

IMBALANCE OF ENERGY

Date

MIX IN PAKISTAN AND ITS CONSEQUENCES

OUTLINE:

1) Introduction

Thesis Statement: The energy mix of Pakistan is not balanced - It is dominated by production of power through fossil fuels - Renewable energy covers small portion of energy mix - Consequently, it has grave implications on economy and social life of Pakistan - Concerted efforts are needed to balance the energy mix

2) A brief history of imbalance of energy ~~resources~~ mix in Pakistan

3) Imbalance of energy mix in Pakistan

- (a) Over-reliance on imported oil for production of electrical power
- (b) Unwise usage of depleting reserves of natural gas
- (c) Untapped coal reserves and reliance on imports
- (d) Non-utilization of hydropower resource to full extent
- (e) Meagre share of solar energy in energy mix
- (f) Under-utilized wind energy considerable
- (g) Smaller share of nuclear power in energy mix

Avoid sweeping statements

4) Consequences of imbalance of energy mix

- (a) Production of costly energy
- (b) Closure of industrial unit due to price hike of electricity and fluctuation in electricity supply
- (c) Diminution of foreign reserves

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- (d) Prevalance of social restlessness due to high cost of electricity ✓
- (e) Soaring price of electricity and fuel cause surge in inflation and poverty ✓
- (f) Excess usage of single source of energy cause resource depletion ✓
- 5) Solution for balancing energy mix ✓
- (a) Harness the potential of CPEC for establishing renewable energy power plant ✓
- (b) Encourage public private partnership for establishing renewable energy power plant ✓
- (c) Improve energy efficiency ✓
- (d) Incentivize green technology- ✓

6) Conclusion

It was August 29, 2023. A very sad news was being aired on almost all news channels that a mother of four children committed suicide in Kharewal because of high price of electricity bill of 10,000. This news reveals the imbalance in energy mix of Pakistan. It is so disrupted that people are taking their lives due to soaring price of electricity. The energy mix of Pakistan is unbalanced due to many factors like excessive reliance on imported oil for power production, unwise utilization of depleting natural gas reserve, relying on imported coal without exploring indigenous coal and non-utilization of hydropower resource to full extent. It also includes under-utilization of wind energy corridors, meagre share of solar energy in energy mix and smaller share of nuclear power in energy mix. This imbalance brings myriad of problems for Pakistan. This includes production of costly energy, closure of industrial units, diminution of foreign reserves and prevalence of social restlessness due to high cost of electricity. Furthermore, it includes rise in inflation and poverty and depletion of resources. There is a need to take steps for balancing energy mix in Pakistan. These steps include harnessing the potential of CPEC and encourage public private partnership for establishing renewable energy power plant. Moreover, it comprises of improving energy efficiency and incentivizing green technology. In a nutshell, Pakistan is grappling with energy crisis due to imbalance of energy mix. Energy mix is dominated by fossil fuel with little area covered

by renewable energy resources. This has grave on economic and social life in Pakistan. Therefore, concerted efforts are needed for balancing the energy mix.

Pakistan witnessed history of imbalance of energy mix. However, throughout the history, fossil fuel contribute to great share in energy mix. Pakistan reliance on oil reached 43.2% in 1998 and 2001. This showed decline over period and reached to 31.2% in 2018. Pakistan's energy mix contribute to about 30.4% in 2006. This contribution is highest of entire history. However, it reduced to 34.6% in 2018. In terms of hydro power, Pakistan's reliance was 13.1% in 1998 but diminished to 7.7% in 2018. Coming to coal, Pakistan's dependence on coal remained in single digit for two decades. Nonetheless, it reached to record high value of 12.7% in 2018. The share of nuclear was surged from 0.2% in 1997 to 2.7% in 2018. The total share of renewables was 0.3% in 2015 but augmented to 1.1% in 2018. Therefore, the history of Pakistan reveals that the trajectory of Pakistan's dependence on renewables and clean energy sources is growing at snail's pace.

One of the most grave imbalance in energy mix of Pakistan is its ~~over~~ over-reliance on crude oil for production of electricity. Pakistan largely imports this crude oil for producing electricity. Pakistan's economy suffers due to the import of crude oil because of hike in global price of crude oil due to different factors. Power production through crude oil contribute to lion's

share in energy mix - Around 38% of power is produced using oil (Energy Crisis in Pakistan: Socio-Economic Implications and Way Forward, Farooq Akshad). This results in excessive loadshedding due to shortfall of production. In addition, this also cause surge in circular debt. Therefore, Pakistan's energy mix consist of energy production from imported oil which disrupts the balance.

Unwise usage of depleting reserves of natural gas results in energy crisis for Pakistan. God has bestowed Pakistan with wells of natural gas. However, the inefficient usage of this resources is causing extinction of this resource. Pakistani government has started giving price to two which use most of natural gas. These groups are household consumer which utilize 50% of total gas consumption and fertilizer industry that contribute about 12% of total utilization. Some flawed policy of government has also contribute to depletion of reserves. In 2006, when global oil prices surged government reduced the gas price for promoting only industry. This policy enhanced the rate of depletion. Therefore, uncautious use of natural gas is leading to the depletion of resource.

Although, Pakistan has abundance of coal reserves but it still relies on imported coal. The Thar and Thal deserts of Pakistan are replete with coal. These coal have potential to fulfill Pakistan's energy need but only a portion of these reserved is explored. Total electricity generation from coal is around 5280 MW. Thar coal is contributing 1320 MW, while imported coal contribution to electricity generation is about 75% of

Total electricity produced from Coal (Energy Chapt-
er, Economy Survey 2021-2022). This imported
Coal further cause in electricity tariff - Hence,
Pakistan's reliance on imported coal without expl-
oring indigenous coal is a flaw in energy mix-
Pakistan is not utilizing hydropower resour-
ces to its full potential - Pakistan is the country
that has large number of river, lakes and other
water reserves - These water bodies can be used to
produce hydro power which is clean and efficient.
However, Pakistan is failed to take advantage of
this energy resource - Pakistan produces small
amount of electricity through hydropower as compare
to other sources - According to economic survey 2022-
2023, Pakistan produces only 25.8% of its power
through hydel energy - Although, it has great capa-
city but goes unuse - Pakistan uses only 14% of
its total hydropower capacity (IAEA, Pakistan's
Nuclear Profile). Therefore, Pakistan is inefficient
in using its hydro power source to full capacity -

The energy mix of Pakistan has shown
a meager share of solar power - Pakistan is the
country that has moderate winter and summer
temperature - This country receives sunlight through-
out the year - Almost every part of the country receives
sunlight - However, this source of power generation remains
unutilized - According to statista, power generation
through solar energy makes up only 0.94% of energy
mix - This source of energy has potential to substitute
the energy demand of the country - According to
World Bank, utilizing just 0.071% of country's
area for solar photovoltaic power generation should

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meet Pakistan's current electricity demand - Hence, solar energy source for power generation is not utilized. Wind energy corridors of Pakistan remain under-utilized. Wind energy is very cheap source of energy - It also has least environmental repercussions. Pakistan is one of those country that has 4046 km long coastal line. This coastal line is excellent site for establishing wind energy plant. However, Pakistan is incompetent in utilizing this free source of energy. This source of energy share only 4.5% of energy mix. Although, the capacity is far higher than this value. According to Economic Survey 2021-2022, wind power can generate 50,000 MW of electricity but currently it is producing 1985 MW. Hence, wind energy corridors are under-utilized in Pakistan.

Nuclear energy share in energy mix is also negligible. Nuclear energy is very efficient and powerful energy source. Large portions of world is shifting towards nuclear energy because of environmental concerns of using fossil fuels. Pakistan has abundance of nuclear reserves in KPK. Although Pakistan has established nuclear power reactor with collaboration of China and other countries. The contribution of these reactor in energy mix is very small. Pakistan produces around 11.5 TWh of energy through nuclear energy source (Pakistan Energy Country Profile, Hannah Ritchie, Our World in Data). Therefore nuclear energy contribute negligibly to energy mix.

This imbalance of energy mix has caused lots of problem for Pakistan. Pakistan produces expensive

electricity because of its reliance on imported fossil fuels. Large portion of Pakistan's energy is produced through imported oil. As the price of global oil increases, the price of electricity also surges. Recently, Russo-Ukraine war cause surge in global price of oil. Pakistan has to import expensive LNG for satisfying energy demands. Moreover, the rupee is devaluating against dollar. Due to this, Pakistan has to produce expensive electricity by paying more rupee for buying same quantity of fossil fuels. Thus, this imbalance compels Pakistan to produce expensive electricity.

The imbalance of energy mix can lead to closure of industrial units. As Pakistan's energy mix consist mainly of energy production from oil. Higher prices of oil cause surge in electricity tariffs. Moreover, it also consist of depleting reserves. Therefore, for saving reserves, the intensity of loadshedding also increases. All the aforementioned points affect industries due to less profit generation and malfunctioning of machines due to excessive loadshedding. According to report by PIDE, majority of industrial unit have no plan to expand in future due to excessive electricity which hinders production and operational efficiency. Therefore, this imbalance in energy mix can shut-down industries.

It also lead to diminution of foreign reserves. Pakistan's economy already has low amount of foreign reserves. The import of oil for production of energy will deplete the foreign reserve. Import of petroleum product valuing about \$2 billion, which constitute 26% of total import bill, is the main

contributor to massive trade deficit (Indigenous Crude Oil, Engr. Hussain Ahmed). Moreover, high cost of electricity can lead to closure of industry. This result in decrease in export and surge in import. This further effect economy by causing shortage of foreign reserves. Therefore, imbalance of energy mix can bring storm of economic problem.

One of ~~most~~ worse consequences of imbalance of energy mix is the prevalence of social restlessness due to high cost of energy. Pakistan is poor country. Many people live ~~po~~ hand to mouth. Sudden increase in electricity bill passed the wave of shock among masses. Many people committed suicide because of sky-rocketing bills of electricity. An old man jumped off a bridge in Islamabad and a young man shot himself in Faisalabad. Many ~~industrial~~ industry's owners stage protest against government for ~~not~~ approving surge in electricity bill. People started tearing and burning their bills in fit of fury. All these destroy the peaceful environment. Therefore, the imbalance of energy mix has potential to mar the peace of the country.

It also cause surge in inflation and poverty. Pakistan is already grappling with these issue. The price of many ~~eat~~ edible item depend upon the price of fuel. As the price of fuel increases, the price of edible item also increases. This in turn cause inflation. According to bureau of statistics, the annual inflation rate in Pakistan has accelerated to 29.2% in November 2023. As the inflation increases, it pushes many Pakistani below the ~~poor~~ poverty line. People become unable to make the Gracy

both ends meet- According to World Bank, 40% of Pakistanis are living below the poverty line. Therefore, this imbalance can increase the ~~the~~ intricacies of Pakistanis by causing surge in inflation and poverty.

The imbalance of energy mix can also result in depletion of resources. Excessive use of resources can result into depletion- The resources which have to be used longer started depleting earlier. Pakistan energy mix mainly consist of oil and natural gas. These two sources are major sources of electricity production. This result into extinction of these resources- According to EPRC's policy report, the original recoverable reserves of 63, 311 billion cubic feet has been declined to 20, 951 Bcf. According to DGDCU, these reserves will be ~~exhausted~~ exhausted by 2025. Therefore, relying solely on one or two reserves for production of energy can result in a depletion of resources.

There is a dire need to take steps for balancing the energy mix. One of the step is to harness the potential of CPEC for establishing renewable energy power plant. Pakistan has to increase the share of renewable energy in its energy mix for solving many problems. ~~Many~~ Pakistan has to utilize CPEC for this. Divert the focus of CPEC for producing energy through renewable sources from production through coal. Provide security to Chinese official for preventing any delay in CPEC project. ~~Remove~~ ^{Remove} hurdles in the way of CPEC. All the hurdles in the way of CPEC from Pakistan's side should be removed. Pakistan's

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Frailing economy is the main hurdle. Pakistan should strengthen its economy through recent standby agreement with IMF. Hence, CPEC has the potential to balance the energy mix by enhancing energy production through renewables.

Public Private Partnership needs to be encouraged. Pakistan's government is short of money. It is difficult for government to buy latest machinery for exploring resources or to establish plant for harnessing renewable energy. Public Private Partnership is best solution of this. Private investors need to be ensured that their invest is safe and government is responsible of it. They should be give hefty profits. Procedural measures need to be eased. Red tapism should be removed. All the dealings should be made transparent. Apply BOT model for encouraging investors. Therefore, if this step is enacted sincerely then many of Pakistan's problem will be solved.

Another solution is to increase energy efficiency. Many of Pakistan's energy related problem are due to inefficient energy supply and use. Pakistan has to born huge losses due to this line losses should be minimized. Get the energy audit done for detecting line losses. Power theft should not be tolerated. Everyone should be encouraged to buy energy efficient appliances. Energy star rating should be checked before buying any equipment. Awareness should be raised to not waste the electricity. All these ~~any~~ action would lower the energy demand which ultimately leads to its stabilization. Hence, ~~an~~ improving energy efficiency can bring balance to energy mix. Gracy

Incentivizing green technology can balance the energy mix. There are various methods for incentivizing green technology. All the industries which make transition to green technology should be given tax relaxation for some period of time. The tax on the input of machinery used for green technology should be lowered. Many households sell solar electricity to government which they produced from solar panels. Government should purchase at suitable rates. Organize competitions and challenges to encourage innovation in green technology. Give prize and recognition to all those who comes with innovative ideas. Therefore incentivizing green technology is a potential step for stabilizing energy mix.

In a nutshell, Pakistan has been facing imbalance of energy mix. There are many factors that caused this imbalance like production of electricity through imported oil, depleting natural gas reserves, under-utilization of solar and wind energy and many other. This has negatively affected Pakistan by bring energy and economic crisis, closure of industrial unit and hike in inflation and poverty. However, all the proposed solutions have potential to stabilize the energy mix. The required thing is that these steps must be implemented sincerely. God has bestowed Pakistan with myriad of energy resources. Therefore, Pakistan has capacity to overcome this energy crisis. The real problem ~~was~~ ^{were} when Pakistan does not have these resources and depend upon other for fulfilling energy needs.

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