# Policy Brief: Regional Energy Cooperation in South Asia

## Introduction

- Transmission grid interconnection and integrated power networks can augment national energy supplies and facilitate faster energy transition. Renewable electricity trade across large world regions via direct-current-type ultra-high-voltage (UHVDC) lines can boost renewable electricity production by 12.5% by 2050 and reduce cumulative $CO_2$ emissions from the power sector by up to 9.8 % over the next 80 years.[1] This brief highlights how regional energy cooperation through adequate infrastructure and institutions can alleviate South Asia's energy linked challenges and meet its climate goals.

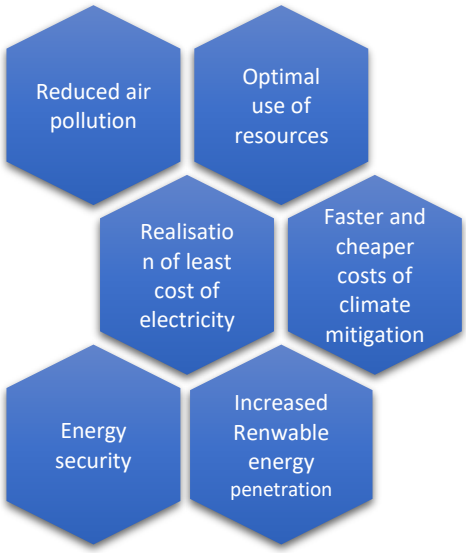


Figure 1: Key benefits of regional energy cooperation
Source: IRENA (2021)

- Given the recent advances in ultra-high-voltage (UHV) transmission technology, there is potential to transmit renewable energy across long distances with relatively low losses. There are several regional energy interconnections across the world.

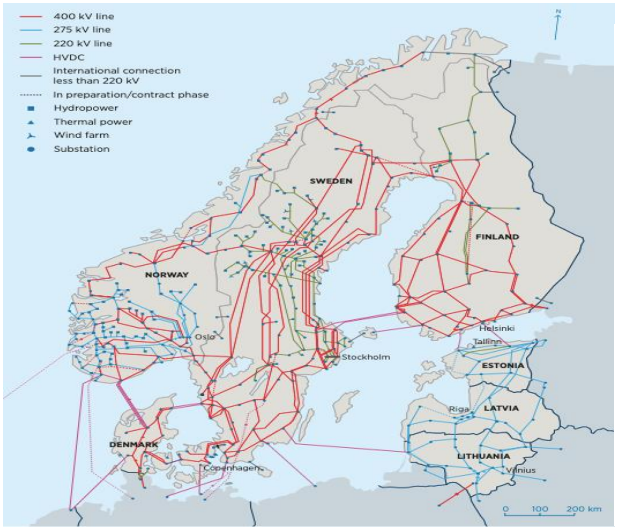


Figure 2: Nordic area transmission system under Nord Pool
Source: IRENA (2021)

Nord Pool is the most successful example of such an interconnected grid. The power pool that serves 16 countries, announced in 2022, that a total of 1077 TWh of power was traded through it.[2] The market unification has optimized the use of available renewable energy to lower average electricity prices, reduce carbon emissions, and increase the security of supply in dry years.

SIEPAC, the Central American Electrical Interconnection System, participating countries reached a total installed capacity of 19 GW inexpand 2020.[3] SIEPAC is owned by a Regional Operations Entity (Empresa Proprietaria de la Red - EPR), comprising the public utilities and transmission companies of the six participating countries (75%) and private capital (25%). The establishment of the regional grid infrastructure and power market helped reduce the region's dependence on hydro by diversifying energy sources. A well-integrated region can help in expanding its scope of renewable energy potential by 3 times.[3]

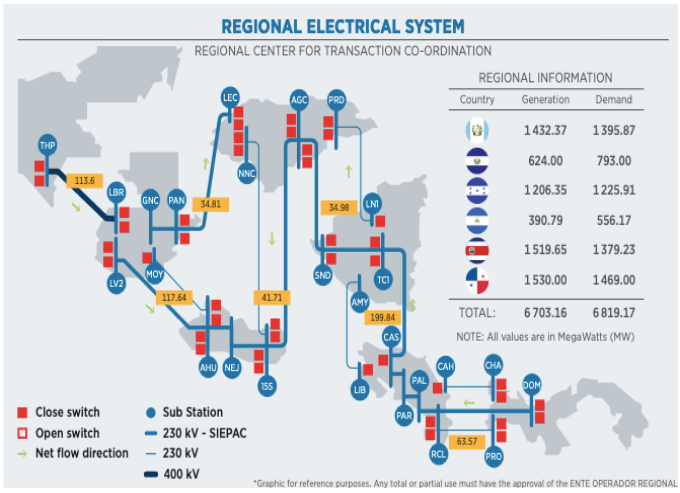


Figure 3: Status of SIEPAC power flows on 20 October 2020
Source: IRENA (2021)

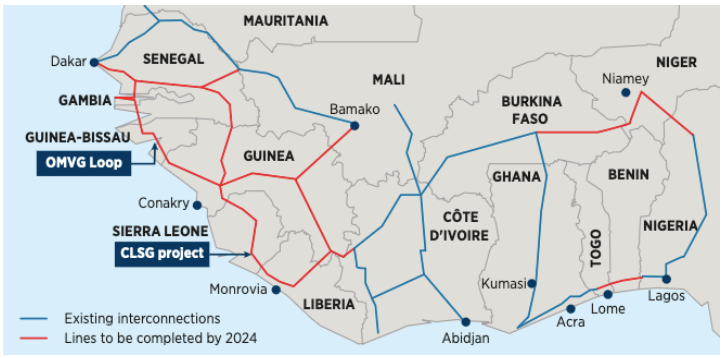


Figure 4: Interconnected grid and near-term expansion in West Africa under the West African Power Pool (WAPP)
IRENA, 2021

The West African Power Pool (WAPP) countries exchanged 6 TWh in 2020, or 8% of the total power generated.[5] The IEA estimates that trade will double by 2025. The World Bank has estimated that the economic benefits of regional trade in the WAPP would reach USD 5–8 billion per year due to reduced operation costs.[6]

**South Asia, Climate Change, and the Global Transition to Net Zero**

- Amongst those most vulnerable to the near-term risks of climate change as a result of their geographic and socioeconomic features, South Asian countries will have to pay attention to rising peak electricity demands with increased economic activities and energy access. This demand will be worsened due to high temperatures and risks associated with extreme weather events.
- By the year 2070, owing to growing population size, India's per capita electricity consumption is set to grow threefold, while the rest of South Asia's will grow fivefold. According to the Asian Development Bank, under a high emissions scenario, climate change could impose GDP losses of 35% in India and 24% in the rest of South Asia by the year 2100.[7]

- Presently, under the Paris Agreement, the Nationally Determined Contributions (NDCs) of South Asian countries to achieve net zero are - India: 2070, Bhutan: 2030 (achieved), Nepal: 2050, Sri Lanka: 2060, Maldives: 2030. These plans will hinge upon the decarbonization of the energy sector.
- By transitioning to clean energy sooner, South Asian countries will likely benefit from revenue accrued from carbon offset exports and minimize their long-term costs of mitigation by channelling such revenue towards more effective decarbonization and capacity building.
- World Bank approximates that almost two-thirds of the energy used in South Asia is imported, making energy security a significant concern for the region. Almost 80 % of the region's total primary energy production is reliant on fossil fuels.[8] According to the BP Statistical Review of World Energy 2022, the region consumed approximately 7% of world's primary energy in 2021, almost 85% of which was in India.[9]
- Under India's G20 presidency, G20 ministers responsible for energy emphasized the need to accelerate the pace of energy transition, expanding regional grid connections, for technology sharing, supply chain diversification, and low-cost financing. As part of India's One Sun, One World, One Grid initiative, the country is also assessing the feasibility of connecting its grid, through undersea cables, with the countries of the Gulf Cooperation Council (GCC). Representing almost a fourth of the global population and at the frontlines of the climate crisis, South Asia, with its growing energy demands, will play a significant role in global energy policy, underscoring the need to balance aspects of energy security, equity, and environmental sustainability. Climate adaptation and mitigation ambitions in the region will have a global impact.

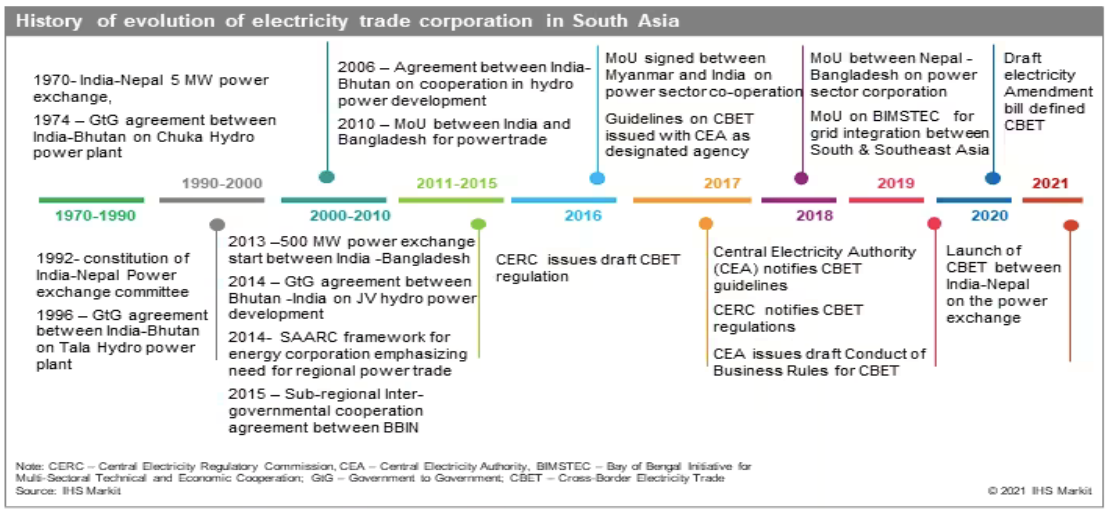


Figure 5: Evolution of regional energy trade in South Asia
Source: IHS Markit, 2021

**Regional Energy Cooperation in South Asia**

- Cross-border power transmission in the region has grown markedly over recent years. Cross border electricity trade in South Asia initially took place between Bhutan-India, India-Nepal and India-Bangladesh through bilateral government-to-government (G2G) arrangements based on case-to-case negotiations. Many new electricity trade contracts between other countries in the region are trilateral arrangements that are being finalised.
- In first-of-their-kind arrangements in Asia, Nepal began importing electricity from the power exchange in India in April 2021 and Bhutan bought electricity from the Indian power exchange in 2022. Bangladesh, too, is expected to follow suit soon.[10] Nepal and Bhutan possess massive untapped hydro resources which can be exploited, and surplus energy exported. With the falling costs of other renewable energy and storage, the long-term competitiveness of hydro energy will have to be considered.

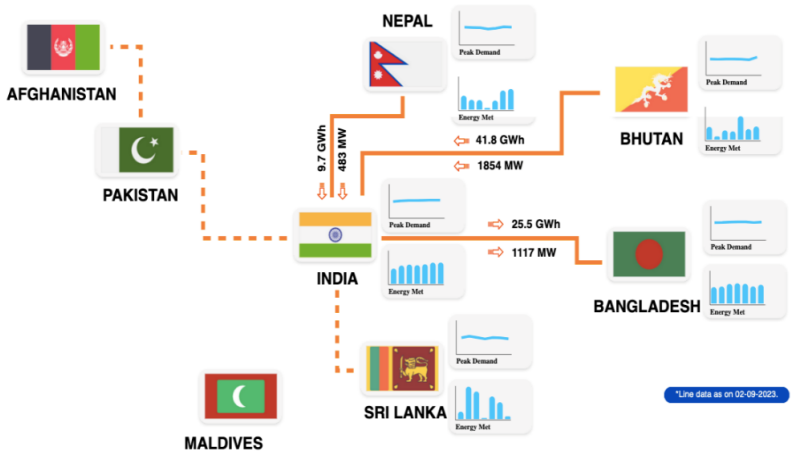


Figure 6: Peak demand and energy met: South Asia. Line data as on September 2, 202
Source: South Asia Energy Database

- The total power installed capacity in South Asia increased from 190 gigawatts (GW) in 2010 to 449 GW by 2020 (Clean Edge Asia, 2020). Given the abundant renewable energy resources in the the region, it has a hydropower potential of approximately 350 GW, a solar power potential of 939 GW, and a wind power potential of 1,289 GW. It is estimated that, of this capacity, only 18%, 3.8% and 3% respectively, have been tapped so far, leaving immense potential for the expansion of renewable energy capacity and diversification of energy through regional cooperation.[11] Analysis by think tank IRADE predicts that with the cost decline in renewable energy and storage, the regional electricity trade could grow from 13TWh in 2019 to as high as 986 TWh by 2050.[12] IHS Markit further predicts that with the strengthening of the regional grid, the interconnection capacity will grow fourfold by 2040.[13]
- According to the EEG Synthesis Report on Cross-border electricity trade and the potential for green grids in South Asia and Southern Africa (2022), if the cost of solar and wind technologies continue to fall at a relatively high rate, the Bangladesh, Bhutan, India, Nepal (BBIN) region of South Asia could save between USD 227 and 312 billion respectively on total discounted systems costs between 2015 – 2050, at 2015 prices.[14]

- Due to its central geographic location, India will play a significant role in cross-border electricity trade (CBET) and grid integration. The Ministry of Power's 'Guidelines for Import/Export (Cross Border) of Electricity, 2018' facilitates CBET between countries through India.
- Regional cooperation will result in cost-effective energy procurement. For instance, during the energy crisis, average power generation costs in Bangladesh shot up from USD 0.064/kWh to USD 0.085/kWh during FY 2021-22.


Figure 7: Difference in cost of power purchase from various sources of Bangladesh
Source: BIMSTEC Energy Outlook 2035

The average electricity purchase cost from Independent Power Producers (IPPs) was as high as USD 0.11/kWh for the same period. In contrast, the average electricity prices for May 2022 and December 2022 were USD 0.083/kWh and USD 0.064/kWh, respectively, on the Indian Energy Exchange.[15] The ability to procure energy from a common power exchange could allow Bangladesh to choose cheaper electricity from the day ahead market. This would also benefit other BBIN countries with growing energy demands.

- Since electricity trade in the region will involve significant quantities of hydroelectric energy, the seasonal demand for and supply of electricity in Nepal and Bhutan will play a key role in trade policy.
- According to EEG Energy Insight, given the diversity of energy sources, the large potential for hydroelectric energy in Nepal and Bhutan, the differences between countries in terms of seasonal and hourly load shapes, and the existence of transmission capacity between India and each of the BBIN countries, a cost-based CBET has the potential for significant economic benefits. In such a market, the market operator uses information on the technical characteristics of generation units and information to determine prices.

**Challenges and the Role of Parliamentarians**

- The South Asian region is blessed to have a rich and diverse energy resource base. A national approach to utilize these resources judiciously is not efficient and definitely not resilient against global and climate shocks. Regional integration of resource use, grid infrastructure and accessing regional power markets will have to be the new imperative. However, progress on this front has been in early stages and slow, particularly in South Asia. For both advancing and accelerating this process, a number of steps will need to be undertaken.

**Table 1** Different levels of regional market integration

| Market integration level | Interconnectivity level | Trading arrangements | Harmonisation rules |
|---|---|---|---|
| **Early stage of market integration** | Physical interconnection between two countries | Long-term, bilateral, over-the-counter (OTC)[8] power purchase agreements (PPAs) | Simple rules agreed for the operation of the interconnected system |
| **Shallow market integration** | Physical interconnection between several neighbouring countries | Long-term PPAs supplemented with short-term wholesale markets | Harmonisation of market rules, grid codes, and transmission tariffs |
| **Deep market integration** | Full synchronous operation of a multi-country interconnected system | Well-functioning markets with competition achieved through trading in different timeframes and various markets (OTC vs. power exchanges, capacity vs. power markets, day-ahead vs. intraday markets, etc.) | Regional regulatory agencies, regional market operators and harmonisation of market rules, grid codes, and transmission tariffs |

Figure 8: Steps needed for deep market integration in South Asia
Source: IRENA, 2019

- That said, the primary role of parliamentarians at the regional level will be to bolster economic, cultural, and political cooperation with countries in the region through dialogue and diplomacy. Since much of the energy cooperation in South Asia is reliant on G2G/bilateral/trilateral agreements, productive diplomatic relations will be essential in building trust not just between countries, but amongst investors. More specifically, parliamentarians in BBINS countries can collaborate to take the following concrete steps:
  - Sustained and demonstrated political dialogue amongst cross-party parliamentarians at the regional level on different diplomatic and policy concerns.
  - Raise concerns and representation at the national governments and guide national policymakers in taking the steps to implement policy actions such as regional resource estimation and publishing a plan for utilization keeping domestic and climate concerns at the centre.
  - Review and revisit energy or power sector laws that allow more intra-south Asia and inter-south cooperation.
  - Build a wider consensus and capacity of other parliamentarians on these issues.

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