

Session A3: Towards an Integrated Energy Grid



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Background



- Growth in energy demand in South Asia ([World Bank, 2022](#))
- Fossil fuels account for about 80% of primary energy production in the region (two third imported)
- GHG emissions from power generation in South Asia are largest (68%) compared to emissions from other sectors
- Regional cooperation and integration can help accelerate the diversification of electricity supply resources across South Asia while enabling a greater role for renewable energy resources
- Important for energy policy makers in the region to have a shared vision for a South Asia regional electricity market that prioritizes diversifying energy sources and a transition to renewable energy

Integrated Energy Grid: Benefits



1. Seasonality
2. Energy Mix: Hydropower from Nepal and Bhutan can replace fossil fuels and balance the variable solar and wind energy in the region
3. Grid Stabilization
4. Greater Supply Reliability
5. Strengthening of mutual confidence and increased interdependence among the countries
6. Economical, Revenue Generation

Integrated Energy Grid: Benefits (Seasonality)



	January	February	March	April	May	June	July	August	September	October	November	December
Bangladesh	Green	Green	Blue	Red	Red	Red	Blue	Blue	Blue	Blue	Green	Green
India - North East	Blue	Green	Blue	Green	Green	Blue	Red	Red	Blue	Red	Red	Blue
Bhutan	Red	Red	Blue	Blue	Blue	Green	Green	Green	Green	Blue	Blue	Red
India - East	Green	Blue	Red	Red	Blue	Red	Red	Red	Red	Green	Green	Blue
Nepal	Red	Red	Blue	Blue	Green	Green	Green	Green	Green	Blue	Blue	Blue
India - North	Blue	Blue	Green	Green	Blue	Red	Red	Red	Red	Blue	Green	Green
India - West	Red	Red	Red	Blue	Blue	Blue	Green	Green	Green	Red	Red	Red
Pakistan	Green	Green	Blue	Blue	Blue	Red	Red	Red	Red	Blue	Blue	Blue
India - South	Red	Red	Red	Red	Blue	Green	Green	Blue	Blue	Blue	Green	Blue
				Low	Medium	High						

(Source: Timilsina et al. 2015. Monthly Electricity Load Profiles across South Asian Grids)

Integrated Energy Grid: Barriers



- **Economic:**
 - Absence of competitive power markets, all G-to-G experiences
- **Technological:**
 - Grid synchronization
 - Lack of national and regional transmission infrastructure (for power trading)

Integrated Energy Grid: Barriers



- **Regulatory**
 - Controlled access (not open), a significant state regulation.
 - Lack of Regional policy/regulatory framework for multilateral cooperation
- **Institutional**
 - No clear vision of regional market
 - Absence of regional institutions to monitor, implement and review the development of the South Asian power market

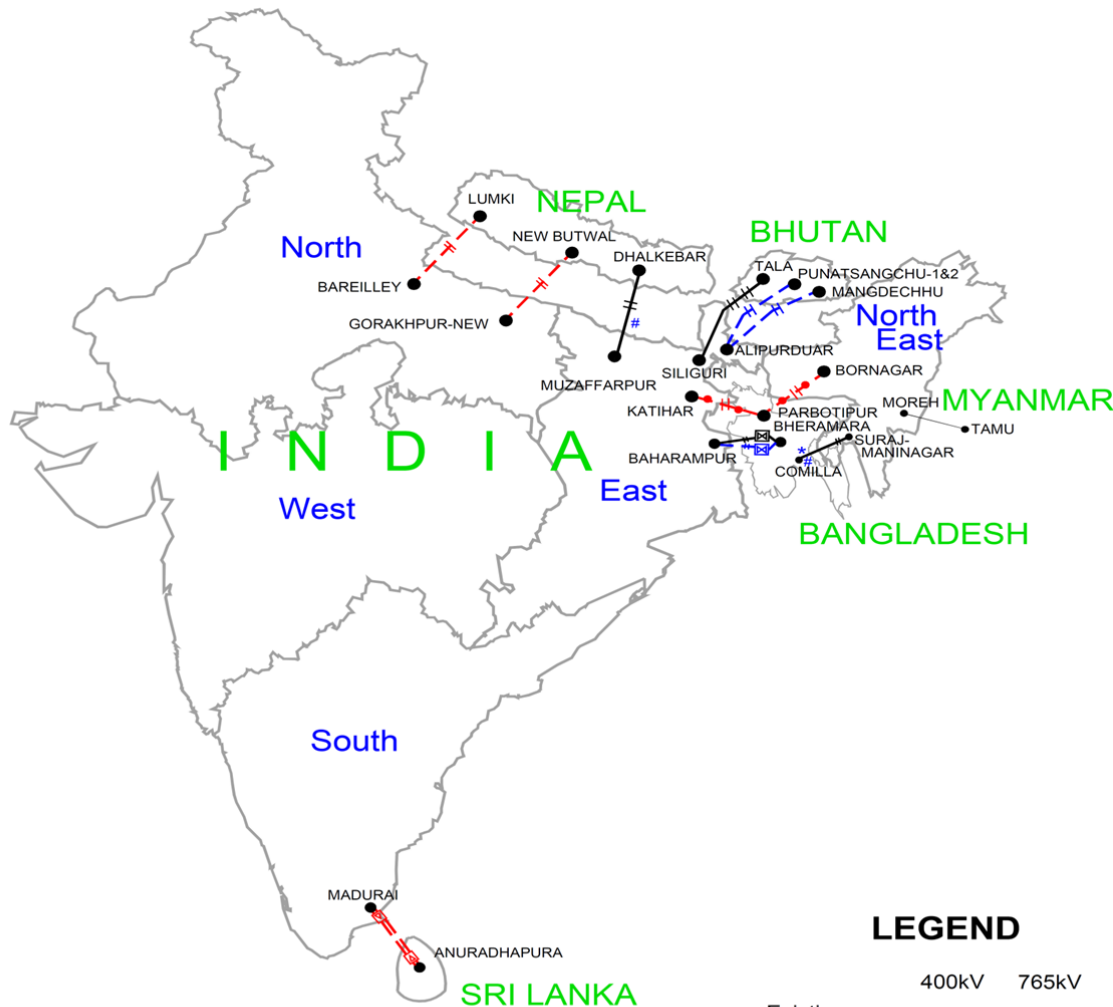
Initiatives of Power Trade



- BIMSTEC: 7 member signed MOU to explore electricity market in 2018
- Bangladesh signed MOU with NVVN (India) to import 300-500 MW from Nepal's Upper Karnali
- India's national power plan envisages 10,000 MW import by 2026/27
- Bhutan-India MOU to develop capacity to expand transmission link up to 10,000 MW export in coming years
- Bangladesh's national power plan envisages 9,000 MW import by 2030
- Bangladesh Nepal signed MOU for power trade in 2018
- Bangladesh, India and Bhutan discussing to develop 1,125 MW Dorjilung Hydropower in Bhutan

(Source: Kul Man Ghising, NEA MD's and Prof. Shovakar Dhakal's presentation on 9 Aug 2019 (AIT Alumni Association Nepal Seminar))

Cross-border Interconnections



(Source: Kul Man Ghising, NEA MD's presentation on 9 Aug 2019 (AIT Alumni Association Nepal Seminar))

LEGEND

	400kV	765kV
Existing	—	—
Under Const.	- - -	- - -
Planned	- - -	- - -

* Being upgraded to operate at 400kV along with 500MW HVDC Back-to-Back at Comilla
 # 400kV line being operated at 132kV

Cross-border Power Transfer (MW)

Interconnected Nations	Under Operation	Under Construction	Under Planning	Perspective Plan	Total
India-Bangladesh	1160	340 ¹	1000 ⁴	-	2500 [@]
India-Bhutan	1350	2900 ²	-	23500	27750
India-Nepal	550	800 ³	3000 ⁵	25000	29350
India-Sri Lanka	-	-	1000 ⁶	-	1000
India-Myanmar	2-3	-	-	-	2-3
India-Pakistan	-	-	-	500	500
Total	~3060	3640	5000	49000	~61100

1: 500MW HVDC Back-to-Back at Comilla	4. Katihar (India) – Parbotipur (Bangladesh) – Bornagar (India) 765kV D/c line
2: Punatsangchhu-I (1200MW), Punatsangchhu-II (1050MW) & Mangdechhu (720MW) HEPs	5. New Butwal (Nepal) – New Gorakhpur (India) & 2 nd Muzaffarpur (India) – Dhalkebar (Nepal) 400kV D/c (Quad) lines
3: 400kV operation of Muzaffarpur-Dhalkebar (presently operated at 220kV)	6. New Madurai – New Habarana 1000MW HVDC or HVAC line

[@]Once synchronous system is agreed there may be many more interconnections of much higher capacity.

(Source: Kul Man Ghising, NEA MD's presentation on 9 Aug 2019 (AIT Alumni Association Nepal Seminar))

Way Forward



- Moving from bilateral trade to third party access
- Build regional trust and political will
- Build one trusted independent center to provide reliable information/support/ coordinate for the region. Example : ASEAN Centre for Energy (provide information, technology and expertise)
- Involve financial institutions such as ADB, World Bank – build Regional Investment Framework
- Build/demonstrate few GOOD showcase models of activities/project of regional cooperation to build greater confidence



Thank you !!!