Global Journals LaTeX JournalKaleidoscope™
Artificial Intelligence formulated this projection for compatibility purposes from the original article published at Global Journals. However, this technology is currently in beta. *Therefore, kindly ignore odd layouts, missed formulae, text, tables, or figures.*

Power Grid Interconnection of South Asian Region to Retain Sustainable Energy Security and Figure Out The Energy Scarcity

Dr. Khizir Mahmud[1]

[1]

Received: 13 February 2012 Accepted: 4 March 2012 Published: 15 March 2012

Abstract

South Asian region is enjoying unprecedented booming economic growth. But this booming pecuniary emergence is becoming stifled by significant shortages in energy supply. If the exigent corrective steps are not initiated and implemented, it may be arduous to sustain the achieved growth rates and overall sustainable development. The region?s political leaders and its business community are recognizing gradually the need of cross-border energy exchange and promote regional energy trade. The region has available energy resources to produce power and it should be a matured option to interconnect the entire regional grid to mitigate the power crisis. This article identifies the potential and explicates the main opportunities of the south Asian region to cope up the energy crisis through sub continental power grid interconnection.

Index terms— Bangladesh, Bhutan, Energy, India, Nepal, Power, Power Grid Interconnection, South Asia, Sri Lanka.

1 Introduction

outh Asia has undergone a growing lopsidedness between energy demand and its supply from indigenous sources resulting in increased import dependence. No South Asian country is going to be able to meet its energy needs entirely from its own domestic resources. Energy demands is growing at rate of over 6% a year which is far in excess of the region's capacity to meet **??**2]. Moreover, about 1.5 billion people and half of the regions are out of electricity **??**4]. There are a lot of natural resources of the region but distributed spatially which has created a need for regional cooperation of cross-border energy exchange especially in electricity. Power grid interconnection can be a matured option to meet energy demand which can be also a best catalyst for the development of the region. By this interconnection one country will be able to export its surplus electricity to another electricity deficient country so that both will be beneficiary. To fulfill the goal firstly a brief scenario of energy resources of the region has been depicted. In the latter part, the energy ring between the south Asian countries to solve the power scarcity has been discussed. Finally some interconnection between South Asian countries has been proposed and also depicted graphically with congruous elucidation.

Author : Chittagong University of Engineering & Technology (CUET), Bangladesh.

2 II.

3 Energy Resources In South Asian Region

South Asian region has a great potentiality in energy resources. For the scattered position a huge portion of the resources is still unused. But if the resources are used to generate power and share that by the same power grid then the region will be beneficiary in its social and economical development and overall to uplift the living standard of the citizens. India has a great challenge to meet it's proliferate energy demands. On the other hand Nepal, Bhutan, Pakistan, Myanmar and Sri Lanka face acute power shortages [3]. The region is rich in other

sources of energy which are unevenly distributed and untapped. India, Pakistan and Bangladesh have large reserves of gas and coal **??**2]. Nepal and Bhutan has a great potential of hydro-electric power [2]. To exploit the regional resources an initiative took in 2006 by launching South Asian Association for Regional Cooperation (SAARC) Energy Center in Islamabad [3] [2]. The objective of that is to facilitate and promote energy trading connecting India, Pakistan, Bangladesh, Sri Lanka, Nepal, Maldives and Bhutan to minimize the acute power shortage faced by them. Nepal and Bhutan generate 40,000 megawatts (MW) of hydro-electricity which can be exported to other SAARC countries through common grid stations **??**2]. India has already grid interconnections with Nepal and Bhutan **??**2]. If the others are connected with that grid then all will get benefits of cross-border electricity exchange and trade among the regional states, leading to optimal utilization of regional resources for electricity generation.

4 IV. PROPOSED BANGLADESH INDIA POWER GRID INTERCONNECTION

The Bangladesh economy has grown at about 6% per annum but providing electricity to less than 50% of the population [14]. The country's peak power demand is deficit and nearly 1,500 MW [14]. Moreover, about 90% power is generated by the natural gas which is the cardinal resource of the country [14]. In this backdrop an initiative has been taken to interconnect Bangladesh India power grid. This grid will establish 125 km. 400 kV double circuit cross-border link between the Bheramara of western electrical grid of Bangladesh and the Baharampur of eastern electrical grid of India [1] [7]. There will be a 400 kV switching station at Baharampur (India) and a 500 MW back to back high voltage direct current (HVDC) sub-station (400/230 kV) at Bheramara (Bangladesh) [1] [7]. The system will facilitate an initial power flow of 500MW into Bangladesh from the Indian grid with a provision to enhance the power flow to 1,000 MW.

5 VII. INDIA AND SRI LANKA PROPOSED POWER GRID INTERCONNECTION

A HVDC Grid Interconnection is a proposed to link the national grids of India and Sri Lanka. The grid will be connected from Madurai in southern India to Anuradhapura in central Sri Lanka, through the Palk Strait [7][10]. The link will be 285 kilometers in length and is proposed to exchange about 500 MW power [7][10]. Fig. **??** : Proposed India and Sri Lanka power grid interconnection [7].

6 VIII. BANGLADESH, BHUTAN, INDIA AND NEPAL PROPOSED POWER GRID INTERCONNECTION

There is a mismatch between energy demand growth and energy resource endowments in the South Asian region. Relatively smaller economies like Nepal, Bhutan and Myanmar has lots of hydropower and hydrocarbon resources which can supply to others energy demanding countries like Bangladesh, India, Pakistan and Sri Lanka. Energy exports can make significant contribution to the GDP growth of lower economies and enhance energy security to the growing economics. For instance Bhutan's electricity export in financial year 2007 is expected to constitute nearly 25 percent of its GDP and 60 percent of its state revenues **??**11]. India and Pakistan are two geographic clusters centered on the south Asia which can serve as pillars of regional integration of power system. In the Eastern zone Bangladesh, Bhutan, India, Nepal, Sri Lanka can work together to share power from the same grid.

7 CONCLUSION

The overall energy need for South Asia is prophesied to be three fold that of today within the next 15 to 20 years. Energy trade and power grid interconnection in the region can be a best reliable solution to meet up the energy deficit, sustain security and resilience of the networks. Furthermore, Reliable energy supply can act as a catalyst to alleviate poverty and achieve sustainable economic growth. The benefits of grid interconnection include pooling of generation, resulting in lower generation costs; pooling of load, for significant equalizing effects; common provisioning of reserves, resulting in cheaper primary and secondary reserve power costs; and mutual assistance in the event of disturbances. This paper's aims to provide a comprehensive, objective portrait of the South Asian electric grid, focused research and demonstration, the challenges and opportunities it is likely to face over the next decade and sharing of important data can facilitate meeting the challenges and seizing the opportunities that the grid will face.

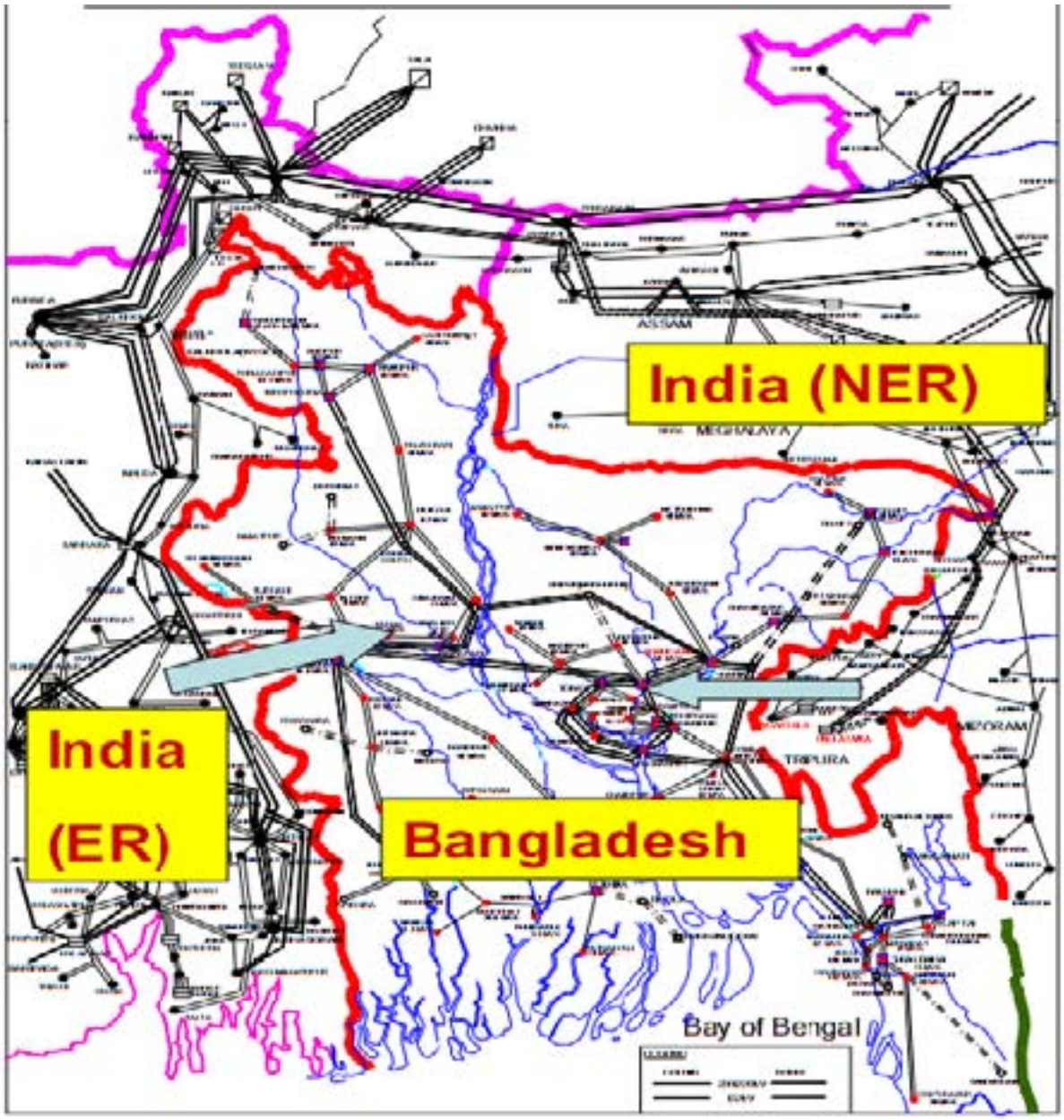
1 

Figure 1: Fig. 1 :

2

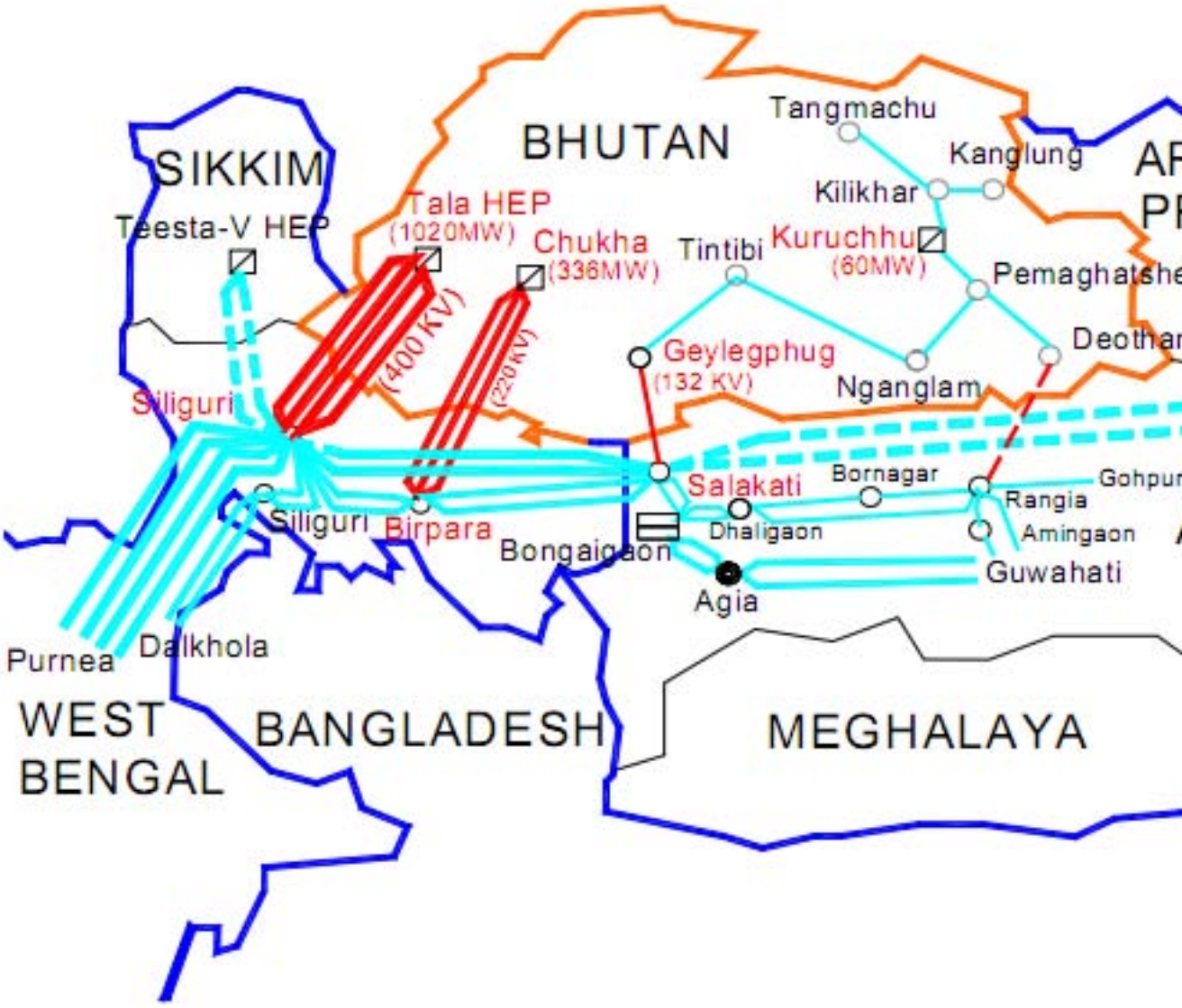
Importing Countries	Exporting Countries					
	India	Bhutan	Nepal	Bangladesh	Srilanka	Myanmar
India	-	Significant quantities of hydropower	Significant hydropower export possible	Significant amount of gas or power possible; some resource uncertainly	Some peak power support possible	Significant gas and power supply possible
Bhutan	Dry season support	-	Unlikely, similarity of resources and seasonal shortages	Small amount of thermal power and gas connection via India	No Scope	Unlikely (far off, too small market)
Nepal	Thermal power support, dry season support	Unlikely, similarity of resources and seasonal shortages	-	Small amount of thermal power and gas connection via India	No Scope	Unlikely
Bangladesh	Sharing resources; Electricity swaps	Some hydropower connection via India	Some hydropower connection via India	-	No Scope	Unlikely (Although some potential in hydropower)
Srilanka	Dry season and thermal power support	Unlikely (far off)	Unlikely (far off)	Unlikely (far off)	-	Unlikely (far off)
Myanmar	No scope	Uncompetitive	Uncompetitive	Uncompetitive	Uncompetitive	Uncompetitive

Figure 2: Fig. 2 :



34

Figure 3: Fig. 3 :Fig. 4 :



6

Figure 4: Fig. 6 :

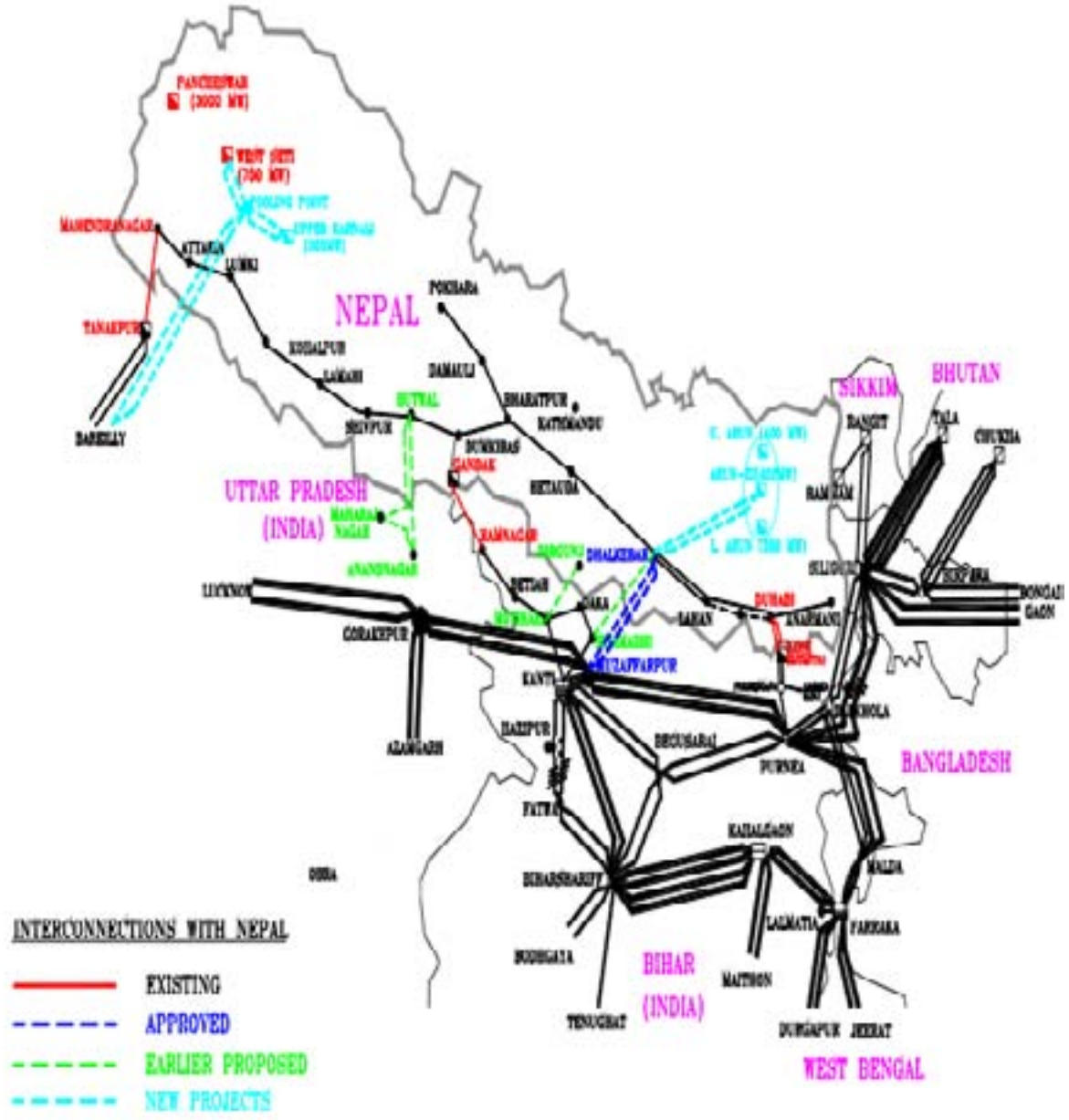
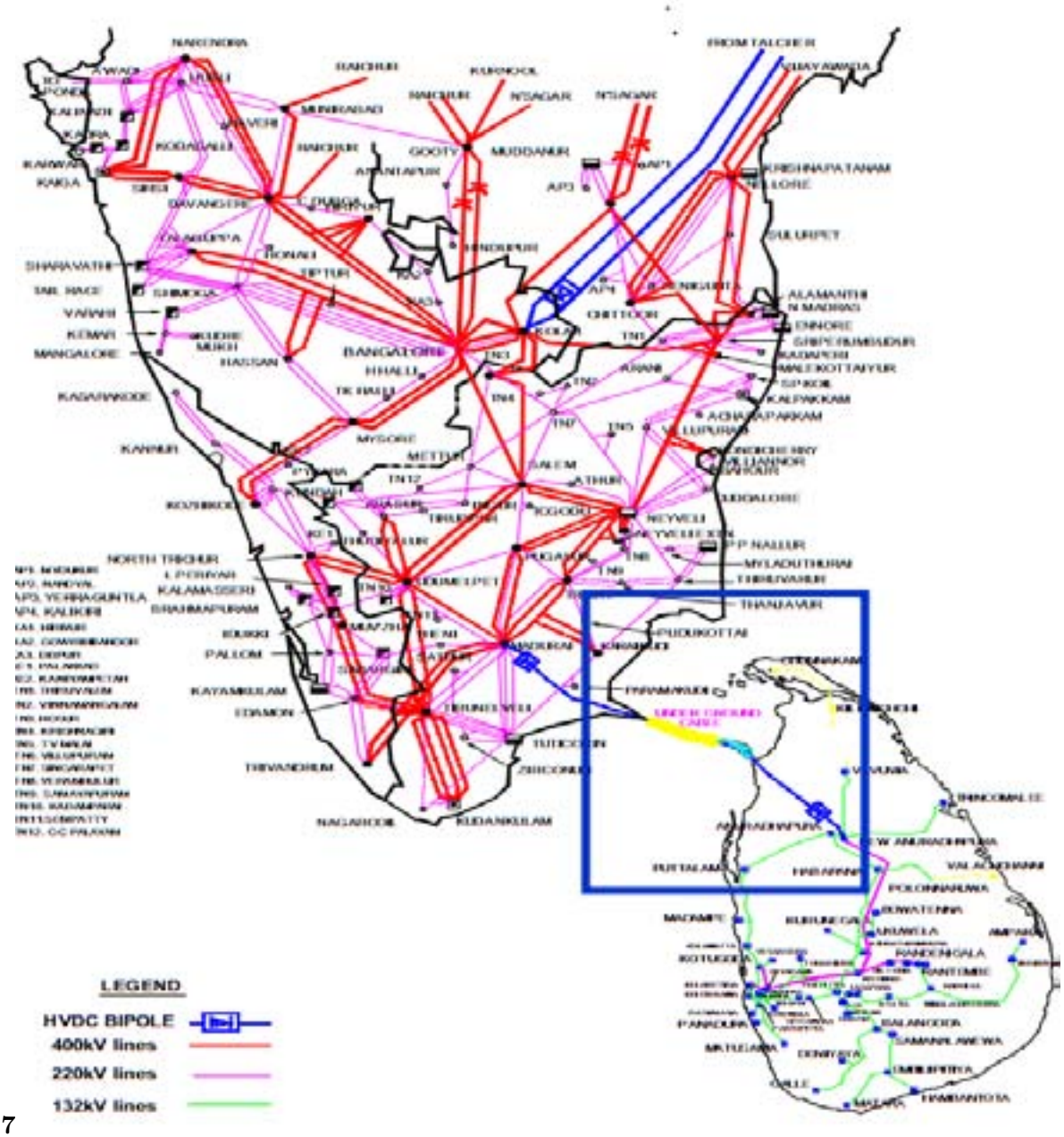
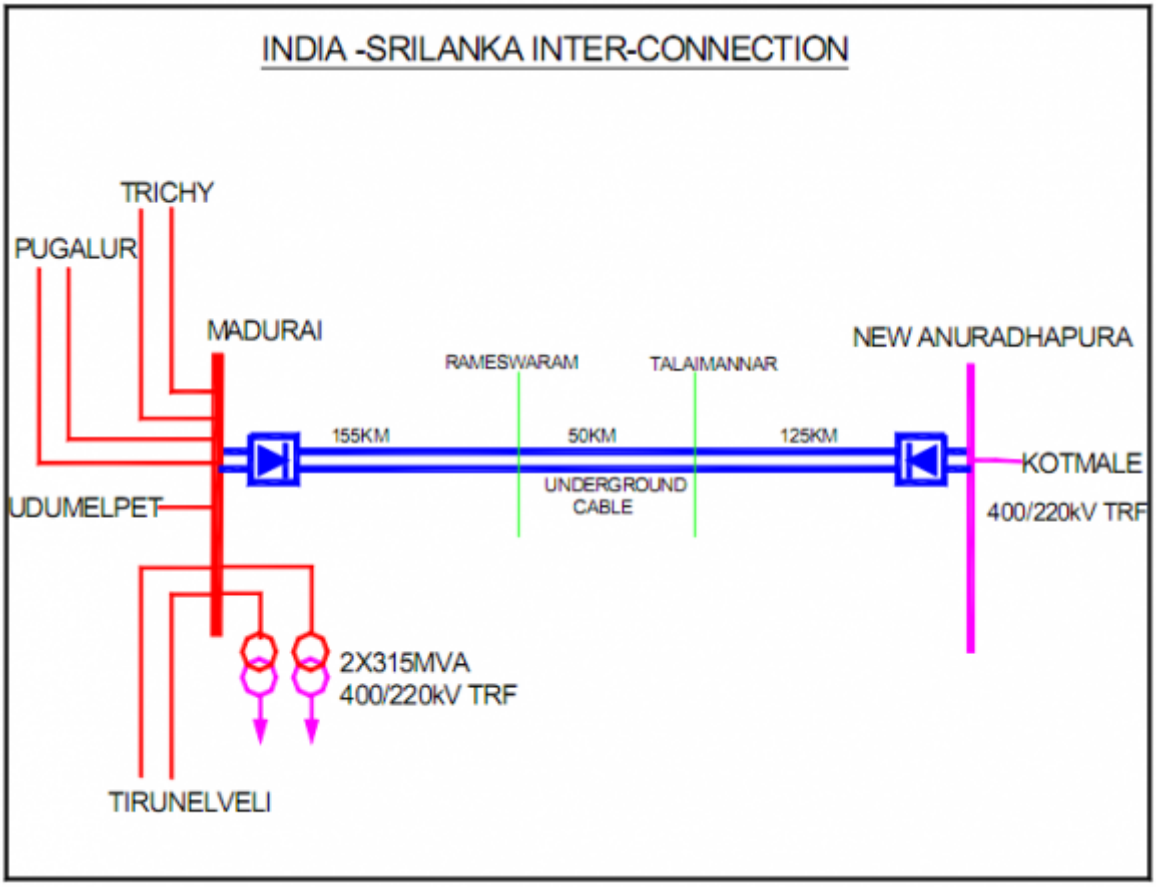

NEPAL
BHUTAN
SIKKIM
UTTAR PRADESH
(INDIA)
BIHAR
(INDIA)
WEST BENGAL
BANGLADESH
INTERCONNECTIONS WITH NEPAL
EXISTING
APPROVED
EARLIER PROPOSED
NEW PROJECTS

Figure 5:



7

Figure 6: Fig. 7 :



8

Figure 7: Fig. 8 :

1

Countries	[6][7][8][9][10] Coal (Million Tones)	Oil (Million Barrels)	Gas (TCF)	Hydro (MW)
Bangladesh	884	12	8	330
Bhutan	2	0	0	30000
India	90085	5700	39	150000
Nepal	NA	0	0	42000
Pakistan	17550	324	33	45000
Sri Lanka	NA	150	0	2000
Total	108521	6186	80	269330

III. SOUTH ASIAN ENERGY RING TO SOLVE THE ENERGY CRISIS

Figure 8: Table 1 :

[Icrch10] , / Icrch10 .

[Bangladesh Power Development Board (BPDB)] http://www.bpdb.gov.bd *Bangladesh Power Development Board (BPDB)*, (Key statistics)

[Gippner ()] 'Energy cooperation in south Asia, prospects and challenges'. Olivia Gippner . Web:www.sawtee.org *South Asia Watch on Trade, Economics and Environment (SAWTEE)* 2010.

[Energy Ring Best Option To Solve Regional Needs Global Energy Network Institute (GENI) (2012)] 'Energy Ring Best Option To Solve Regional Needs'. http://www.geni.org/globalenergy/library/technical-articles/transmission/power-engine-er/energy-ring-best-option-to-solve-regional-needs/index.shtml *Global Energy Network Institute (GENI)*, September 1, 2012. March 29, 2012. (Bangladesh-India Electrical Grid Interconnection Project) (Asian Development Bank (ADB))

[Energy Statistics in Asia and the Pacific ()] *Energy Statistics in Asia and the Pacific*, 1990-2006. ADB.

[How can south Asia promote energy trade South Asia, the world bank (2012)] 'How can south Asia promote energy trade'. http://siteresources.worldbank.org/SOUTHASIAEXT/Resources/223546-1171488994713/3455847-11750 *South Asia, the world bank* August, 2012.

[Regional cooperation integration energy: opportunity for trade South Asia, The World Bank (2012)] 'Regional cooperation & integration energy: opportunity for trade'. *South Asia, The World Bank* August, 2012. (South Asian Energy ring in discrete parts)

[Role of Energy Regulators in Guaranteeing Reliability and Security of Supply: The National, Regional and Global Dimensions S] 'Role of Energy Regulators in Guaranteeing Reliability and Security of Supply: The National, Regional and Global Dimensions'. Ref: I12-SoS-08-03. *SAARC Regional Energy Trade Study (SRETS)*, (Mandaluyong City, Philippines; Kathmandu, Nepal; Washington, D.C., U.S.A) October, 2009. 10. March, 2010 11. March 2008. August 3, 2012. 13. December 31, 2009. (Formal Report) (South Asia regional initiative for energy)

[Jha (2009)] *South Asia Conclave on Enabling Regulation for Investment in Infrastructure*, " I S Jha . 4th Nov, 2009. Power Grid Corporation of India Ltd.