

CSS-2021  
Q5

Discuss - The significance of renewable energy resources for Pakistan

## INTRODUCTION

— 1 — Pakistan since the late and early 90's has been facing an energy crisis. This crisis is exacerbated by the over-growing population and cities centers. Today more people live in cities than they did in the 90's. Similarly, a rise in wealth / per-capita income lead to many people shifting from the villages to the cities. With the shift from rural areas to urban centers the cities resources got strained and most of all the supply network of crucial utilities got strained. Electricity supply was already low and now became more strained. Fast forward to today, cities in most parts experience 10-12 hrs of outages, while villages experience 12-16 hrs. Pakistan has a lot of potential of electricity generation through renewable sources. Till 1998, Pakistan's major share of electricity was being produced by Hydel energy. Today close to 30% is being produced by hydel energy (World Bank). Pakistan lies in the best regions for hydel generation; solar energy production; wind and other sources of energy production.

## RENEWABLE Vs. NON-RENEWABLE Energy Sources

→ These are the sources of energy that can be used again and again without the fear

→ these are those sources which are limited in nature and once used cannot be

of it being depleted  
→ Prominent Examples  
are Wind, hydel, tidal,  
Solar, nuclear etc.

replenished.

→ Prominent Examples are  
Oil, Coal, Natural Gas  
and etc.

## SIGNIFICANCE OF RENEWABLE ENERGY SOURCES FOR PAKISTAN

### Current Energy Scenario

Pakistan's current generation according to  
the Economic Survey is given below:

Thermal	48.57%
Hydel	28.11%
Nuclear	18.65%
Renewable/others (Wind, Solar, Biogas and others)	4.66%
	100%

Total Generation Capacity = 4,517 MW

(Economic Survey)  
of Pakistan  
2023-24

However, all of this is not providing any benefit to  
downstream consumer. Due to constraints in the transmission  
and distribution system, pilferage in the network  
and so on.

# TYPES OF RENEWABLE ENERGY SOURCES CURRENTLY OPERATIONAL AND UNDER CONSTRUCTION:

## Hydel Energy:

Pakistan has a lot of hydel energy potential. The topography of Pakistan suits hydel energy corridors. Pakistan's hydel power projects are mainly fed by the Indus and Jehlum River. The two biggest operational dams in Pakistan are the Mangla and Taubela ~~each~~ with a capacity of <sup>combined</sup> over a ~~2000~~<sup>5000</sup> MW. Moreover small scale run-of-the-river projects are being constructed in the upper northern areas of the country. The most prominent of which are enlisted below

- Suki-Kinari Hydro Power Project (HPP)      ~ 900 MW
- Kailot HPP      ~ 770 MW
- Kohala HPP      ~ 1100 MW
- Diamer-Basha HPP      ~ 4500 MW
- and other small dams

## SOLAR ENERGY

Pakistan is at the best solar angle for solar energy production. With an average of 300 days a year are sunny. These conditions make it perfect for solar energy production. Prominent projects are the 1000 MW Quaid-e-Azam Solar Park, Bhawalpur and another 2000 MW Solar Park. Energy projects have been approved by the government. Moreover, according to the National Solar Energy Policy, the government aims to generate 10,000 MW of solar energy. According to NEPRA, 6000 MW of solar panels have been imported till last May-24.

## c) Wind Energy

Nature has blessed Pakistan with sufficient natural resource. One of which is a wind corridors and using that corridor to harness energy. Pakistan has currently developed 1 wind corridor - Jhimpir wind corridor. Projects are being run on public-private and completely private basis. The minimum amount of <sup>installed capacity</sup> (production) of a single project is 50-100mw. The total production of the wind corridor is about 2000mw according to the Economic Survey. Some prominent projects are

- a) UEP wind power project - 150mw
- b) Metro/Master wind project - 50mw
- c) NASDA wind project - 50mw

## SIGNIFICANCE OF RENEWABLE ENERGY FOR PAKISTAN

### a) Economic/Monetary Relief From Buying Imported Fossil Fuels

Apart from those running on local fossil fuels, Pakistan imported Residual Fuel Oil (RFO) that was used to run fossil fuels plant. Moreover, coal is also imported to run power plants. These inputs put a burden on the national exchequer.

### b) Energy Independence and Security

Through renewables energy project, Pakistan can guarantee its energy security and independence with respect to

energy volatility. As the war in Ukraine has shown that dependence of a country on another for energy can lead to severe problems, if relations turn sour.

## b) Mitigating Climate Change and Environmental Impact

Pakistan is considered the 5<sup>th</sup> most at-risk country of climate change. By lowering <sup>the country's</sup> carbon footprint, we can ensure that the effects of climate change are managed and mitigated. Moreover, these projects will lead to decarbonization of the country's energy supply and will add to the carbon credit kept with the IMF/WB.

## d) Job Creation

In a country where unemployment is in double digits, these projects provide an opportunity for people to get employed. On any one of these projects, thousands are employed and earning their bread and butter through them.

## e) Aspects of Energy Trade

As the model of the CASA-1000 project, <sup>the country</sup> can trade energy with its neighbours. Energy deficient countries like Afghanistan can benefit from the excess capacity.

## b) Economic Benefits through greater capacity

Greater <sup>Renewable</sup> capacity means the total cost of electricity <sup>of</sup> <sup>can</sup> be cut down. Renewables have a virtually zero operations cost because their fuel is free (wind, solar, hydro) whereas, conventional fuels have higher running costs as the costs of the fuel <sup>also</sup> have to be factored in the calculation / tariff rate.

## g) Political Significance and mileage

Infrastructure projects are source of political mileage and capital in the country. They are major reason why governments wish to start and finish them in their terms. These projects provide significant mileage and capital to the governments.

## h) Societies and their uplift more possible:

Through better and localized sources of energy, far-flung communities can ensure their energy supply. Rooftop solar panels and mini-hydro power projects can help a community prosper. Many communities have adopted de-centralized energy system and are uplifting their communities.

## CHALLENGES / WAY FORWARD FOR PAKISTAN WHILE ADOPTING RENEWABLE ENERGY

### a) Lack of Financing on the Government's Ends

These projects require massive amounts of financing. Unfortunately, the governments of the day do not possess such financing. Even the Chinese have shied away from financing as the political turmoil has impacted the country's perception.

## Supply Constraints hamper inclusion of new projects

Pakistan has a peak consumption of close to 31000 MW that is reached on a single day. However, the supply constraints in the transmission and distribution network reduce the benefit of cheap and indigenous if it cannot be supplied throughout the country.

## c) Power Theft and Pilferage cause huge losses

This is a chronic issue as it has plagued the country's electricity network. Some people have used alternative means to bypass the meter and use electricity without paying for it. By doing so, it causes huge losses to the governments.

## d) Regulatory Frameworks and Market Norms are outdated

Pakistan runs on a single-buyer model. In order to reap the complete benefits of these projects, complete overhaul of the regulatory frameworks and market mechanisms are required to ensure competition and better dividends for the governments.

## CONCLUSIONS

In conclusion, Pakistan has a lot of potential when it comes to generating cheap and clean renewable electricity. Currently Pakistan plans to add above 10000 MW in the form of various renewable energy projects. By doing so, the country can secure its energy security/independence, make crucial gains from the electricity it sells and enable growth of the country by ensuring a continuous supply of clean and inexpensive electricity.