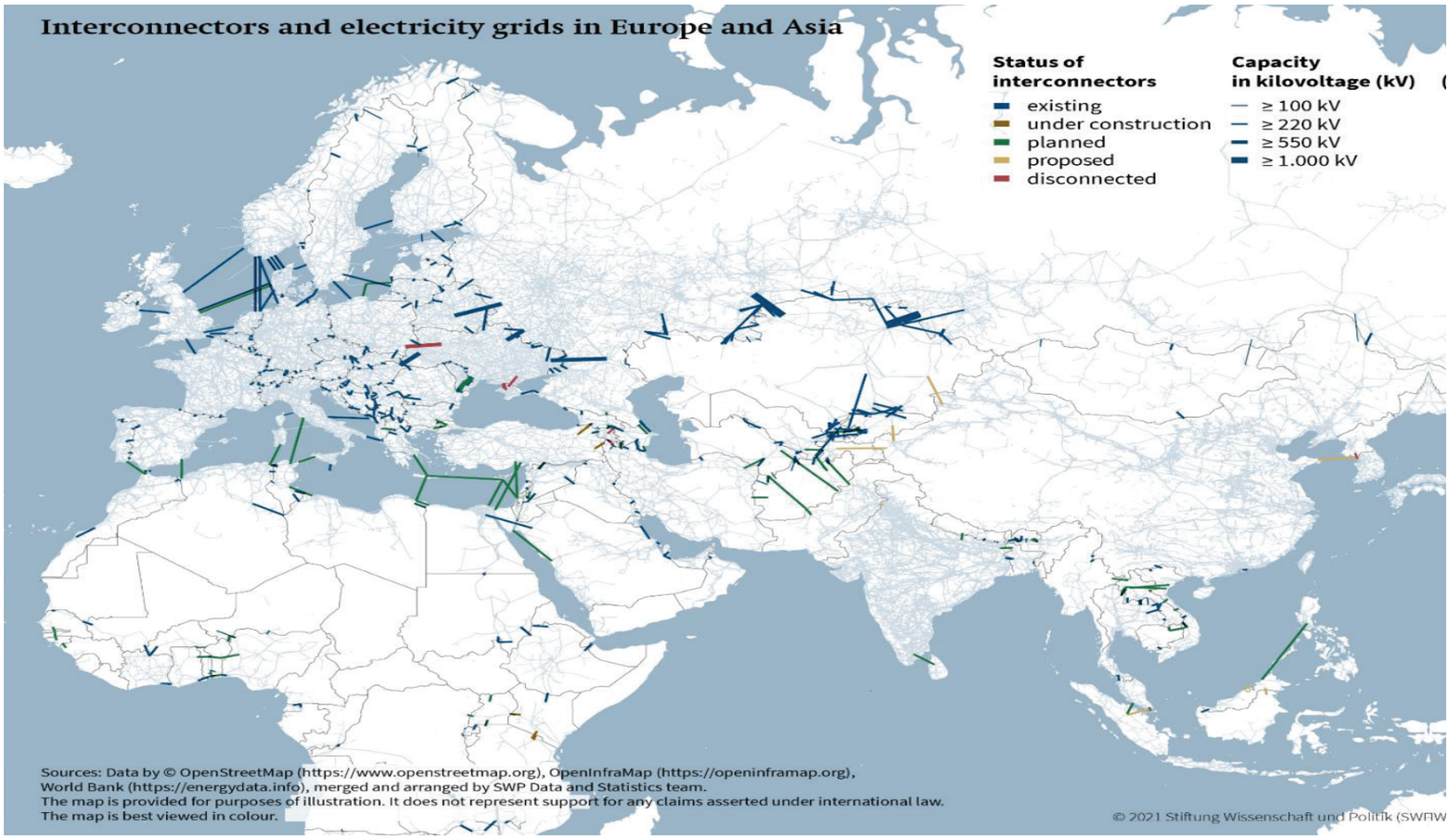


Current grid interconnections in Europe and Asia. Source: SWP, 2021

POLICY BRIEF: REGIONAL ENERGY CO-OPERATION IN SOUTH ASIA

INTRODUCTION

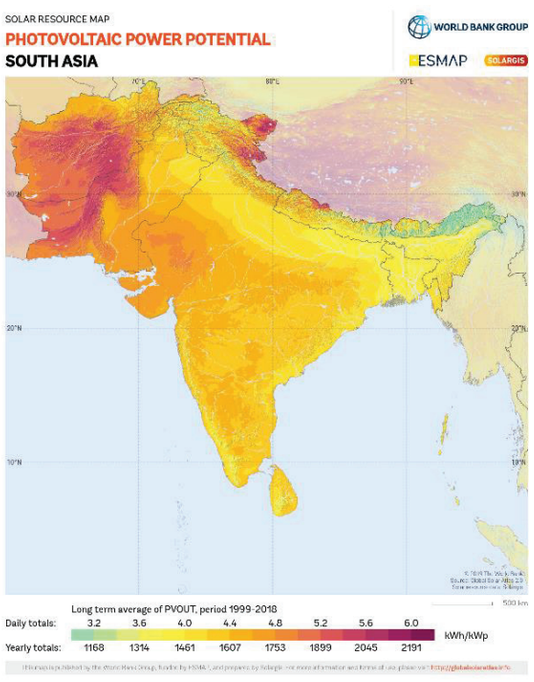
- A global energy crisis is unfolding currently sending international energy markets and national energy plans towards a state of turmoil. Both natural gas and coal prices have hit record high levels. To shield consumers from the high energy prices, developed nations have also announced more than USD 500 billion in different measures including energy efficiency and subsidies.

- These difficult conditions have accelerated global energy transition efforts particularly in the European nations to reduce their dependence on natural gas in particular. Progressive energy transition policies in countries such as the USA, China, Japan, European Union, and India will generate investments in clean energy to the tune of USD 2 trillion annually. The World Energy Outlook, 2022 by IEA, has for the first time, projected the peak of fossil fuel demand, firmly establishing the future of energy being clean energy - solar, wind, biomass, geothermal and hydro.

SOUTH ASIA CLIMATE CHANGE AND ENERGY

- South Asian countries are still largely dependent on fossil fuel-based energy sources (63.6% electricity capacity is fossil based) not just for regular electricity supply but also for more subsistence level energy requirements such as cooking or basic lighting. A significant portion of this is imported and as a result South Asia is facing the brunt of the high and volatile pricing of global energy markets. Many countries are experiencing power outages affecting economies and livelihoods. Nevertheless, energy demand in South Asia is expected to double in this decade owing to its growing households level electrification rates and industrialization.

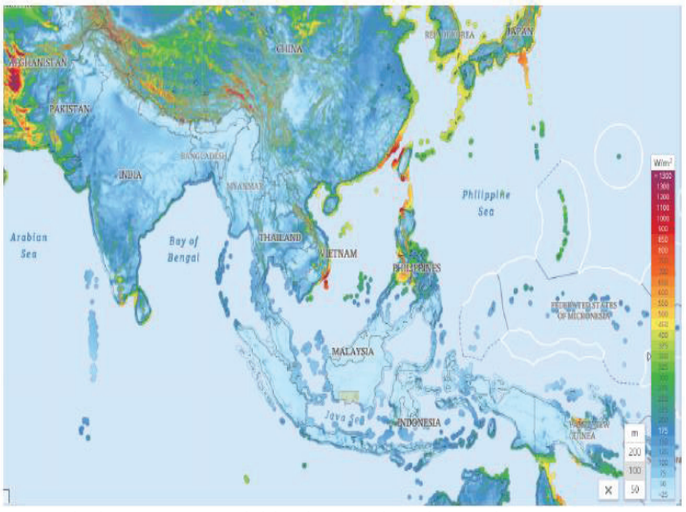
- Equally important to note is South Asia's significant vulnerability and contribution to climate change. As one of the most vulnerable regions in the world, it is concerning that as the per the latest assessment published by UNFCCC, the current level of efforts will lead to a global temperature rise beyond the critical threshold of 1.5 ºC. Climate change is expected to wreak havoc in all areas of life and livelihood in South Asia while putting critical infrastructure including the energy sector under heavy risk. World Bank, in its Climate Change Action Plan 2021-25, estimates that the region will suffer climate change related losses averaging USD 160 billion per year by 2030. Paradoxically, even with lowest per capita carbon emissions, South Asia is one of the highest carbon emitting regions in the world led by India (4th largest).



Solar power potential in the South Asian region
Source: Climate Analytics, 2019

- A systemic transition to large scale renewable energy will be key to meet energy security, development, and climate change concerns. This would need a rethinking of the current electricity structures, market, institutions, and ways of consumption. This is because the nature and operation of renewable energy and other new energy technologies are going to be markedly different from coal and oil. Further, energy systems will need to prepare for achieving multiple objectives while preparing for multiple global shocks, vulnerabilities, and uncertainties.

- This will need diversification of energy supply sources and distributing the risks linked to energy systems that will in turn push policymakers to look beyond national energy systems – ushering a regionally co-operative and networked approach to energy systems.



Wind power potential in the South Asian region.
Source: Climate Analytics, 2019

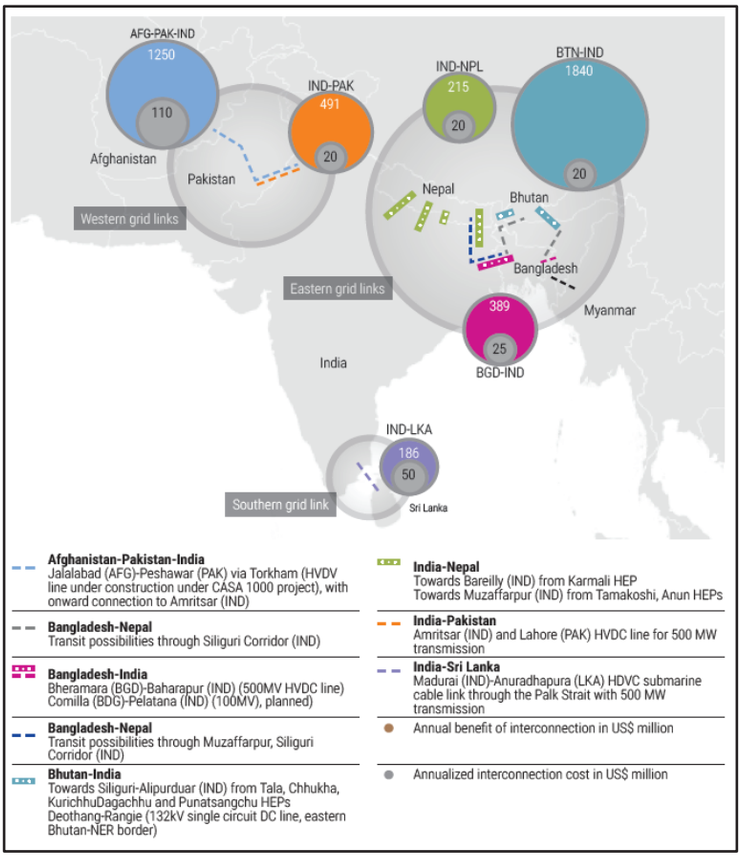
- Located in the tropics, the region receives abundant sun light averaging over 5 kwh/m2/day. Owing to its unique geography, the region is rich in a variety of renewable energy resources. Himalayan nations Nepal and Bhutan are rich in hydro resources (350 GW), of which only 18% has been tapped (SARI, 2021). Bangladesh has significant solar, biomass, and now wind resources while Sri Lanka has large micro hydro potential besides biomass and wind. India has rich solar, biomass, and wind potential.

REGIONAL ENERGY CO-OPERATION IN SOUTH ASIA

- South Asia has a long history of regional energy cooperation and cross border energy trade. Energy commerce across borders and energy collaboration in South Asia stretch back to the 1950s and 1960. In 2014-2015, a first-of-its-kind regional agreement in the region, the SAARC Framework Agreement on Energy Collaboration, was signed in 2014–2015 and cleared the way for fostering cross-border energy trade and cooperation in the South Asian region. Since then, Guidelines for Import/Export (Cross Border) of Electricity, Central Electricity Regulatory Commission (Cross Border Trade of Electricity) Regulations, and Procedure for Approval and Facilitating Import/Export (Cross Border) of electricity have each been released by the Ministry of Power, Government of India, Central Electricity Regulatory Commission, and Central Electricity Authority, respectively, to facilitate cross border electricity trade. The draft legislation to amend Electricity Act of India also contains encouraging provisions on cross border electricity trade. Another regional framework agreement on grid interconnection amongst the BIMSTEC countries has been signed in 2018.
- However, despite the many inherent benefits, the region has moved little beyond bilateral co-operation between India and Nepal and India and Bhutan in exploiting the hydro resources. In 2019, Bhutan exported 80% of its hydro energy to India and earned USD 87.58 million while India benefitted by ensuring that its citizen connected to the northern grid were ensured reliable power. Bangladesh

currently imports power from India mostly through a 1,000-MW high-voltage DC interconnection.

- Additional high-voltage interconnections are planned between India, Nepal and Bhutan. A trilateral power trade initiative involving Nepal, India and Bangladesh is under active stage of discussion and finalisation. This initiative will enable Bangladesh to import around 500 MW of hydropower from Nepal through India.



Economic costs and benefits of interconnectors in South Asia
Source: UNESCAP, 2018

- Cross-border electricity is traded primarily through non-market mechanisms in the region. In a significant development, cross-border electricity trade in the South Asia region through a market mechanism i.e., Power Exchange (PX) has started with Nepal (April 2021) followed by Bhutan's (Jan 2022) participation in the Indian PX platforms. Electricity price discovery through PX platforms is transparent and highly competitive, thereby offering best value of procurement of electricity for consumers.

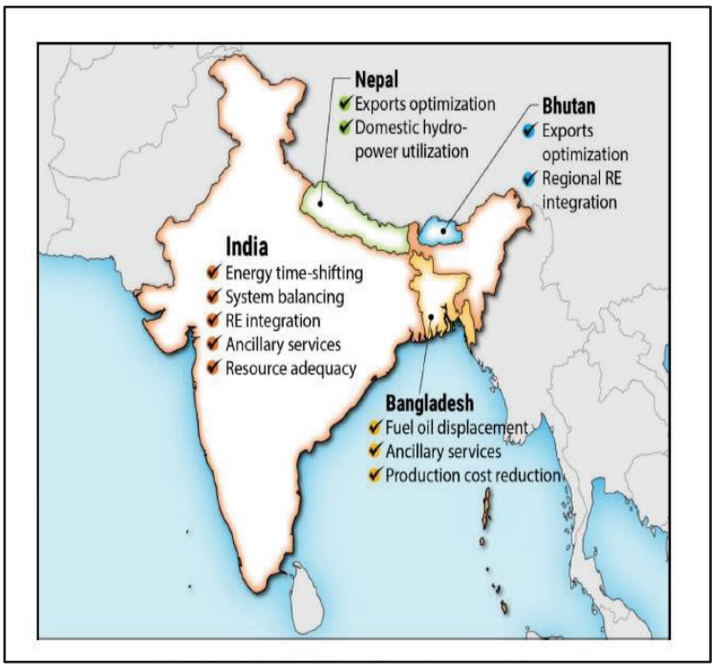
- A number of detailed studies have established that the whole region of the South Asia will benefit in multiple dimensions by expanding the current bilateral agreements to multilateral collaborations. NREL, a leading research organization, and South Asia Regional Energy Initiative, a multi-year energy research program, have argued that an institutionally coordinated approach in the South Asian region can help the countries to achieve their renewable energy targets in a more cost-effective way and for long term sustainability of cross border energy trade and regional energy cooperation. Some specific examples are given below:

Bangladesh Bhutan India Nepal (BBIN) region

- The region, as a whole, will benefit from cost efficiency gains in power supply, resilience of the power system, and accelerated gains in clean energy adoption. The diversity of the resource intensive pockets distributed across the region is better matched with the heterogenous demand profiles in the region if the national power systems operate at the scale of the entire region.

- According to UNESCAP (2018), regional energy co-operation could reduce the installed capacity demand by 35 GW in India, 13 GW in Pakistan and 11 GW in Bangladesh during 2015- 2040, while reductions of 52 GW, 9 GW and 4 GW could be expected in Nepal, Bhutan and Afghanistan, respectively

- Costs per unit of electricity generated in the region can decrease by 5.4% with improved coordination across the system. With increased internal coordination, the BBIN region can also export more power to the rest of India. With the help of an independent system operator power production costs can see further 1.1% reductions.



Region wise value offerings of energy storage
Source: NREL, 2020

- Installation of additional energy storage strategies can deliver multiple benefits across the region including cost effective exports and imports at strategic times, maximizing revenue generation. Map shows the benefits that are possible to accrue in different countries of the region.

- SARI study finds that combining hydro power with other renewable energy sources such as solar and wind and increase reliability as well as reduce costs for the transacting countries. Further, increased power volume will improve cost recovery as well increase renewable energy integration into the grid.

Bangladesh

- Bangladesh an agriculture intensive country with little land to spare can benefit by importing cheap renewable power from the continent. Specific calculations found by NREL (2020) study:
  a. Importing 1 GW of Tamil Nadu (India) wind power replaces 3.4 TWh of domestic generation annually at a savings of USD 175 per MWh replaced
  b. Importing 1 GW of Tamil Nadu (India) solar power replaces 1.5 TWh of domestic generation annually at a savings of USD 158 per MWh replaced
  c. 1 GW of Nepal hydropower offset 5.5 TWh domestic generation annually in Bangladesh at a savings of USD 168 per MWh for the energy replaced

Sri Lanka

- In Sri Lanka, NREL studies found that by sourcing 1 GW wind power from other countries in the region, Sri Lanka can witness a decrease in power production cost by 29% and emission reduction by 21%. Other key findings from the NREL study show:

a. Importing 1 GW of Tamil Nadu wind power replaces 3.2 TWh of domestic generation annually at a savings of USD 62 per MWh replaced

b. Importing 1 GW of Tamil Nadu solar power replaces 1.6 TWh of domestic generation annually at a savings of USD 80 per MWh replaced

Nepal

- An integrated and coordinated regional power market can help Nepal achieve economically beneficial balance between import and export. Further, if the current regulatory and market functioning challenges are addressed, the NREL (2020) studies find that annual exports from India to Nepal could triple, hydro curtailment in Nepal could reduce and power supply costs in both the countries could decrease.

CHALLENGES AND WAY FORWARD

- Political will and long-term relationships amongst countries are one of the biggest challenges in achieving an optimum level of regional co-operation. Formal and informal networking and dialogue on regional power cooperation can be one way of mitigating political roadblocks and bureaucratic delays.
- Several regions have initiated work on regional power co-operation (see image below). The power co-operation takes the form of integration of grids, preparation for regional power market, uniformization of regulations, coordination fora among others. The European regional grid and power market is the most advanced example of energy cooperation at the moment and shows the way forward.
- Bilateral energy trade engagement will not be adequate in the context of climate change and energy transition challenges being faced; therefore, engagement has to be multilateral going forward in the South Asia region.

Examples of institutions established for regional energy cooperation