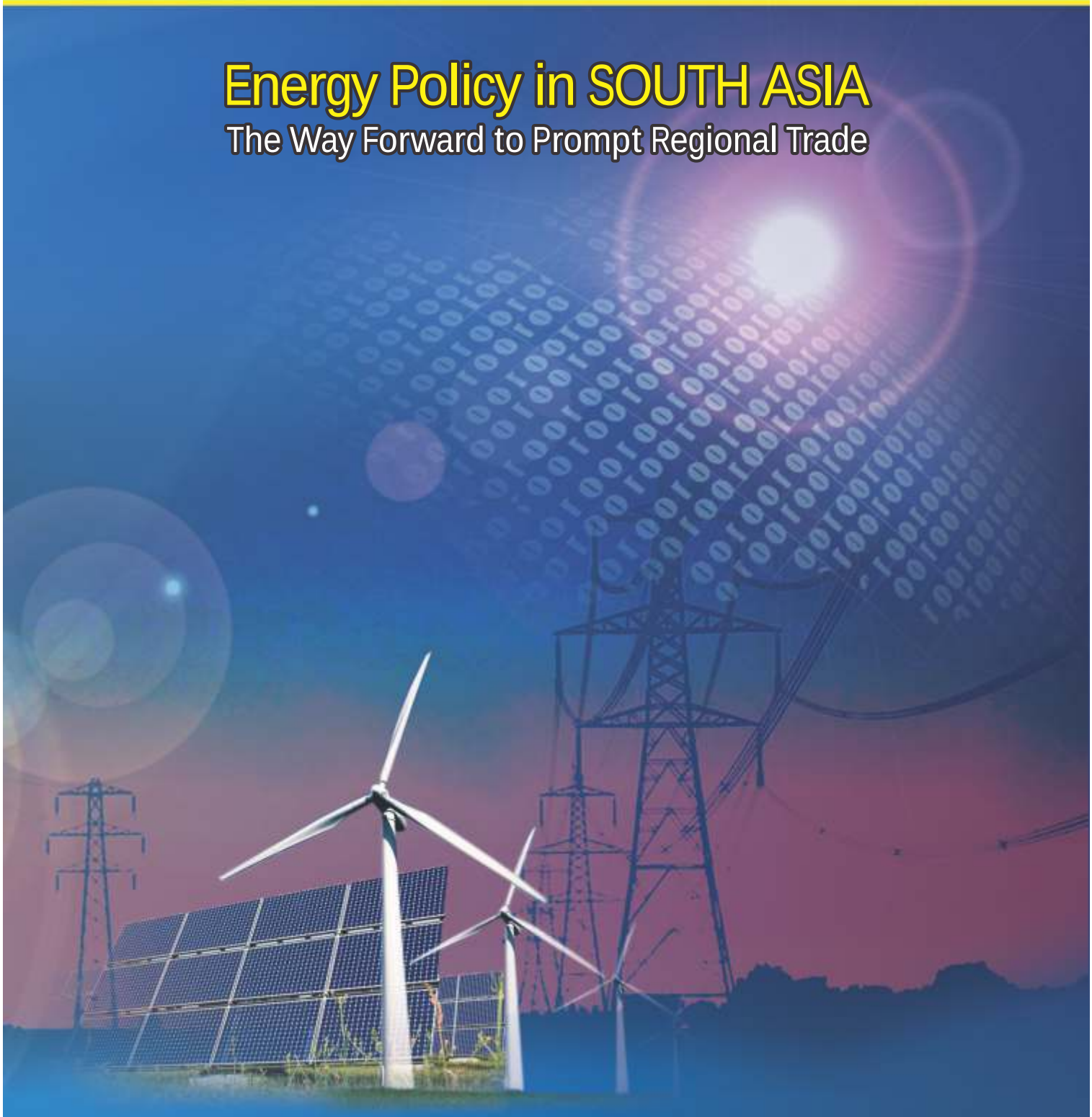
SAARC CCI Policy Paper

Energy Policy in SOUTH ASIA

The Way Forward to Prompt Regional Trade



SAARC CHAMBER OF COMMERCE AND INDUSTRY

SAARC CCI Policy Paper

Energy Policy in SOUTH ASIA

The Way Forward to Prompt Regional Trade

(An Industry-Academia Discourse)

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and
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in Partnership with

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FOREWORDS

South Asia is ranked as one of the regions with lowest per capita consumption of Energy particularly in form of electricity despite the fact that region is blessed with enormous energy potential for generating enormous amount of electricity. Presently, South Asian countries are producing electricity less than 50% of their available potential.

On the other hand, the region has witnessed encouraging GDP growth (from 5.5% to 6.5%) during 2004-2010. To keep the region on the trajectory of economic growth, un-interrupted supply of energy at affordable price, is key to sustain this economic growth. Presently, amongst eight SAARC nations, India, Pakistan, Nepal and Bangladesh are faced with acute shortage of electricity to the tune of 40000 MW. They apply various energy mixes predominantly using imported oil, which in turn is persistently increasing their import bill.

Due to 8-12 hours power cuts in Bangladesh, Nepal and Pakistan, the commercial business has to pay 35% extra by using diesel and oil generators, thus adding to their operational expenses.

Provision of supply of energy has been the mainstay of the energy policy of every country. On regional level, SAARC energy Centers have been created in the region, which are trying to coordinate, establish regional pool of information, expertise and have suggested the roadmap by establishing SAARC Energy Grid, wherein surplus energy would be pooled and transmitted to the country, requiring electricity supply. Although this is a great noble cause, it seems difficult to articulate this until and unless, the South Asian Nations exhibit greater will for providing enabling environment to encourage production, trade and distribution of electricity through an efficient and fair mechanism.

Since the Private Sector is the most important stakeholder of Energy production, its involvement through Public-Private-Partnership (PPP) model need to be encouraged on policy making level. The SAARC Chamber of Commerce & Industry (SAARC CCI) organized string of conferences in Bhutan and Pakistan to sensitise the Private Sector about Energy issues in South Asia and share their vision to suggest a policy mechanism to the Governments in South Asia.

This policy report of SAARC CCI on "Energy Policy: The way forward to Energy Trade in South Asia" provides some unique ideas and add value to the work and initiatives taken by various organizations involved.

I extend my hearty gratitude to Sustainable Development Policy Institute (SDPI), Pakistan, the speakers at the Conferences, support of FICCI and all other national Chambers in South Asia, the office bearers of SAARC CCI and particularly the authors of the report and the dedicated team at SAARC CCI Secretariat in Islamabad for this wonderful value-added piece of work.

I am certain the policymakers, researchers, Government officials and general readers will benefit from the findings of this paper and invite comments and suggestions for the further improvement in its next edition.

Vikramjit Singh Sahney
President, SAARC CCI

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We are in appreciation of the management of the Bhutan Chamber of Commerce & Industry (BCCI) and the Royal Government of Bhutan for their support and extend our profound gratitude to Hon'ble Prime Minister of the Kingdom of Bhutan H.E. Lyonchen Jigmi Y Thinley for inaugurating the “Conference of Climate and Energy” and H.E Lyonpo Khandu Wangchuck,Hon’ble Minister for Economic Affair, Kingdom of Bhutan, Hon”ble Minister for Power and Energy, Government of Sri Lanka, Dr. Pema Jamtsho, Hon ’ble Minister for Agriculture, Dr. Mohammad Azam Khan Swati, Former Minister for Science &Technology, Government of Pakistan. We are also thankful to all our National Member Bodies (FBCCI, FICCI, MNCCI, FNCCI, FPCCI, FCCISL), SAARC Energy Centre (Pakistan) and SDPI for their knowledge support.

We are also thankful to Mr. Kanwar M. Javed Iqbal, Snr. Research Associate, SDPI & Joint author of this report, whose contribution, continuous support enabled us to present this publication. We are also indebted to our distinguished speakers, representing various think-tanks like Dasho Sonam Tshering, Hon'ble Secretary, Ministry of Economic Affairs, Kingdom of Bhutan, Dr. M. Basheer Ahmed Khan, Vice Chancellor and Dean of Management, Sido Kanhu Murmu University, India, Mr. Mollah M. Amzad Hossain, Editor, Energy & Power, Eastern Trade Centre, Bangladesh, Mr. Manjeet Dhakal, Clean Energy, Nepal, Engr. G.R. Bhatti, Member Pakistan Engineering Council, Former GM-Karachi Electric Supply Corporation, Pakistan, delegates, participants of the deliberation held during conferences in Bhutan and Pakistan. We are also thankful to Mr. Zubair Ahmed Malik, Fr. EC Member SAARC CCI for his assistance in improving the contents of the report and Mr. Sardar Ahmed Nazish, Snr. Scientific Information Officer, PCSIR, Pakistan for editing the report.

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(Muhammad Iqbal Tabish)
Secretary General

ACRONYMS

ASEAN	Association of Southeast Asian Nations
CCI	Chamber of Commerce and Industry
CSP	Concentration of Solar Power
EGS	Enhanced Geothermal Systems
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GHS	Green House Gas
IEA	International Energy Agency
IP's	Independent Producers
IPPs	Independent Power Producers
JICA	Japan International Cooperation Agency
KWh	Killo watt hours
NAFTA	North American Free Trade Agreement
PPP	Public–private partnership
PV	Photovoltaic
RE	Renewable Energy
RES	Renewable Energy Resource
RET	Renewable Energy Technology
SAARC	South Asian Association for Regional Cooperation
SAPTA	South Asia Preferential Trade Act
SAARC CCI	SAARC Chamber of Commerce and Industry
SEC	SAARC Energy Centre
SEF	SAARC Energy Forum
SMS	SAARC Member State
SPRA	SAARC Power Regulatory Authority
STCE	SAARC Technical Committee for Energy
WTO	World Trade Organization

ABSTRACT

Sustainable energy supplies with economically viable and best energy solution have become imperative to major energy policy and procedures in order to meet increasing energy demand in SAARC Member States. Recent trends reflect the increasing significance of developing Asia in advancing renewable energy. Electricity generation from renewable energy sources is predicted to grow at an average rate of 5 percent annually, which would increase the renewable share of the region's total generation from 16 percent in 2011 to 20 percent in 2035. Within the ASEAN, International Energy Agency (IEA) predicts that the total "realizable potential" for renewable electricity in 2030 is 1.8 times the total level of electricity consumption in the region in 2007. Some of the SAARC Member States have considerable experience in using environment-friendly renewable energies. Policies for sharing of such environment-friendly technologies could play greater role in reducing energy imports and air pollution, and could be incorporated in policies for sustainable development, environmental protection and improvement in public health.

In order to address the present energy policy needs of the region, SAARC Chamber of Commerce and Industry (SAARC-CCI) intended to develop this paper with the aim to provide policy recommendations for sustainable harnessing the energy potential in general and energy trade mechanism in particular for its benefits to the natives of SAARC Countries. The production of this policy paper primarily involved the evaluation of primary and secondary sources of information and analysis of secondary data from various sources. The overall scope of the paper covered the analysis of existing energy potential and its trade mechanism in SAARC countries by taking into account the technical review of barriers, legal implications, role of stakeholders and impact of current policies.

The paper concludes that the present energy demand and supply is not in a balance form and supply deficit needs urgent attention to harness the existing potential of renewable energy at SAARC level through coordinated efforts. The region is in dire need of sufficient energy resources for economic growth and sustainability. The planning and progress for the reality of concept "energy ring" is not up-to mark and special initiatives are required at the level of Pakistan and India for long-term sustainable solutions to the region. The key challenges include transforming bilateral Power exchange into Multi-lateral, vision beyond four-nation Power Grid (Bangladesh, Bhutan, India and Nepal), Competition and Low-carbon Development. Besides, the political challenges includes questions on energy leadership in the region, mechanism for India-Pakistan energy exchange, pumping of energy from Central Asia and the Middle East and short fall of SAARC energy resources for its requirement.

Energy cooperation in South Asia, even while the region remains energy deficit in aggregate, would mean efficient utilization of the region's resources, increase in reliability of energy supply, economy in operationalization of initiatives, mutual support in contingencies, and confidence building measures for geo-political solution strategy. At the bilateral level, energy engagement is being pursued yet immense potential lies untapped. The existing intra-regional energy trade among SMSs is limited to electricity trade between India and Bhutan, India and Nepal. Overcoming inertia, assessing further possibilities, and harnessing them is key whilst taking into account the geopolitical, economic and technical risks. It is encouraging that the governments of the region are engaged in bilateral dialogue to resolve the issues pertaining to economic relations. Despite the fact of bilateral development in South Asia, the national policies and the political mindset towards the concept of energy security also proved to be major inhibitors of energy trade.

The regional cooperation needs to address different variables including huge investment cost, political will, environment, climate change, private participation, affordability, Right of Way and inaccessibility. Trust and confidence between SAARC member states are of prime importance for the success of SAARC Energy Ring Concept and promotion of Energy Trade. The Governments can take benefit of expertise of SAARC Energy Centre in particular and SAARC CCI in general to address the basis needs of Energy Ring. SAARC CCI could be instrumental and play a catalytic role for the application of PPP concept through mobilization and active involvement of private sector, and bridging gaps at policy level for energy cooperation among member states.

Reduction of political tension within and across the countries could be instrumental in bringing overall sustainability in the region for which synchronization of policies and procedures are critically important in national and regional context. Special efforts and initiatives are required to reduce the political tension between India and Pakistan by undertaking a series of high-level dialogues and confidence building measures. The SAARC CCI, intellectual community, researchers, print and electronic media, and other stakeholders can be instrumental in mobilizing the political leadership and creating a favorable environment for the energy cooperation in the region on sustainable basis.

1. INTRODUCTION

Sustainable energy supplies with economically viable and best energy solution have become imperative to major energy policy and procedures in order to meet increasing energy demand in SAARC Member States. The oil prices and increasing energy demand have put severe strains on resources of all South Asian Countries in order to ensure energy availability and its security in a sustainable way. It has serious implications including slowing down of economic development, increasing inflation, deepening poverty and causing political and social instability in the region. The South Asian region is energy deficient as it does not produce enough oil and gas to meet its needs thus depends heavily on imports. Most of the member states are also not able to generate sufficient electricity to meet their demands. In the emerging energy and environmental crises, SAARC region stands quite vulnerable, compared to developed economies. The luxuries enjoyed by the developed economies such as low cost energy and minimal environmental implications are not available for a developing SAARC region. It has been estimated that energy needs of South Asia will increase three times in next fifteen to twenty years.

Recent trends reflect the increasing significance of developing Asia in advancing renewable energy. Electricity generation from renewable energy sources is predicted to grow at an average rate of 5 percent annually, which would increase the renewable share of the region's total generation from 15 percent in 2007 to 20 percent in 2035. Within the ASEAN, International Energy Agency (IEA) predicts that the total "realizable potential" for renewable electricity in 2030 is 1.8 times the total level of electricity consumption in the region in 2007. Some of the SAARC Member States have considerable experience in using environment-friendly renewable energies including wind, solar and biogas plants in India, micro-hydro plants in Nepal, micro-financing for rural energy in Bangladesh, grid connected small hydro in Sri Lanka and small hydro and solar in Pakistan.

The need to reduce future oil imports can be combined with policies to improve environmental quality by making use of less polluting sources such as hydropower and other renewable resources and natural gas. Most of the SAARC Member States have the potential to develop additional hydropower capacity, and through careful selection of sites after getting inputs from civil society and other stakeholders, the negative environmental impacts can be reduced. Policies for sharing of environment-friendly renewable energies technologies could play greater role in reducing energy imports and air pollution, and could be incorporated in policies for sustainable development, environmental protection and improvement in public health. Some agreements already exist on an ad-hoc basis for projects involving natural gas, and hydropower in order to enhance Regional cooperation amongst the SAARC Member States that would provide economies of scale for energy projects which would help them manifolds by saving the revenue for oil import, improving the health status and enhancing the productivity and livelihood of the rural people in particular and as a whole in general. Special policy measures are required at SAARC level in order to take maximum benefits of existing energy potential and its trade among member states.

2. AIM AND OBJECTIVES

This paper was intended by SAARC Chamber of Commerce and Industry (SAARC CCI) to provide a comprehensive document with policy recommendations for harnessing the energy potential in general and energy trade mechanism in particular for its benefits to the natives of SAARC Countries. The overall scope of the paper covered the analysis of existing energy potential and its trade mechanism in SAARC countries by taking into account the technical review of barriers, legal implications, role of stakeholders, and impact of current policies.

The overarching aim of the paper was to provide a comprehensive document with policy recommendations for sustainable harnessing the energy potential in general and energy trade mechanism in particular through the following key objectives:

- To analyze the energy situation, potential and impact of current policies.
- To identify barriers and suggest policy measures for energy policy of SAARC Member States.
- To suggest a viable mechanism for encouraging and promoting the energy cooperation among SAARC Member States.

3. METHODOLOGY

The production of this policy paper primarily involved the evaluation of primary and secondary sources of information, and analysis of secondary data from various sources. The overall scope of the paper covered the analysis of existing energy potential and its trade mechanism in SAARC countries by taking into account the technical review of barriers, legal implications, role of stakeholders, and impact of current policies. Initially, the literature was reviewed through a desk study based on which the analysis and evaluation was done for the energy potential and best policy measures for SAARC member states. The existing trends for barriers and other concerns in SAARC countries were analyzed and evaluated through scrutinizing the secondary material including latest available policy documents, agreements and national concerns.

The opinions of stakeholders and feedback of technical experts of member states were acquired through two consultative workshops:

1) Held in Bhutan from 21st - 23rd April 2012.
2) In Pakistan on 30th April 2012.

Finally, on the basis of triangulation and rationale grounds of all information and data, the strategic actions have been suggested for the promotion of mutual cooperation for energy trade options in SAARC countries.

4. ENERGY IN SOUTH ASIA

The present economic growth of South Asian region is comparable with one of the fastest growing regions of the world. This growth has not only increased the demand for energy as a pre-requisite in all sectors of mechanized life but also has many other push-n-pull factors for the overall sustainability in South Asia. The momentum of growth is in a dire need of an adequate supply of energy on sustainable basis. The energy sector's challenges are enormous - ensuring access to energy for all, meeting the increasing demand in a cost-effective manner amidst increasing oil prices and minimizing pollution of the local and global environment.

The traditional energy causes climate change and air contamination due to emissions to air, and put pressure on the non-renewable natural resources. There are growing concerns over energy security with cost of production which always remains high due to oil prices in the global market. The Clean Energy Resource Potential yet to be exploited as the countries either remain energy deficient or are not able to optimally harness & utilize their resources like Nepal, Bhutan and Pakistan. The fossil fuel import dependence envisages diversification especially for renewables.

4.1 Current Energy Status

The global energy resources are unevenly distributed by virtue of nature and the regional demand and supply are mismatching in South Asia due to many other additional factors. Some areas are rich in energy resources viz-a-viz some other areas having energy deficit status. The developed and large countries are enjoying most of the global energy resources while the cooperation among South Asian countries can be instrumental for a win-win situation in the region.

South Asia presents a picture of enormous diversity in terms of composition of fuels produced and consumed in the different countries, the relative size of consumption, and the issues of accessibility of modern energy systems for the countries and especially the rural areas of the countries. The extent of utilization of renewable energy also varies, though the highest level of utilization was not over five percent of the total commercial energy consumption in any of the countries.

The countries of this region present a picture of wide disparities in size, population, and economic growth, though they share many common aspects of history and culture. South Asia is in a period of transition as the constituent countries are striving to implement effective economic, political, social measures and evolve administrative and legal structures to support sustained growth. Energy supply and security have become issues of great importance to sustain growth. But all countries of the Region are highly dependent on imported oil whose supply and price are volatile. There is now a greater emphasis on developing indigenously available Renewable Energy Resources (RER).

The demand of energy around the world is growing in an immense pace. SAARC countries current and forecast energy requirements, development needs and resource shortages require immediate attention towards improving the efficiency of energy supply and use across all economic sectors. In the emerging energy and environmental crises, SAARC region stands quite vulnerable, compared to developed economies. The luxuries enjoyed by the developed economies such as low cost energy and minimal environmental implications are not available for a developing SAARC region. Another barrier present for the SAARC region is the lower importance placed on economic planning, a key attribute of development in a resource constrained world. However, SAARC region can look forward to embrace efficient technologies, processes and systems much easily, due to the infant stage most countries in this region when considering economic development. Speedier implementation is also possible, due mostly to the lesser developed systems and processes acting against new initiatives.

Most countries, with the exception of India and Pakistan, have a predominant dependence on a single commercial energy form- the “Oil”, which is case of Afghanistan (78%), Maldives (100%), Nepal (67%), and Sri Lanka (79%); hydropower for

Bhutan (50%); and natural gas for Bangladesh (74%). Such a large dependence on a single energy resource not only limits the options of meeting diverse energy needs but also increases energy security concerns. It is also relevant to note that despite substantial coal resources available in the region, particularly in India and Pakistan; some of the SMSs are importing coal, India, for example, imported 28 million tons of coal in 2006. This is mainly due to the poor quality of domestic coal and technological constraints for improving its quality.

The basic method of electricity generation is still in use even after nearly two centuries. Electricity is being generated at Power Station by electromechanical generators driven by heat engines-use of chemical combustion or nuclear fission. Other means of kinetic energy of flowing water and wind used. Solar Photo-voltaics and Geothermal power are also in use. Fossil fuels such as Oil and Coal provide much of our energy needs. Major part of our electricity generation is using traditional modes. There are alternate sources of energy derived from non traditional sources and modes like compressed natural gas, solar, hydroelectric, wind etc.

All SAARC member states need more power supply for their economic growth, but all of them except Bhutan are facing shortage of primary energy especially in the form of power supply, as depicted in the following table 1 while the status of electricity access, supply and demand is shown in table 2.

Table 1: Current Power Production Status in Member States

S. No.	Member State	Current Power Production (MW), Installed capacity	Remarks
1	Afghanistan	1,200	66% Imported, having shortage.
2	Bangladesh	8,000	40-50% Shortage
3	Bhutan	1,488	Export to India
4	India	189,620	Peak shortage around 15%
5	Maldives	23.6	Rely on imported oil for energy production.
6	Nepal	714	Monsoon Supply 660MW Winter 325MW Power cut 12 to 16 Hours, Exporter and Importer.
7	Pakistan	20,922	5000 – 7000 shortage
8	Sri Lanka	2,878	Costly Electricity, No Shortage

Source: Synthesized from individual country's energy database.

Table 2: Status of Electricity Access and Demand

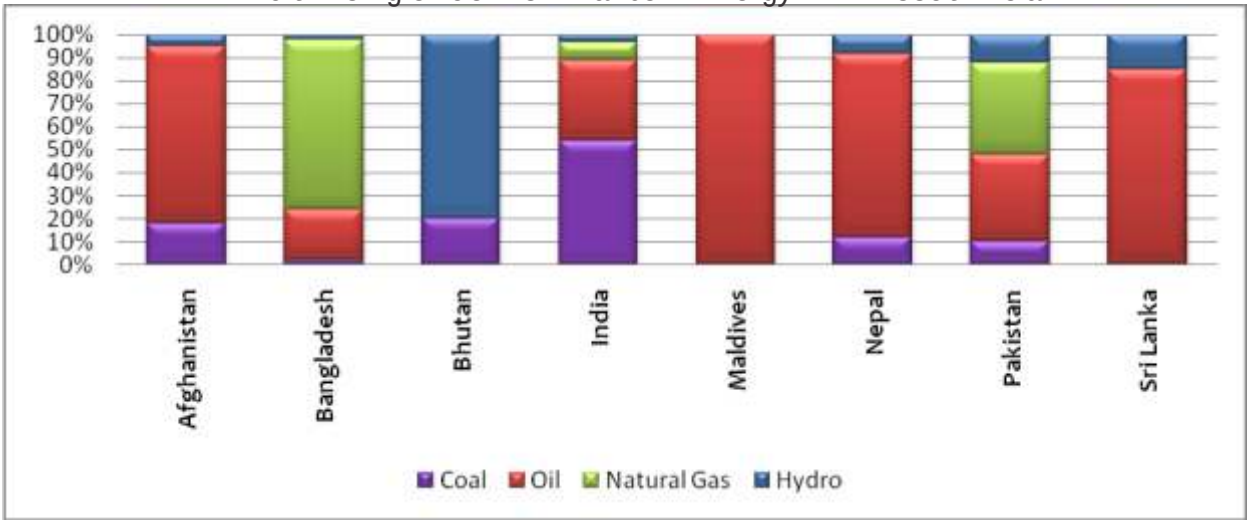
Electricity Access, Supply and Demand in SAARC Member States								
Specification	Afghanistan	Bangladesh	Bhutan	India	Pakistan	Maldives	Nepal	Sri-Lanka
% of Population with Electricity Access	20%	42%	80%	56%	77%	100%	25%	88%
Annual Generation (MU)	953.00	29,247.00	7,046	788,355	95,358		3,711	10,715
Electricity Demand (MU)		33,716	1,684	861,591	144,711	1,923	4,693	10,327
Surplus/Deficit		-25%	76%	-8.5%	30%		-20.33%	-37%
Future Demand (GWh)		71,990	2,500	2,550,000	261,523	2,447	8,990	22,040

Data Source: www.bpdb.gov.bd, www.cea.gov.in, SRETS, 2010, Energypedia.info-Nepal, www.sari-energy.org

At present, Bangladesh, India and Afghanistan need to import power from neighboring countries. India's demand is expected to rise by 7.4% as it had peak shortage of 9% in 2011. Many member states are now exchanging electric power like Nepal-India power exchange, Bhutan-India power exchange, Bangladesh-India power exchange (250MW+250MW) from Baharampur to Bheramara (On-going programme), Bangladesh-India Power Exchange from Tripura (the proposed programme), India-Sri Lanka Power Exchange (at planning stage), Power from Central Asia through Afghanistan-Pakistan-India, and Bangladesh-Myanmar power exchange. There is a dire need to make efforts for the success of proposed SAARC Power Grid and SAARC Energy Ring to be functional as per original concepts and plans in order to meet the requirements with mutual cooperation and sharing of resources for a sustainable future in the region.

Key challenges faced by the energy sector in South Asia include increasing energy deficits, single fuel dominance in the energy mix, rising import dependence, and lack of requisite energy infrastructure. Augmenting the energy supply and diversifying the fuel basket requires inter- and intra-regional energy trade. The exhibit 1 shows dominance of single fuel in energy mix in South Asia.

Exhibit 1: Single Fuel Dominance in Energy Mix in South Asia



Data Source: SAARC Energy Centre's Website

4.2 Energy Potential

The SAARC region is home to 23% of the total world population and a large proportion of the population is living below the poverty line. There is a wide variety in the energy resource endowments among the SMSs, particularly in relation to hydel, wind, solar, tidal, fossil, and other energy options including Bioenergy so as to meet the requirements in different walks of life, economic activities and meeting a large portion of household energy demand across the region. The energy demand in the region is expected to grow at an annual rate of 5%, with the household and industry sectors as main contributor whereas the potential is far beyond the present and future needs of the region.

In the power sector, the present installed capacity of the region (from all fuel sources) is 222,142 MW viz-a-viz present suppressed demand is > 300,000 MW. Over 75% of petroleum products in the region are imported. The estimated total Hydropower potential is 299,330 MW depicts the energy potential far in excess of requirement. Bhutan and Nepal have huge hydro-electric potential while Pakistan, India (in North-east) and Myanmar (near Bangladesh) have about 59000, 60000 and 7000 MW hydro-electric potential respectively.

Some of the SAARC Member States have considerable experience in using environment-friendly renewable energies. Examples include wind, solar and biogas plants in India, micro-hydro plants in Nepal, micro-financed rural energy in Bangladesh, grid connected small hydro in Sri Lanka, and small hydro / solar in Pakistan. Policies for sharing of such technologies and experiences within the SAARC region could play greater role in reducing energy imports and air pollution, and could be incorporated in policies for sustainable development, environmental protection and improvement in public health. Supply of clean energy especially electricity and other technologies (e.g. biogas, solar, improved cook-stoves, micro hydro, wind) may be expanded and up-scaled to enhance health status and productivity of the rural people.

Micro hydro plants for electric power generation and mechanical power are a technology that has matured substantially over the past 30 years. Also, many governments in South Asia have begun to embrace it as a viable energy option, especially for remote and rural areas, within a larger renewable energy portfolio driven strategy.

Electricity is a secondary form of energy which is produced from fuels like coal, oil, natural gas and non fuel based primary electricity sources such as hydro electric potential, nuclear technology as also from renewable energy sources such as wind and solar. Electricity Generation, Transmission and Distribution are very capital intensive and the need for electricity extends to every parts of a country. It's useful therefore to examine electricity sector separately. In the production of electricity in all the countries the fuel source available in plentiful quantity is used. For example Bhutan and Nepal use Hydro Electric resources for most of the power generation Pakistan and Bangladesh. Coal is the source for most of the power generation in India while Pakistan has recently done successful experiments on Coal gasification technology for harnessing the coal energy potential on mass scale. The following table 3 gives picture of energy reserves/ potential in SAARC member states.

Table 3: State wise Energy Potential

S. No.	Form of Energy	Unit	Energy Potential in SAARC Member States							
			Afghanistan	Bangladesh	Bhutan	India	Pakistan	Maldives	Nepal	Sri Lanka
1.	Coal	Million Tones	440	884	2	90085	17550	NA	NA	NA
2.	Natural Gas	Trillion Cubic feet	15	20.5	NA	39	33	NA	NA	NA
3.	Fossil Oil	Million Barrels	NA	12	NA	5700	324	NA	NA	NA
4.	Hydro Electricity	MW	25000	330	30000	150000	50000	NA	42000	2000
5.	Biomass	Million Tones	NA	0.08	26.6	139	0.06	NA	27.04	12

Source: Synthesis in this study from data available at SAARC Energy Centre website. 2010)NA = not available

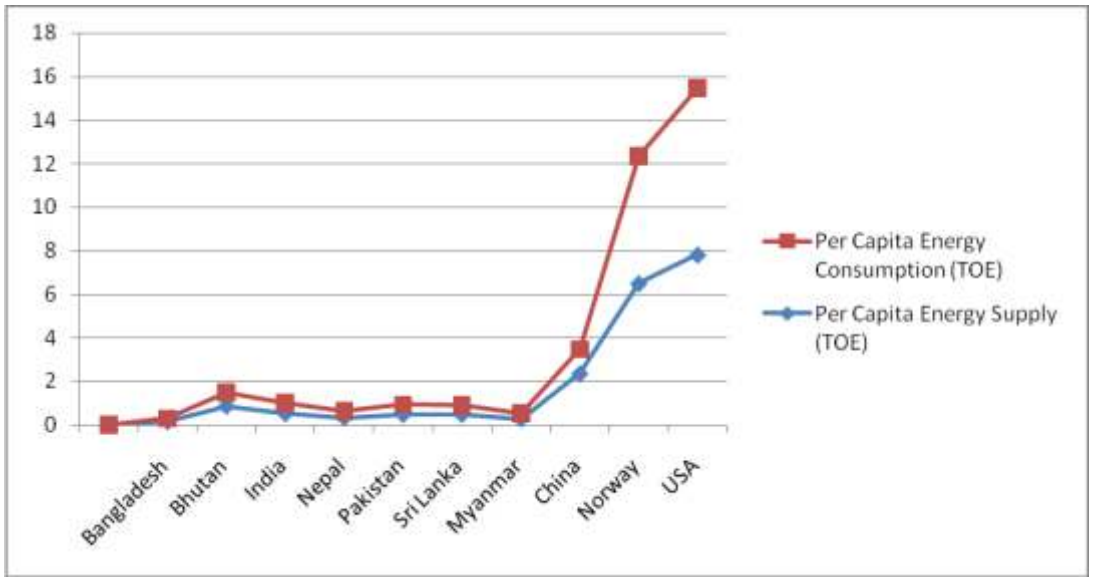
4.3 *Initiatives on Alternate Energy Resources*

The geographically features of all South Asian countries highlights high potential for all alternatives in the form of presence of vast land mass, sea waves, bio-fuel, coal, rivers, windy areas, woods, mountains and other natural means. The current level of alternate energy use is limited and the private enterprises are exploring commercial viability. The alternate energy now contributes up to 12.9% of the total primary energy supply in the region. The renewable energy supply is estimated at 43% and 77% of the demand by the year 2030 and 2050 respectively that would help in Green House Gas (GHS) savings up to 560 Gigatons of CO2e from 2010 onward. Exhibit 2 & 3 gives present picture of energy demand and supply from alternative means in South Asian countries vis-a-vis China, Norway and USA.

By 2050, 2/3rd of World's energy has to come from Alternate energy sources. The energy sector is undergoing a dynamic transformation in South Asia and co-operation is essential since most of the countries in the region are facing similar challenges which have so far been hindered by local priorities and ground realties in the member countries.

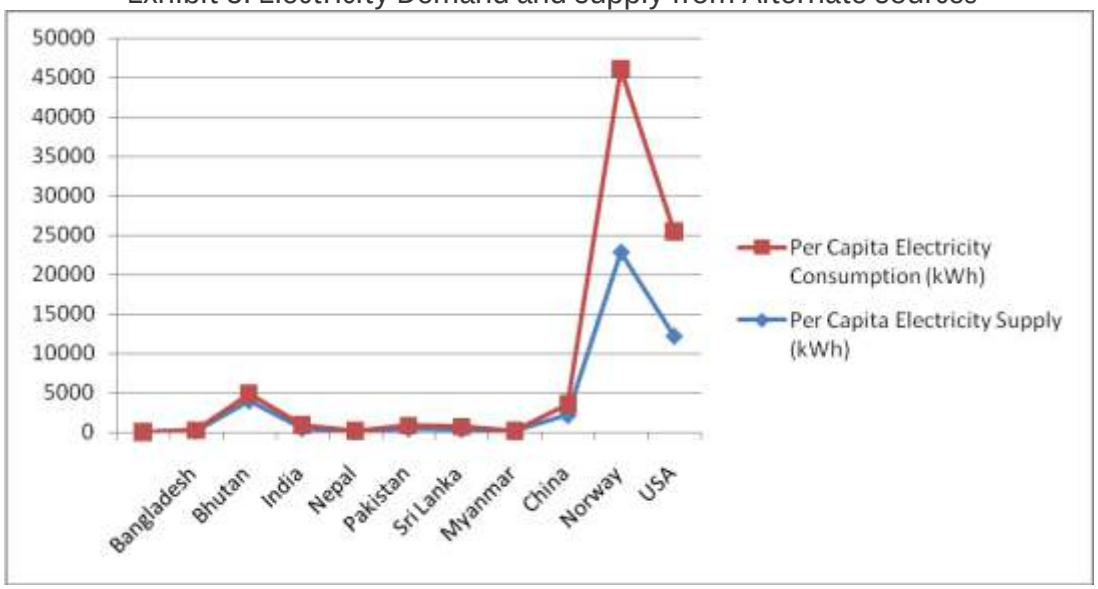
Presently, the production of renewable energy is practices through small and large scale boilers, domestic pellet based heating systems and ethanol production from sugar or starch. Gasification for combined power plants and liquid bio fuel production from algae are at the research and development stage. Solar energy is harnessed using photovotaic (PV) and Concentration of Solar Power (CSP). But solar energy is variable and unpredictable. Geothermal energy is harnessed using GT reservoirs and hydrothermal reservoirs. Enhanced Geothermal Systems are also used (EGS). These are also under research and pilot project stages

Exhibit 2: Alternate Energy Demand and Supply



Source: Synthesis in this study (2009)

Exhibit 3: Electricity Demand and Supply from Alternate Sources



Source: Synthesis in this study (2009)

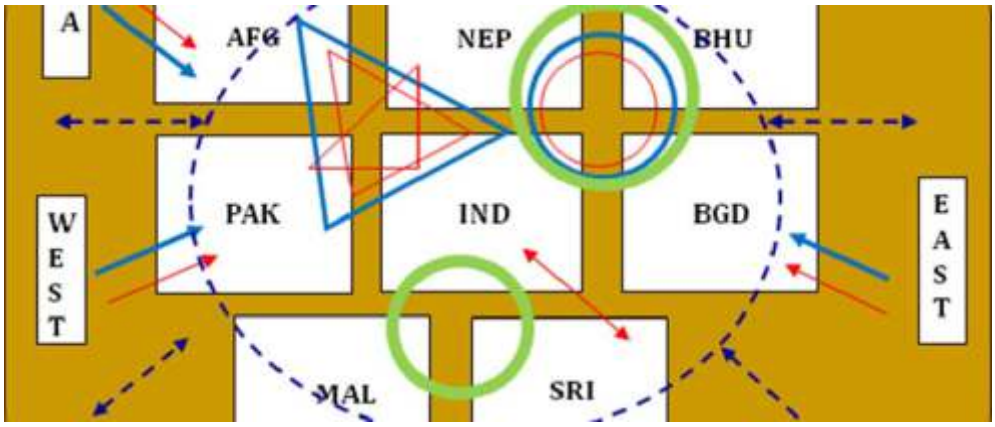
4.3 Legal Aspects of Energy Trade in South Asia

The rules and regulations for IPs and national grid system are complex and there is no harmony found so as to support the initiative of energy especially electricity trade at regional level. The purpose of the establishment of SAARC was to provide platform to the people of Southern Asia to make joint efforts to promote harmony, confidence, and understanding among states. The rules, regulations and role of SAARC Energy Centre is also not clear on how to drive the concept of Public Private Partnership or Private Interventions in at regional level in order to make the SAARC energy grid functional.

4.4 Benefits of Energy Trade among SAARC Countries

The major energy issues facing South Asian nations are rapidly rising energy demand and the need to promote cross border energy trade due to undergoing energy shortages, usually in the form of frequent, costly and widespread power outages. Given this situation and its economic, social and political ramifications, improvement of energy supplies in general and electricity in particular is of vital concern for countries of the region. Regional cooperation in the form of energy trade and investment provides many sensible options in the context of the resources complementarities that exist in the region. Apparently, interest in and support for promoting regional energy trade in South Asia is considerable. In July 2004, the SAARC endorsed the concept of an "Energy Ring" of interconnected energy systems in the region. Exhibit 4 shows the conceptual model of SAARC Energy Ring for the mutual energy cooperation and trade.

Exhibit 4: SAARC Energy Trade



Source: SAARC Energy Centre

The SAARC region which is the home of 20% of the global population is poised to be the next power house in global economic development. This vast geographical region and large community requires better energy supply and trade at affordable prices. India is looking at the prospect of an annual GDP growth of 10 percent for the next 10 to 15 years. Pakistan is looking at 7 to 8 percent growth, while Bangladesh hopes to grow at around 5 to 6 percent. As the energy is a pre-requisite, the success of energy ring would last the following key benefits to the region:

- End of persistent energy crisis,
- Enhanced and sustainable rate of growth, and
- Quality of life in the region.

5. WHY THE POTENTIAL REMAINED UN-TAPPED?

Despite the political barriers that persist in the region from unresolved problems caused by partition, the proximity of the energy resource to demand centres and the geography of the intervening terrain are the key factors in determining interconnection decisions.

5.1 Impact of Current Policies

In recent past, the WTO tried to play a positive role and facilitate the free trade among its member countries globally. But, the issues of restriction on trade, customers' safety, human privileges and environmental harms are prominent in developed and less developed countries globally and similar problems exist in case of South Asian countries.

With regional cooperation making only modest progress, bilateral free trade agreements are gaining momentum in this region. Although some bilateral initiatives are in place, including those between India and Sri Lanka, India and Nepal, and India and Bhutan, others are under negotiation, such as those between Pakistan and Sri Lanka and India and Bangladesh. Some sub-regional economic cooperation programs have been launched to bring together the four countries in the eastern part of South Asia. These four countries have joined together under the Growth Quadrangle (India, Nepal, Bangladesh, and Bhutan) and another possible sub-regional initiative is being considered between

South India, Sri Lanka, and Maldives.

At a national level, renewed prospects for regional energy trade were achieved over the past year by licensing of electricity traders under India's Electricity Act 2003. These and other market forces created by reforming India's power sector were accompanied by support for implementing the South Asia Preferential Trade Act (SAPTA) to reduce tariffs and eliminate trade barriers over the next several years. While SAPTA can provide specifically for promoting cross-border energy trade by adopting certain provisions included in other regional trade agreements, such as the North American Free Trade Agreement (NAFTA), realizing the full potential of energy trade in South Asia requires all countries in the region to adopt policies, regulations, and rules similar to those being undertaken to create an electricity trading market within India.

The review of renewable energy policies of South Asia indicates that almost all the countries have specific policies in respect of renewable energy as a whole or specific policy towards certain resources. The larger countries like India, Pakistan, Sri Lanka and Bangladesh have set up good institutional arrangements. Many of them are yet to get well established. They have all been active in participating in regional and international seminars to understand the issues and have initiated some small RE projects. Most of the policies rely on providing capital subsidy or tax concessions. The use of feed-in-tariff to encourage the sale of electricity through the use of RETs is slowly gaining ground. There are only a few countries, which have a policy towards very sophisticated and complex technologies in RET like hydrogen utilisation. It is praiseworthy that all countries are conscious of the importance of paying adequate interest in the future developments of proper RE Technologies.

Bangladesh, India, Pakistan and Sri Lanka have formulated draft policies for renewable energy development. Bangladesh Renewable Energy policy has been approved in November 2008. Pakistan Government had issued the "Policy for Development of Renewable Energy for power generation 2006" in January 2007. "National Energy Policy and Strategies of Sri Lanka" was released in 2006 which is a policy declaration in respect of both conventional and renewable energy. India has separate policy for the important RE resources like Wind and Solar. India has a very large number of specific policies, programmes and activities for development of RE resources. It has not been possible, however, for Government of India to finalise a comprehensive Renewable Energy Policy, though there are continuous efforts to achieve the same. In respect of the more abundantly available resources like wind and solar, there are detailed policy guidelines. In India, the absence of a comprehensive policy has not affected the work of the numerous agencies created for the development of RE resources. Government on its part is allotting large funds for furthering the projects and policies in the RE Sector to all the agencies.

Bhutan introduced the electricity sector reforms in 2002 with the government approving the energy policy and enacting the Energy Policy Act. As a follow up of the Energy Policy Act, the Department of Energy was created with a Renewable Energy (RE) Division within that department. No major policy change has been brought about as yet by the Division, though a very detailed report on Rural Electrification has been prepared with Japanese assistance (JICA). The RE division has taken up on an ad-hoc basis, some small solar energy projects. Pakistan has a "Policy for Development of Renewable Energy for Power Generation" which was approved and issued by the Government in January 2007. Sri Lanka has comprehensive "National Energy Policy and Strategies" has sections devoted to the development of indigenous renewable resources. Some small success has been achieved in promoting specific projects and initiating some specific incentive programmes.

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Maldives has very little interest in renewable energy in view of its very small population and also due to the fact that the country consists of hundreds of small islands with small habitations. Its priority for preserving the national ecology, has however, forced the agencies to examine the options in non-polluting energy production to supply power and cooking energy to hotel resorts in the small islands. Nepal does not have a comprehensive energy policy but has initiated several ad-hoc policy measures to promote alternate energy. The initiatives mostly relate to the development of solar, biogas and a little wind power.

Despite the fact of bilateral development in South Asia, the national policies and the political mindset towards the concept of energy security also proved to be major inhibitors of energy trade. Till recently the region followed inward looking import substitution strategies which regarded energy trade as reducing energy security by creating import dependency and by enhancing disruption risks. Macroeconomic policies pursued resulted in a persistent shortage of foreign currency resources which did not allow the countries to think in terms of discretionary imports. On the whole there was a pervasive perception which regarded national self-sufficiency as a synonym for energy security. Energy trade was strictly limited to the inevitable import of oil and oil products only. Despite the serious problems faced by Indian power companies in the use of poor quality domestic coal, import of good quality coal from abroad for blending took several decades to materialize. Nepal has the highest average tariff in the region at about 9 cents/kWh and still is unable to cover its cost of supply, mainly on account of its choice to operate a high cost all hydro system, avoiding import of thermal power from India to balance its hydropower system or to encourage the construction of large hydropower plants, which will be cost effective on the basis of export of power to India.

The existing intra-regional energy trade among SMSs is limited to electricity trade between India and Bhutan, India and Nepal and trade in petroleum products between India and Bangladesh, Bhutan, Nepal, and Sri Lanka. While the electricity traded is based on indigenous hydropower resources, the petroleum trade is based on India importing and refining crude oil and exporting petroleum products to Bhutan, Nepal, and Sri Lanka. India is also exporting diesel to Bangladesh.

5.2 Analysis of Problems and Barriers

Despite the present development initiatives at national or bilateral level, the countries of South Asian region are energy starved. To meet the growing energy requirements, energy trade between these countries is essential. But South Asia's current cross-border energy trade is limited to Bhutan, India and Nepal. Recently, energy trade between Bangladesh, India and Pakistan has been proposed, in line with the construction of liquefied natural gas pipeline from Myanmar to India through Bangladesh, and Iran to India through Pakistan. These proposed energy trade projects, if implemented successfully, will contribute to integrate regional economies.

In South Asia, the principal barriers to developing interconnected energy networks are geopolitical and geographic. While not insurmountable, these barriers have been problematic. A realistic and up-to-date understanding is required of the existing bilateral or multi-lateral trade arrangements and the existing limits of economic cooperation among the economies in the region since the principal criterion of market success is the delivered price of the energy commodity to established and future markets.

Despite trade barriers, informal trade has flourished across the South Asian frontiers. In 2002, this region's share in world output was merely 2 percent, and its share in FDI inflow in developing countries was just 2.8 percent. South Asia faces the danger of marginalization in the global economy. Regional cooperation is an effective modality that can put South Asia firmly on the global map and improve its access to financial and technology flows. Lots of theoretical work has been done so far on prospective areas in which countries in this region will gain, and impediments have been identified, but no action has been taken to address these issues. The countries of Southeast Asia have achieved commendable success in development with regional cooperation, with ASEAN playing a key role in this process.

The planning and progress for the reality of concept "energy ring" is not up-to mark and special initiatives are required at the level of Pakistan and India for long-term sustainable solutions to the region. The key challenges include transforming bilateral Power exchange into Multi-lateral, vision beyond four-nation Power Grid (Bangladesh, Bhutan, India and Nepal), Competition and Low-carbon Development. Besides, the political challenges includes questions on energy leadership in the region, mechanism for India-Pakistan energy exchange, pumping of energy from Central Asia and the Middle East and short fall of SAARC energy resources for its requirement. So, the regional cooperation needs to address different variables including huge investment cost, political will, environment, climate change, private participation, affordability, Right of Way and inaccessibility.

Efforts are going on to reduce the political tension between India and Pakistan by undertaking a series of high-level dialogues and confidence building measures, such as enabling travel of businesspeople, road, rail and air links, and common and cooperative programs to fight terrorism. Trade barriers are being reviewed to minimize their impact and facilitate trade.

In Nepal, the insurgency appears to have been overcome and the prospect for a stable democratic regime appears bright. After the elections of Bangladesh in early 2007, political disturbances are expected to subside and major decisions on cross-border investments are likely to be made. Afghanistan, which appeared to be moving toward stabilization in the last year or two, seems to be facing a potential reversal of that trend. On the whole, however, regional political tensions appear to be lessening which would be a good portent for the success of SAARC Energy Ring in near future.

Following are some of the key elements for the success of energy cooperation among member states.

1) Mistrust
   The specific barriers includes India which is the biggest country in SAARC with a 4 country supported grid already in place for Bangladesh, India, Nepal and Bhutan. On the other hand, the geo-political importance of Pakistan also drives any solution strategy for regional integration. Mis-trust is a big and foremost problem and barrier especially between India and Pakistan having lasting impact in the regional context of South Asia. Second barrier is tariffs for which questions need to be addressed as the tariffs are not equal at present so as to support the energy trade.
2) Security Threats
   The Security Threats, subjected to war on terror, are hampering the investment opportunities especially in Pakistan and Afghanistan with a negative impact on the overall regional economy.
3) Shortage of Water
   Due to shortage of Water, especially in winter season, the production of Hydel Power reduces to bare minimum.

4) Circular Debts

The circular debt has taken a serious situation in member states and the amount ranges between Pak Rs. 300 – 400 Billion in case of Pakistan due to which the Generation Companies are unable to produce electricity as per full installed capacity.

5) Prices of Furnace Oil

Due to unprecedented increase in oil price in the world, the prices of electricity have become unbearable by the general public in the region and the issue of tariff is becoming significant and playing the role like a limiting factor for regional integration.

6) Inconsistent Policies

Due to lack of will power in the Political leadership and inconsistent policies the power crisis in Pakistan has taken chronic shape which should now be controlled by the business community and the forums like this can be help full for combating the problems of member countries.

5.3 Role of Stakeholders

Apparently, the key stakeholders are not clear for their anticipated role in the context of energy trade in the region. On the other hand, the actions of stakeholders are not actively visible for their role in order to develop energy cooperation. The biggest challenge is mistrust between India and Pakistan. The SAARC CCI, intellectual community, researchers, print and electronic media, and other stakeholders can be instrumental in mobilizing the political leadership and creating a favorable environment for the energy cooperation in the region on sustainable basis.

6. CONCLUSION

The present energy demand and supply is not in a balanced form and supply deficit needs urgent attention to harness the existing potential of renewable at SAARC level through coordinated efforts. The region is in dire need of sufficient energy resources for economic growth and sustainability. The planning and progress for the reality of concept "energy ring" is not up-to mark and special initiatives are required at the level of Pakistan and India for long-term sustainable solutions to the region. The key challenges include transforming bilateral Power exchange into Multi-lateral, vision beyond four-nation Power Grid (Bangladesh, Bhutan, India and Nepal), Competition and Low-carbon Development. Besides, the political challenges includes questions on energy leadership in the region, mechanism for India-Pakistan energy exchange, pumping of energy from Central Asia and the Middle East and short fall of SAARC energy resources for its requirement.

Energy cooperation in South Asia, even while the region remains energy deficit in aggregate, would mean efficient utilization of the region's resources, increase in reliability of energy supply, economy in operationalization of initiatives, mutual support in contingencies, and confidence building measures for geo-political solution strategy. At the bilateral level, energy engagement is being pursued yet immense potential lies untapped. The existing intra-regional energy trade among SMSs is limited to electricity trade between India and Bhutan, and India and Nepal. Overcoming inertia, assessing further possibilities, and harnessing them is key whilst taking into account the geopolitical, economic and technical risks. It is encouraging that the governments of the region are engaged in bilateral dialogue to resolve the issues pertaining to economic relations. Despite the fact of bilateral development in South Asia, the national policies and the political mindset towards the concept of energy security also proved to be major inhibitors of energy trade.

The regional cooperation needs to address different variables including huge investment cost, political will, environment, climate change, private participation, affordability, Right of Way and inaccessibility. Trust and confidence between SAARC member states are of prime importance for the success of SAARC Energy Ring Concept and promotion of Energy Trade. The Governments can take benefit of expertise of SAARC Energy Centre in particular and SCCI in general to address the basis needs of Energy Ring. SCCI could be instrumental and play a catalytic role for the application of PPP concept through mobilization and active involvement of private sector, and bridging gaps at policy level for energy cooperation among member states.

Reduction of political tension within and across the countries could be instrumental in bringing overall sustainability in the region for which synchronization of policies and procedures are critically important in national and regional context. Special efforts and initiatives are required to reduce the political tension between India and Pakistan by undertaking a series of high-level dialogues and confidence building measures. The SCCI, intellectual community, researchers, print and electronic media, and other stakeholders can be instrumental in mobilizing the political leadership and creating a favorable environment for the energy cooperation in the region on sustainable basis.

7. THE WAY FORWARD

7.1 Key Actions Needed

Keeping in view the future development in each member country, there are promising and extensive opportunities of Energy Trade and investment for which moderate policies are required to be framed enabling brighter future and prosperity of the citizens. The Electric Energy can be traded within SAARC Member countries by pooling all the resources and controlled through a centralized regulatory mechanism at SAARC level. Nepal and Bhutan are rich in Hydro resources, Bangladesh is rich in gas reserves and Pakistan & India are rich in coal resources, thus providing promising option for cooperation among all countries.

The strategies for the promotion of energy cooperation and trading can be achieved through carrying out energy sector reforms, setting up suitable institutional arrangements at SAARC level, private sector participation, long term strategic planning for production and transmission and free exchange of information. Issues to be addressed in the process are:

(1) Success of "SAARC Energy Ring" concept in letter and spirit.
(2) Investment capabilities
(3) Viability of buyers
(4) Inadequacies in institutional mechanism
(5) Power markets of SAARC countries.
(6) Cross border trading in electricity has technical considerations as well as political and economic ones.
(7) Both Generation and Transmission capacity needs to be enhanced.
(8) Common principle & methodology for tariff determination, operational protocol, security, reliability and regulation are to be adopted.
(9) The Agreements should address the principal obligations that are equitable, risk sharing, issues related to financial and payment, commercial and legal, dispute resolution and arbitration.
(10) Technical solutions are not difficult but Political will of the member countries are important that needs the mobilization efforts and active role of all stakeholders.
(11) A cooperative mindset - Efforts to build trust and confidence.
(12) A commitment from the member countries for resources, manpower and reciprocal measures.
(13) Regional economic prosperity should take precedence over political compulsion.

7.2 Application of PPP Concept

Public–Private Partnership (PPP) involves a contract between public sector authority and a private party, in which the private party provides a public service or project and assumes substantial financial, technical and operational risk in the project. Over the past two decades more than 1400 PPP deals were signed in the European Union, which represent an estimated capital value of approximately €260 billion. India has already two organizations for power trading which already offer Bangladesh to purchase power in open price. Some other Indian private companies are looking into the feasibility to set-up power plants in Bangladesh and Sri Lanka.

SAARC member states should take benefit of the concept for the energy cooperation and its trade option as a best possible solution. The application of PPP concept in South Asia could be instrumental, beneficial and functional in following ways:

(1) Keeping in view certain limitations in government's structural framework and fiscal constraints in South Asia, the PPP concept could be instrumental for harnessing the potential of renewable and other energy resources.
(2) The private sector in the region has the potential and capabilities to materialize the objectives for the futuristic demand and supply of energy.
(3) The application of PPP concept could further be instrumental in promotion of energy cooperation and trade, and overcoming the geo-political barriers at SAARC level.
(4) The rate of return for private investor needs to be well defined prior to start the joint venture. SAARC CCI.

7.3 Role of Stakeholders for PPP

The SAARC CCI, SAARC Energy Centre, intellectual community, researchers, print and electronic media, and other stakeholders should play their role for mobilizing the political leadership and creating a favorable environment for the implementation of PPP mechanism at SAARC level.

7.4 Role of SAARC Energy Centre

The concepts and vision of SAARC Energy Centre (SEC) is pretty good but have certain limitations. The SEC can be instrumental through following ways.

(1) Regular research work is required in all member states to cover supply and demand vis-à-vis recent and past trends by covering the cross-cutting varibales.
(2) Preparation and promotion of strategic models for functional aspects of Energy Ring.
(3) Technical role for feasibility, designing, Operationalization and monitoring of "Central Transmission & Dispatch Centre".
(4) Monitoring role for PPP projects.
(5) Organize consultative workshop at regional level for consensus building on the different issues and barriers.
(6) Organize awareness raising seminars and campaigns on research based findings.
(7) Dissemination of research findings at all level.

7.5 How to make SAARC Energy Grid Functional

(1) The actual concept, vision and objectives of Energy Ring should be implemented in its true letter and spirit.
(2) "Central Transmission & Dispatch Centre" may be established under "SAARC Power Regulatory Authority (SPRA)" for facilitation of Power Dispatch as per requirement and availability of Power among each member country.
(3) Monitoring Team comprising of technocrats from SAARC Energy Centre and SAARC CCI should monitor the implementation as per specific TORs of a given project or agreement.
(4) Institutional and contractual arrangements may be made for technology transfer taking into account the different levels of development or maturity of the technology.
(5) "SAARC Energy Fund" may be created by member countries for the objectives of Energy Cooperation and Trade.

The fund may be managed through SAARC Energy Centre under the governance of "SAARC Technical Committee for Energy (STCE)". The rules of the business and modus operandi may be set at later stage with mutual consensus of members states.

7.6 Legal Solution

(1) Clear legislation needs to be brought into act for IPs and national grid system. This should also set the legislation regarding functions of IPs for their production and bring into the national or regional grid system. There is a need to harmonize the national grid system by taking into account the regional context for bring such a legislation into practice. SAARC CCI and other stakeholders in member states can play a vital role for demanding such an important and critical legal amendment and support for the promotion energy cooperation and trade through PPP concept.

(2) There is a need to develop a SAARC energy policy. The policy may be formulated and implemented by "SAARC Technical Committee for Energy (STCE)". This step would give satisfaction to the private investors.

(3) "SAARC Power Regulatory Authority (SPRA)" may be established under STCE for framing the regulations necessary for Electric Power Trade.

7.7 Synchronization of Policies and Procedures for Energy Cooperation & Trade

Keeping in view the gravity of problem, the respective Governments should formulate long term consistent policies keeping in view the interests of investors as well. The following recommendations need to be taken into account for bringing long-term synergies and sustainability in the policies at regional level:

(1) Energy Trade should not be restricted to SAARC member states so as to ensure long-term sustainability not only in the region but also to the adjacent economies in accordance with the original concept and vision of SAARC Energy Ring, and SAARC Energy Charter Treaty.

(2) There is a need to develop a comprehensive policy for trading with uniform procedures for tariffs, rules, surplus etc. including the concept and rules for PPP in national and regional contexts.

(3) Regional energy architecture needs to be built at all levels, from bilateral to multilateral. Initially the bilateral set up should be developed strategically with multi-lateral vision at later stage.

(4) In long run, running hydro-project is safe but big dams could be a problem and may have serious issues of pertaining to resources politics through riparian problems as well as long-term environmental issues. Water crisis is a problem in the region and strategic studies are required for the exploitation of hydro potential in the areas. Strong confidence building measures required prior to exploit the hydro-potential.

(5) A "SAARC Technical Committee for Energy (STCE)" at should be constituted with the mandate to formulate, review and implement policy, agreements, rules and institutional mechanism at regional level through taking into confidence all member states as well as SAARC CCI private segment. While convincing the governments and SAARC CCI, the Committee must also take into account the environment, climate change, political handling of situation and best available technological options. This technical committee can be instrumental for implementing the SAARC Energy Charter Treaty.

(6) The Committee may devise a comprehensive mechanism for pooling, sharing and trading of power resources of all member states, as per prioritized requirement.

(7) "SAARC Power Regulatory Authority (SPRA)" may be established for framing and implementing the regulations necessary for Electric Power Trade in line with the modus operandi as devised by "SAARC Technical Committee for Energy (STCE)".
(8) Conducive and secure environment should be provided and ensured at SAARC level.

7.8 Strategy for the Promotion of Cooperation among Member States

The outcome of this paper rationalizes and recommends cooperation among SAARC member states for harnessing the energy potential and its trade.

(1) The Energy Cooperation and Trade have complex nexus and barriers at national and regional level. The national legislation and energy policies may interfere with the objectives of energy cooperation and trade at regional level for the overall vision of SAARC Energy Ring.
(2) There is a need to first overcome the national barriers and issues and create a conducive environment for the application of PPP concept. The SAARC CCI and SAARC Energy Centre with the help of other stakeholders can be instrumental in resolving such barriers and issues.
(3) There is a need to design and implement a regional level Institutional and Stakeholders Capacity Building Programme.
(4) Although the SAARC Energy Centre has developed information management system but its scope needs to be broadened and comprehensive plan for Communication & Outreach is required for Information Dissemination at national and regional levels. The communication medium should be carefully addressed so as to meet all linguistic and low literacy requirements.
(5) There is a growing need to establish a vibrant SAARC Energy Forum (SEF) for all stakeholders. This will act as a hub for quick information dissemination and passive motivator for the replication of success stories.
(6) A massive awareness raising programme needs Seminars and consultative Workshops for the awareness raising and mobilization of key stakeholders on a common vision and perspectives.
(7) Monthly news bulletins by SAARC CCI or SAARC Energy Centre especially with success stories from different member states would act as a passive motivator for the adoption of common agenda for SAARC Energy Ring.
(8) Print and electronic media should be used for the promotion of energy cooperation and positive aspects / progress on SAARC Energy Ring.
(9) There is a need to also promote the development of Alternate Energy Resources so as to reduce climate change impacts due to fossil fuel use for energy purpose.

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