost which makes power companies produce less than its full capacity as the problem of underpricing is mentioned in the policy document of 2013. Recently as Ministry of Water and Power stated to increase power tariff with an agreement to IMF in 2016(Dunya NEWS, 2016) but NEPRA is not reviewing the request to revise tariff and the tariff rate of 2014-15 was not enough and was in phase of implementation where 5 distribution companies rejected it. Here the government and court are not able to make NEPRA abide by their decision which is excessive use of power of regulatory authority (Business recorder, 2016). NEPRA had disputes before about the tariff rates with the

government and other companies. Such practices are making foreign investment more difficult as power sector is not giving much incentives to earn profits.

Commitment through administrative procedure:

Every regulatory institution has been provided with the set of laws and rules which affects their day to day decisions. A regulatory institution or any government institution cannot implement any regulation without a good support from the constitution which gives it power of law. NEPRA has set of well-defined rules on the basis of which NEPRA is taking decisions. NEPRA is not working as quasi-judicial way, which make things unclear about it because it does not have power of law to implement its decisions.[46]

It is mentioned in commitment to economic restraints that NEPRA didn't give any response to request to review tariff rates by high courts on appeal of the government (Business recorder, 2016) which is clear evidence of NEPRA being rigidly enforcing rules and failed to respond to request to review tariff rate which it needs to do according 1998 act. NEPRA also alleged KE(KESC) of overcharging the bills which K electrics responded as false allegation based on the members' political reason and NEPRA has not sent any legal notice for this allegation (Custom today, 2016). Kessides suggested that external consultant should conduct management audits of regulatory agency to examine claims of excessive rigidity.

[46]Quasi-judicial means regulatory authority which has power as that of courts.

CHAPTER 4

Pricing

This chapter is discussing price regulation which is important because investors take prices as revenue receivables and thus decides whether to invest, prices signals investments. The reason to discuss pricing separately is because Pakistan has issue of pricing and India has also seen pricing issues in its early privatization and liberalization. Only producer side prices are discussed in the policy reforms whereas consumer side prices are equally important and are subsidized in Pakistan and India.

Firstly, pricing and different pricing strategies are being discussed to know which kind of pricing Pakistan and India implemented in their policy reforms. Prices of electricity from the beginning of reforms are discussed separately for Pakistan and India to understand contribution of the policies and regulatory authorities in pricing strategy for both countries.

Price regulation:

Price regulation involves setting prices by regulatory body or the government agency. Electricity prices varies from region to region and country to country. Privatization and liberalization reforms in India and Pakistan involved price regulation, before 1998 prices were being regulated by the government and after the formation of regulatory commissions in India and regulatory body (NEPRA) in Pakistan this responsibility was transferred to regulatory authorities. Pricing strategy is important to attract private investment (IEA, 2012) as it will determine the return on investment. Pricing strategies under public ownership always differ from private ownership as the governments works more like socialist where as private ownership use mostly capitalist

approach for pricing (Sheifer 1998). Privatization always faced opposition from public in developing countries because people believe that it is harmful for poor, cause unemployment and raise prices of essential services (Nancy and John, 2003).

Mainly the government do privatization to achieve efficiency and revenue generation both can be done by the effective policy reforms and implementation (Shelifer and Wishny, 1994). There are five goals for price regulations which are rent extraction, supply side efficiency, demand side efficiency, revenue adequacy and fairness (Kessides, 2004). Rent extraction involves socially acceptable balance of prices between investors and consumers. Supply side efficiency requires that prices should be just to investor and should be motivation for more production and revenue generating factor. Demand side efficiency means prices should be just to consumer so that they can consume efficiently which is necessary because if the electricity produced is not affordable or in reach of all consumers there will be excess supply which is not beneficial on producers' side. Revenue is essential for increase in investment and prices reflect revenues. Prices should signal adequate revenue to save investors' interest. Fair prices should be charged which means there should not be any matter of corruption in prices or unjust receivables. Fair prices contribute towards the universal service goal because fair prices will be more affordable and thus it will enable whole population to consume electricity (Joksow, 1998b). These all goals cannot be achieved altogether. When a policy reform gives demand side efficiency in developing or poor countries it will require lower prices which can cause tradeoff between revenue adequacy and demand side efficiency. Price cap and cost plus regulation are mostly followed mechanism to determine prices.

Cost plus is the type of regulation where investors estimate their cost of production and quote it to the government agency or regulatory authority which then adjust price according to the suggested cost and implement it through an agreement between investor and the government. There are two types of cost plus regulation one is pure cost plus and other is rate of return, pure cost plus requires firms to submit their cost which includes all expenses on production and regulator will pass on these cost to consumers whereas rate of return includes cost accounting of regulated firms cost and a return percentage is also added to this cost to suggest final price. Rate of return pricing stay fixed until the regulatory review where as pure cost plus can fluctuate time to time with the change of cost.

Cost plus is used by many policy makers as it was efficient way of revenue

generation and can be used to save market from monopolistic prices but it has both pros and cons. The best option about cost plus was that it attracts private investors as this pricing strategy will enable investor to recover cost and earns enough revenues. Revenue adequacy and supply side efficiency can be achieved but fairness and demand side efficiency can be a problem in developing countries. When there are ways of corruption companies can bribe regulatory body or the government for more than actual cost. For efficient cost plus regulation there should be effective cost accounting system. Rate of return is used to set prices where they stay fixed for a specific period of time which can also cause problem for producers and thus affect the goal of revenue adequacy and rent extraction when prices of imported fuel used in production fluctuates as per international market price fluctuations, it will not be translated to tariff due to fixed rate of return for a specific time.

When the government body or regulatory authority give a fixed set of prices for a basket of goods then it is called price cap regulation. Price cap regulation give investors incentives to cut cost and produce cheap electricity. There is no limit of time for review of prices which can benefit producer in long term but if regulators reviews prices after small interval of time it can benefit consumer. If review happen in small intervals with efficient cost accounting, then price cap regulation is close to rate of return because in both price approaches, the government is determining tariff for a specific period of time. Once the price is set regulators cannot dictate price to investors and investors can earn profit by using cost efficient ways. But it also gives incentive to regulatory authority to control prices to provide consumers good rate of electricity and save market from monopoly prices. Price cap regulation also make it difficult for politician to intervene in pricing decisions but a problem can arise when there is inflation or fuel prices either drops or rise affecting the profit of investor in good or bad way.

Pure cost plus and price cap regulation are exact opposite of each other and cannot fulfill all goals of efficient pricing (Kessides, 2004). A hybrid regime can be adopted for better implementation of the policy. Hybrid regime include banded rate of return, sliding scale profit or cost sharing and institutionalized regulatory lag (Kessides, 2004). In banded rate of return regulator give a range of prices where actual prices can fluctuate, investors are allowed to choose any price which will include rate of return form the range provided. Sliding scale profit or cost sharing is the pricing strategy where regulator give a rate of return ratio and if the prices and cost fluctuate to give

same rate of return ratio the prices will hold otherwise regulator can change the rate of return. Rate of return requires reviews after varying interval of time but under institutional regulatory lag rate of return will be reviewed after a known fixed period. Because time is fixed it creates a lag which is why it is named as institutionalized regulatory lag. It can help investors earn profit during that specific time period if rate of return enables investors to earn profit but if prices of resources used in production increase during the fix period of time then investors would cut costs to earn profits.

Power Prices from beginning of privatization in Pakistan and India

Power Prices in Pakistan:

Pakistan at the beginning of privatization and liberalization in the 1994 policy adopted cost plus regulation with rate of return of about 18% on equity which was paid in US Dollars (Kamal A. Munir and Salman Khalid, 2012). The policy gave incentives to investors to produce efficient quality product and it attracted many foreign investors to thermal power production. This pricing strategy achieved supply side efficiency but rent extraction was not satisfied as in the May 1998 policy reforms, it was a matter of concern for consumers that IPPs were producing expensive electricity (Julia M. Fraser, 2005) and put WAPDA in bankruptcy as WAPDA was purchasing power from IPPs on 25-30 years' agreement (Anjum Siddiqui, 1998). Supply side efficiency was fulfilled but demand side efficiency goal of pricing was not achieved in the 1994 policy reform. Record of subsidy is not available for 1994 but Pakistan was phasing out subsidy from 2000 which is the evidence of the fact that Pakistan electricity was heavily subsidized during 1990-2000. End consumers were not burdened with full amount of price which was agreed between investors and the governments in the 1994 policy and renegotiated prices were not transferred to end consumer.

IPPs were selling electricity on bulk power tariff which included two factors, capacity purchase price and energy purchase price and this tariff was applied for 10 years and then IPPs were supposed to be shifted to levelised tariff according to the 1994 policy. Levlised tariff was applied to full project life after the completion of 10 years' operation of power project and it was lower than bulk power tariff. In bulk power tariff transmission entity buys electricity in huge amount and pay a particular amount for that

bulk amount of electricity. The Pakistani government guaranteed payment even if producer would not have demanded amount of electricity or demand of electricity was less than supply because it was decided between investor and the government in the power purchase agreement that a fix amount for a fixed unit bought in bulk of electricity would be paid regardless of demand or supply. Levelised tariff was variable tariff rate over the whole power purchase agreement discounted for inflation. One problems with the pricing was that they were sensitive to exchange rates because bulk tariff was set in dollar currency and was to be paid in Pakistani currency. It was fixed in power purchase agreement for 10 years where it stayed constant while currency devalued during this tenure. When Pakistan's currency devalued after 1994 from 30 rupees/dollar to 60ruppes/dollar it made tariff high and made electricity expensive for WAPDA to buy. WAPDA was paying tariff rates through subsidy financed by the government here due to lack of funds and declining economic conditions the government was not able to pay full amount of subsidy it included in the prices. WAPDA was paying IPPs through loans taken on behalf of the government and every year amount of loan was increasing which made WAPDA bankrupt because it was not able to pay back loans on one side and it was not able to pay IPPs their full amount on the other side. There were other reasons for bankruptcy but currency devaluation was also one of the reason.[47]

In 1995 power projects were being offered on competitive bidding and side by side on cost plus basis. Cost plus was applied to those projects which were being started at the places other than the government recommended sites. In the 1998 policy regulatory authority became responsible for tariff structure and there were two types of tariff in practice. One tariff was declared by NEPRA for power purchase agreement and second type of tariff was based on competitive bidding. Competitive bidding was being done for lowest levelised tariff with review period determined by NEPRA where it would change tariff according to the rulings.

The 2002 policy which was thought to be a stepping stone towards change in prices because in this regime the government was keen interested in lowering subsidies and power sector was regulated by regulatory authority. Regulatory authority was responsible for determination of tariff rates. Under this policy bidding were invited for lowest levelised tariff. To introduce competition in market this tariff was bid based and NEPRA was authorized to review tariff after 3-4 years. Tariff rates were indexed with

[47] Circular debt due to low collection of revenues, high fuel pricing and transmission and distribution losses.

dollar which did not mitigate the risk of exchange rate from tariff payments. Tariff was supposed to be paid in Pakistan currency but was indexed with foreign currency. This made it riskier as currency was devalued after 2002 up-to 90 rupees per dollar. When tariff got fixed in 2002 the tariff would be less as currency was at higher rates compared to dollar and in 2003 currency got devalued but the fixed payments were not changing where as these payments got expensive due to devaluation. NEPRA was not flexible in changing tariff rates due to currency devaluation.

Fuel mix was supposed to be changed but hydel projects were requiring time for completion so under that policy generating plants were mostly using furnace oil and oil rose to very high prices in international markets under the 2002 policy era. The government also removed subsidy on purchase of oil which was being provided since 1994. The prices of electricity were also supposed to increase due to currency devaluation and oil prices. These high prices have to be paid by the government because the government was collecting revenues from consumers and NTDC was the government entity for transmission lines. But these high prices were not transferred to end consumer through the provision of subsidy. Cost of electricity subsidy in 2010 totaled to 180 billion (Chris Trimble et al, 2011) and in 2010 the government was following the policy reform of 2002. This subsidy was applied on all consumer and there was no difference in payment between high energy users' and low energy users' payment. Although the government planned to reduce subsidy but in practice due to opposition from political leaders this could not be translated into practice.

NEPRA is regulating tariff for power sector for which there occur some disputes between the government and NEPRA and also between power producers and NEPRA. 2003-2004 reports of NEPRA showed that private investors were not satisfied with the tariff rate and tariff was not cost reflective because fuel was very expensive and NEPRA had not adjusted fuel prices in tariff fully. NEPRA advised private investors to cut cost to earn profit until next review. NEPRA contracted prices during 2002, oil was cheap at that time but when prices of oil went up the tariff contracted through bids was not enough to reap revenues. This was the reason of underpricing on producer side. There was underpricing on consumer side by providing them subsidized price and on producer side by not providing them with full adjusted fuel prices.

The 2013 power policy came with the aim to reduce supply demand gap with cheap energy mix and to make transmission and distribution lines efficient to get rid from new circular debt. Tariff was determined through competitive bidding for levelised

tariff for the selection of generators. Review period was same as that was in the 2002 policy which is 3-4 years. The policy tried to promote competition among generators but the government also allowed small power projects which were not selected on competitive bidding rather they were selected by signing agreement. For these small power plants upfront tariff was declared by NEPRA. These projects were mostly owned by the provincial government with capacity of 50MW. Due to upfront tariff, there was lack of competition because projects were not selected through bidding. Competition could not be promoted in these projects.

Consumer end tariff was still under the government control which was providing subsidy on it. In an interview, Minister of Information and Broadcasting Pervaiz Rashid said: "It has been decided that the difference between the cost and sale price of electricity would end. Currently electricity is being generated at the rate of Rs 15 per unit and is being sold at Rs 8 per unit. Therefore, the government is giving a subsidy of Rs 6 to Rs 7 per unit. This facility is for consumers using up to 200 units of power" (Pakistan Today, 2013). Clearly this subsidy was not targeted only to poor only because in 2013 there were longer hours of black outs in villages up to 16-18 hours. The electricity supply in villages is low because blackouts in villages are high and mostly poor population is living in villages of Pakistan. Middle income group from cities were enjoying subsidy who were able to afford. There were huge transmission and distribution losses which put burden on the government budget to pay independent power producer. In this way circular debt was piling up every year making independent power producer unable to repay fuel prices. These non-payments lead power producers to produce less than their full capacity because most of the independent power producers were producing electricity through thermal power plants. The subsidy was not phased out until 2015 and even in the policy of 2015 subsidy was not targeted well or was not phased out completely. The policy of 2015 came with a view of phasing out subsidy and promoting hydel and coal production which was thought to be cheaper than oil and gas fired plants. The government made contracts with IMF on the basis that it would phase out power subsidy. The government announced a cut of 250 billion of subsidy in 2015 but the subsidy was removed as oil prices declined which made it easy for the government to pass on the burden of unsubsidized electricity to end consumer. The government did not offer lower tariff to consumers due to decrease in fuel prices which is part of tariff. Fuel prices has direct effect on tariff rate which was reviewed by NEPRA. The government offered same tariff rates as before to end consumers to phase

out subsidy amount. Subsidy was not removed from agricultural user of 300 units and all domestic users using 300 units or less (Pakistan Today, May 2015). These subsidies were not only for the poor but due to excessive blackouts people in urban areas from lower middle income class and middle income class also get covered in this amount.

NEPRA on the other hand is rigid in reviewing tariff rates as tariff review period is 3-4 years while the prices of fuel were changing every year. NEPRA is following two types of tariff, upfront tariff and levelised tariff. This is causing a difference in prices payed to investors. The government is not letting NEPRA decide on consumer side and there is time to time intervention in pricing strategies of NEPRA. NEPRA lacks expert staff which are not able to efficiently price electricity and produce competition in power sector.

Power Prices in India:

India started liberalization reforms in 1991 due to supply demand gap of 2000MW which publicly owned utility were not able to produce and the government was not able to fund new projects. The government made amendments in 1948 act of electricity to let private generation companies enter power sector as independent private producer and sell electricity to state electricity boards of India through power purchase agreement between state electricity boards and private generators.

For pricing strategy in 1991, state electricity boards were responsible to buy electricity produced by those independent private producers and transmit it through state distribution and transmission channel to end consumers. State electricity boards were required to buy electricity from private producers at 16% return on equity with plant load factor of 68.5% for thermal and 90% plant load factor for hydro. Return on equity was to be paid in dollars rather than local currency. Two-part tariff approach was followed where one was fixed and other contained variable components in it. Price mechanism adopted was cost plus established through 1948 act of electricity.

Tariff was high for state electricity boards because it was measured in dollars whereas Indian currency was devalued and The government included subsidy without its full payment to state electricity boards. Companies had option to renegotiate with the government for pricing and private investors were using cost plus approach which made electricity expensive. India was in dire need of investment for new generation plants due to growing future expected demand which let investors negotiate on higher tariff rate. On the consumer end prices were not cost reflective and were much lower than actual

prices for household and agricultural users which was due to provision of subsidy. Agricultural users were provided with zero charge of electricity and there was no metering of electricity in agricultural areas.

The difference between the payments of independent private producers and consumer paid amount were supposed to be funded through subsidies by the state governments. But the state governments were not paying full amount and were paying it with delays which made state electricity boards bankrupt. State electricity boards were not able to repay independent power producers. The exchange rate fluctuations were causing problems as Indian rupee was depreciating in value against dollars. Those exchange rate fluctuations increased the burden of payments on state electricity boards.

The 1995 policy came with same tariff rates and the governments were obliged to phase out 50% of the subsidy to make state electricity boards work efficiently in 1996. For mega power projects the tariff rates were based on competitive bidding. There was less response of private investors during this policy and one reason could be the low recovery rate of payments. The agricultural subsidy was not removed in any of the state and put more burden on budget and SEBs for payments to power producers. Transmission and distribution losses also made state electricity boards recover less cost. The price of electricity for consumers was low but not for industrial consumers because it was cross subsidy. Due this cross subsidy and the captive power plants policy industries started producing their own electricity which makes the situation worse because free users increased more than paid consumers in 1998. In 1998 regulatory act, responsibility of tariff structure was transferred to regulatory commissions. But due to involvement of state and politics in pricing and tariff rates regulatory commissions were not able to assure private investors for their revenues (Pierre Audinet,2002).

Due these non-payments and financial burden of subsidies 2003 act of electricity was formulated which intended to privatize state electricity boards of power sector. Privatization of distribution sector was proposed and open access to transmission lines with wheeling charges were made available to private sector. To phase out subsidy, the state governments were ordered to pay subsidy amount before the implementation of subsidy. Tariff rates were determined through competitive bidding under this act.

Tariff rates were regulated by regulatory commission with orders not to implement any subsidy program without full payments from the state-governments. A multi years tariff approach was adopted with the review period of 4 to 5 years. The policy came after the implementation of 2003 act phased out subsidy on agriculture by

50% amount and household subsidy was also reduced by 50% but due to political interference it was not removed fully. It was also not removed from all the states due to institutional and judicial constraints in different states.

In the policy of 2005 the problem arose with tariff structure which was determined on competitive bidding but reviewed after 4 to five years. State regulatory authorities were very rigid to this tariff regime and were not allowing any fluctuations. Due this reason private investors were not able to earn revenues as prices of fuel were going up but were not reflected in final tariff rates. Prices of gas and imported coal were high but due to fixed review period there was less front for earning profits for independent private investors. This was the reason of underpricing occurred under the 2005 policy. Under this policy tariff was not indexed or measured in dollar rather it was measured in local currency which mitigated the risk of high payments due to currency devaluation. The government suggested foreign investors to bear currency risk themselves.

The policy of 2012 was based on producing clean energy by setting return on equity of 15.5% following cost plus tariff regime. Fuel prices were adjusted in tariff on monthly average basis which mitigated the risk of higher fuel prices. Different tariff rates for different generation units were proposed which included cost of capital and fuel price. This tariff setting was also reasonable to private renewable power plants as different plants were built on different location. Here state regulatory commissions were declaring tariff rates on renewable power plants. There was no competition through prices under this policy for renewable plants.

Subsidies were not completely removed as agricultural sector still is being provided with subsidized 50% cost of production. The government also halved the tariff for the electricity household users of up to 400 units (livemint, 2016). The tariff followed in this policy was annually reviewed. Some areas of India do not possess electricity or face blackouts at sometimes due to the reason that distribution companies are not supplying electricity due to price problem as at peak hours cost of supplying electricity is higher which distributors are not able to recover (livemint, 2016). As tariff was being set by state regulatory commissions it was underpriced according to private investors because of subsidy provision. This was the reason distributors were not supplying electricity to villages where cost of distribution was higher. In 2015 tariff structure was changed to reverse auction for renewables only which made electricity through renewables expensive where bidding was done but for higher prices. Regulatory

commissions were not able to promote competition to reduce prices of electricity produced through renewables.

CHAPTER 5

Challenges with Pakistan Privatization and Regulation

The challenges of Pakistan power sector are extracted from previous chapters which next policies needs to address. The process through which each challenge came up is explained in detail in this chapter. This chapter is covering all of the problems which occurred through the policy reforms, privatization, liberalization and regulations. Detailed analysis of challenges is done to draw conclusion and offer recommendations for Pakistan power crises which will be discussed in next chapter.

Pricing:

The transmission and distribution system of Pakistan is owned by the government. Independent regulatory authority is responsible for tariff determination for producers' side only and for promoting competition though pricing. In the beginning of privatization up to 1998, the government was regulating prices. Publicly owned utilities were not able to produce efficiently for future expected growing demand which led to privatization and liberalization in 1994. From the beginning of privatization, the government was subsidizing electricity because the average income of household was low with GDP per capita of US dollar 434,03 (World Bank, 1994).

On one hand, the subsidy was for the purpose of increasing welfare; on the other hand, it was a political issue. As mentioned people had very low incomes and were not able afford high prices. In order to gain support from these poor people which were in majority, politicians used subsidy on electricity. Lower prices for consumers and higher prices contracted with producers made the government bear huge burdens of budget. WAPDA was not able to collect revenues due to corruption on billing, unauthorized use, and transmission and distribution losses. WAPDA (public utility) owned transmission

and distribution in whole country except the city of Karachi where KESC (public utility) was performing in the same way as WAPDA in 1994.

The power policy of 1994 attracted investors in thermal power plants which were using oil or gas for production of electricity. Oil Prices went up in 1994-1996 from 15 US dollars to 20 US dollars. Thermal power plants contracted bulk power sale in 1994 for 10 years for 24 US dollars.[48] When prices increased IPPs negotiated it with the government and electricity became expensive. But the burden of expensive production was borne by the government rather than end consumer.

In 1998, NEPRA was established and was made responsible for setting tariff rates. The approach of tariff determination was 'competitive bidding' to determine levelised tariff rates. NEPRA was rigid in determining tariff rates. Once the tariff was decided NEPRA did not change it and there were some projects for which NEPRA was declaring tariff through its own calculation rather than competitive bidding.

Oil Prices changed in international market from 2002 to 2005; they went up from 24.36 US dollar to 50.59 US dollars. These huge amount of changes were not addressed in tariff rates. These variations caused underpricing on production side. On consumer side, the government kept on granting subsidies until the 2013 policy, when the government decided to decrease the subsidy by 50%. The decision faced political obstacle but because oil and gas prices were low in international markets decreasing the subsidy did not show up as huge price change. The government of Pakistan is providing subsidy to the consumers on0 300 units of electricity per month under the 2015 policy. Oil prices were lowered in 2013-2014 but the tariff offered to consumer was not changed. Producers were producing at lower rate but consumers were paying same rate which was paid in 2012.

Thermal power plants play a huge part in the production of electricity which means change in fuel prices will affect overall level of prices in the country. Oil prices are being regulated in country by OGRA which is oil and gas regulatory authority Pakistan. In case of pricing of electricity produced by thermal power plants OGRA is also involved. The final consumer prices are determined by the Ministry of Finance. NEPRA, OGRA and Ministry of Finance are not coordinating in determination of prices with each other resulting in pricing problems. NEPRA and the government needs to

[48] Bulk power sale is the sale of huge amount of electricity at one price. All of the units were priced equally and were sold in bulk. The government was paying for whole amount of electricity a fixed price which was contracted at the beginning.

coordinate with each other to bring electricity prices closer to actual prices. Due to underpricing, investors are not responding to incentives offered to private investment for Pakistan power sector. This underpricing problem needs to be addressed to recover the full cost and give profitable returns to investors.

Pakistan was following cost plus regime which did not give any incentive to private producer to cut costs in 1994 and in case of hydro which is a cheap source but WAPDA was producing through hydro at higher costs which made cost of production of hydro similar to thermal power production cost. WAPDA's hydro plants were not working at efficient scale which priced electricity at high rates. These high prices could be lowered through price cap regulation or banded rate of return because WAPDA was using its monopoly power in hydro production. The problem with Pakistan electricity prices is that generation became expensive due to the previous policy and energy mix adopted in the 1994 policy reform. The policy reforms happened later were not able to promote competition through prices because it included both 'bid based' and upfront tariff pricing. Some projects followed 'bid based' and others followed 'upfront tariff' regime. The tariff rates declared by NEPRA are not cost reflective and requires expert review for better pricing. Reviews happen after long intervals and the prices after the reviews are not acceptable for firms which claims NEPRA for underpricing. Qualified staff from accounting, economic, engineering and the policy field are not appointed which could be the reason of inefficient regulations offered by NEPRA.

The government of Pakistan is phasing out subsidy but the economic condition of Pakistan is evidencing majority of lower income group in the country. The production costs are not decreasing and the government is unable to lower production cost through prices. If electricity will be expensive, people will not be able to afford it and If the government does not subsidize the power sector, public will oppose it.

Transmission and Distribution Losses:

The Pakistani power policies were focused on the issue of generation and in some policies, the Pakistani government tried to improve transmission lines by giving private investors 'operate and maintain' based projects for transmission lines. Before unbundling of WAPDA in 1998 and privatization of KESC in 2005, WAPDA and KESC were responsible for transmission and distribution of electricity as public entities. Due to low recovery of billing and distribution losses WAPDA was bearing huge crisis and it was affecting financial performance of WAPDA. WAPDA was a public entity which

means WAPDA was funded by the government for its payments so the inefficient performance of WAPDA was burdening the government expenditures. Unbundling of WAPDA was done by separating transmission and distribution wing from WAPDA along with public thermal power generators. Separation of power transmission and distribution occurred for the efficient control of system to reduce transmission and distribution losses.

Privatization of distribution was also proposed in 1998. However, delays in privatization of distribution has been increasing burden on the government budget because distribution losses are one of the reasons of circular debt which the government has to pay to independent power producers. One problem with the distribution network in Karachi was that even after privatization in 2005 distribution losses continued until 2009 when it accounted for 39.5% of total production of electricity in Karachi. The privatization of distribution of KESC solved the problem slowly as distribution losses dropped to 27.8% of total production of electricity in 2013 which was not as low as it was expected form privatization of distribution.[49] Karachi electrics (KESC) started a huge operation named BURQ to catch people who were not paying bills or were steeling electricity. Operation BURQ resulted in a reduction of load-shedding for over 200,000 households and commercial operations across the city of Karachi.[50] The current policy is working on privatization of distribution which is hoped to be implemented soon. There has been no progress on this privatization decision since 1998. The privatization of distribution will cause decline of losses and corruption on billing. As mentioned in previous chapters, the privatization of distribution without retail competition would cause problems and Pakistan regulatory authority is weak which means it will be difficult for it to control prices. Privatization of distribution without retail competition will not solve the problem; instead, it will give rise to new problems in power sector due to lack of competition at consumer end.

Generation capacity:

Pakistan electricity crises had been related to less generation capacity. In the 1994-2004 policy era, there was a surplus of electricity as discussed before. All of the policies from 1994 until 2015 has put the generation as the top priority. The 1994 and

[49]K elecrtric.com

[50]K elecrtric.com

2002 policies were successful in attracting investments but all other policies were not able to attract satisfactory amount of private investment. There is a counter argument for the capacity which is that since 2004 until 2016, power plants due to fuel prices and low recovery rates has not been able to use their full capacity. The situation will be better if the full capacity will be utilized. Pakistan power sector is using 41% of its total installed capacity of production of electricity (Dawn and The NATION, 2016). If Pakistan power sector is not able to use its full capacity, then required additional generation capacity cannot be determined. New power plants are expensive and much time is required for completion of projects which also need careful assessment of already built capacity.

Operational and maintenance cost:

This issue has never been addressed by policy makers because the policies are mostly formulated to privatize and liberalize the energy sector. Privatization can solve the problem as the government do not have funds to raise investments. The policies are ignoring old public utilities which were built in 1960s and 1970s. The hydro power plant has an approximate life span of 30-35 years after which plant's depreciation rose due to old machinery and old constructed infrastructure.

India is renovating and modernizing its old generation as well as distribution network whereas the Pakistani policy makers are not including this important issue in the policy. When old plants are maintained, the old machinery problems are settled, they are not replaced with new machinery. Old machinery will have higher depreciation cost which would increase overall cost of production. WAPDA plants has been working for 50 years and in the policy, no measures are taken to modernize hydro system of WAPDA. Gird station technology and distribution network is old and no work is done on modernization of distribution channels. These projects require attention by policy makers for upcoming policies.

Energy Mix:

Pakistan started reforms with immense investment in thermal power plants which included oil and gas. The 1994 policy attracted huge investment for thermal power plants. The choice of fuel made the electricity expensive and has put a huge burden on the government budget through subsidies. The reason behind the policy reforms was 77]to increase capacity. The government encouraged investors towards

thermal power generation but investors were free to choose the fuel. Private investors choose investments in thermal power plants. Thermal power has been criticized for expensive production mix because of international market prices of oil and gas and uncertainty of supply. Thermal power is very economical, suitable and reliable for Saudi Arabia, Iran and Middle East but worse for Pakistan, India, and China. (Hassan, June 2014).

The 1994 policy allowed run on river projects which were not attractive to investors because the water level was dropping seasonally in Pakistan along with some other reasons. This means that in summer, rainy season was the cause of huge water flows in country where at other times, river water level stays low. The seasonal water flow requires that hydro power plant will be successful when it is reservoirs rather than run on river. It will be expensive than run on river power plant but once its built, production will be cheap. Pakistan has huge potential of hydro power which can be utilized to generate cheap energy.

Renewable energy is not given much attention and latest policy is trying to promote renewable energy. However, incentives for investments are not huge such as there are import duties on solar panels which make them expensive to be used in Pakistan.

Lack of Coordination:

Pakistan's electricity is regulated by NEPRA which is responsible for tariff, performance standards, and regulation to promote competition in this sector. Energy mix of Pakistan's electricity shows that most of the production consist of thermal energy source which include oil and gas. Oil and gas regulations are made by OGRA (oil and gas regulatory authority). Ministry of Water and Power is making the policies for the electricity sector and is determining consumer end prices.

These are three different entities with no interconnections among them but the electricity requires coordination of functions in this sector. Ministry of Water and Power is not taking recommendation from NEPRA and OGRA to build its policies. There have been many disputes between NEPRA and the government about the tariff rates. OGRA is making its own regulation without considering regulations of power sector as OGRA is determining prices of oil and gas which is used in thermal power plants. NEPRA needs to revise tariff considering the regulations of OGRA but NEPRA act rigidly in its regulations which causes underpricing of electricity when fuel prices rise. The

government is intervening in tariff determination practice such as it did not let NEPRA decrease tariff for end consumers in 2015, to recover the cost of subsidy from the reduced amount of fuel prices.

Policy Issues:

Pakistan started liberalizing its electricity in order to fulfill expected future demand and to supply efficiently. The 1994 policy gave a good start to liberalization in terms of investment. Pakistan policy makers used partial privatization and liberalization approach. The first policy adopted gave generation surplus of energy and also raised new problems. The main problem was the energy mix adopted in this policy. Thermal energy was given importance as the government gave incentives on thermal power generation. This energy mix was the reason of higher generation cost of Pakistan's electricity. In 1985 hydel was at high percentages of production but later due to increased liberalization thermal power production was increased to higher percentages than hydel. In 1985, hydel to thermal ratio was 65% to 33% and in 2015 the share of hydel decreased to 28.67% and thermal production share increased to 67.74% (The Express Tribune, 2016). This change of energy mix happened due to privatization and liberalization reforms which attracted private investment to thermal energy more than hydel.

Each government is making the policy reforms but there are certain problems with the policy as mentioned by Ghafoor and Weiss 1999 that the Pakistani power policy up-to 1998 could solve the problem for short term not for long term. The reason was that liquid fuel can instantly increase power generation and overcome the solution in short run but as liquid fuels are imported in Pakistan, they cannot give sustenance to the sector. Prices and supply of these fuels are not certain in the long run.

In 2015, the government made the policy reforms to switch towards renewable energy for power production, but there are no clear ways mentioned about how to achieve this goal. Solar energy is an expensive option for power production in Pakistan due to high prices of solar panels, batteries and related system which are imported at high import duties. The government wants to increase production of electricity through renewables but in implementation it has not given much incentives to encourage it.

The policies has not addressed certain issues until 1998 such as transmission and distribution losses, expensive energy mix and lack of competition in power sector. Each new policy shifts energy mix to a completely new resource which will not provide solution because continuation of steps is required to reach a solution. Every policy is

focusing short term solution such as the 2015 policy suggested coal as solution where as long term problem due to coal usage are ignored. The policies are not addressing renovation and modernization of old infrastructure. Policy makers are fully aware of the condition of old public power generation plants and distribution network which requires renovation and modernization.

The government is trying to promote competition through ‘competitive bidding’ but in the policies it has allowed ‘non-bid based’ projects which are hindering competition. The policies could not create competition due partial privatization approach where WPADA and KESC has monopoly power in power sector which was not curbed through the policy reforms. WAPDA is public monopoly and KESC(K-electric) is private monopoly.

Implementation of the policies are also challenging such as privatization of distribution was proposed in 1998 but it has seen no progress until now. Coal was encouraged for production mix but until 2013 it has seen no progress. Some projects got approvals in 2013.

Circular debt:

Pakistan is facing circular debt problem which arises when the government is not able to pay distribution companies the amount of subsidy and distribution losses. When the distribution network does not have enough funds to pay back independent power producers, the independent power producers are not able to pay back for fuel. The independent power producers are buying fuel from publicly owned enterprises such as oil for thermal power production is bought from Pakistan state oil which is publicly owned company. When independent power producers default on the fuel payments, the government is getting less revenues. The government use loans to purchase oil form Saudi Arabia. There are many reasons which cause less recovery of revenues at consumer side and thus creates circular debt.

The Pakistani government retired circular debt in 2013 (Power policy, 2013). But there is possibility of piling up of circular debt again because of unpaid subsidy amount of 2014 and 2015, high transmission and distribution losses, theft, corruption in billing and expensive fuel. Considering all of these point it is clear that circular debt will pile up again and the government will not be able to pay it.

Political intervention:

Pakistan is politically diversified in the sense that since 2012 elections each of the four provinces are ruled by different parties. Policy makers, implementers and regulators involve bureaucratic personnel. Every government is trying to maximize its vote bank through the policies they implement.

It was political will of 1994 leader to change energy mix to oil and gas which were expensive fuel however, the option of increased hydel power production was available at that time (Saleem, 2007). The reason political will is involved here is that many of the ruling party personnel became a part of independent power producers and had their commission from the firms (Saleem 2007). The government chose independent power producer on contractual basis with 'cost plus tariff' regime in 1994 which gave an incentive for investors to build expensive projects by bribing the government and in the beginning of liberalization era there was no regulatory authority, the government was directly involved in privatization and liberalization process. The independent private producers were not selected on efficient basis due to unnecessary political intervention (Kessides,2013).

Huge subsidy on electricity is also an indication of political intervention where firstly the government allowed generation through expensive fuel which made electricity expensive. The government allowed 18% return on equity which was a very high rate of return and then gave subsidy to consumers. Pakistan's population was not well informed about the project's cost and its benefits in the long term. People who are poor or middle class do not let the government remove subsidy from electricity and political parties are opposing expensive generation but are not allowing to remove subsidy. The government which was elected in 2012 has reduced subsidy but at the time when fuel prices were low in international markets. The decrease in prices of oil and gas were to be translated in lower consumer tariff and the government did not allow NEPRA to lower the consumer tariff. The amount which is paid to producer is low but consumers are paying high under the 2015 policy. Consumers are paying cost reflective prices and the difference is removed by not allowing NEPRA to decrease consumer tariff. The subsidy is removed for those who are consuming more than 300 units. This is the reason people were not able to get cheap electricity in low price era of fuel during 2014-2015.

The involvement of political agents in regulations of NEPRA is making the process complicated and difficult. Tariff regulations are always interfered by the

government bodies specially for consumer end tariff as mentioned above. In the policy of 2013, the government is criticizing the tariff determined by NEPRA. NEPRA's high officials are bureaucrats which are the reason of the involvement of politics in regulations. With every new government high ranked officers of NEPRA are changed which is also an indication of political interventions (World Bank, 2001). Political intervention on a big dam of KALA Bagh is well known. Kala Bagh had got importance in hydro power projects due to less cost of construction with a very high generation capacity of this project.

Delays in implementation of projects:

Pakistan has adopted several policies and targeted new projects to overcome supply demand gap. The projects are taking longer time for completion than contracted time due to the change of the policies and the government are not letting old projects be implemented in their era as it gives other party a reason to gain votes. Due to delays in implementation and operation of projects, the projects are getting expensive with time.

The policy of 1994 promoted thermal power projects which took more time than contracted for completion which was criticized by researchers in 1999 (Ali and Beg, 2007). Some projects delayed due political intervention. An example of delayed projects due to political influence is Kala Bagh dam which was proposed in 1987. All provinces had claim over the water which was the main Indus river. The construction cost was very low which has increased over time due to inflation and economic situation of the country. Political intervention did not let this project to be implemented. In 2005 General Pervaiz Musharaf again proposed Kala Bagh project which was opposed by the Khyber-Pakhtun-khuwa government and the Sindh government and in 2009 the ruling party government excluded this projects declaring that it was no more possible.

Nelum-Jehlum project was initiated in 2008 which was supposed to be completed and in 2016 however, it is reported that the project will be completed in 2019. Both projects were under the control of WAPDA which is a public utility. Delays in project implementation increased their cost of construction over time.

CHAPTER 6

Conclusion and recommendations

This chapter will summarize the above discussion to draw a number of conclusions and distill lessons and recommendations. From reforms and regulations it can be seen that Pakistan needs to make the policies carefully and regulatory authority needs improvements. Two sets of recommendations are provided, those are extracted from Indian experience and are more general recommendations.

Conclusion:

Pakistan's severe power crises are affecting every walk of life. The government has been proposing the privatization and liberalization policies since 1994 to solve the ever increasing problem but despite various attempts at reforms, a severe power crisis had continued since 2006. This pointed that policies had been unable to solve the problem up until now. The 1994 policy successfully increased investments by attracting private investment for thermal power plants and solved the problem for that time period but problems again roared up with more severity in 2006. The policy overview showed that even the 1994 policy which was a successful policy form among all the policies after 1994, was not able to provide sustainable growth solution for this sector because of two reasons: one was thermal plants were oil or gas fired plants and Pakistan was importing these inputs. Import of these resources on one side increased import bill and on other side prices were not certain which made investment and returns risky. Another problem sprang up in this privatization policy was energy security because of increased

dependence on imported fuel. The policies after this tried to switch energy mix of power sector to hydro power plants but due to financial performance and weak institutions private investors did not respond as they responded to 1994 power policy.

One important issue is observed during this overview is, the government focused its policy only on increasing generation capacity but was ignoring transmission and distribution reforms and delayed their privatization since 1998. Also, government policies did not address full utilization of already built power plants. Circular debt was one of the factor which affected full utilization of power plants as companies were not able to pay for required fuel. This underutilization pointed toward less subsidized prices and privatization of distribution because of high distribution losses. These factors were contributing to circular debt but both aspects are still not addressed well in the policy of 2015. Privatization of distribution has not been done up to now since the day it was proposed and lack of renovation and modernization of distribution lines contributed to the worsening of the situation. The process of privatization is facing delays making it more expensive due to economic conditions. Weak institutions are not able to solve theft problem and corruption at distribution end.

Pricing of electricity is an important issue which is needed to be addressed. Before regulatory authority prices were regulated by the government from where the problem of prices took a start. The government offered cost plus at high equity rates and fuel prices also rose up making it difficult for authorities to provide electricity at cheap rates. This leads the government to subsidize prices of electricity at consumer end and it also provided subsidy on fuel purchase for power plants to ease producers. These subsidies burdened the government budget and it became challenging to lay of subsidies because subsidy matters considered political intervention. After the formation of regulatory authority in 1998 problem of underpricing rose up as regulatory authority NEPRA tried to control prices. Political intervention, inefficient regulatory staff, weak legal system, financial dependence of regulatory authority on the government are some of the reasons found in the study for inefficient regulatory authority and thus unproductive regulations.

This thesis is a comparative study where India is taken as benchmark. India solved its problems. India solved the problem of generation, transmission, pricing and distribution losses. India took number of important steps to solve its problem such as it privatized distribution successfully in its states and center. India decreased its subsidy level and improved efficient pricing both for producers and consumers. Energy mix of

India includes coal which India is producing domestically, most of the coal used in production of electricity is mined domestically which is a cheap source of electricity production. India made the policy for developing more renewable power plants to address energy security in its latest policy. A law (1948 Act, 2003 Act) is backing each policy of India which is helpful in successful implementation and lessened political intervention by making regulatory authorities more independent. India has special electricity courts working for problems and issues related to power sector. In short India was having similar problem as Pakistan but controlled it specially after the implementation of 2003 act of electricity. Pakistan can follow the steps taken by India for improving its power sector and can learn from failures of the Indian policies as well.

Lessons Learned from India

Policy perspective:

The policy planning is done by experts in India because planning commission involve specific position for economist accountants, engineers and policy makers. Pakistan on other hand use political leaders to make the policies and plans which lead to more political interest than public interest. Political interest can be gaining votes through the policies but due to less expertise they will not be able to make effective policies. Pakistan needs experts in policy planning commission so they can make effective policies and regulations to improve power sector.

The policy is not backed by any law in Pakistan whereas in India there had been always a law which is being followed in every policy. The Pakistani policy also requires to follow a law so that investors will be able to predict the policy changes for future. A policy backed by law will also be able to pass through parliament which involves opposition leaders, this will make the policy more transparent because the government will not be able to promote its own interest through inefficient policy.

India has implemented the policies better than Pakistan. The central and the state governments are making progress in power sector by timely implementation of the policy after 2003 act of electricity subsidy had been phased out for example in the 2005 policy, India planned to phase out subsidy by 50% and it implemented this policy whereas Pakistan decided to lessen the subsidy in 2013 and in 2015 Pakistan started

phasing out subsidy. The Pakistani government and PPIB needs to foster their implementation strategy.

The power policy of Pakistan is ignoring some important facts which can be taken into consideration to enhance long term growth. The policies are being made for short term solution as the policy of 1994 was implemented without considering its future cost of production. The energy mix chosen in that policy is affecting Pakistan until now where as India has chosen coal as energy mix which is being produced domestically. India has to import coal for production because domestic coal is not enough but the energy mix is not that expensive as in Pakistan. Pakistan tried to solve problem over time but share of thermal added at the beginning of privatization has effects on energy mix of now. No effort is made to change these old plants to use other type of energy which means oil fired plants can be changed to coal fired plants which had been proposed by the current government but there had been no progress on it.

Regulations:

Regulations are important for effective and smooth run of the policy. India and Pakistan both had one similarity in the beginning of reform, the government was responsible for regulation of power sector. The Indian power sector reforms were implemented under set of rules whereas the Pakistani government had no law to follow instead the government was free in choosing the regulation of power sector. India and Pakistan were not able to handle it efficiently due to pricing regulations adopted by both countries. Financial liabilities on WAPDA in Pakistan and state electricity boards in India were very high and burdened the budget of the government because the government guaranteed the purchase of power. In 1998 NEPRA was established to regulate tariff rate but the government intervened in it by providing subsidy on consumer end.

Subsidy was one of the problem both countries were having which was because of political interests of the governments. Financial liabilities and lack of competition in power sector brought the need of regulatory authority. India made two types of regulatory authorities, central level and state regulatory authorities. After 2003 India gave much independence to its regulatory commissions. In Pakistan NEPRA was established in 1998 for regulation and promotion of competition. Both countries gave similar responsibilities to regulatory authorities.

In India regulatory commissions had expertise staff which help in effective

regulation of power sector. Economist, accountant, engineers and legal experts were staffed in regulatory commission whereas Pakistan regulatory authority has not hired experts in its regulatory authority which is making regulation inefficient. Pakistan regulatory authority has been criticized on the basis of techniques used for tariff determination.

Price regulations were following similar approach of cost plus basis but India has regulated price better than Pakistan. One reason can be expertise involved in regulatory commissions did a good cost accounting to make firms unable to charge extra benefits from cost plus in India. Secondly multiyear and annualized tariff rates were important for this sector because multiyear did not let the government intervene in tariff and annual basis was done to include fuel cost in total price. NEPRA is using upfront and levelised tariff and both types of tariff are opposite to each other where upfront is declared tariff and levelised is bid based tariff. The government is intervening at consumer end and also forced NEPRA to review tariffs for some projects.

From the start of privatization India offered 16% return on equity whereas Pakistan offered 18% returns on equity. The generation cost was high in Pakistan due to return on equity, devaluation of currency and energy mix adopted. India used its domestic coal in the beginning of privatization and also offered less return on equity than Pakistan resulting in lower prices for India than Pakistan. Currency devaluation risk is also mitigated in India where tariff will be determined and paid in Indian currency whereas tariff of Pakistan has indexed with foreign currency which raised devaluation risks.

The state governments were not allowed to interfere in lowing tariff due to subsidy without complete payment of subsidy. The Pakistani government is lowering consumer end tariff by provide subsidy on it. Ministry of power is interfering in provision of subsidy without paying it fully which is the reason of circular debt. There is law which can back NEPRA to make independent price decision but is not effective due to lack of independence and bureaucratic staff of NEPRA where as in Indian regulatory commissions are backed by law for price determination which are strongly followed by the governments.

Retail competition:

India has privatized distribution to lower the burden of the government due to distribution losses in 2005 and promoted retail competition by giving license to multiple

retailers in 2015. This made it competitive on consumer side through free selection of retailer choice for consumers' side and decreased transmission and distribution losses. Retail competition is new in Indian electricity market as it was introduced in 2015. Retail completion has been implemented due to problems with privatization and liberalization of distribution. Distribution losses were not lowered due to monopoly of distributors without retail competition after 2005. Private companies improved the situation but distribution losses stayed at high level and prices were also not lowered for end consumers.

Pakistan has planned privatization but it is being delayed since 1998 which is the reason Pakistan is still facing transmission and distribution losses at high rates. These losses put burden on budget of the government and thus circular debt. Pakistan did privatization of K-Electrics distribution companies which showed decline in distribution losses from 35.9% in 2009 to 27.8% in 2013 (K-electric, 2013). This means privatization of distribution can help in reduction of distribution losses in Pakistan. But as it can be seen from the privatization and liberalization experience of India that retail competition will be a better solution with privatization/liberalization of distribution. This competition will generate less consumer prices and more control over distribution losses by private distributors.

Appellate tribunal:

India has established new courts which are working under the regulation of regulatory commissions to deal the matters of electricity such as dispute and theft. These special courts are working with set of regulations provided by regulatory commissions. In this court dispute are resolved in less time and theft is addressed, which also cause decline in burden on distribution companies. Pakistan needs to address the same issue but there is no special court to deal with the electricity matters. The reason of emphasis for new court is that electricity cases should be immediately solved where as in High courts the matters of electricity theft are being delayed due to load of other work.

Coordination in power sector

India had the problem of coordination in power sector which it resolved recently by making set of empowered ministries where it put fuel related ministry and power ministry under same group to let them coordinate in the matters related to fuel and

power where as in Pakistan fuel sector is handled by OGRA which is another regulatory authority, ministry of power is not contributing in regulations of pricing with NEPRA. There is lack of coordination which made regulations difficult for power sector in Pakistan.

Renovation and modernization:

Renovation and modernization of old power plants can also enhance capacity of production with efficient cost. WAPDA is important for Hydro power generation because it's production share of hydro power generation is huge in generation mix but its power plants are about 50 years old and a hydro power plant machinery/equipment can work efficiently for 30-35 years at most after that good maintenance can help in functioning otherwise after 50 years' system needs to be renewed. Another reason which is important for renovation is new technology can produce efficiently than old technology at low cost. NEPRA needs to regulate performance standards strictly and should retire old power plants to let new modernized plants replace old plants, the policy needs to address this issue. Thermal power plants that were built in early 1994 and are working under public authority were rehabilitated under the 2013 policy and showed increase in capacity of power plants such as GENCO-1 when renovated and modernized increase capacity from 225MW to 710MW of energy (NEPRA, 2013).

India has focused on renovation and modernization of power sector which has improved it generation and decreased its operation and maintenance cost. Pakistan also needs to include this in its policy with strong implementation so that old plants could be modernized and new technology could replace old, for efficient production results.

Energy security:

India has recently tried to change its energy mix towards renewable to decrease its energy dependency as it was dependent on imported gas and coal. Developments is these projects is having fast pace than development of renewable in Pakistan. Pakistani policy makers are proposing to import coal for their electricity production and Pakistan is already using oil and gas to generate electricity. No strategies to change oil and gas power plants had been adopted. The policies should include energy security in upcoming strategies to stay at safe side in case of uncertain supply or price shocks.

Captive power plants:

India introduced captive power plants to facilitate industries and saved them from shortage of electricity and expensive electricity. Private investors were encouraged to invest in captive power plants. Captive power plants were located near industries which also helped in lower transmission or distribution cost. Pakistan industrial sector is badly affected by power crisis of Pakistan. Pakistan has a huge textile industry but due power crisis export share of textile industry dropped from 2.2pc to 1.8pc (Dawn, 2015).

Pakistan can set captive power plants and can encourage private investment as India did to mitigate the power shortage for industries. This will also lower down the demand of electricity as industries will not use electricity produced nationally or provincially which can be supplied to general public, household or commercial sector.

Recommendations:

Power subsidies had not been targeted well since they were implemented. The government can develop a card based system to pay for electricity bills up to specific number of units consumed which in case of poor will be smaller. The government should recharge the amount of subsidy on cards and cards should only be useable for electricity bill payments. In this way the government can target subsidy well but allotment of cards should be done on merit and should be transparent with no political intervention country wide.

Delays in implementation of high capacity hydro projects is an important issue which is needed to be addressed. Pakistan has allowed less than 50MW power plants without federal approval since the 2002 policy which means generation can take place in province with the provincial government approval of plants up to 50MW. This made some provinces produce electricity through small independent private power plants. If the government allow more capacity 100MW or 200MW to be approved by provinces there is a possibility that provinces will generate and fulfill their demand better. Secondly politics also play its role over here in such a way that each province has its own government which do not have power of center. The central or federal government tries not to let opposing political party make good reputation by starting new power projects in their province. For example, currently PMLN (Pakistan Muslim league noon) is holding center and Punjab province where as its biggest opponent PTI (Pakistan Tehrek-e-Insaff) is ruling KPK (Khyber Pakhtunkhwa) province. The central government is opposing projects in KPK due to political reason. This is the reason, the KPK government is allowing 50MW plants and have built up to 250 mini hydro power

plants (DAWN, 2016). If generation of high capacity power plants will be decentralized, then this political barrier will drop.

Energy mix is expensive for electricity production in Pakistan which raised problems of pricing and supply uncertainty. The Pakistani policies are proposing change in energy mix to cheap resources but no progress has been shown so far. Oil and gas power plants can be converted to coal which can produce cheap electricity but for current situation Pakistan had to import coal which will not solve supply uncertainty problem. Environmental constraints will also rise if these plants will be converted to coal and Pakistan has reserves of lignite which is not so efficient for the production of electricity. Environmental issues are necessary to keep an eye on and policy makers should not jump into another policy trap which will cause problem in future rather than a solution. The policy of 2002 and after that particularly the 2015 policy is suggesting coal as solution and such policies will be able to address short term solution as happened in 1994. Bio gas can be used for production which has potential of 35.625 million Kwh (Waqar et al, 2015), and geothermal has 100,000MW at price per unit of 5-10 cents (Ahmad, 2014). Private participation in these projects should be encouraged through attractive policy reforms.

The government in some policies mentioned that water is seasonal and in low water level period there arise a problem of shortage of electricity which the government will not be able to address. If water is seasonal pumped storage hydro power plants can be used. Private participation in such kind of hydro projects should be encouraged to increase hydro power generation.

Pakistan power crisis cannot be solved all at once and will require time but solutions are available which needs the government attention. Efficient Policies with timely implementation can solve half of the problem. Already built capacity should be exploited amply to lessen the severity of present-day crises. Political will and coordination among all authorities entangled in power will be an important step for successful implementation.

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