Prospects of Inter-Regional Power Trade Among the South Asia (SA) and the Southeast Asia (SEA) Region

Jyoti Parikh 13th March, 2024
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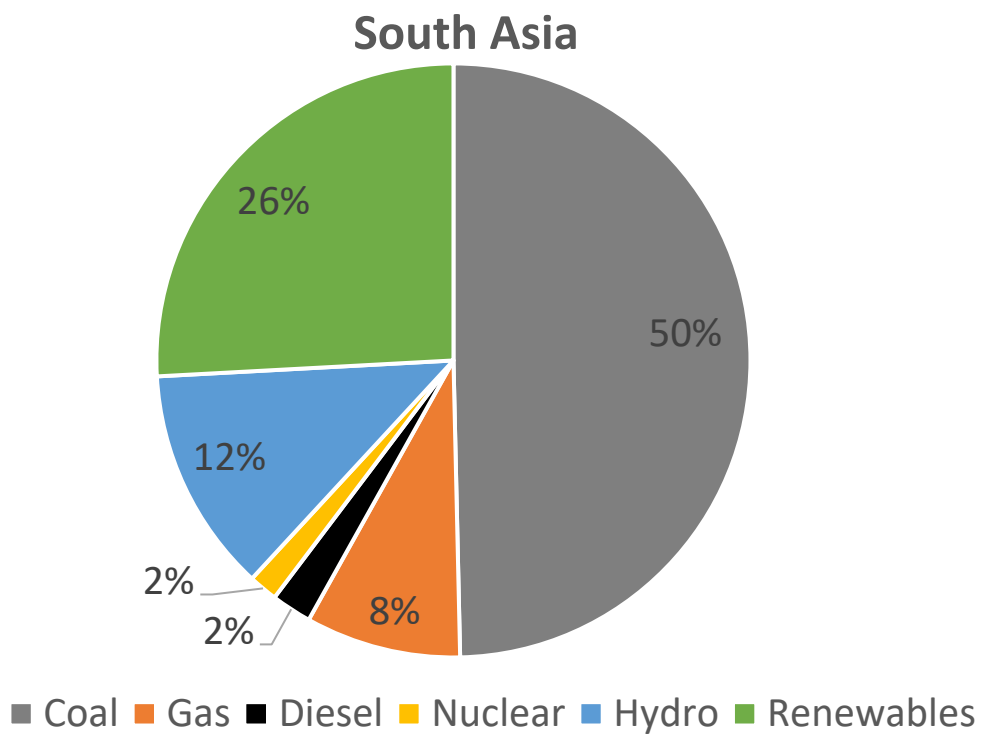
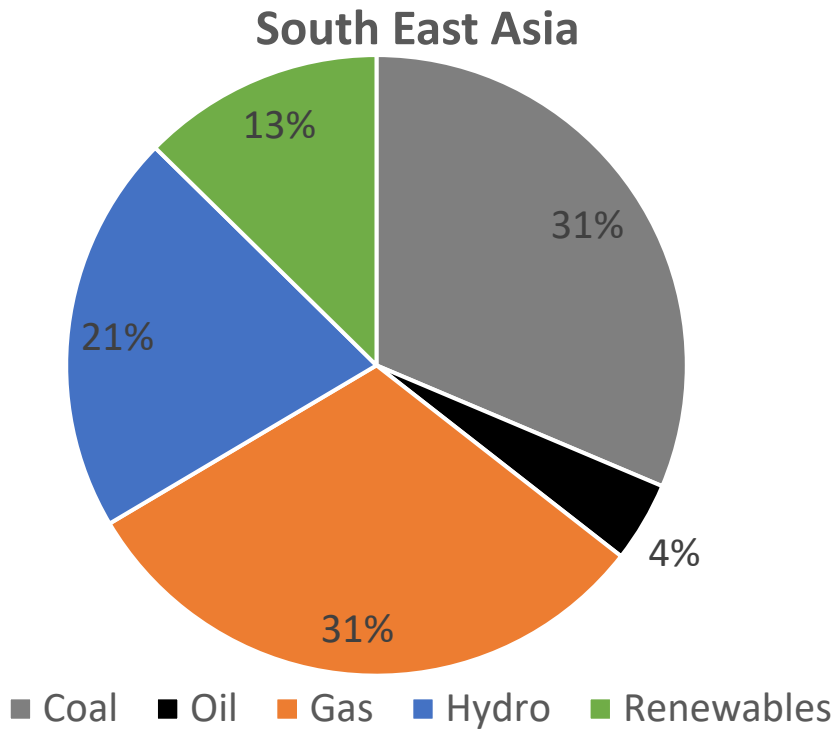
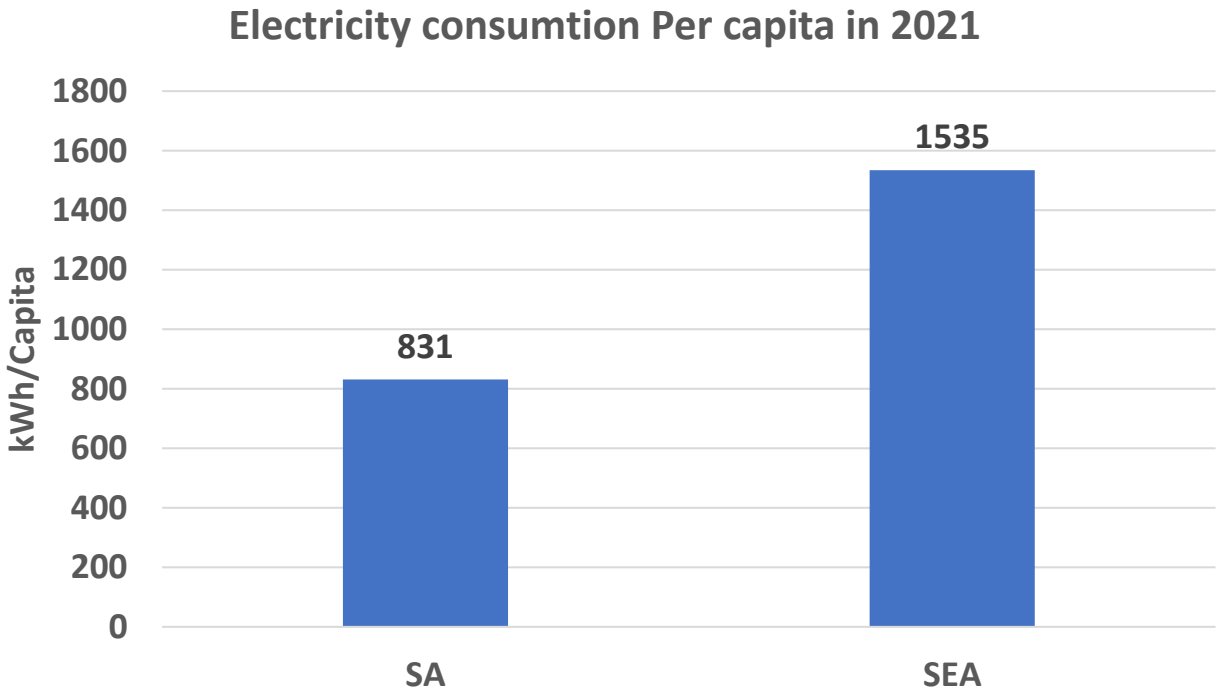
Current Status of Electricity Sector in SA and SEA Region

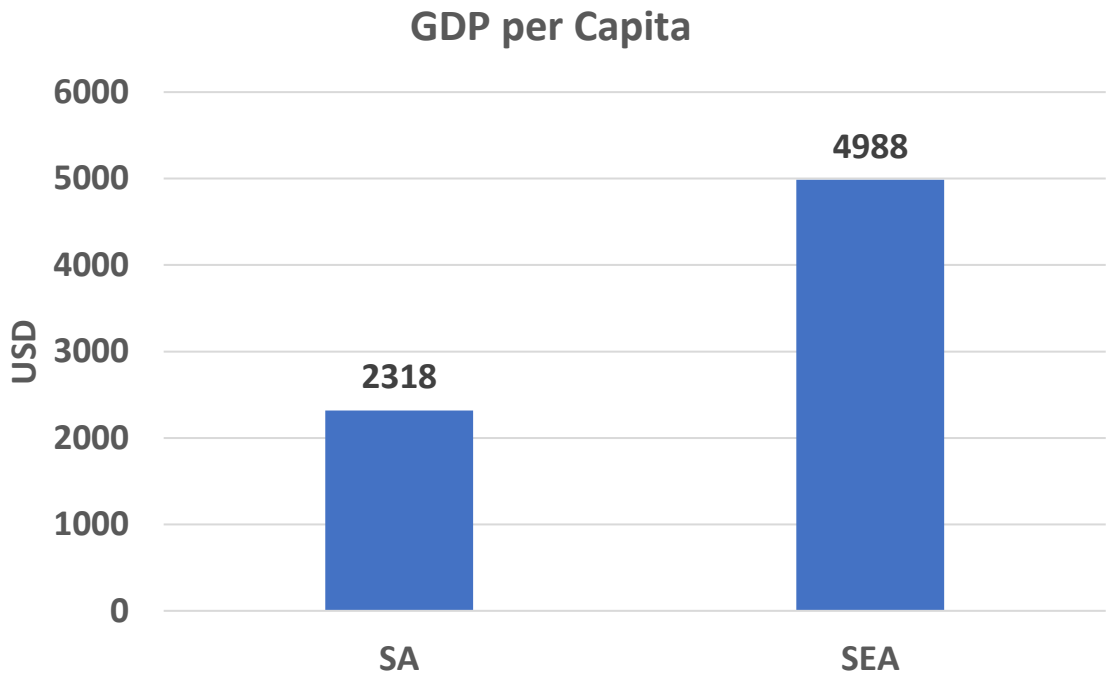




Electricity Sector		
	SA	SEA Region
Installed Capacity (GW)	430	286
Generation (TWh)	1767	1161
Consumption (TWh)	1324	1039

Per capita Electricity Consumption





- The CAGR of GDP in the last decade was 5% in South Asia and 4% in SEA
- The World average of Per capita electricity consumption is approx. 3200 kWh/capita. The per capita electricity consumption is far below than the world average in both regions.
- Both regions need to find solutions on both fronts i.e. demand side and supply side.
- Since the transmission lines are easier to put up, regional cooperation can lead to a clean energy transition and adequate power generation faster and at lower system costs.

The compelling reasons for clean energy transition with a focus on the power sector are:

a) To decrease reliance on imported fossil fuels viz; coal, oil, and gas,

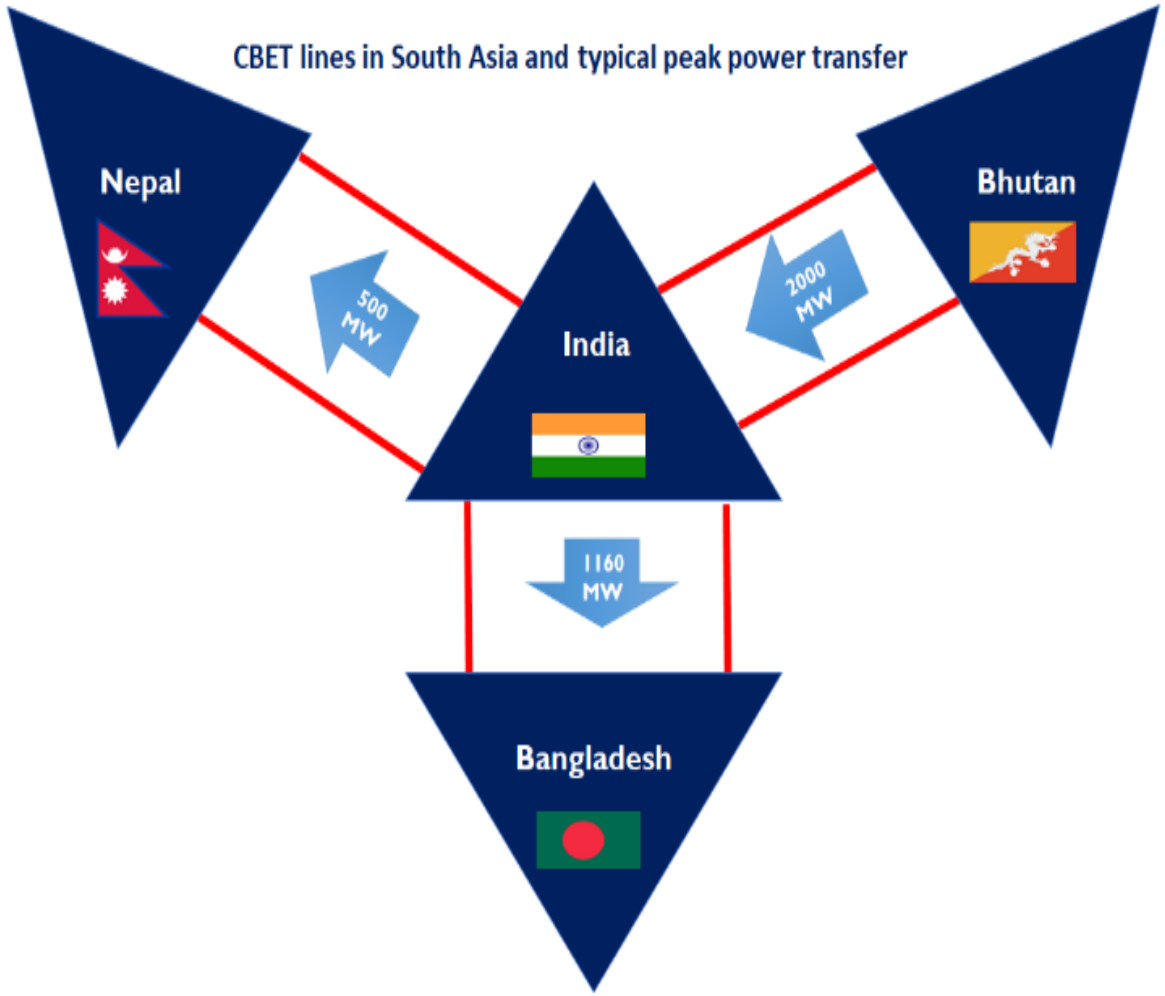
b) The uncertainties of availability and prices

c) To fulfil the NDC mandate to reduce greenhouse gas (GHG) emissions for climate mitigation;

d) The cross-border power trade can optimize generation costs capacity, and reduce fossil fuel consumption, and CO2 emissions

e) For fast-growing economies, it reduces the delays that happen due to want of infrastructure

Presently available Cross Border Transmission Corridor and envisaged capacity in future



Present Transmission Capacity in BBIN Region		
Interconnections	Present Capacity (MW)	Future Capacity (MW)
India-Bhutan	2070	4290
India-Bangladesh	1160	1160
India-Nepal	1000	2800
Total	4230	8250

Existing Transmission Connections in SEA region			
Laos – Thailand		Laos – Vietnam	
1	Vientiane – Nong Khai	18	Xekaman 3 – Thanmy
2	Pakxan – Bueng Kan	19	Xekaman 1 – Pleiku
3	Thakhek – Nakhon Phanom	Cambodia – Vietnam	
4	Savannakhet – Mukhadan	20	Chau Doc – Phnom Penh
5	Bang Yo – Sirindhorn	Laos – Cambodia	
6	Na Bong - Udon Thani 3 50	21	Ban Hat – Khamponsalao
7	Nam Theun 2 – Savannakhet, Rot Et 2	Thailand – Cambodia	
8	Hoouay Ho – Ubon Ratchathani 2	22	Watthana Nakhon – Siam Preap
9	Thakhek – Nakhon Phanom 2	Thailand – Malaysia	
10	Houay Ho - Ubon Ratchathani 2	23	HDVC Khlong Ngae – Gurun
11	Hongsa – Nan	24	Sadao – Bukit Keteri/Chuping
12	Xaiyaburi – Thali	Malaysia – Singapore	
13	Thanaleng – Nong Khai	25	Plentong – Senoko
14	Phone Tong – Nong Khai	Malaysia – Indonesia	
15	Pakbo – Mukdahan 2	26	Mambong – Bengkayan
16	Xe-Pain Xe-Namnoy – Ubon Ratchathani 3		
17	Bangyo – Sirindhorn 2		

Drivers of Power Trade

Medium-Term Trade Drivers

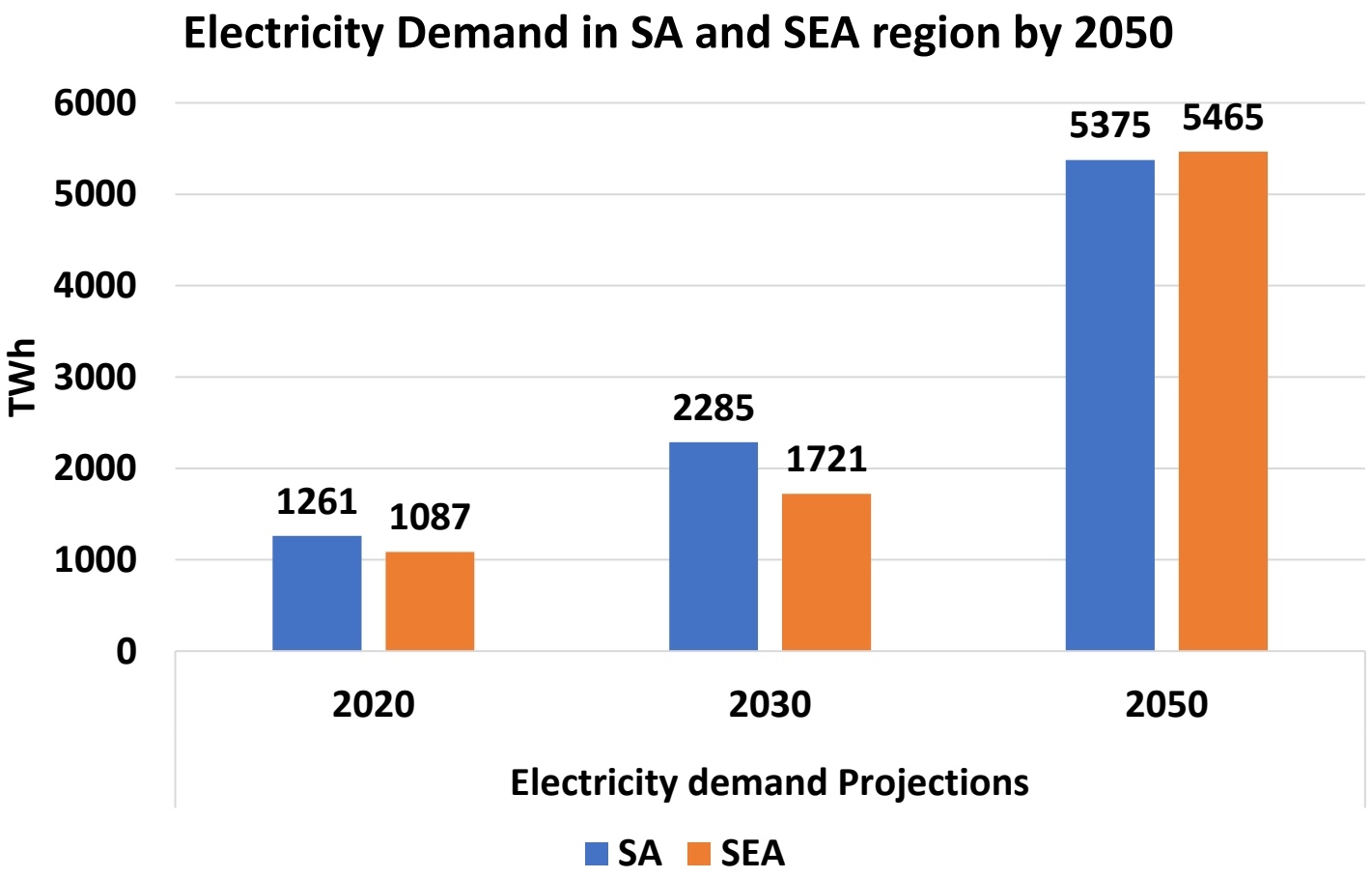
- Installed Capacity: Adequate, Deficit or Surplus
- Composition of Power Sources, and time period of availability
- Infrastructure and power maintenance
- Price Difference
- Time Difference
- Nature of Load Curve

Long-Term Trade Drivers

- Demand growth
- Resource Potential: Fossil and Non-Fossil
- Environmental and Development Goals
- Availability of Infrastructure
- Investment for growth

Drivers for Power Trade

- Driver 1: Electricity Demand

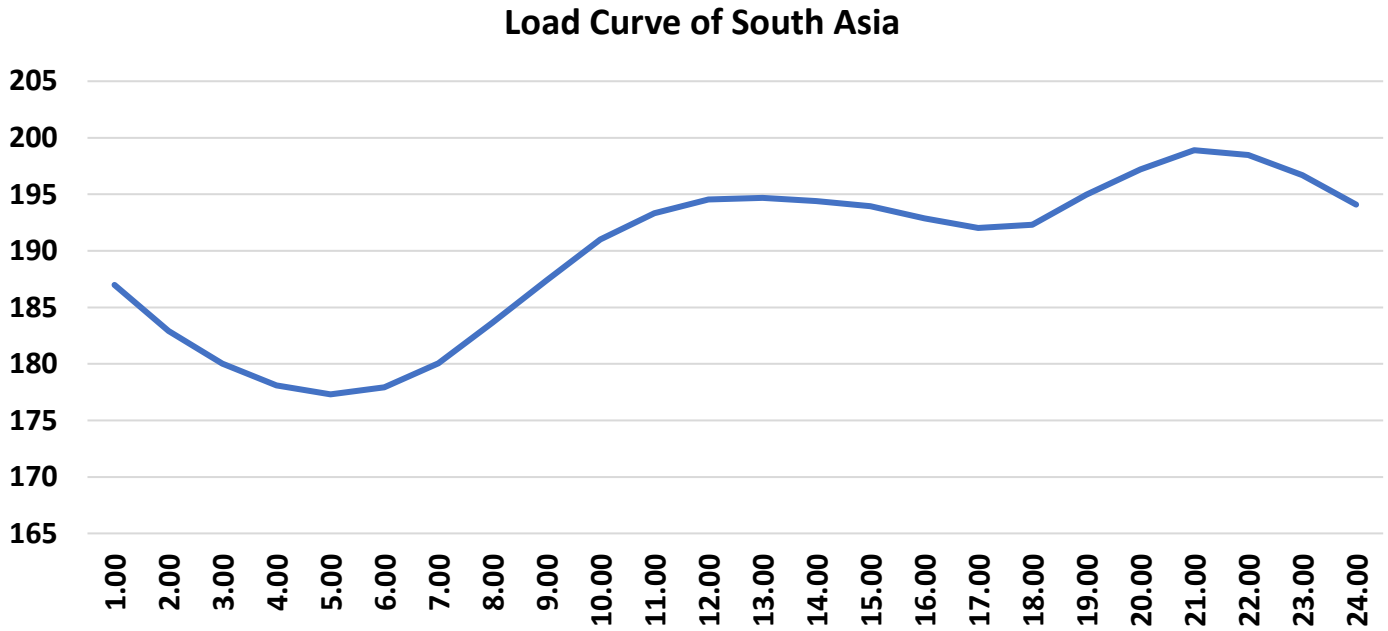


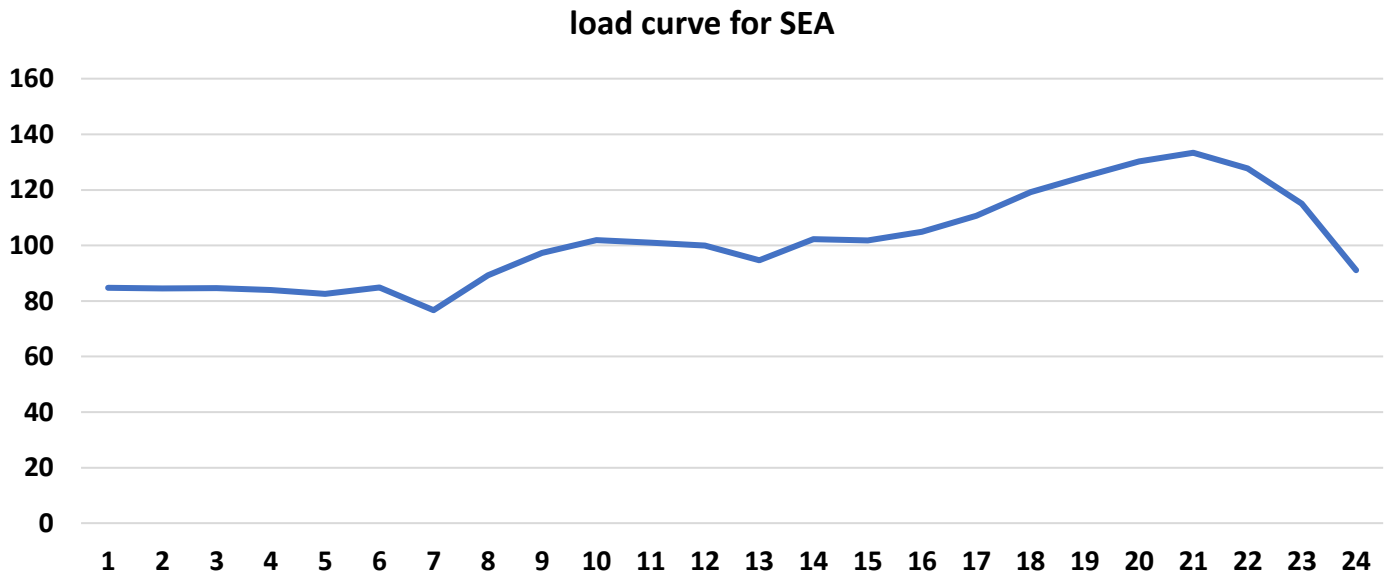
The Seasonal Nature of Demand

- The power demand is driven by high Economic growth rates
- The seasonal demand for electricity influences the amount of energy.
- Disperse allocation of energy resources
- Energy demand is not necessarily seasonal but also vary within a day.

Seasonal Diversity

- In Nepal and Bhutan energy requirements increase in winters and need supply from India when the rivers are frozen.
- In summers, hydropower could be exported to India and Bangladesh.
- The seasonal differences are not large among the SEA countries. Therefore, resource allocation is the key player of power trade among these countries.





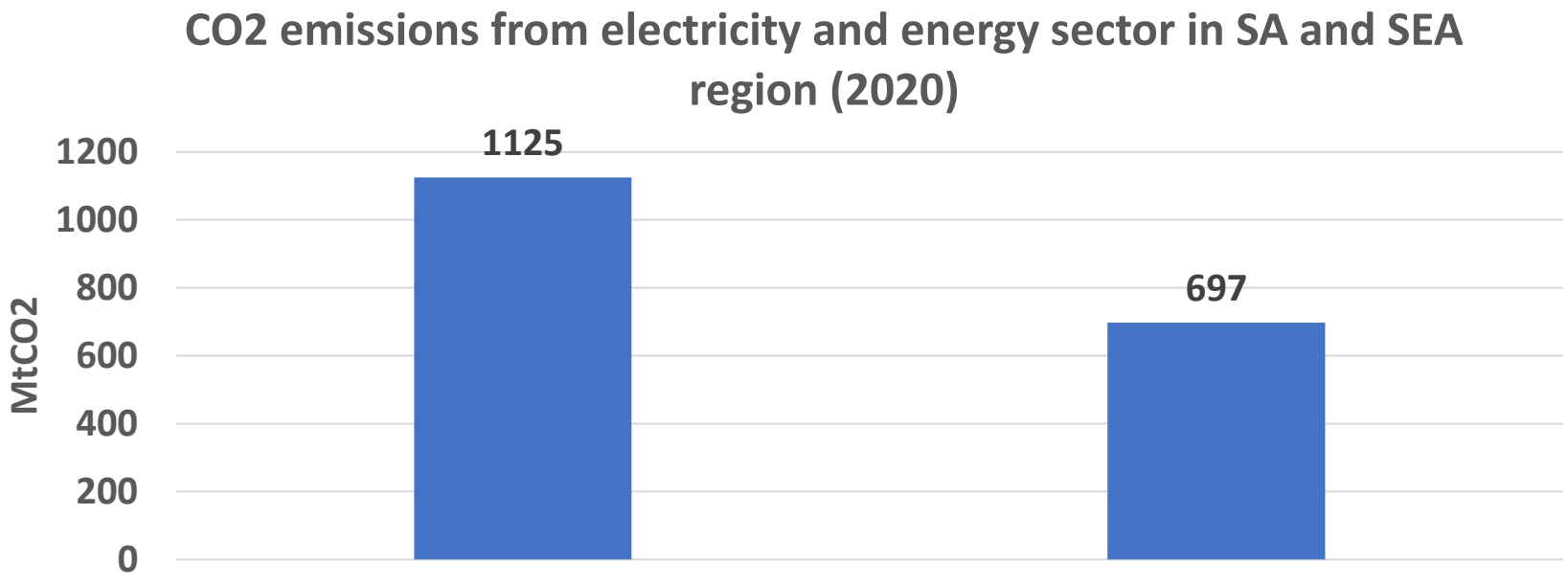
- Driver 2: Resource Potential

	South Asia		South East Asia	
GW	Total Potential	Tapped Potential	Total Potential	Tapped Potential
Solar	772.8	54 (7%)	15602.7	23*
Hydro	275.3	52 (19%)	261	60 (23%)
Wind	309.4	40 (13%)	1256	3*
Total	1357.5	146 (11%)	17119.7	86 (1%)
*** Almost negligible**				

- Driver 3: Time Diversity

Time differences among the SA and the SEA countries with reference to the Coordinated Universal Time (UTC) zone			
UTC+5.00	UTC+6.00	UTC+7.00	UTC+8.00
India	Bangladesh	Cambodia	Malaysia
Nepal	Bhutan	Laos	Singapore
	Myanmar	Thailand	Indonesia
		Vietnam	Philippines
		-	Brunei

- CO2 Emissions



Geography

- Connecting Sri Lanka and Maldives with India through undersea cables has been considered a feasible option.

- Similarly in the SEA region, Indonesia and Malaysia have challenges