



Electricity cooperation in South Asia: Barriers to cross-border trade

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ABSTRACT

The South Asia Region (SAR) continues to face electricity shortages, underinvestment and challenges to improve energy access. Strengthening cooperation for cross-border electricity trade in South Asia makes it possible for the region to take advantage of significant benefits from greater regional coordination in capacity investments. Trade can complement domestic investment to increase the availability and reliability of supply, bringing economies of scale in investments and more cost-effective expansion of renewable electricity. Efforts to expand cross-border electricity cooperation and trade in SAR need to address not only regional barriers, but also barriers stemming from domestic electricity sector policies in the region. Expanding the scope of bilateral electricity cooperation in the short- and medium-term, and especially opening up to commercial as well as government-to-government projects, can build confidence in the process of cross-border trade and the potential benefits it can provide. The longer-term desirable goal is emergence of a well-functioning regional market for electricity, supported by a regional organization or forum for cross-country coordination.

1. Introduction

Increased availability of reliable, affordable and cleaner energy can facilitate economic development and improve welfare in the South Asia Region (SAR).¹ Problems in the region include poor access to electricity, combined with unreliable supply due to generation and network capacity shortages and poor maintenance of assets.² This, in turn, leads to the use of costly and environmentally harmful small-scale fossil fuel-based back-up generators. Investment in electricity infrastructure and improved system management are key steps for overcoming these problems (Andres et al., 2013a, 2013b; Ghosh-Banerjee et al., 2015).

Another key step is finding ways to take advantage of the significant operational, economic, environmental and reliability benefits of power trading across borders in SAR, advantages that remain largely unexploited (Chattopadhyay and Fernando, 2011). Strengthening cooperation for cross-border electricity trade in South Asia makes it possible for the region to take advantage of significant benefits from greater regional coordination in capacity investments. Trade can complement domestic investment to increase the availability and reliability

of supply, bringing economies of scale in investments and more cost-effective expansion of renewable electricity.

Increased electricity trade also allows the region to benefit from complementarities in electricity demand and resource endowments due to diversity of primary energy resources and differences in seasonal patterns of supply and demand. In addition, regional cooperation can bring enhanced competition and improved sector efficiency (Timilsina and Toman, 2016; Singh et al., 2013, 2016; ESMAP, 2010; Srivastava and Misra, 2007; Thakur, 2004). For example, Nepal and Bhutan have comparative advantages in hydropower production that can only be economically harnessed through cross-border trade with other countries, considering the gap between domestic demand and energy generation potential. These two countries also experience significant decline in hydroelectric generation during the winter season, and thus would benefit from improved access to other electricity generation capacity from neighboring countries.

Efforts to expand cross-border electricity cooperation and trade in SAR need to address not only regional barriers, but also barriers stemming from domestic electricity sector policies in the region. The

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¹ In this paper, the South Asia Region (SAR) refers to Bangladesh, Bhutan, India, Nepal, Pakistan, and Sri Lanka. Afghanistan and Maldives are in this region as defined by the World Bank, but are not discussed in this paper.

² The countries in the South Asia Region are home to 1.57 billion people (23.7% of global population). Around 493 million people lacked access to electricity across South Asia in 2009, despite electricity sector reforms in the region (IEA, 2011). In 2010, average per capita electricity consumption in the region was 563 kWh as compared to the world average of 2977 kWh (Singh et al., 2013).

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barriers include the lack of cost reflective pricing; shortages in generation capacity; low operational efficiency and service quality; weak utility financial performance; and limited involvement of the private sector. These are relatively familiar attributes of power sectors with limited reforms. Identification of the relevant regional and national scale barriers and discussion of how to overcome them is the main objective of this paper. Our aim is to support appropriate political, policy and regulatory interventions for overcoming the barriers.

The remainder of the paper is structured as follows. Section 2 reviews the status of cross-border electricity cooperation in SAR. Impact of domestic sector weaknesses on cross-border electricity cooperation and trade is discussed in Section 3. Section 4 identifies key regional-level barriers to expanding cross-border cooperation and trade in SAR. Section 5 summarizes the findings of the paper.

2. Status of cross-border electricity trade in South Asia

Increased regional energy cooperation and trade fall within the broader domain of regional trade expansion and cross-border market integration. General interest in regional economic cooperation predates the formation of South Asian Association for Regional Cooperation (SAARC) in 1985. The agreement for a South Asian Free Trade Area (SAFTA) signed in 2004 envisioned transition towards a common market. Tangible expressions of interest in regional energy cooperation followed the formation of SAFTA. The South Asia Regional Energy Coalition (SAREC) was formed in 2006 to promote advocacy initiatives by leading policy-oriented business associations in the region. The SAARC Energy Centre (SEC), established in 2006 as a Special Purpose Vehicle (SPV) with its base in Islamabad, Pakistan, also focuses on regional energy sector cooperation in South Asia.

In late 2014, SAARC member states agreed to a “framework agreement” for regional cooperation in electricity.³ The agreement contains broad-ranging provisions for the establishment of a regional market for electricity, including non-discriminatory access to transmission, market-based pricing of electricity exchanged, and establishment of a body for coordinating regional power integration and trade. It remains to be seen how extensively or rapidly these provisions will be put into practice to achieve the objective of developing the SAARC Market for Electricity (SAME).

Table 1 summarizes the current state of cross-border arrangements for electricity trade in South Asia. At present, SAR electricity trade is dominated by India. Simple bilateral electricity trading arrangements are predominant, including arrangements between Nepal-India, India-Bhutan and most recently India-Bangladesh (Singh et al., 2013; Srivastava and Misra, 2007; Paudyal, 2013). These bilateral relationships are based on government-to-government agreements.⁴

Current electricity trade between Bhutan and India reflects the comparative advantage argument laid out in the introduction to this paper. Bhutan is endowed with significant potential for development of hydroelectricity, which significantly surpasses its domestic needs. The country thus deepened cooperation with India to develop its hydroelectric resources for export purposes.⁵ Access to thermal power from India during the dry winter season further highlights mutual benefits of interdependency of the two power systems.

Trade between India and Bangladesh reflects the urgent need in the

latter country to reduce capacity shortages, due in particular to increasing scarcity of domestic natural gas for use in its own generating plants. The power transmission link between the two countries, which went into operation in 2013, has an initial capacity of 500 MW, with possibilities for expansion. A 25-year government-to-government electricity purchase deal involves import of 250 MW of coal-fired electricity from India to Bangladesh. Bangladesh also is acquiring 250 MW of power under short-term agreements on India's power exchanges.

The lack of sufficient available generation capacity addition has led Nepal to draw increasing imports of electricity from India. However, Nepal also can become a large net exporter of electricity as the country develops its vast hydroelectric potential. The benefits for Nepal and Bhutan from further developing their large hydropower generation potential include significant improvement in domestic availability of electricity; income flows from electricity export; and access to other power sources in the dry season. The countries buying power from Nepal and Bhutan would benefit by lower electricity costs,⁶ displacement of more polluting domestic sources, and the potential for increased system reliability from diversification of sources.

3. Barriers to increased regional electricity cooperation and trade due to national sectoral policies

Arguably, the current state and magnitude of electricity cooperation and trade in SAR is far less than the potential considering the regional diversity of energy resource endowments and the differences in demand patterns across countries in the region (Wijayatunga and Fernando, 2013; Singh et al., 2013; Timilsina and Toman, 2016). Discussion of this issue often focuses on regional-level barriers, which we discuss in Section 4. Here, we discuss barriers to increase regional electricity cooperation and electricity trade attributable to weaknesses in domestic sector policies.

3.1. Overview of power sector reforms in South Asia

Countries in the South Asia Region initiated national electricity sector reforms following somewhat different approaches and timelines (Table 2).⁷ The reforms have been undertaken to address, among others, the fiscal burden of energy price subsidies and low revenue collection rates; and the economic burden of insufficient supply, low service quality, and high network energy losses experienced under largely state-owned and controlled systems (Newbery, 2002; Singh, 2006, 2010). The reform processes in SAR have been aimed at improving the investment climate in order to reduce serious generation capacity deficits, in particular by attracting more domestic and foreign private investments (see Singh, 2007 for discussion of this in the context of India). While reducing dependence on state financial support, reforms also have sought to maintain affordable as well as reliable service quality (Lama et al., 2002).

The single-buyer model (SBM) (*one buyer and many sellers*) dominates the wholesale generation market arrangements across the region (Table 2). Only India has introduced a degree of competition in wholesale markets for electricity, and a day-ahead market (Singh, 2010; Thakur et al., 2005).⁸ Vertically integrated incumbent electric utilities in Pakistan and India have undertaken functional unbundling (Singh et al., 2013). Most of the states in India have unbundled the State Electricity Boards (SEBs) into separate corporatized entities for generation, transmission and distribution. Due to a provision of India's

³ See <http://www.saarc-sec.org/userfiles/SAARC-FRAMEWORK-AGREEMENT-FOR-ENERGY-COOPERATION-ELECTRICITY.pdf>.

⁴ The private sector is starting to become more involved in cross-border power projects. A number of Indian investors are developing large power projects in Nepal, part of which can serve the export market. A number of power generation projects in Bhutan as well Nepal are witnessing participation of private investors, including those from within South Asia. As of December 2014, 161 mostly small hydro projects (totaling about 2000 MW) have been developed and are under development in Nepal. Most of the small projects are being developed by the private investors.

⁵ The Royal Government of Bhutan also gains a minimum 12% royalty from power projects.

⁶ Cost of hydro-power generally declines over the lifetime of the plant, whereas variable cost of thermal power plants increases due to increasing cost of fuel and decrease in heat rate.

⁷ A separate appendix containing details on national sector policy changes in individual SAR countries is available on request.

⁸ However, parties involved in longer-term bilateral transactions have preference in access to transmission over those obtaining electricity through the power exchanges.

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