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LEVERAGING ENERGY TRANSITION AND SUSTAINABLE ENERGY

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Published by Center for Peace Security and Development Studies
D-127 Siddique lane,
KDA Scheme #1 Tipu Sultan Road, Karachi

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Abstract

While there is a growing momentum at the global level for the implementation of 2030 Agenda for Sustainable Development and its associated goals, significance of the seventh goals focused on “ensuring access to affordable, reliable and modern energy to all” is critical to recognize given energy’s centrality to security and development Security and sustainable development are both interlinked and reinforced by enhanced accessibility, affordability and sustainability of energy supplies. In case of Pakistan, China Pakistan Economic Cooperation (CPEC) has provided a temporary relief and solution to the most acute problem of the country i.e. energy shortage which had crippled almost all segments of the economy and society. CPEC has undoubtedly helped Pakistan improve the accessibility of energy, yet the affordability and sustainability remains unsolved in absence of fundamental much needed energy sector reforms. Based on identification of trends and factors influencing the accessibility, affordability and sustainability of energy, three key recommendations have been made herein: regional cooperation, inclusive and diversification of energy mix, and minimizing financial risks through improved regulation.

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Introduction

As rightly pointed out by Ban Ki-Moon, the former Secretary General of United Nation, “Energy is the golden thread that connects economic growth, social equity, and environmental sustainability.” It, indeed, has the potential to bring about public prosperity and welfare, social equity and national security, if managed well. However, pertaining to its interlinkages with the economy, people, industry and environment in the current interdependent and high-tech world, mismanagement of the energy sector can have phenomenal costs. Pakistan serves as a prime example of how lack of governance in the energy sector has led to recurring economic crisis, deindustrialization, and damage to export competitiveness. Getting energy right will have high economic payoffs.

Energy, Security and Sustainable Development – The Link

One important dimension of the current energy crisis in Pakistan, which signifies the pertinence and timeliness of developing an improved energy security policy, is its association with the Sustainable Development Goals (SDGs). Globally, there is a growing momentum to implement the 2030 Agenda for Sustainable Development critical for inclusive, sustainable and balanced development. However, this is unattainable without energy accessibility, affordability and sustainability. Hence SDG7 advocates “ensuring access to affordable, reliable and modern energy to all” to be an integral element of energy strategies and development plan[3].

Development and peace are mutually reinforcing, where both are interlinked to accessibility, affordability and sustainability of energy supplies, its balanced mix and low carbon content (see Figure 1). Quest for augmenting energy resources and supplies as one important factor behind recent inter and intra-state conflicts in the Middle East (Northern Iraq), Africa (South Sudan and the Niger Delta), parts of Central Asia and the Arctic. Similarly, disputes over water resources, given energy-water nexus compound energy insecurity, particularly impacting prospects for hydel potential. Adversities of climate caused by high rate of greenhouse gas emissions given strong demand for energy, particularly from the fast-growing Asia and inappropriate energy mix exploration and production have resulted in rising sea levels, extreme temperatures, and natural disasters, which ultimately breed social tensions and instability.

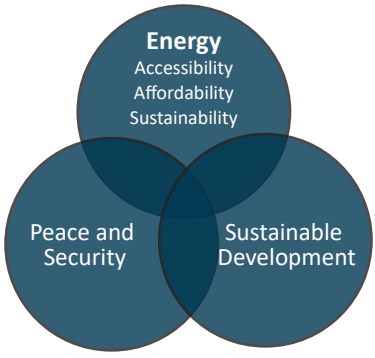

Figure 1: Relationship between Energy, Security and Sustainable Development

Energy security can be further threatened by domestic political instability. For instance, in the case of Pakistan, gas pipelines have been a major target for insurgency-driven activities in Baluchistan – home to large gas reserves. In Khyber Pakhtunkhwa (KPK), the largest power station in Mardan was blown up in 2015, tripping the power grid, and plunging a large part of the province in darkness. There have been similar other incidents in Punjab as well. These attacks are symbolic of efforts by insurgents to sabotage national security through destroying energy reserves.

Energy Crisis – A Diagnostic Overview:

The ongoing energy crisis in Pakistan is an outcome of myopic and lack of strategic forward planning and mismanagement by policymakers, operators, and regulators. Current energy composition and profile are made up of short-term fixes and solutions and there is a clear absence of any consistency and long-term regularity in our energy policy. Most disturbing trends in the Pakistan energy sector are:

1. 12% decline in the share of natural gas in the national energy mix. In 2011/2012 the share of natural gas was close to 50%, which is now down to 37.9% in 2016/2017.[4] Rather than exploiting and developing indigenous resources, Pakistan has increased its dependence on oil over the last decade, which now constitutes 34.4% of energy mix equivalent to one-fourth of country's import bill. It is important to understand that with no policy change the ratio of import petroleum products in the energy mix can further rise.

2. For long, there have been no major investments in developing hydel power generation plants, despite their reputation of being the most sustainable source of energy supply.

3. The share of alternate and renewable energy sources like solar and wind remains modest in the energy supply mix, lesser than 5% as per latest estimates. Pakistan has fortunately higher potential for generating renewable energy and hence exploiting this source would help support climate friendly energy mix.

4. Gas reserves have declined notably as country over relied on limited gas reserves that remained low in wake of lack of attention on discoveries through exploration. With no significant support from the government in the upstream oil sector, some E&P companies have exited Pakistan in recent years. While there is scope for petroleum exploration and development in the country, it is subject to the government involvement by building an incentive regime for fuel exploration industry.

5. To fill the supply-demand gap, the government few years back resorted to the importation of LNG but being a higher cost option it cannot provide a long-term solution to the problem of energy crisis.

These trends are reflective of the mismanagement of the energy sector in Pakistan. A major concern lies with the lack of integration in energy policymaking and implementation: there remain separate bodies for policy-making, planning, developing a legal and regulatory framework for each fuel mix. Furthermore, there is no appropriate analysis to judge the optimal long-term economic, social, and low carbon energy pathways or consequences of the current fuel mix. This lack of integrated perspective of fuel mix results in distortion of pricing regime for producers and end users as well as macroeconomic and social consequences. For instance, indigenous natural gas reserves' head prices are almost half the LNG landed price at the port. In addition, while there has been analytical work done on how to pace and sequence restructuring of gas sector, not much has yet been done by way of implementation of this plan. Even unbundling of the power sector is still an unfinished agenda, with distribution and transmission system financial losses being booked as off-budget liabilities and banks are forced to advance guaranteed loans to finance these obligations, thereby crowding out private intermediation. Rather than investing in new assets and technologies to arrest distribution and transmission technical losses, the government is relying on subsidies and off-budget liabilities to erode fiscal discipline.

Keeping these issues in the backdrop, while there is some improvement in energy accessibility due to support of CPEC and some domestic initiatives over the last five years, the issues related to affordability and sustainability of energy remained unsolved. Some important concerns about the energy affordability and sustainability include:

1. Cost of energy contracts which guarantee virtually all types of risks including political and macroeconomic risks, and technical losses;

2. Most new capacity additions are dependent on oil imports, which is subject to international oil price volatility, and under present cost-sharing arrangements, has fiscal consequences;

3. Coal-based generation, though cheaper than other options, has long-term

adverse consequences and is raising public concerns regarding why other alternative options such as exploration and development of natural gas as well as renewable energy were not pursued under CPEC[5] ; and

4. The financial burden of CPEC projects is turning out to be fiscally challenging to manage, given the fixed high returns awarded to power projects despite layers of guarantees offered by Pakistan including sovereign, *sino sure* and other commercial or financial guarantees.

Recommendations for Future Energy Security Strategy

1 *Regional Cooperation in the Energy Sector*

The future energy strategy for Pakistan will have to keep in perspective not only the domestic challenges but the future global energy scenario, and oil price volatility and unfolding pricing dynamics of fuel mix. There is need to factor in the strong energy appetite of Asia that already consumes about 25% of global oil, 45% of coal and 10% of gas. The region is expected to see a rise in its share in global GDP and energy to 52% and 48%, respectively by mid-century and its energy demand and supply dynamics is expected to change accordingly. The region may be energy deficit at present, but it has surplus belts of hydrocarbon reserves and great hydel as well as other renewable resource potentials. Hence, Asia's energy cooperation and connectivity will gain momentum and yield mutual benefits for energy deficit and surplus economies.

Instead of competing for resources, Asia will need to deploy approaches and modalities to promote efficient utilization of resources by opening avenues for trans-boundary energy collaboration and connectively and trade. Enhancements in power grid parity across geographical boundaries is critical to spur energy trade and would offer opportunities for promoting efficient and optimal regional energy demand and supply balance and effective utilization of energy resources. Regional smart grids support greater optimization of energy sources and flows, load balancing and most off all further the potential for use of renewable energy supplies otherwise facing technical difficulties of how to mainstream and integrate the variability of this energy source, which might otherwise be incompatible with more limited national or sub-regional grids. High-voltage transmission systems help improve the economic and technical range for interconnecting power grids which among others can help unlock access to remote energy resources. This is feasible if backed by framework for fair competition and distribution of energy through a mutually agreed regulatory body that one one hand lays out the

integration principles of renewable energy, and on the other hand offers cross border energy sharing mechanism with enhance common power grid.

However, the opportunities offered by regional energy connectivity for Pakistan within South Asia is limited but there remain opportunities for it to develop energy collaboration with the Central and South East Asia. Notably, CASA 1000 and TAPI with later involving transportation across to India made a beginning, yet it is important to remain realistic and it takes more than a decade to structure cross-border deals.

Pakistan has prospects for geopolitical alliances with West and Central Asian bloc. To enhance regional connectivity Pakistan needs focused bilateral and trilateral energy economic diplomacy to promote cross-border frameworks, legalities and norm and protocols with the right allies. On its part, India is pursuing Look East Policy within SAARC belt and is tapping hydel potential of Nepal and Bhutan and developing linkage with ASEAN energy markets. Work on SAARC Power Grid has run into political gridlock. Regional peace will help nurture integrated sub-regional interconnection agreements. It should promote electricity trading within a multilateral trading framework to nurture viable, cost-effective and sustainable power generation choices, and ensuring it is based on Levelized Cost of Energy (LCOE), taking into consideration the full lifetime cost of the power plant. Through the adoption of LCOE, renewable energy will have much better opportunities to be utilized in providing power to the regional grid.

Benefits of Regional Energy Cooperation
Promotes cross border energy sharing supporting win win solution among energy deficit-energy surplus economies and optimizing energy deployment and its competitive usage
Supports integrated energy development including renewable energy
Offers opportunities for establishing common markets based on pooling of load capacities
Provides solutions based on enhancement of cross-boundary grids through deeper infrastructure integration given advancements in transmission technology

2 *Improvements in the Energy Mix in accordance with SDG7*

To foster energy security Pakistan needs to pursue energy transition anchored on SDG7. It underscores adopting long-term, integrated energy strategy and holistic action plan to fundamentally alter country's energy mix based on least cost generation options and solutions. There are strong economic imperatives for Pakistan to reduce its dependence on imported fossil fuels by focusing on enhancing reliance on indigenous sources. This however requires fast-tracking exploration and production of gas and launching an ambitious renewable energy program including proceeding with feasible hydel options. World-wide advancement in renewable technologies is impressive and offers captive industry and off-grid solutions, among others, for the rural and far-flung area too. For solar and wind options, investments would be needed in integrated power grids with a potential to transact variable energy sources and development of market-driven regional pooling to ensure timely management of surpluses and deficits and trading of power on competitive pricing.

Pakistan should further pursue low carbon pathways supported by new industrial technologies that help reduce energy intensity and promote energy conservation and efficiency as curbing demand with rising population and urbanization has to be part of the solution. Enhancement of energy efficiency, among others, can be promoted through strict fuel economy standards for vehicles, greater reliance on public and switch to sustainable transportation, phasing out of fuel subsidies and incentivizing investment in alternative technologies. Most of all, reduced import dependence, through energy diversification, will strengthen economic resilience to price shocks and diversification of oil production.

3 *Minimizing Financial Risks through Improved Regulation*

Managing energy technology transition is critical as rapid changes can induce dislocations, repricing of fossil fuel assets and generate stranded assets and hence call for actions to allow markets and investors to adjust and minimize financial stability risks. A combination of measures is warranted to attract foreign investment for exploration and drilling including alignment of the incentive regime across fuel mix, streamlining business and regulatory burdens, building capacities across ministries and regulators and ensuring that divisions in the ministry of energy coordinate and work together. Equally critical is well calibrated, collective and streamlined efforts across federal,

provincial and local government and institutions levels with predefined renewable and energy conservation and efficiency targets.

Conclusion

To conclude, though Government has temporarily improved energy accessibility, the energy requirements would outpace availability in the near future. Energy Year Book 2017 estimates it to reach 131.8 MTOE by 2030 with oil demand reaching 29.9 MTOE, more than present national refining capacity, natural gas demand around 85.8 MTOE that would deplete known gas reserves of the country calling for exploration and development. Business as usual scenario, based on past diversity of energy-mix, is an expensive option with negative externalities and enhanced global warming and planetary consequences. Empirical work has proven that a "Green Pakistan Scenario" based on renewable technologies will be the least expensive, operationally conducive once power grids transformed and it externality costs minimum in the long run. Hence, exploitation of alternate and new resources holds the key to the future of energy security by supplementing supply, improving access through innovative off-grid and smart grid solutions and allowing an opportunity to transition to low carbon pathways.

Climate "denialists" and oil lobbyist continue to resist energy transition which will have consequences for global sustainability. Unwinding invested resources in wrong fuel mix will destabilize financial markets. Demand and supply requirements will continue to shift baselines under demographic and urbanization pressures and the undeniable nexus between energy, water and food crisis etc. We do need to exploit indigenous resources and tap least costs solutions. After years of wrangling, Pakistan has set in motion tradition for exploitation and development of coal but its tolerance would depend on technology mix adopted to reduce carbon emissions.

Notes

[1]. Ban Ki-Moon, Remarks at *Delivering Sustainable Energy for All: Opportunities at Rio+20* (Washington DC: Center for Global Development, 20 April 2012), UN Document No: SG/SM/14242-DEV/2941-EN/270

[2]. In my short term in the ministry of finance and other ministries, this particular subject did trouble me the most because there were so many complains from the private sector as well as public regarding the mismanagement of this sector

[3]. *The Sustainable Development Goal Report* (United Nations, 2018)

[4]. Hydrocarbon Development Institutes of Pakistan, *Pakistan Energy Yearbook 2017* (Islamabad: HDIP, 2018)

[5]. Not only we are not able to achieve a decent share of renewable energy in the national energy supply mix, the rate at which we are producing energy through renewable sources is much higher than its price in the world.

[6]. A few solar and wind power projects are exceptional cases and should not be counted as a mainstream strategic development

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