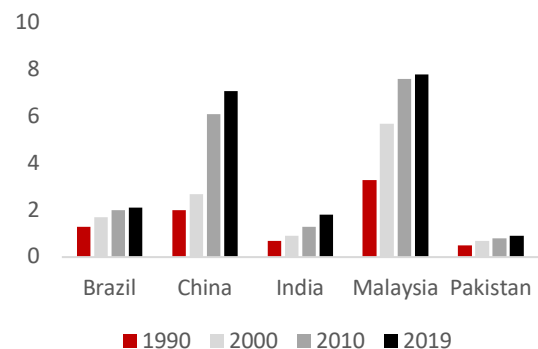
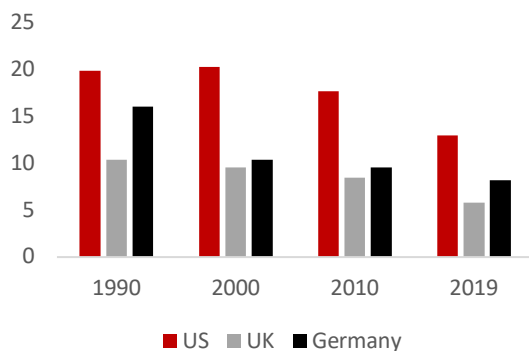


Where is Pakistan on Energy Transition? – Resources Future

As investors and companies seek opportunities to mitigate impact on climate and the environment, businesses are adapting a comprehensive "energy transition" — where reliance on conventional fossil-fuel powered energy production and consumption is mitigated through transition to renewable energy sources. Switching from nonrenewable energy sources like oil, natural gas, and coal to renewable energy such as wind solar and nuclear has been made possible by technological advancements and a societal push toward sustainability. Spurred by structural, permanent changes to energy supply, demand, and prices, the energy transition also aims to reduce energy-related greenhouse gas emissions through various forms of decarbonization, and ultimately ensure a safe future for everyone.

The transition of decarbonization is subjective; depending on the economic strength and ability to sustain and adapt to the renewable forms of energy. To capture energy transition, a small report has been drafted based on certain factors taken into account to illustrate the position of Pakistan viz a viz developing countries in the global economy¹.

1. The developed countries are witnessing declining CO₂ emissions per capita, primarily due to rising material and resource efficiencies.
2. But it still portrays a rising trend in the developing countries, including resource heavy economies such as China, India and Brazil



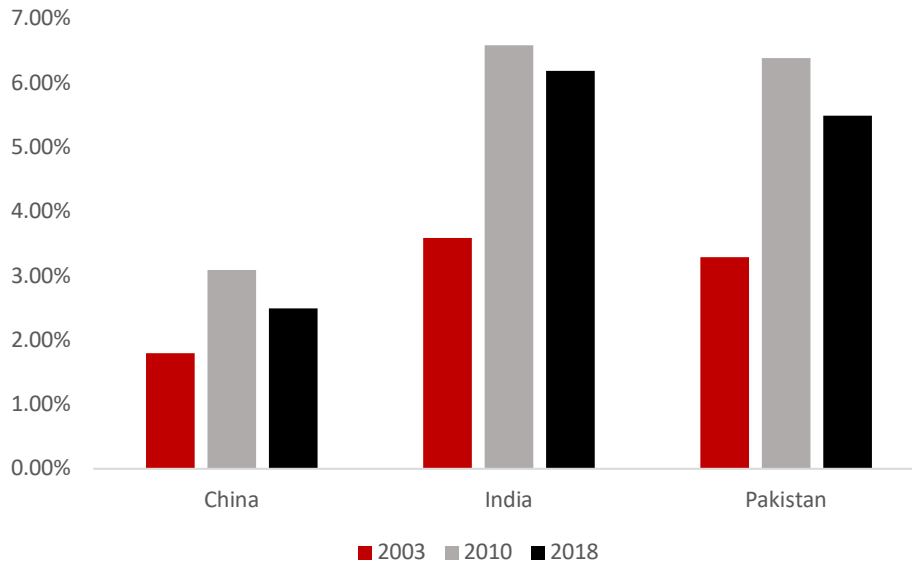
3. In developing countries, the need for sustained economic growth can be seen by an increasing oil consumption per capita, starting from 1990s. Though the trend is more visible in China and India, Pakistan has lagged behind with a sluggish economic growth rate and higher population.

Oil Consumption per person per annum	1990	2000	2010	2019
Brazil	0.003	0.0038	0.0042	0.0041
China	0.0007	0.0014	0.0026	0.0037
India	0.0005	0.0008	0.001	0.0014
Malaysia	0.005	0.008	0.009	0.01
Pakistan	0.0007	0.00095	0.00084	0.00077

¹ All data source from BP Energy Statistics 2019

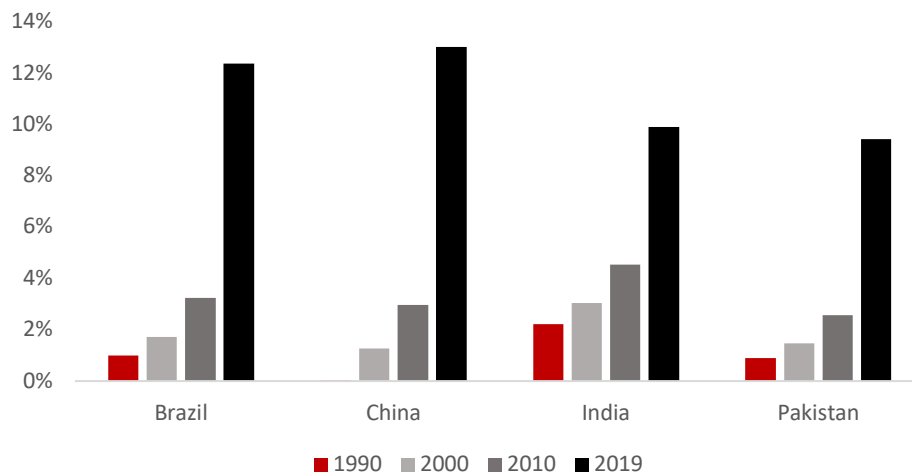
4. Nonetheless, there is a need for sustained energy transition to a more renewable energy future as oil imports as a percentage to total GDP continues to be higher. In Pakistan’s case, this also implies higher FX outflow leading to higher fiscal and trade deficits and creating economic imbalances.

Oil imports as percentage of GDP



5. The bright spot in the energy transition story is the percentage of total electricity that is produced from low carbon sources that has increased in developing countries over the last decade. The low carbon sources taken into account for this analysis include nuclear, solar and wind. Pakistan has shown growth from the previous years and will continue to tread on an ambitious target of 20% renewable electricity by 2025 and 30% by 2030, as announced by the Government under the new ARE Policy.

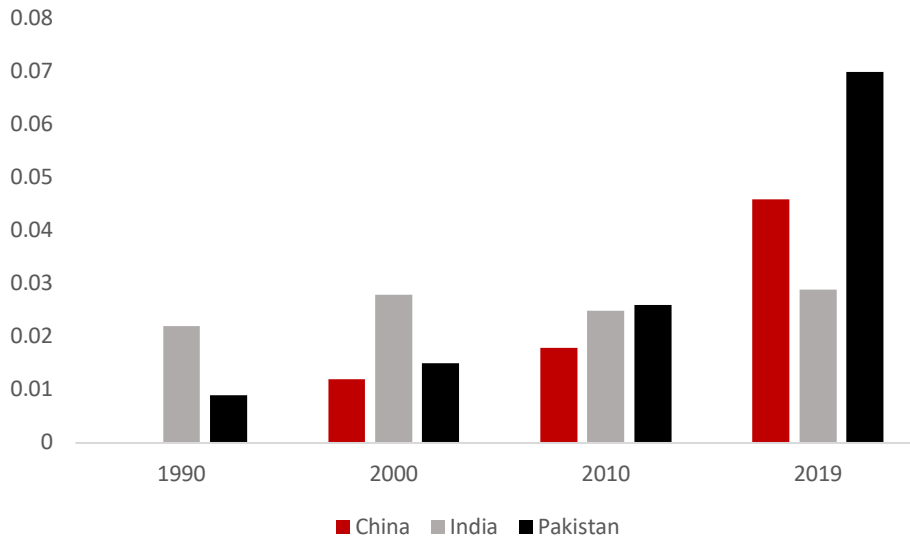
Percentage of electricity generation from low carbon sources





6. Overall, the energy transition process has begun, albeit slowly. For instance, there is an increase in generation of nuclear power as a percentage of total electricity in the developing countries is shown in the figure below. Pakistan, although having a small amount of energy generation from nuclear is expected to improve as two new nuclear power plants, expected to come online in Karachi.

Share of nuclear power as a % of total electricity generation



7. Solar has experienced significant growth in the past decade in the following countries. Although Pakistan's share is minimum as of now, the potential for solar is massive owing to the geographic location of the country.

Solar	2010	2019
China	0.02%	2.98%
India	0.01%	2.97%
Malaysia	0.00%	0.46%
Pakistan	0.01%	0.85%

8. Similarly, generation from Wind power has started taking roots, with both China and India capitalizing heavily on wind energy transition. Pakistan is yet to capitalize on its wind resources though a vast resource is available in Jhimpir / Gharo belt.

Wind	2010	2019
China	1.17%	5.41%
India	2.08%	4.06%
Pakistan	-	3.50%

9. Besides electricity, transport offers another avenue for a sustainable energy transition. Overall, transition to transport are critical for energy transition as they are the second highest producer of Greenhouse Gases (GHG) and CO₂ emissions in the country.

Sectoral share in GHG emissions in Pakistan



■ Industry ■ Power ■ Transport ■ Agriculture ■ Recycling

Source: Electric Vehicles in Pakistan: Policy Recommendations – LUMS Energy Institute & U.S.-Pakistan Center for Advanced Studies in Energy (USPCAS-E)

The use of EVs can lead to high amount of reduction in the fumes generated from the Fossil Fuel Vehicles (FFVs) and help to mitigate the amount of GHG emissions as well as maintaining a moderate level of fine particulate matter (PM) in Pakistan's megacities. Moreover, EVs also project an emerging trend in the developing countries. For instance, China alone sold 1.1 million cars in 2019, rising from none in 2010. The US sold 0.02 million cars in 2011 and has transitioned to 0.33 million sales in 2019. Although Pakistan has insignificant number of EV presence, relaxation on duties and taxes on import of two and three wheelers will incentivize investors to change Electric Vehicles in the years to come.