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Power shortages in Pakistan Causes and Solutions

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Abstract: Developing countries like Pakistan need a stable supply of clean and cheap energy. In today's world, there is widespread concern that fossil fuels are quickly running out and energy costs are increasing daily. Renewable energy sources and technologies have the potential to solve long-standing energy problems facing developing countries. Pakistan is currently facing a major energy crisis and renewable energy sources may be the best alternative to quickly end the need for fossil fuels. Combining renewable energy sources such as solar, wind, and biomass power with fuel cell technology can help Pakistan overcome its energy shortages. (D. Kothari, K. Singal, and R. Ranjan, 2011). Interest in biomass is growing as it is a promising renewable energy source and produces a type of fuel similar to oil and natural gas. Energy from biomass depends only on the availability of raw materials. Therefore, biomass can play an important role in meeting modern energy demands. Energy consumption has increased significantly over the last century, making almost all human activities dependent on energy. Load shedding, sporadic blackouts, and other disruptions to Pakistan's power supply are on the rise. This problem significantly impacts the country, especially in rural areas. Rising costs of power generation and a high percentage of line losses necessitated higher tariffs, resulting in losses for companies involved in power generation, transmission, and distribution. (S. R. Bull 2001) The power shortage has also made it difficult for manufacturing to create jobs, leading to a significant rise in Pakistan's unemployment rate. 10% annual rate he 42 years. During this period, the government strongly advocated plans for rapid electrification of rural areas. For this reason, the share of households in total electricity consumption rose from 12% in 1971-1972 to 47% in 2000-2001. Farmers in rural Pakistan may find it easier to plan their farm management with load shedding at the right time and for the right duration.

Keywords: natural gas, Biomass, Economic growth, supply side, demand side,

1. Introduction

The biggest single damage to Pakistan's economy has been caused by the energy crisis. The fuel mix causing this dilemma has changed since power generation became more dependent on imported fuel oil than on hydropower 20 years ago. Rising costs of power generation and a high percentage of line losses necessitated higher tariffs, resulting in losses for companies involved in power generation, transmission, and distribution. (K. Kaygusuz 2002) This in turn leads to the phenomenon of circular debt in the electricity sector, where delays in payments (particularly by public authorities) lead to a series of delays in payments for imported kerosene, natural gas, or other inputs to heat generation systems. Cause and, in turn, influence. It negatively impacts the operation of the power plant and leads to sub-optimal capacity utilization. Pakistan's energy shortage is caused by a variety of factors, including aging power plants, rising demand, lack of access to electricity in rural areas, gas, and oil supply shortages, and scarce financial resources. Solutions include investing in renewable energy sources, improving energy storage and transmission infrastructure, increasing the efficiency of power generation and distribution, and improving the financing capacity of the energy sector. (D. L. Klass 1998) Additionally, the energy crisis is putting great pressure on government resources, with energy subsidies taking up a significant portion of the federal budget and consuming a lot of it. In a deal signed with the IMF in September 2013, the government paid off its distribution debt, changed tariffs to better allocate resources, promote energy conservation, and make natural gas available for power plants. I agree to take steps of

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improving the efficiency of transmission and distribution and improving access to electricity in rural areas are key to addressing Pakistan's power shortage. This can be achieved by investing in renewable energy sources such as solar, wind, and hydropower, increasing energy storage capacity and transmission infrastructure, and encouraging greater energy efficiency. Additionally, providing financial support for infrastructure development and access to energy and electricity in rural communities can have an even greater positive impact. (P. Purohit, A. K. Tripathi 2006) Investing in sustainable infrastructure is key to achieving the above goals. This includes expanding transmission and distribution networks, investing in renewable energy sources and technologies, and energy efficiency. Special attention should be paid to the development of off-grid electrification programs and grid-connected services for remote rural communities and households. (S. C. Bhattacharya 1993) In addition to the infrastructure investments mentioned above, to develop a skilled workforce to support and sustain these activities, to develop strategies to de-risk investments, and to encourage private sector involvement in this area. , requires a great deal of effort. Governments should also create incentives for businesses to invest in renewable energy sources, energy efficiency, and advanced technology. Finally, the framework conditions must also be created in favor of SMEs to exploit the enormous potential of renewable energy systems.

1.1 Pakistan's energy crisis and its consequence

Electricity is a crucial component of the industrial process as an energy source. Without high-quality, non-interruptible power sources, sustained high economic development is not conceivable. Pakistan serves as a case study for the effects of energy scarcities, which have slowed down the expansion of the country's GDP, stagnated industries, created few jobs, had a substantial negative impact on the government budget, and made things tough for regular home customers.

The demand for electricity demanding while conventional energy sources are being used less as Pakistan's urban population quickly increases. (X. Y. Zeng, Y. T. Ma, and L. R. Ma 2007) But supply is falling well short of demand, particularly in rural regions where blackouts are more frequent. Under investment, poor energy sector management, and poor governance. Due to limited generation, there is a 32% gap between supply and demand for electricity.

State-owned distribution businesses will be privatized as part of energy sector reforms, but it is too late to overcome the supply-demand imbalance for power and put an end to lengthy blackouts. Pakistan's economy, social system, and stability continue to suffer from these blackouts.

1.2 Slower economic growth

According to a 2013 analysis by Pasha et al., the blackout reduced economic growth by around 2% and lost Pakistan's economy 7% of its GDP. Grid congestion, outdated, ineffective transmission, and distribution (T&D) systems, power loss en route to customers, and inconsistent grid supply, (M. Asif 2003) which makes the industry costly, are the causes behind this. Are compelled to install dependable but somewhat inefficient internal capacity. Power shortages have also made it difficult for the manufacturing sector to add jobs, which has greatly increased Pakistan's unemployment rate. (M. Afzal, R. Raza2015) However, industrial customers pay far more for energy than their counterparts in nearby nations, which makes Pakistan's exports uncompetitive on the world market. Inflation was caused by rising power costs, which raised families' and consumers' costs of living nationwide.

1.3 Risk to stability

Numerous issues with law and order stability have been brought on by regular power outages during the previous ten years. Pakistan and started a large-scale uprising. The frequency of these protests has, however, decreased as a result of small improvements in the situation during the last two years. (J. F. Li and R. Q. Hu 2009) However, persistent defaults erode a state's authority and capability, making it more challenging to limit the impact of rebel organizations. Therefore, resolving the electricity problem is crucial for both political and economic stability.

2. Causes of the energy crisis

The research essentially separates the main causes of power shortages into supply- and demand-based causes. For three reasons, Chinese direct investment is more advantageous to Pakistan than investment from other sources.

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2.1 Demand side

2.2 Growing household demand

Over the previous 42 years, household power consumption has increased at an average yearly rate of 10%. The government strongly advocated a program of quick electrification in rural regions during this time. (R. Raza, N. Akram, M. S. Javed 2016) Due to this, homes' percentage of overall power usage rose from 12% in 1971–1972 to 47% in 2000–2001. During the same time, period industry's proportion of power usage decreased from 54% to 30%. The number of customers and power consumption per user rise quickly due to these variables, raising household power demand (Figure 1).

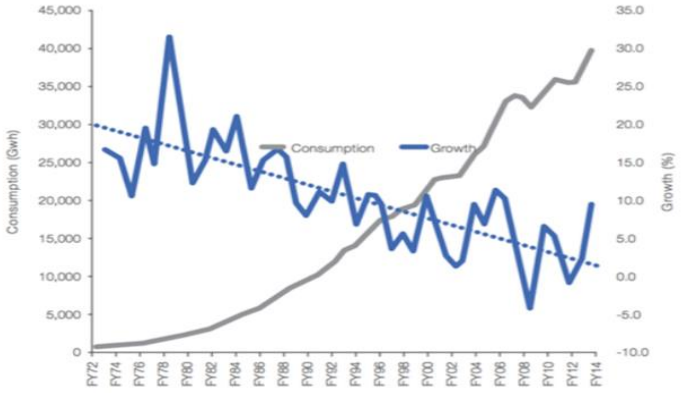

Figure 1: Household Electricity Consumption and its Growth

Industrial prices for specific categories and panels will also become unsustainable due to changes in power demand, particularly when subsidies are phased out of the budget and the overall cost of cross-subsidies2 is increased. Even more so under regimes where industrial and commercial users are subject to tariffs.

2.3 Inefficient Consumption

Between 2000 and 2007, there was an increase in the usage of electronic gadgets across Pakistan due to a credit-driven spending boom. (K. T. Dunn 1991) Ineffective home consumption was a factor in the power crisis' intensification. An investigation conducted by the Asian Development Bank in 2008 found that more than a quarter of the power used at home is lost due to the prevalence of inefficient equipment.

2.4 Supply-side

2.5 Power generation

Pakistan has a large range of natural resources, but its ability to generate electricity is severely constrained. Between 1995 and 2010 in particular, the amount of investment in the industry dropped significantly (Fig. 2), capacity development was needlessly sluggish, and significant investment in the sector to increase efficiency was scaled down.

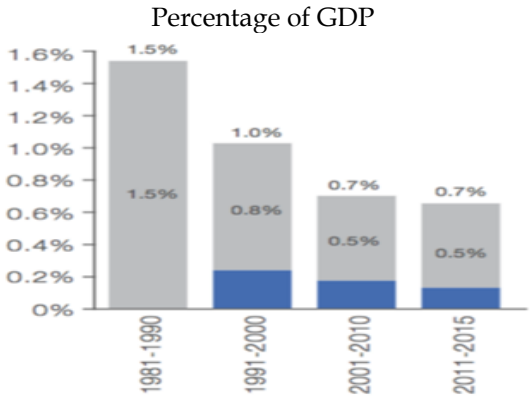

Figure 2: Investment in Energy Sector

2.6 Financial Management

Pakistan's inability to pay for the electricity generated has an impact on power production. (M. Kugelman 2013). The fiscal issues facing the energy industry are mostly a result of poor management, weak administration, and ineffective government policies that fail to modify rates charged to customers despite huge increases in power-producing costs.

2.7 Governance issues

Pakistan's inability to pay for the electricity generated has an impact on power production. The fiscal issues facing the energy sector are mostly a result of bad leadership, subpar management, and ineffective government regulations that prevent price adjustments for customers despite huge increases in the cost of producing power.

2.8 Weak accountability

Pakistan's inability to pay for the electricity generated has an impact on power production. The fiscal issues facing the energy sector are mostly a result of bad leadership, subpar management, and ineffective government regulations that prevent price adjustments for customers despite huge increases in the cost of producing power.

3. Solutions

Governments and individuals must both contribute to the diverse response needed to address the energy challenge. Revisions to address this issue include:

Resolving Financial and Investment Issues

- Promoting new investment and generation is crucial to raising the sector's efficiency.
- Rather than just depending on government assurances, investors should start using a market-based strategy (such as bidding on the price of the power they generate and growing their client base). (M. A. Khan and U. Ahmad 2008) you shouldn't rely just on assurances from the government.
- Customers must be aware of their responsibility to pay their power bills on time and in full, and they must accept the possibility of being disconnected if they fail to do so. The sector's financial problems will only become worse if it resists change.

3.1 Improving power sector governance

The government must cease interfering with administrators' daily operations and provide them with the assistance they need to investigate and prosecute instances of power theft. If investors want to boost utilities' performance, governments and regulators must authorize investment authorization.

3.2 Reducing theft and losses

- The grid has to be updated and maintained, and cutting-edge management systems need to be installed to better oversee employees of distribution companies. In addition to maintaining current buildings, money must be invested in purchasing the newest systems and technology.
- It's crucial to enhance the legal structure that allows for the investigation, prosecution, and punishment of fraud and corruption.
- All reports of power theft must be swiftly investigated by law enforcement and prosecuted.

3.3 Promoting renewable energy

- Renewable energy sources like solar and wind are expanding quickly. Supporting the growth of renewable energy sources will result in a significant diversity of the nation's energy supply.
- Pakistan's regulatory system gives energy producers the freedom to select the fuel of their choice. (N. Alter and S. H. Syed 2008) this makes it possible for investors to plan and create renewable energy projects. The standard permission criteria that apply to all power-producing projects must be met.

3.4 Solar Energy

Pakistan lies between 61° and 75.60° east longitude and 23° and 37° north latitude. Pakistan is a country with a dry climate and low rainfall. 60% of the country is mountainous and 40% is flat and stepped. This geography of the country is very suitable for the use of solar energy. In Pakistan, a very large population in rural areas has no electricity, is remote, or has a very small population that cannot be easily connected to the national grid. It is expensive and also significantly reduces the load on the national grid. This excess energy used in public parks, street lights, and street lights can be supplied to the national grid, reducing the supply and demand gap, thus reducing Must use of solar energy.

4. Conclusion

The world is changing rapidly. Each process is automated, saving time while speeding up the production mechanism. Without energy security, we cannot keep up with the world. If we want to become viable and develop Pakistan into a modern country, we must introduce renewable energy methods in time to meet our energy needs. Due to the dynamics of the global economy, Pakistan does not appear to see a decline in energy demand shortly. But it is up to Pakistan's political leaders and stakeholders to minimize this energy crisis and find solutions. It's important to keep in mind that optimism can help you weather any kind of crisis. We should all do what we can to strengthen our country on all fronts.

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