Regional Energy Trade – a Viable Approach to Tackle Energy Poverty in Pakistan

Policy Brief #109

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Abstract

This policy brief highlights the challenges faced by the energy sector of Pakistan due to limited cross-border collaboration in terms of energy security issues. It also explores as to how the regional cooperation can play a major role in addressing these challenges. Stressing the need for effective policy frameworks that support regional energy trade, it further highlights the low regional integration in South Asia as well as the multiple challenges of regional cooperation ranging from political disagreements and instability to limited cross-border infrastructure for energy cooperation amongst certain member states. Moreover, it discusses the importance of the creation of necessary legal framework, the allocation of financial resources, and the development of infrastructure to enable regional energy trade. Driven by qualitative analysis of stakeholder consultations and secondary data analysis, it emphasizes the need for i) improving energy integration in South Asia, ii) diversifying energy supply chain, and iii) mobilizing green finance across the region through increased role of entities such as SAARC. Keeping in view the ongoing regional turmoil, there is a need to establish negotiation platforms and formulate guidelines in order to facilitate dialogues between public and private sector participants. This policy brief suggests that Pakistan and regional nations must establish a framework that encourages frequent exchange of knowledge and research between professionals and experts.

Keywords: Energy poverty, Energy trade, Energy cooperation, Renewable energy
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1. INTRODUCTION

Energy security and economic development of a country are in a direct index. With an increase in population, rapid urbanization, and industrial growth, the global electricity demand increased from 13,195 TWh in 2020 to over 24,000 TWh in 2022. Given this strong relation, the unavailability or unaffordability of energy to a population not only hinders its growth and development but also affects its social welfare (Modi et al. 2005). This, in turn, is apparent from the current regional turmoil caused due to the convergence of a multi-faceted crisis, including COVID-19, Russian invasion of Ukraine, climate change impact, and other supply chain disruptions.

The convergence of these crises compelled many countries to stay away from achieving their 2030 energy goal. As of 2021, around 675 million individuals had lacked access to electricity (International Renewable Energy Agency [IRENA] 2023). While the impacts are faced by most countries, the amplitude is far more severe for under-developed and developing economies such as Pakistan.

Pakistan's GDP growth deceleration and increase in energy-related expenditures has had a cascading effect with the average household now dedicating around 20% more of its income to energy products compared to the preceding year. Consequently, Pakistan witnessed a surge in inflation, reaching 27.2% on a year-on-year basis in August 2022, and maintaining a high of 24% through September 2022 (Trading Economics 2023). Energy and food prices jointly contribute to 35-45% of this overall inflation (Noor, 2023). Now, low carbon development in the energy sector is both an economic and environmental imperative. Aligned with the Sustainable Development Goals (SDGs), sustainable energy takes center stage in addressing climate change, particularly emphasized in SDG-7, which targets affordable, clean, and sustainable energy for all by 2030. However, Pakistan's pursuit of SDG-7 has been significantly hindered by economic, social, and political challenges. Despite ample potential in renewable energy sources, the combined contribution of wind, biomass, and solar remains below 7% in the overall electricity generation. Addressing both challenges require a holistic approach that caters for both economic and environmental needs.

In the backdrop of challenges highlighted above, it is an opportune time for Pakistan to expedite its energy sector development in a sustainable manner through regional cooperation. South Asia, having great potential in renewable energy sources, could achieve improvements in the energy sector through such cooperation. This includes the creation of inter-regional infrastructure and the recommendation of knowledge and experience exchange regional forums within the region. Moreover, regional cooperation,
on the one hand, can assist states to lower the expenses of energy reserves and reduce the effects of energy price unpredictability, but on the other can improve their national energy security (Rahman et al. 2011).

1.1. Objectives

In the backdrop of opportunities and challenges highlighted above, this policy brief aim to address the following key objectives:

• To examine the status quo of energy access in Pakistan (both electricity and clean cooking fuel) and propose strategies to increase energy access, affordability, and reliability in impoverished regions of Pakistan through regional collaboration.
• To identify the major challenges hindering energy sector development through regional cooperation in South Asia.
• To suggest potential paths for Pakistan to address energy poverty by fostering regional collaboration.

2. METHODOLOGY

A mixed method approach based on desk review has been adopted. The main documents reviewed in this connection include Pakistan’s Energy Sector Overview, past and ongoing regional projects around energy sector, and success stories of effective energy cooperation among the South Asian countries. Furthermore, the brief also derives some recommendations from the dialogues titled: “Energy Security in South Asia and Transition to Sustainable Sources” and “Supporting Energy Security in Pakistan and Transition to Sustainable Sources through Regional Cooperation”.
3. DISCUSSION & ANALYSIS

3.1 Pakistan’s Energy Poverty in Regional Collaboration Context

Energy poverty refers to “the lack of access to sustainable modern energy services and products” (World Economic Forum 2010). An individual is regarded as energy poor if he or she lacks access to: i) approximately 35 kg per capita per year of LPG for cooking from gas or liquid fuels or from clean and efficient cooking stoves, and ii) 120KWh of electricity per capita per year for lighting and access to basic services (Falak et al. 2014).

3.1.1. Energy Access

Pakistan, like other developing countries, has been struck by energy poverty. Lack of access to energy and its shortage have embroiled the country and as a result, it has been experiencing a major crisis in recent times. An estimated 50 million people in Pakistan are deprived of their right to access to a reliable and consistent form of electricity (Energy Sector Management Assistance Program [ESMAP] 2021). Around 94% of the population does have any form of electricity source (either off-grid or solar stand along systems), these sources are outdated and are rarely used for productive purposes. Rural areas mainly face a larger portion of this deficit, thus leading to energy poverty. In the context of electricity availability in rural areas, Pakistan ranks 40 out of 88 countries (Siddiqui 2021). On the overall access, Pakistan is left behind the countries like Bangladesh and Afghanistan, as its place is at the 149th out of 196 countries (ibid). Just like in other countries, Pakistan’s urban communities have more access to electricity as compared to the rural communities. Figure 1. shows the percentage of urban and rural electricity access (left) and clean cooking fuels (right) to parts of Pakistan.

![Figure 1: Access to Electricity and Access to Clean Cooking Fuel.](Source: Cheema, 2021)
cooking, as commercial and modern energy sources are not readily available to them (Bhutto et al. 2011). In rural areas, households rely on 83% of traditional biomass and animal waste for cooking and heating purposes to meet their off-grid requirements (Energy Information Administration 2011). Most households in the Punjab, Sindh, and Khyber Pakhtunkhwa (KP) use natural gas as their primary cooking fuel. When it comes to households using wood as a cooking fuel, it is the top choice in Balochistan and the regions of Gilgit-Baltistan (G-B), Azad Jammu and Kashmir (AJK), and newly merged districts (formerly known as FATA). Wood is the second most used fuel for cooking in the Punjab, Sindh, and KP provinces (Ahmad et al. 2023). Figure 1 also shows the source of cooking fuel in different parts of Pakistan.

A large portion of Pakistan’s rural areas are not connected to the national grid, especially Balochistan and Northern Areas. Given the increasing needs, the Hindu Kush-Himalayan (HKH) region meets its energy demand by generating electricity through off-grid RE methods like Mini/Micro hydropower plants, mainly located in KP, AJK, and G-B. Some places in Balochistan with a high potential for solar energy have rooftop solar systems. Rural areas of the Punjab are also known for having high solar energy potential and have solar PVs installed in remote regions. Though various initiatives have been taken by both public and private sector organizations, there are various challenges driven by inefficient systems, financial constraints, and limited capacity of the community organizations or locals to operate such solutions. Consequently, these off-grid systems have not yet seen any positive developments.

3.1.2. Underlying challenges and determinants for off-Tracked SDG 7

The major underlying challenges that are limiting Pakistan’s progress towards SDG 7 are indicated in Figure 2.

Figure 2: Underlying Challenges for off-Tracked SDG 7
Pakistan’s energy relies heavily on imported fossil fuels for thermal electricity. According to a report of Central Asia Regional Economic Cooperation (CAREC) Program, ‘Energy Outlook 2030’, Pakistan imports around 40% of its entire primary energy supply. However, this approach is not sustainable given the environmental impacts and long-term economic instability. Pakistan’s $128.1 billion foreign debts along with mismanagement of indigenous resources also contributes to the problem. The country experiences heavy T&D losses and ranks 14th out of 131 nations in 2019 with an exceptionally high rate of T&D losses in energy. During 2021–2022, T&D losses in Pakistan, measured by DISCOs, and KESC were 17.13% and 15.35 respectively (National Electric Power Regulatory Authority [NEPRA] 2022). These factors, along with others, are putting a strain on overall electricity generation, making it unaffordable for potential consumers besides a significant shortfall (Tao et al. 2022). Furthermore, the country faces challenges regarding comprehensive energy planning and lack of institutional support and effective policies for off-grid renewable energy solutions. Additionally, there is a dearth of research and feasibility studies, which results in investors being provided with delayed information. Inadequate funding also poses a significant problem. However, while the nature of these challenges and potential opportunities have been highlighted at various platforms, there has been a limited debate on how regional cooperation can address energy poverty in Pakistan, and at the same time enable a shift towards clean energy sources to address climate action.

3.1.3. Regional Energy Cooperation in South Asia and Pakistan’s Stake

A broader overview of literature indicates that cross-border energy integration requires work around four enabling interventions as highlighted in Figure 3. Through these four principles, South Asian countries have initiated some programmes for regional cooperation such as:

• SAARC framework on cooperation
• Free trade areas, and
• Bilateral cross-border electricity trades.

However, lack of engagement persists in the region. The inter-regional trade share of South Asia is only 5.6%, which is the lowest across the world. However, an overview of the energy sources, demographics, and current consumption patterns indicate a substantially large potential, especially to enable energy access and renewable energy transition. Some of the key opportunities are also highlighted in
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Figure 4. While some of the countries have harnessed a portion of this potential, Pakistan has been on the backburner. Other than a few programmes with limitations of its own such as CASA-1000 and TAPI, no success has been achieved so far. There are multiple obstacles in the way of regional collaboration such as political disagreements, instability, lack of trust, national laws and regulations surrounding cross-border energy trade, variances in taxation systems, and limited cross-border infrastructure amongst certain member nations to facilitate energy cooperation. The primary obstacle is the lack of network connectivity and infrastructure, which makes commerce possible only when there is an exportable excess over domestic need. Improving demand management and technological advancements are necessary to increase exportable electricity, but these efforts are hampered by a lack of domestic manufacturing capacity for renewable energy components. Trade is further impeded by political issues such as disagreements over projects established by other nations and sovereignty issues pertaining to natural resources.

Figure 4: Opportunities for Regional Cooperation

Pakistan remains the part of frameworks, e.g. SAARC, which focus on energy cooperation. However, it has not been successful in generating enough advantages on a bilateral or multilateral basis. Similarly, another example of bilateral and multilateral power trade agreements that have not achieved success include Turkmenistan, Afghanistan, Pakistan, and India (TAPI). These agreements were not supported by proper intergovernmental action or by appropriate stakeholder dialogue. In the presence of international border conflicts, political unrest, and other issues, the countries have had several difficulties in utilizing the full potential of this framework. It is important
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to note that regional projects of this kind need strong intergovernmental activities and aspirations to succeed. South Asian nations might learn a lot from the ASEAN Plan of Action for Energy Cooperation and the Lao PDR-Thailand-Malaysia-Singapore Power Integration Project initiatives in this regard (Chaudhury et al. 2023).

To enable regional energy cooperation, the three most crucial areas are: i) formulation of necessary legal framework, ii) allocation of financial resources, and iii) development of infrastructure. In particular, the creation of a common energy protocol is a prerequisite for the success of regional energy trade and cooperation. Moreover, connecting South Asian projects together with a regional regulatory structure that enforces strong economic discipline will maximize the benefits of a market-driven strategy for cross-border power trading. To facilitate the trading of renewable energy both within and between areas, it is imperative that grid infrastructure be strengthened and upgraded. Similarly, to investigate and enhance this trade potential, the nations can endeavour to increase their collaboration and trade in renewable energy with their neighbouring nations or regions (such as ASEAN).

Regional integration is an alternative to energy storage integration. Demand and supply mismatches can be exchanged throughout the region using a common power exchange method, effectively resolving the previously mentioned problem. Furthermore, negotiation platforms and guidelines should be established to facilitate dialogue between public and private sector participants. Pakistan and regional nations must establish a framework that encourages frequent exchange of knowledge and cooperative research, with the participation of professionals and experts. Power generation, technology and development, energy efficiency enhancement, loss reduction, and the integration of renewable energy sources into the grid are a few of the areas that such a collaboration could aim to cover.

3.1.4. Green Energy Transition through Regional Cooperation

Looking at past experiences, it seems that Pakistan may not yield economic benefits without setting up right rules and fixing compatibility issues among legal and regulatory systems of all involved countries. If we stick to trading between two countries only, we’ll keep the current limited system at risk, missing out on big economic, reliability, and environmental benefits. Developing a way forward would require a holistic approach that can address regulatory, technical as well as political challenges.
4. POLICY RECOMMENDATIONS

To address the issue of energy security, it’s important to include improved energy access as a component of a comprehensive rural development strategy. This should be combined with other carefully designed development initiatives and how they can be integrated in a regional plan. Without such plans, energy access alone may not lead to positive results for sustainable poverty alleviation and local development. South Asia needs to invest more in renewable energy sources to meet the energy demands while tackling climate change and adapting to it. Based on country-wise need, a regional plan should be developed that focuses on area-specific adaptation measures. Businesses can be developed to promote electrification by training people from specific regions to install, operate, and maintain solar systems. This would require several measures (including but not limited to) described below:

To bridge institutional shortcomings in Pakistan, there is a need to appoint licensing and regulatory authorities for Cross-Border Electricity Trade (CBET). Likewise, it’s essential to develop a plan for national transmission system operators for effective planning and coordination.

- In view of recent developments, energy trading in Pakistan can be recognized as a separate commercial activity in the power laws. The government should also put in place necessary fiscal measures such as taxes, waivers, duties, etc.
- Existing frameworks such as SAARC can be utilized by the region to coordinate, exchange best practices and learn. Under a joint working group, it could involve officials from every SAARC member state, which as a result, would enable regular interaction, discussions, and provision of technical assistance.
- Renewable Energy Development through regional cooperation should be included in energy development plan of South Asian countries to enhance its effectiveness in supporting different projects.
- The growth of RE in SAARC member states can be supported by strong policy planning, implementation frameworks and public and private partnerships. Policy-level initiatives, such as requiring RE to be a must-run, can reduce curtailments and improve the integration of RE into the network.
- To reduce RE supply chain cost, South Asia can develop a plan for the localization of RE industry. This would require key experts within the member countries to pool their technical as well as financial resources.
- To evaluate the economic costs and benefits and facilitate RE uptake, it is crucial to establish a regional database of projects. This database can raise awareness and encourage collaboration on RE solutions.
• To share best practices and promote learning among countries particularly to address energy issues in off-grid areas, a “regional Mini-grid Cooperation Mechanism” should be set up that includes representation from ministries and departments concerned of the member countries.

• There is a need to create an online platform for South Asian states that can connect different project developers, investors, and service providers. Therefore, the RE deployment can be supported through this platform by supporting investors and securing the finance load efficiently.

• Joint members can establish a special capacity-building programme for specialized courses on the operation of different community-based models and programmes that can be offered to the stakeholders.

• Integration of think tanks and workshops for knowledge transfer should be organized experiences and knowledge sharing by the experts from SAARC member states.

### 4.1 Policy Impact Matrix

<table>
<thead>
<tr>
<th>Key Action(s)</th>
<th>Stakeholders</th>
<th>Time Span</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design regulatory and licensing protocols for cross-border electricity trade</td>
<td>Ministry of Energy, NEPRA, NTDC</td>
<td>Short-term</td>
</tr>
<tr>
<td>Re-establish the role of SAARC to address the regional collaboration and foster energy trade among countries.</td>
<td>Government of Pakistan</td>
<td>Short-term</td>
</tr>
<tr>
<td>Include regional energy collaboration among energy policies and development plans of the country</td>
<td>Ministry of Energy, Relevant plans of South Asian countries</td>
<td>Medium-term</td>
</tr>
<tr>
<td>Develop a plan for localization of renewable energy industry within South Asia.</td>
<td>SAARC, Government entities (all member countries)</td>
<td>Long-term</td>
</tr>
<tr>
<td>Establish a regional database of best practices within the region regarding both on and off-grid energy access.</td>
<td>SAARC (or similar platform)</td>
<td>Short-term</td>
</tr>
<tr>
<td>Develop a joint capacity building programme to replicate best practices to enable energy security</td>
<td>SAARC (or similar platform)</td>
<td>Short-term</td>
</tr>
</tbody>
</table>
5. CONCLUSION

Pakistan has been one of the energy deficient nations and its energy sector has been confronted with multiple challenges, exacerbated by limited cross-border collaboration. The debate generated around a shift towards clean energy sources to counter climate change and regional cooperation’s role in addressing energy poverty in Pakistan has not gained much attention and remains limited. Given this, a holistic approach is required to address regulatory, technical, and political challenges, paving the way for sustainable regional energy collaboration in South Asia. While this research provides recommendations to create a better discourse for CBET, the resulting outcomes will have significant socio-economic impacts. Not only can they contribute to alleviating energy poverty and fostering sustainable development, but they also have the potential to enhance regional stability and cooperation. Moreover, they pave the way for future research areas, including the evaluation of the economic and social impacts of regional energy trade, the optimization of renewable energy supply chains, and the exploration of innovative financing mechanisms. By prioritizing regional collaboration and implementing the recommendations, Pakistan and its neighbouring countries can unlock new opportunities for sustainable energy development, economic growth, and regional prosperity.
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