Journal of SUSTAINABILITY OUTREACH

Vol 1 (1): Pages 1-9 (2020)
DOI: 10.37357/1068/jso.1.1.02
ISSN: 2435-7243

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Afghanistan as an emerging regional energy hub

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Special Issue Article
Open Access
Published

Keywords
- Central Asia and South Asia energy trade
- Afghanistan energy trade
- Socio-economic development
- Energy policy and trade
- CASA-1000
- TAPI and TAP-500

ABSTRACT

The enormous potential supply of energy in central Asia offers an excellent opportunity to establish international energy-sharing agreements, mitigate political instability, and improve regional socio-economic development. Pakistan and India have increasingly relied on energy imported from Middle and Central Asia to meet frequent energy shortages. Afghanistan has played a central role in recent efforts to balance energy trade among regional countries with an emerging opportunity as an emerging energy hub. This study considers what energy trade policies and strategies are needed to transform Afghanistan from energy consumer to energy provider. This analysis summarizes multi-disciplinary approaches that target geopolitics, economic, trade, management, institutional, environmental, and technical aspects. This study avoided a commentary description of the subject. The overriding objective of this study is addressing key solutions to enable Afghanistan as a leading stakeholder of the energy hub in the region countries. The finding of this study is outlined in 30 recommendations. Beneficiaries and stakeholders also express increasing concern about Afghanistan's current security and political stability. This brief study can inform students, researchers, scholars, and interested policymakers with the recent trends and future outlook.

Received: January 17, 2020; Revised: March 16, 2020; Accepted: March 20, 2020; Published: June 01, 2020

1. Introduction

Afghanistan has an opportunity to claim a role as an international energy trade hub providing secure energy delivery with favorable trade policies and expertise. However, its handling of energy, trade, security, and domestic politics allows others to question Afghanistan's urgency to take that role. Diplomatic tensions between Pakistan and India, liabilities in project implementation are other threats [1,2]. A viable energy strategy can establish Afghanistan's role as a reliably secure trade-hub and the best alternative route for regional energy transit. In this role, Afghanistan can limit the influence of hostile external interference to ensure further political stability, economic security, and socio-economic development. A regional strategy should be assessed to determine how international agreements affect Afghanistan and the region over energy trade and security. Cooperation between Central Asia and South Asia on energy trade policy and security can stabilize regional governments and stimulate economic development. It should rely on the principles of establishing a continuous and reliable supply, and universal availability and accessibility of energy at a competitive, affordable price. Consequently, to promote fair trade, political commitment, and sustainable policies are needed.

2. Region Energy Interaction Behavior

The 2008 agreement allows delivery of surplus hydropower from Central Asia to South Asia (CASA-1000) over 1,222 km and at the cost of around 1.17 billion USD (Figure 1). This transmission line runs through three AC-DC converter stations for 120km in Tajikistan (Sangtuda 1.3GW/500kV), 560km in Afghanistan (Kabul 300MW/220kV), and 70km in Pakistan (Peshawar 1.3GW/) [3]. A high voltage 500kV DC (HVDC) line will run 750km from Tajikistan (Sangtuda station) to Pakistan (Nowshera Station) with a capacity of 1.3GW [3]. This regional project is financed by the World Bank, the Islamic Development Bank, the European Bank for Reconstruction and Development, the European Investment Bank, the UK Department for International Development, the Afghanistan Reconstruction Trust Fund (ARTF, $40m), and the US Government [4].

Ratified in 2015 for anticipated operation in 2020, the 1,814 km Turkmenistan-Afghanistan-Pakistan-India (TAPI) Pipeline will deliver 90 million m^3 of natural gas each day (Figure 2). Up to 33 billion m^3 natural gas will be delivered from Turkmenistan to Afghanistan (816 km through Herat, Farah, Nimroz, Helmand, and Kandahar provinces), Pakistan, and India over three decades [5]. Afghanistan will pay 400 million USD in transit duties annually. The Asian Development Bank financed this pipeline at approximately 22.5 billion USD [6]. It is projected that Afghanistan will consume 500 million m^3 in the first year, rising to 1 billion m^3 in the following ten years and to 1.5 billion m^3 after 30 years. TAPI will also satisfy an

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anticipated 25% energy deficit in Pakistan. The Turkmenistan-Afghanistan-Pakistan 500kV transmission line (TAP-500) will transmit 2000MW of electricity to Afghanistan and Pakistan. This project uses three substations in Afghanistan (Herat, Farah, and Kandahar provinces) and will generate revenues of 110 million USD to Afghanistan annually [7].

3. An Uncertain Future

Completed, ongoing, and planned energy projects in Afghanistan should be subject to an assessment of their impact on energy independence and progress towards becoming an energy hub. The ideal strategy should stabilize the Afghanistan government and economy; it also should leverage its differences with neighboring countries' positions. In addition to the internal barriers that include the nation's vulnerability to sabotage and militant attacks, Afghanistan sees energy independence as the solution to meet its domestic energy demand and export energy to the neighbor countries in the long run. Because energy transmission trade through Afghanistan to Central Asia and South Asia, the government is pressed to revise and align its domestic energy policies, economic measures, and human resource capacity.

Figure 1. Central Asia and South Asia (CASA-1000) power transit project proposed map [8].

Figure 2. Turkmenistan–Afghanistan–Pakistan–India (TAPI) pipeline project proposed map [9].

4. Energy sharing opportunities among regional countries

Harmonious diplomatic relationships among regional nations must be achieved when addressing energy-sharing agreements and policies. History suggests that regional conflicts and competition have been barriers to energy-trade. A long-term strategy requires continued perusal of international agreements in energy policy to maintain a sustainable profit-sharing revenue stream. Afghanistan has benefitted from both energy importation and an energy transit tax with the CASA-1000 and TAPI projects. With Tajikistan, Kazakhstan, Kyrgyzstan, and Uzbekistan as hydropower exporters, Afghanistan are uniquely positioned as an energy hub bridging Central Asia and South Asia. To overcome contributing barriers to the domestic energy crisis, a comprehensive analysis of the impact of the electricity market and the influences of the regulatory factors on private sector should be conducted.

5. Proposed solutions in a broad perspective

Energy security has been identified as a growing concern for energy trade. Energy demand is expected to rise over the long term, so the energy trade remains the main pillar of regional development. Here are key recommendations to address these challenges:

1- Convene an independent advisory board of national and international energy experts to develop, direct, and implement energy policy. This board shall be committed to Afghanistan's interests and focused on experience, data, and outcomes. Avoid sketchy and hasty policies [10].

2- Convene a task force from members of the advisory board that will focus on implementing an energy security strategy and quickly respond following its mission. According to the EIAD (Energy Infrastructure Attack Database) of the Journal of Energy Security, Afghanistan has been among the four countries with the highest energy infrastructure attacks [11].

3- Achieve a consensus among countries to implement successful approaches that support a growing regional economy. And establishing a viable roadmap to offer a multidimensional solution framework [12].

4- Expand networking and cooperation with international energy organizations such as the International Energy Agency (IEA), and so on.

5- Analyze the supply chain to propose any backup and alternative surge emergency sources or procedures to continue to prevent sudden energy outages.

6- Identify vulnerabilities in domestic energy security.

7- Symmetrical development strategy for local energy resources and technologies deployment within the constrained environmental requirements (i.e., renewable energy deployment, solid waste to energy, etc) [13].

8- Attract investments in domestic energy generation by utilizing renewable sources through regulatory reform and gathering energy market data.

9- Exploitation of green energy sources and technologies at urban [14] and rural [15] scales; with an optimum efficiencies within the socio-economic requirements.

10- Establish an energy regulatory authority and an energy economic currency for the international energy trade.

11- Review and amend any energy laws, policies, and regulations to address current energy demands [16]; this includes any policies on licensing, tariff setting, quality of service standards, consumer protection, marketing, competition, and energy efficiency [17].

12- Propose incentives for increasing domestic energy production and attracting regional energy trade.

13- Define a process to balance the contribution of energy sources from domestic and international sources and carriers [18].

14- Incorporate long-term sustainability goals in energy policies and their impact on socio-economic and sustainability factors such as community involvement, social responsibility, accessibility, affordability, disparity, safety, use efficiency, supply and production efficiency, cost-effectiveness, and environmental impacts (on air, water, and soil quality), and equity [19].

15- Establish a review process to investigate technical, financial, and legal aspects of international energy trade, with the perspective of Afghanistan's role as an energy hub between Central Asia and South Asia.

16- Use the IEA Model of Short-term Energy Security (MOSES) [20] to evaluate energy security risks in delivering electricity from source to end-user.

17- Support a roadmap for Afghanistan energy independence using wind, water, and solar power to reduce emissions of both air pollutants and greenhouse gases [21].

18- Communicate the urgency for Afghanistan to transition from being an energy-consuming country to an energy-producing and exporting country.

19- Include a collection scheme for revenues and tariffs within the energy policy for delivery and transit to balance any trade deficits among the region's countries.

20- Emphasize that production should prioritize meeting domestic energy demand before selling and exporting any surplus. More importantly, reducing technical and commercial losses are essential [22].

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21- Provide flexibility to select a delivery route to encourage competition, ensure security, fulfill demand, and maintain low end-user costs.

22- Commit to long-term investment in domestic energy development. Build or renovate hydropower facilities.

23- Uphold principles of justice and equity in the regulation of the electricity supply among stakeholders.

24- Promote energy conservation over domestic and foreign energy consumption.

25- Strengthen energy efficiency codes and regulations [23].

26- Establish an implementation timeline.

27- Develop and employ an educated and skilled workforce to build and maintain energy-efficient public, commercial, and industrial facilities.

28- Develop standards for certifying energy-efficient buildings [24].

29- Define achievable milestones and short-term targets (greenhouse gas reduction, purchases of energy-efficient appliances, energy loss reduction, refurbishing and renovating existing buildings).

30- At last, alignment of scopes, objectives, plans, and actions in accordance with the 17 goals and 69 targets of the Sustainable Development Goals (SDGs).

6. Discussion

Ensuring secure energy delivery relies not only on an abundant energy supply but also on safeguards. That limit interruption in power delivery to households, businesses, and public services [25]. Redistributing power delivery to best accommodate end-users needs to be considered.

Energy is essential to nurturing socio-economic development and improving quality of life. So, meeting increasing energy needs remains a significant concern, especially in large cities. Decades of post-conflict have hindered Afghanistan's growth in energy policy and trade. It is still a concern that around 70% of energy consumed is imported from neighboring countries due to three main reasons: population increases result in an unpredictable increase in anticipated energy demand, underutilization of domestic energy assets, and a lack of motivation to encourage energy self-sufficiency over the past 18 years. Afghanistan can emerge as a regional energy hub by aligning its domestic energy agenda with mutual benefits with neighbors such as Pakistan.

Fortunately, in the region, renewable energy is increasingly being used at a 5% average annual growth rate, and more renewable energy assets have yet to be accessed. As energy consumption and trade increases within the region, per capita income should also increase, further emphasizing a link between regional economic growth and personal prosperity. Recently, global energy consumption has risen most rapidly in the public services and transportation sector from increased international commerce.

7. Future Work

This study suggests that Afghanistan can play a strategic role as a regional energy hub if a comprehensive analysis of the benefits and impact of international energy trade is analyzed. Future reports aim to assess other benefits to support embracing this role.

8. Conclusion

A strategic analysis of completed, ongoing, and planned energy projects throughout Afghanistan should focus on keeping its energy supply secure and reducing outages. Any solution should use validated strategic tools and techniques that address short- to long-term sustainability. The solutions proposed in this study can be considered a roadmap to empower Afghanistan's role in the regional energy trade. In addition, this study highlights that a deliberate energy trade policy and political commitments are needed for success. A comprehensive energy policy compels Afghanistan to develop alternative supply routes for neighboring countries and encourages it to develop political reforms to encourage stability, security, and socio-economic development. Finally, regional energy policy is needed to evaluate the impact on trade and security.

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