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Towards a Green Economy in Pakistan: Perspectives for a Clean Energy Transition

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Executive Summary [Full Report Available at: https://bit.ly/3xhKZy0]

Energy plays a critical role in socio-economic development of a region. According to the United Nations-Sustainable Development Goal 7 (SDG 7), affordable, reliable, sustainable and modern energy for all should be ensured by 2030[1]. Achieving this target would require prompt measures in building energy infrastructure, mainly for renewable energy technologies.

Despite being currently able to generate electricity in a surplus that is estimated to increase to 15,000 MW by 2025[2], around 25% (50 million) of population in Pakistan still do not have access to electricity[3]. The power sector is marked with major inefficiencies, losses, and theft in distribution system. In recent years, Pakistan has observed some of the worst power blackouts due to poor transmission systems, lack of connectivity and poor reliability. Unlike most developed countries, Pakistan has a very limited fiscal space available, and the policies are generally driven by economic priorities. The circular debt of Pakistan has now risen above PKR 2.35 trillion[4] and is being contributed by surplus capacity payments. Consequently, between 2007 and 2020, the power crisis has cost Pakistan approximately $82 billion in loss GDP (Gross Domestic Product)[5].

Along with these multifaceted energy crises, the country is ranked among the top ten most affected and the most vulnerable countries to climate change from 2000 to 2019, according to the latest 'Long Term Climate Risk Index' report[6]. Historically, an overall share of Pakistan in global carbon emissions (CO2) has remained less than one percent. Pakistan intends to reduce its expected GHG emissions by up to 20% of (equivalent to 1603 MtCO2) by 2030, amounts to US$ 40B at 2016 prices and climate adaptation costs projected to be US$ 7–14B/annum (GoP 2016), while mitigation costs for Pakistan are ranging between US $8B and US $17B by 2050 (GoP and UNFCC 2011). The energy sector is the main contributor to GHG emissions (50%), followed by agriculture (39%), industrial processes (6%), and other activities (5%) (GoP 2010).

In the light of aforementioned challenges, Pakistan's recent policies and initiatives have strongly advocated the need for Pakistan to transition towards clean energy resources: i) Alternative Renewable Energy (ARE) policy[7] aiming to achieve 30% power through hydro and 30% share of renewables in the energy mix, ii) Electric vehicles policy targeting to achieve 30% share of Electric Vehicles (EVs) by 2030, iii) Paris agreement goals, and iv) the recent moratorium of coal by Prime minister in Climate summit[8], Pakistan is taking a leap towards a green energy future.

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[1] https://www.unep.org/explore-topics/sustainable-development-goals/why-do-sustainable-development-goalsmatter/goal-7

[2] Please See: Electric Vehicles in Pakistan, https://web.lums.edu.pk/~eig/pdf/evReport.pdf

[3] LEI, "Pakistan's Electricity Outlook 2020-25", Available at: https://lei.lums.edu.pk/index.php/pakistans-electricityoutlook-2020-25/

[4] https://www.dawn.com/news/1617589

[5] https://www.dawn.com/news/1606884

[6] https://germanwatch.org/sites/default/files/Global%20Climate%20Risk%20Index%202021_1.pdf

[7] Please See: AEDB, "Alternate and Renewable Energy Policy 2019", https://bit.ly/35EeVbw

[8] https://www.voanews.com/south-central-asia/pakistan-decides-against-new-coal-fired-power

This report attempts to provide a roadmap for the implementation of ARE 2019 policy, the national targets to be achieved, providing technological and policy measures to upscale the growth of clean energy transition in Pakistan. It aims to provide specific policy recommendations that may elicit a shift towards clean energy pathway, predominantly harnessing the huge untapped potential of renewable energy sources in Pakistan in a socially equitable, environmentally sustainable and economically viable way. The study generates evidence based on an extensive literature and desk review research on energy and power sector policies of Pakistan, current trends, international agreements, and socio-economic aspects of different energy sources. It employed qualitative approaches, drawing upon semi-structured interviews with key energy sector stakeholders and experts in policy formulation of the energy and power sector of Pakistan[9].

The report highlights several policy and financial barriers which could offset the benefits of present clean energy transition goals, are mainly driven by (i) lack of grid capacity and infrastructure (ii) data gaps in potential Renewable Energy (RE) sources (wind and solar), iii) lack of institutional coordination and bureaucratic delays in project approvals (Request for Proposals), (iv) lack of enabling conditions and regulations to encourage private sector investment and participation in distributed generation and promotion of public-private partnerships in off-grid supply solutions such as roof-top solar and mini-grids, v) financing.

The study identifies that transmission and distribution (T&D) losses are the primary reasons in escalating the circular debt of the country, posing a serious challenge to Pakistan's economy. The transmission network only allows 23000 MW-peak, with 3% losses and 10 GWh of generation cannot be evacuated due to system constraints[10]. These losses are mainly due to poor maintenance of outdated grid infrastructure, faulty meters, inaccurate billings, and limited recoveries of Distribution companies (DISCOs). Capacity payments are constantly increasing with a net total value of around PKR 900 billion in 2019-20 that is expected to reach PKR 1.5 trillion by 2023[11]. The current proposition of 60,000 MW capacity addition requires an annual investment of $8-9 billion, which manifests to around 2 percent of the overall investment capacity[12]. In the reliability of electricity supply, we are still ranked 99 out of 141 economies in the Global Competitiveness ranking of 2019[13].

The research identifies that the renewable sources of energy provide a much better economic alternative considering the constantly declining costs. The unsubsidized cost of wind has declined from $101-$169 per MWh in 2020 to just $26-$54 per MWh[14]. This indicates a drop of more than 300 percent. Similarly, the unsubsidized cost of solar PV has dropped from $323-$395 per MWh to $31-$42 per MWh in the same period. This indicates a much larger drop of around 940 percent.

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[9] Including extensive literature review of working papers, national energy statistics, academic journals, books, newspaper article, reports and electronic materials.

[10] Afia Maik, "Circular Debt-An Unfortunate Misnomer", 2020, https://bit.ly/3ql1B5d

[11] https://defence.pk/pdf/threads/pakitan-bankrupt-power-sector.703726/

[12] Analysis of Public Private Partnership Unit, Sindh

[13] Please See: The Global Competitiveness Report 2019, https://bit.ly/2UlFUpL

[14] Lazard, "Levelized Cost of Energy and Levelized Cost of Storage 2019", https://bit.ly/3xD5EMI

A report published by the World Bank, titled "Variable Renewable Energy Integration and Planning Study in Pakistan" suggests that the substantial potential of solar and wind generation in Pakistan could save about USD 2-6 billion by keeping its CO_2 emissions close to 50 Gt by maximally using its Renewable Energy (RE) potential, and by avoiding external costs of CO_2 emissions of planned coal-based power plants over the next twenty years[15]. In addition, the global employment in the renewable energy sector has increased to 11.5 million (2020) with an annual increase of around 4.5%[16]. Average employment factor (jobs per MW over life of facility) is highest for solar PV (6.96-11.01) as compared to other conventional sources. The evidence provide a clear picture of benefits of shifting to a resilient and low carbon economy in boosting prosperity of the country, being a net driver of job creation. However, the pace could be slow due to financial, technological, and social hurdles, and would be challenges in in fossil fuel reliant economies like Pakistan.

Furthermore, the analysis suggests that the Climate and energy policies of Pakistan emerge through a complex interplay of diverse roles of actors with specific objectives and means of implementing policies. Pakistan's recent focus on indigenous carries a major concentration on the development of coal and increased share in the main source of electricity generation. The power sector suffers from institutional and structural disconnections and fragmentation in the priority of issues, ignoring the holistic view and focus only on the power sector. For instance, the development of coal in has observed a two-dimensional debate among various stakeholders in Pakistan, where some admire its critical role to enhance energy security and economic advantages, while the others advocate the adverse impact this coal will have on future supply pathways and its potential of financing locking in the long term. As per the initial draft of proposed Indicative Generation Capacity Expansion Plan (IGCEP 2047), by 2047, the country is expecting to add 26,894 MW of power generation capacity only through the local coal[17]. This is around 27.7 percent of total capacity additions from 2030-47. With the current planning with only 12% share of renewables in the energy mix by 12%, the targets of ARE 2019 and international acclaims of climate commitments seem to be disregarded and limiting the potential investments of Wind and Solar, along with the credibility of the recent policies.

Lack of planning and policy mismatch between different departments requires a structured stakeholder involvement and the provinces must come up with power planning development studies for evidence-based policymaking and overcoming the barriers of renewable energy growth in the country.

An integrated Energy plan considering investments in generation, transmission and distribution, and energy efficiency should set up priorities for technology and scale of Renewable energy projects. This would help to ensure more sound and effective competitive bidding for these

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[15] World Bank. 2020. Variable Renewable Energy Integration and Planning Study. Pakistan Sustainable Energy Series. Washington, DC: World Bank.

[16] Please See: IRENA, Renewable Energy and Jobs: Annual Review 2020. https://bit.ly/3vGS0qw

[17] NTDC, Indicative Generation Capacity Expansion Plan 2047, https://nepra.org.pk/Draft/IGCEP2047%20along%20with%20Annexures.pdf

projects. It would assist policy makers at all levels, to evaluate costs of both demand and supply under a given set of economical, technological, and environmental constraints.

Wind turbines and solar electrification provides an economically feasible option for overcoming issues of scattered population using on-grid and off-grid solutions, paying greater attention to rural communities and production sectors. It provides significant prospects for improving energy access and electrification in scattered and rural communities.

The private sector, industries and business sectors represent the next frontiers in the transformation of the energy system and transition towards low carbon development solutions and decarbonization of the energy sector. Through public-private partnerships (PPPs), the government need to focus on encouraging private sector in renewable energy grids investments which would help the government in overcoming their financial constraints. Also, it is significant to streamline the net metering system introduced by the regulatory authority and develop a comprehensive distributed power generation plan. Also, the private sector should incorporate the full range of environmental, social and governance (ESG) dimensions of responsible investment, as an investment strategy to tackle the growing threat of climate change for an inclusive economic growth of the country. In addition, Carbon trading and green trade policy schemes will also enable the industrial sector to move towards green energy solutions and products.

The potential clean energy pathway would require a "Just" transition as an important principle, involving a process that equally contributes to job creation, social justice, and fair transition of workers, enterprises, and communities on equal footing. Experts suggest that these low-carbon energy transitions could be supported and accelerated by climate change policies in addition to their main intention of minimizing negative impacts and maximizing opportunities. Climate risk accounting, climate disclosure policies and mechanism, land use rights, relocation and reclamation policies, pollution laws and liabilities, can strengthen social dialogue mechanisms, tripartism, and building the capacity of institutions to enforce transitional laws and ensure proper communication. The resulting green jobs can set and promote standards and fundamental rights at work, create greater opportunities for women and men to decent employment and income, and enhance coverage and effectiveness of social protection.

The way forward for Pakistan will demand rapid transition towards decarbonization, decentralization and digitalization of energy production, supply and consumption. This must include: i) prioritized actions for renewables, such as least cost generation plan, RE trackers and zoning, developing mini and micro grids, ii) technology transfer programs and skill development through soliciting investments in local RE equipment's to reduce the costs, iii) creating jobs and employment, iv) efficient buildings and green infrastructures for responsible investments, v) Clean cooking solutions, and regional cooperation to be able to meet the National and international targets of Pakistan.

Full Report Available at: https://bit.ly/3xhKZy0