

TOPIC : IMBALANCE OF ENERGY MIX IN PAKISTAN AND ITS CONSEQUENCES

OUTLINE

1- INTRODUCTION

Thesis Statement : Pakistan has been grappling with the issue of an uneven energy mix since many years. This crisis results from factors that include lack of investment in the energy sector, overreliance on fossil fuels and inefficient energy use. Alternative Energy Sources' adoption and induction of power plants are few of the remedial measures to bring Pakistan's energy predicament to a stable footing.

2- Pakistan's Energy Profile and Imbalance of Energy Mix

3- Causes of the imbalance of Energy Mix in Pakistan

- (a) Lack of investment in the energy sector
- (b) Circular debt disrupts energy generation
- (c) Overreliance on fossil fuels
- (d) Currency devaluation and fluctuating oil prices
- (e) Inefficient energy use and lack of energy efficient technologies
- (f) Political interference in the energy sector

4- Consequences of the Energy Mix Imbalance in Pakistan

- (a) Foreign exchange reserves are strained
- (b) Environmental impact in the form of air

- pollution and greenhouse gas emissions due to fossil fuel combustion
- (c) External shocks in the economy due to fluctuating oil prices
 - (d) Untapped alternative and renewable energy resources such as solar and wind
 - (e) Lack of necessary infrastructure development for energy transmission aggravates the imbalance
 - (f) Demand of energy keeps rising due to population growth and global warming
 - (g) Hampers employment opportunities for labour that could be utilised for execution of alternate energy resources.

5- How can the imbalance of energy mix in Pakistan be adequately and effectively addressed?

- (a) A comprehensive policy and regulatory framework
- (b) Infrastructure development and building for energy installation and functioning
- (c) Investing on initial costs for long-term infrastructure and technology
- (d) Relying on local renewable energy resources

6- Conclusion

Essay

Energy is vital to sustain life. It is energy that causes machinery and appliances to function. The lights and fans that are turned on, to the fridges that operate and electricity generation are all a result of an energy mix. It almost seems that a world where a healthy and balanced energy mix of energy resources whereby alternate energy resources are maximised and minimal reliance on fossil fuels is non-existent and a distant reality. From developed to developing countries, everywhere, fossil fuels are the main source of energy production. Developing countries, however, additionally face the issue of energy shortfalls as a result of energy demands being unfulfilled. As is the case with many other developing countries, Pakistan has been facing an imbalanced energy mix as the country seeks to address energy shortages and improving energy efficiency. The imbalance of energy mix in Pakistan has been long-standing that has significantly impacted and impeded the country's economic growth and development. This crisis results from a lack of investment in the energy sector, over-reliance on fossil fuels and inefficient energy use. Adoption of Alternate Energy sources such as Solar Energy, Wind Energy, Hydroelectric Energy, Biomass Energy and policies to induct power plants for effective energy transmission are the need of the hour.

to address this multifaceted issue.

Pakistan's energy mix has been characteristic of energy shortages and heavy reliance on fossil fuels. Pakistan has traditionally relied heavily on fossil fuels, particularly natural gas and oil, for its energy demand. As of 2023, according to the ^{latest} Economic Survey of Pakistan, the ~~to~~ energy mix comprises 58.8 percent thermal, 25.8 percent hydel, and 8.6 percent nuclear power. Additionally, according to Dr. Ghulam Mohey Ud Din, alternate power sources contribute 6.8 percent to the overall mix (Pakistan's energy mix and export competitiveness, Business Recorder, 2023). From this, it is apparent that a huge imbalance in energy mix exists in Pakistan whereby ^{more than} almost 90 percent of electricity generation is through fossil fuels and only about 6 percent is through alternate energy sources. During the summer months from May-August 2023, Pakistan faced an acute energy crisis wherein the electricity short fall widened to 7000 megawatts. (Usama Rehman, Energy Crisis in Pakistan, Modern Diplomacy, 2023)

Lack of investment in the energy sector is one of the primary causes of the energy imbalance. Insufficient investment and lack of substantial investments in building new power plants or upgrading existing infrastructure to meet the growing energy demands has kept the issue from moving

towards resolution.

Secondly, the circular debt crisis in the energy sector hampers and aggravates the crisis. This occurs when power generation companies are not paid on time by consumers or government, leading to a shortage of funds for fuel and maintenance. Resultantly, ~~electric~~ energy generation is disrupted.

Next, over-reliance on fossil fuels has made the energy sector vulnerable to price fluctuations and supply disruptions. Pakistan particularly ^{heavily} imports natural gas and oil, which are finite and expensive resources that are susceptible to market price.

Following from the previous cause, heavy import of fossil fuels also causes fluctuating oil prices to cause an unpredictability in energy mix and generation of power according to demand. Currency devaluation results in higher prices of these fossil fuels putting the entire energy mix at a deplete position.

Moreover, inefficient energy use is a major factor that causes the imbalance of energy mix in Pakistan. Wasteful industrial, commercial and residential energy consumption ^{practices} contributes to the crisis. Lack of energy efficient technologies and conservation measures result in higher energy demand.

Furthermore, political interference

in the energy sector has led to inefficiencies, mismanagement, and a lack of transparency. This has led to the further worsening of the energy mix imbalance and crisis.

Pakistan's energy mix imbalance has led to several consequences. Firstly, foreign exchange reserves are strained. This occurs due to depletion of indigenous natural gas reserves that has forced the country to import expensive liquefied natural gas.

Second, increased environmental impact has resulted. Fossil fuel combustion contributes significantly to air pollution and greenhouse gas emissions exacerbating environmental degradation and climate change. Air quality has also worsened.

Thirdly, external shocks in the economy due to fluctuating oil prices, heavy import and fossil fuel dependence has been a continuous consequence. Geopolitical factors such as international relations and volatile oil prices put the imbalance of energy mix of Pakistan at an extremely uncertain position.

Moreover, Pakistan's vast potential of untapped renewable and alternate energy resources remains underutilised. The coastal areas of Pakistan, for instance, particularly Sindh and Balochistan have substantial wind energy potential. However, installing adequate and efficient wind turbines that could

diversify the energy mix has not been done. This leads to strain on conventional resources and unsustainability.

Furthermore, the lack of necessary infrastructure development aggravates the energy mix imbalance especially in remote areas.

Lastly, hampering of employment opportunities is an impact of the imbalance of energy mix in Pakistan. Skilled labour that could be used for installation, operation and maintenance of energy's alternate resources is underutilised resulting in lack of job creation and stagnant economic growth.

The redressal of this imbalanced energy mix is possible through the following proposed remedies. Policy and Regulatory framework that comprehensively develops an inclusive environment and fostering proactive institutions that include incentives and regulations. This is a crucial factor that would encourage private investment and innovation in the alternative energy sector to curb the imbalanced energy mix.

Second, infrastructure development and building of energy installation and functioning is necessary. Power grids and transmission lines establishment is essential especially in remote areas to ensure energy shortfall and imbalanced energy mix is reduced.

Thirdly, initial costs that are incurred in the development of alternate energy production and technology should be made and seen as an investment for long-term. The upfront investment is substantial to end the energy imbalance mix.

Lastly, relying on relatively easily and cheaply available alternate energy resources is the ultimate solution to curb Pakistan's energy^{mix} imbalance. For instance, relying on Solar Energy. Pakistan has abundant sunlight annually, making solar energy's widespread use, viable option. Large-scale solar farms and rooftop solar installations can significantly augment the energy supply and improve its energy mix.

conclusively,
All in all, as relayed, the causes and consequences of the imbalance of energy mix in Pakistan is due to its inadequate supply of local energy sources and unmet demand for energy as a result of lack of investment in the energy sector. However, remedial solutions such as incurring initial costs or investment of technology to generate energy and a comprehensive policy and regulatory governance framework can pull the country out of this imbalance.