

Energy resources, power system structure and capacity in South Asia



Priyantha D C Wijayatunga, PhD
Principal Energy Specialist
Asian Development Bank

Regional Energy Trade Workshop
8-9 September 2014
ADB Headquarters, Manila



ADB



Outline

- Primary energy sources
- Electricity supply and consumption
- Power system structure
- Transmission network
- Ongoing efforts
- Final Remarks



Energy Resources

Nepal & Bhutan:
Large hydropower
potential, no fossil fuels,
Significant solar, Wind
potential

India: Coal and gas
reserves,
Large hydropower
potential, Significant
renewable energy
potential

Bangladesh: Gas and
Coal reserves, Off-shore
reserves yet to be
explored

Maldives: No
commercial energy
sources; heavy
reliance on oil,
significant solar
potential

Sri Lanka: No fossil
fuels, small potential
hydropower, possibility
of off-shore gas/oil

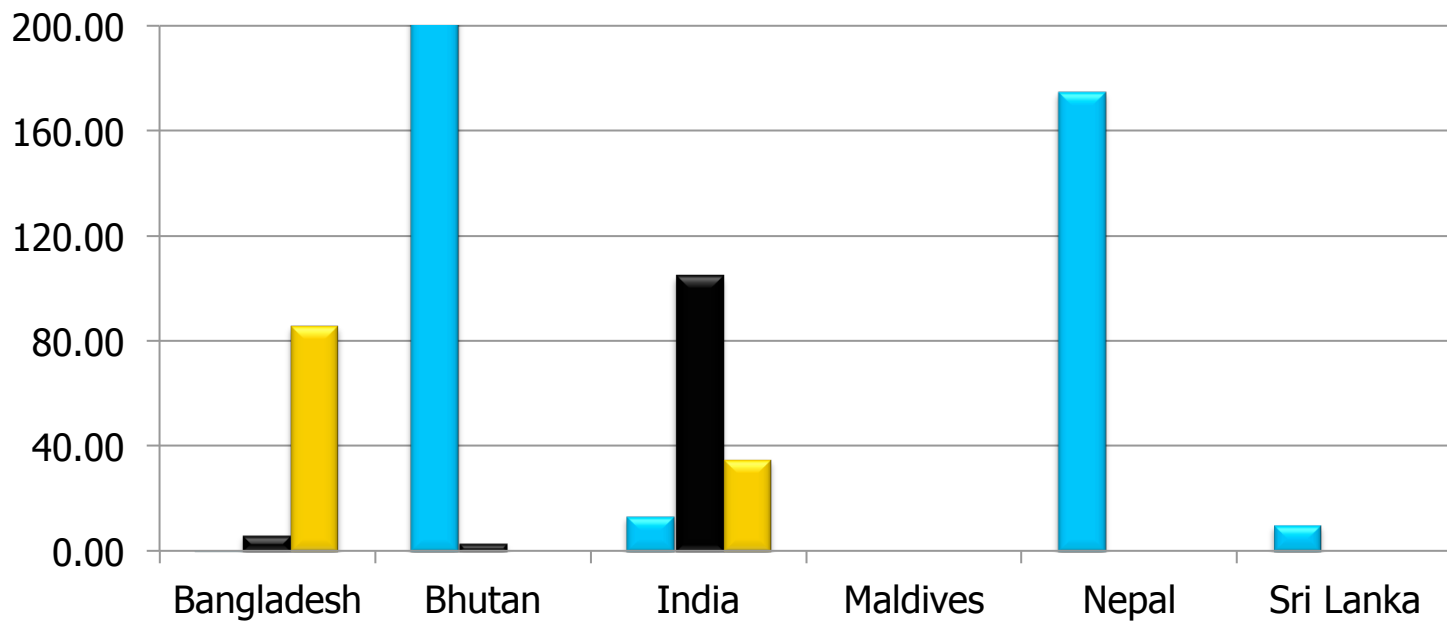


Estimated resources

Countries	Coal	Oil	Natural Gas	Hydro
	Million Tons	Million Barrels	tcf	MW
Bangladesh	884	12	12	330
Bhutan	2	0	0	30000
India	117000	5700	39	150000
Maldives	0	0	0	0
Nepal	0	0	0	42000
Sri Lanka	0	150	0	2000
Total	117886	5862	51	224330

Energy Resources

Per Capita Resources



■ Hydro (MW per 100,000 persons)

■ Coal (tons per person)

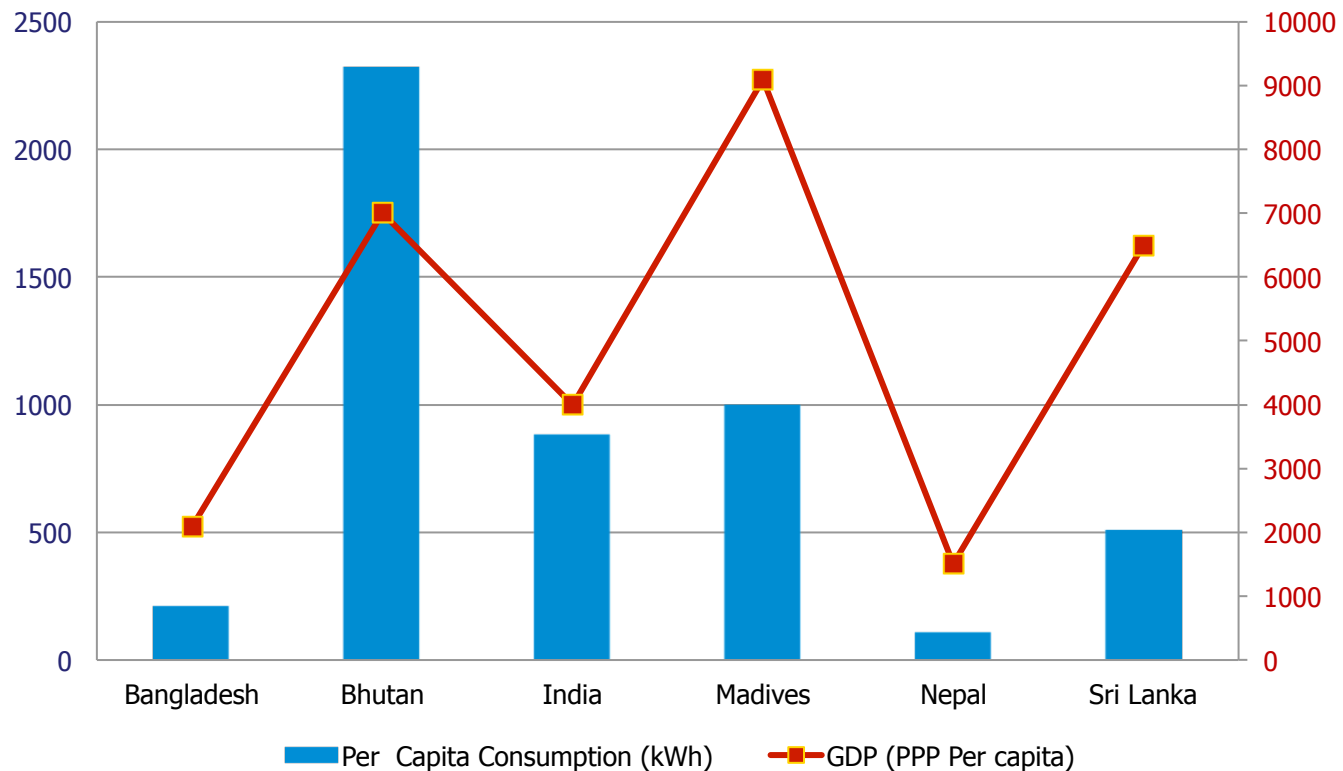
■ Gas (bcf per million persons)



Energy Resources

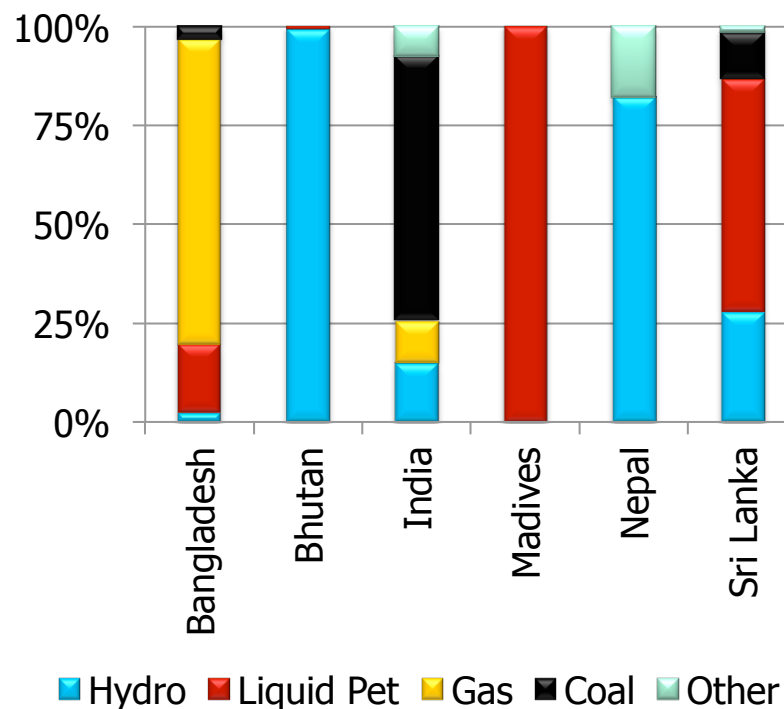
- Estimated total reserves/potential is more
 - India's total coal reserves 293 billion tons including inferred and indicated reserves
 - Some estimates India's hydropower potential to be over 300,000MW
 - Hydropower technical potential in Nepal and Bhutan can be as high as 110,000MW
 - Bangladesh off-shore gas/oil reserves not counted
 - No indication of Sri Lanka's off-shore gas/oil reserves

Electricity Consumption & GDP

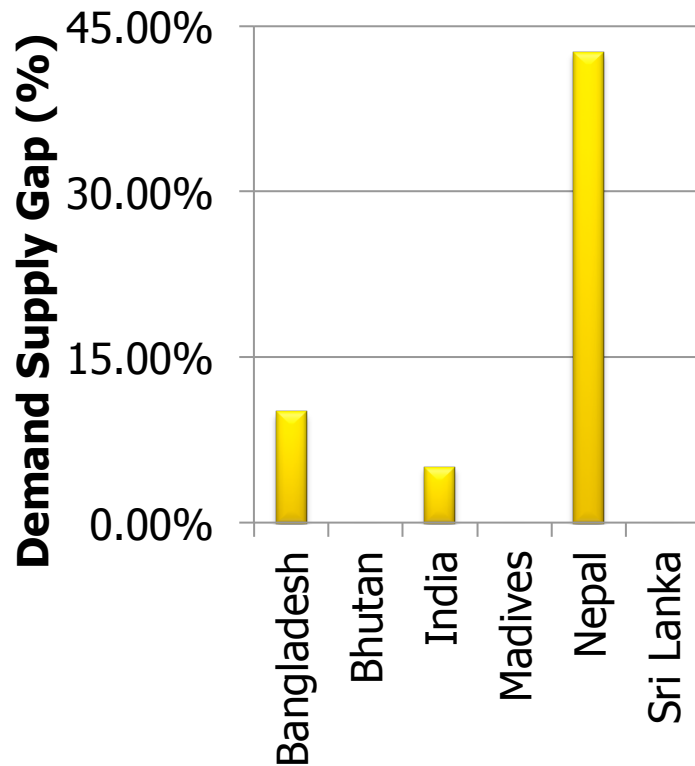


Electricity Supply Composition

	Hydro	Liquid Pet	Gas	Coal	Other
Bangladesh	2.45%	17.30%	77.08%	3.17%	0.00%
Bhutan	99%	1%	0%	0%	0%
India	14.90%	0.40%	10.50%	66.70%	7.50%
Madives	0%	100%	0%	0%	0%
Nepal	82.11%	0.04%	0.00%	0.00%	17.86%
Sri Lanka	27.67%	59.13%	0.00%	11.76%	1.44%



Demand Supply Gap



- Rapid growth in demand
- Inadequate installed generation capacity
- Seasonal water flows
- Absence of storage
- Inadequate fuel supplies
- Poor availability of generation plants
 - Lack of proper maintenance



Power System Structure

Country	Unbundling	Energy Regulator	Regional energy trade
Bangladesh	Largely unbundled	Bangladesh Energy Regulatory Commission (BERC)	Regional energy trade recognized as an option for increasing energy availability
Bhutan	Partially unbundled	Bhutan Electricity Authority (BEA)	Regulations in place for promoting open access
India	Unbundled	Central (CERC) and State regulators	Regulations for open access and third party access in place
Maldives	No	Maldives Energy Authority	No particular mention of regional energy trade
Nepal	No	Only consumer tariff regulator Electricity Tariff Fixation Commission (ETFC)	Hydro Policy 2001 recognizes scope of regional energy trade
Sri Lanka	No	Public Utilities Commission of Sri Lanka (PUCSL)	Regional energy trade recognized as a measure for enhancing energy security



Transmission network

- Bhutan-India
 - Strong cross-border links
 - Bhutan network needs strengthening
- Bangladesh-India
 - 500MW link commissioned
 - Bangladesh network needs strengthening
- India-Nepal
 - Nepal network needs strengthening
 - Low capacity cross-border links
- India-Sri Lanka
 - No cross-border links
 - Country network needs strengthening



Ongoing efforts

- Large hydropower development in Bhutan
- Similar efforts in Nepal
- Increasing emphasis on coal power development
 - Region to add over 65000MW of coal power next 5-6 years
 - India, Bangladesh, Sri Lanka
- Increasing interest and focus on wind and solar power Development
- Cross border transmission development
 - Bhutan-India, Bangladesh-India, India-Nepal, India-Sri Lanka



Final Remarks

- Power trading agreements or nondiscriminatory access to the power market(s)
 - ConditionsTaxes and duties?
- Adequate cross-border and in-country transmission infrastructure capacity
 - Responsibility?
 - Transmission planning for cross-border trade
- Open access to transmission services
 - Separating transmission services
 - Avoid opportunity for cherry-picking
- Regulatory oversight on cross-border transactions
 - South Asia Forum of Electricity Regulators



Final Remarks

- Gradual opening up of trade
 - Selective development initially?
 - Open access
- Separating power trading from utilities
 - Pooling of power
 - Regulated



Thank you

Priyantha D C Wijayatunga
E-mail: pwijayatunga@adb.org