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Energy Cooperation in South Asia: Prospects and Challenges

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Abstract *Energy Security has always been a concern for all the countries in the world, as with modernization the use of energy has been increasing rapidly and people's life and national economy becoming dependant on the usage of energy. So, to maintain a secured future, different initiatives are being taken in the energy sector all over the world. South Asian region is vital part of this world with its huge population base and rapid economic growth. To facilitate the objective of achieving faster economic growth in this region, South Asian Association for Regional Cooperation (SAARC) was formed in 1985. But, due to some lack of trust between the member states and political dilemma, this association has never flourished to its full potential. However, through building mutual trust and understanding the greater perspective of this region, SAARC Member States (SMSs) have a big scope to create a strong regional cooperation, which includes bilateral and multilateral energy trade between the states and a generalized energy policy, which can provide a guiding principle for energy security in the future. With the present scenario of energy reserve, production and consumption of the countries of this region, it can be seen that there is a dire need for cooperation among the countries. Observing the successful regional cooperation in other parts of the world, it is high time that the leadership of the SMSs proceed towards a more secured future in the energy sector by pursuing strong regional cooperation.*

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1. Introduction

The South Asian Association for Regional Cooperation (SAARC), comprising Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan, and Sri Lanka was established in 1985 to enhance economic growth through increased cooperation among member countries in different areas and sectors.

To support and quicken economic growth in the region, the most significant input needed is increased access to energy, as there is a formidable direct relationship between economic growth and energy demand. Increased social mobility related to faster economic growth further raises the demand for energy, putting pressure on SAARC member states (SMSs) to ensure uninterrupted and dependable supply of energy.

Even though the SAARC region as a whole is rich with assorted energy resources, with enough potential in renewable energy field, a lion's share of these resources are yet to be exploited. Inadequate availability of indigenous energy supplies, combined with the large population base, makes the region significantly dependent on energy import. The variation of energy resource endowment between South Asia and its neighboring regions presents prospects for interregional energy trade to obtain the optimum advantage from available resources. However, the geopolitics involved and competition from alternative energy markets makes interregional energy trade a challenging proposition. In such a situation regional cooperation can be an effective mechanism boost the region's energy security. SAARC member states (SMSs) require adequate energy supplies and protect themselves from the potential threat of oil price hikes. Regional cooperation provides them such an opportunity.

Examples of successful collaboration in chasing reliable energy policies can be observed in different regions of the world, predominantly in sharing electricity generation using cross-border transmission interconnections. Estimates suggest that in Europe, electricity system interconnection has resulted in a 7%–10% reduction in generation capacity costs. Similar cooperation within the United States has been estimated to bring benefits in the order of $20 billion. A study of the Greater Mekong Sub-region in Southeast Asia suggests that regional cooperation in energy could reduce energy costs by nearly 20%, for a saving of $200 billion during 2005–2025 [1].

This paper briefly presents the current energy scenarios in South Asian countries and highlights the potential benefits of regional cooperation in energy sectors as well as obstacles to forgoing cooperation in this area. In order to derive lessons for South Asia, the paper presents example of energy cooperation in other parts of

the world. Finally, the paper reviews the initiatives taken so far to promote regional energy cooperation in South Asia and recommends steps to ensure energy securityy for all SAARC countries.

2. Energy Scenario in South Asia

In South Asia, the reserve and potential for energy resources comes from a wide variety of options. Initially reliant on conventional bio-mass fuels, the forward-looking sectors of the countries moved on to the use of coal. So, coal mines were one of the first symbols of modernity in colonial times. Coal was discovered first in 1774, but mining began in mid-nineteenth century, primarily from eastern Indian coal seam but also later from Assam and central India. These coals were used to fuel the new railways and industries such as the jute mills around Calcutta metropolis. As modern modes of transportation started to flourish, Oil and natural gas entered the energy basket. The Assam Oil Company went operational in the first quarter of twentieth century after Petroleum was struck in Digboy, Assam in 1889 [2]. As part of multipurpose river valley projects in late 1940s, large-scale hydroelectric projects were initiated. The vital factors behind creating greater demands for modern energy sources are the population growth and urbanization. For instance, the primary energy consumption in India increased as much as four times between 1971 and 2000 with increasing urbanization and this demand is expected to grow further while other South Asian countries have pursued comparable course, with little variations.

Oil reserve has always been a constraint for South Asian region which is rather inadequate to meet the oil demands of the region. So, it is clear that, the region will remain dependent on oil imports. The natural gas reserves in Bangladesh, India and Pakistan are sizeable but they are not seen by experts as a dependable source for long term planning. India and Pakistan, along with Bangladesh, have large coal reserves. India is the world's third largest coal producer, and will continue to use coal as the primary commercial fuel for electricity generation. Pakistan's immense coal reserves are yet untapped and estimated at 175 billion tonnes in the Thar area of Sindh province, a source that Pakistan will probably start to utilize fully in the years to come, although oil and gas are plentiful in regions to the north and west of Pakistan [2]. Pakistan also has plans to develop its lignite resources and to set up mine-head power plants. Bangladesh has limited coal reserves and plans to develop them slowly; although its one large open-cut project in Phulbari has been shelved just before beginning production due to mass demonstrations about the displacement of local communities. Sri Lanka intends to begin coal imports for power generation. Hydro-electric potentials are pretty high

in this region with possible locations being primarily in India, Pakistan, Nepal and Bhutan. Two mountainous countries, Nepal and Bhutan, have the potential to produce power from hydro-electric plants, which are far in excess of their current or projected demand. But, high investment required is the only barrier for them to produce surplus power. Traditional fuels such as biomass and animal waste continue to contribute handsomely in the region's energy mix, but at the same time, nuclear sources provide increasingly sizeable portions of power (in India and Pakistan), as do solar and wind power projects in India. Renewable energy sources have become a point of interest in this region and researches are going on to extract a noteworthy amount of power from renewable energy sources. Solar and Wind power is the segment that is getting pretty high interest from the researchers, private investors and governments.

2.1 Country-Wise Energy Scenario

In different countries in the SAARC region, the energy resources differ. Similarly, the process of power extraction also differ as some countries are dependent on natural gas as their main source of energy while some others are dependent on coal. These country-wise energy scenarios are discussed below in brief to get an overview of the present situation of that country and to get an insight on why regional cooperation in energy sector is required.

Afghanistan

In 2008, Afghanistan generated 0.83 billion kilowatt-hours of electricity from an installed capacity base of 0.489 megawatts. The top 2 energy sources overall were Hydroelectricity (76.48% of total capacity) and Conventional Thermal (23.52%). 76.48% of the installed capacity base comprised of renewable energy sources, the largest being Hydroelectricity at 374 megawatts [3].

From statistics, it is observed that energy scenario of Afghanistan does not truly represent the country's energy demand. The present energy consumption of the country is far below the bench mark of 1978. Some recent surveys project that in the coming years Afghanistan would experience primary energy growth rate of around 6% a year but at the same time, growth rate of electrical energy would be 10.5% a year [4]. Though endowed with natural resources, the country will have to largely depend on energy imports to meet its energy demand. Currently, out of a yearly 3.81 mtoe of non-diminishing hydropower potential, Afghanistan utilizes only 6.69% [4]. From a regional energy perspective, Afghanistan has the potential to act as energy transit country for South Asia.

Bangladesh

Energy sector of Bangladesh is heavily dependent on natural gas. If probable gas reserve can not be firmed up, Bangladesh will experience serious energy challenge due to gas shortage after 2016. To avoid this situation, Bangladesh will have to switch its extreme primary fuel dependency on gas to coal. Bangladesh is meeting its oil requirement through imports. From analysis, it is observed that Bangladesh would experience fuel based primary energy growth of around 6.24% a year, along with electrical energy growth of 7.8% a year from the period 2010 to 2020 [4]. Bangladesh can diversify fuel supply mix in an economic way, through import of gas and electricity from neighboring countries.

Among all the energy sources, presently, Bangladesh heavily relies on fossil fuels, especially natural gas, petroleum oil and coal. Bangladesh has not yet gone for large scale usage of renewable energy sources except the hydroelectric power plant in Kaptai or a failed wind turbine power plant project in Kutubdia. But, steps are being taken to popularize renewable energy sources in the form of solar energy or wind energy. But, at present, it is almost all fossil fuels. Here is an overview of the present scenario of the energy resources of Bangladesh:

Natural Gas

Natural Gas is the most important energy source for Bangladesh for both household uses and heavy industries. But, unplanned use of natural gas in earlier years and highly subsidized price of it has made it difficult to perfectly utilize the full potential of total natural gas reserve in Bangladesh. Contrary to popular belief, Bangladesh does not have a large reserve of natural gas, a Table 1 world indicates.

Table 1: Natural Gas Reserve in Bangladesh [5]

Natural Gas Reserve	Amount in Bcf
Reserve (Proven + Probable)	28,619.70
Reserve (Recoverable)	20,631.45
Cumulative Gas Production (Till Dec 2010)	9,407.14
Remaining Recoverable Reserve	11,224.31
Daily Gas Production in 2010-2011 (Till April 2011)	2.19

From Table 1 it is clear that Bangladesh has used up almost half the total reserve of natural gas. With the increasing rate of use of natural gases, it is obvious that Bangladesh will run out of Natural Gas reserve within 2025 if not sooner.

Already, as can be seen in Table 2, there is a demand-supply gap in natural gas in Bangladesh. According to the monthly report for the month of August from Petrobangla, there is around 500 Mcf shortage of supply every day. [5]

Table 2: Demand Supply Situation as in August 2011 [5]

. Consumer	Demand (Mcf)	Supply (Mcf)	Shortage (Mcf)
Power	923	804	
Fertilizer	289	132	
Non-Grid Power	40	37	
Captive	425	340	
CNG	125	114	
Industry	400	323	
Domestic	275	224	
Commercial and others	36	26	
Total	2513	2000	513

Petroleum Oil

Petroleum oil is the most important fossil fuel around the world. Though presently a very large number of vehicles and industries are running in CNG in Bangladesh, petroleum oil is still a very big source of energy. Unlike in the past, Bangladesh is presently producing enough petrol to serve its own needs. A healthy amount of petroleum products are being produced at different fields under Sylhet gas fields ltd. According to Monthly Production and Sales Statistics of different fields of the company, total production of condensate in the month of June 2011, was 1088.83 barrel from Haripur, Beanibazar and Rashidpur gas fields. But unfortunately, petrol is not as important as diesel as a fuel because bigger machines usually run on diesel engines. The amount of diesel produced from this condensate can barely serve a very low percentage of demand. So, every year, Bangladesh has to import a huge amount of petroleum oil in the form of crude oil, refined oil and lubricating oil.

Coal

Coal is a very important source of energy in worldwide perspective. Since the dawn of industrial age, coal has played a very big part as the primary energy source. But, in Bangladesh, coal is not a popular source because it is a new discovery. Also, due to bureaucratic red tape and resistance by a section of the people, coal has not been yet used in mass level. Presently, only one mine is on operation in Bangladesh and that is in the Barapukuria, Dinajpur. According to the data found in the Centre for Energy Studies, BUET, the total amount of coal reserve in Bangladesh is 3.015 billion MT of which 1.4 billion MT is recoverable [5].

Electricity

Bangladesh's total electricity capacity has increased on an annual compound basis by 3.91% over the last 20 years to 5,453 megawatts (MW) in 2008. The top 2 energy sources overall were Conventional Thermal (95.78% of total capacity) and Hydroelectricity (4.22%). [6].

Total renewable energy capacity accounts for only 4.22% of this total installed capacity base whilst renewable energy sources excluding hydropower account for 0%. Total electricity generation meanwhile climbed 11.72% over the last year to 32.93 billion kilowatthours (bn kWh) in 2008. Conventional sources, including conventional thermal (coal, petroleum, gas), nuclear power and hydro pumped storage accounted for 95.57% of total electricity generated, up from 94.78% 5 years previously. In 2009, Bangladesh had a zero balance net import requirement. There were no exports of electricity. [6]

Bhutan

Available data on Bhutan, which in highly outdated, shows that the country has relatively greater access to electricity and of all country of the region, it has about eight-fold higher per-capita energy consumption. In 2000, 55% of Bhutan's commercial energy consumption (which totaled 380.7 million kWh) was provided by hydroelectric power, 24% from petroleum, and 21% from coal. Electric power was introduced in Bhutan in 1962; by the mid-1980s, six hydroelectric and six diesel power stations were in operation. The 336-MW Chukha hydroelectric project, in south-western Bhutan, was completed in early 1987 and is connected to the Indian power grid; the project was funded by India, which is to receive all the electrical output not used by Bhutan. As of 2002 the major hydroelectric project under construction was the 1,020 MW Tala plant, slated for completion in 2004/05. In 2001, Bhutan's net installed capacity was 425,000 kW; in 2000 production totaled 1,900 million kWh, of which 99% was hydroelectric [2].

India

India's energy consumption is increasing by leaps and bounds; from 4.16 quadrillion Btu (quads) in 1980 to 12.8 quads in 2001, recording a 208% increase. In 2001, coal accounted for 50.9% of India's primary energy consumption, with petroleum accounting for 34.4%, hydroelectricity 6.3%, natural gas 6.5%, geothermal/wind/solar (non-conventional) 0.2%, and nuclear power 1.7%. Despite this growth and high population, India's energy consumption is still below that of US, China, Japan or Germany [2]. In 2008, India generated 785.53

billion kilowatt-hours of electricity from an installed capacity base of 176,788 megawatts. The top 3 energy sources overall were Conventional Thermal (68.95% of total capacity), Hydroelectricity (22.23%) and Wind (5.46%). 28.72% of the installed capacity base comprised of renewable energy sources, the largest being Hydroelectricity at 39,308 megawatts [7].

India's total electricity capacity has increased on an annual compound basis by 4.61% over the last 20 years to 176,788 megawatts (MW) in 2008. Total renewable energy capacity accounts for 28.72% of this total installed capacity base whilst renewable energy sources excluding hydropower account for 6.49%. Biomass and Waste experienced the fastest capacity growth rate (23.92%) while Conventional Thermal Energy added the most capacity in the last 5 years, reaching 121,892 MW in 2008.Total electricity generation meanwhile climbed 3.45% to 785.53 billion kilowatthours (bn kWh) in 2008 with the largest source for electricity generation being Conventional Thermal (82.02% of total net generation).Conventional sources including conventional thermal (coal, petroleum, gas), nuclear power and hydro pumped storage accounted for 83.69% of total electricity generated, up from 85.74% 5 years previously. In 2009, India had a zero balance net import requirement. There were no exports of electricity [7].

Maldives

About 55% of total energy consumption comes from wood. Nearly all of the inhabited islands of the Maldives (194 out of 199) have access to electricity; in late 2001, the Asian Development Bank issued an $8 million loan to boost the availability and supply of power to 40 outlying islands of the Maldives. In 2000, net electricity generation for all of Maldives was 110 million kWh, of which 100% came from fossil fuels. Total installed capacity at the beginning of 2001 was 25 MW [8].

The State Electric Company is to establish power stations all throughout the 200 islands under a planned program of rural development. With 23 islands, electrificated by the State Electric Company, the remaining 177 islands have some form of limited and not-so-reliable power supplies run by individual entrepreneurs. The airports and the tourist resorts have their own power generation systems. All these power supply systems are entirely run on imported fossil fuel, diesel. Renewable energy is used to power navigational lights (marking the reefs), communication transceivers on fishing boats and for power supply at the remote installations in the national telecommunication network.

These installations are not connected to the grid and are privately owned and operated. Solar energy is also used on a small scale for producing hot water for homes and in the tourism industry. The telecommunication company of Maldives is the single biggest user of renewable electrical energy, which is produced using solar energy. One hundred and seventy seven sites, mainly using solar power or solar-diesel hybrid systems, are operational. The largest site has a capacity of 3.5 kW while the total capacity approximates to 130 kW [8].

Nepal

Nepal is the poorest of the South Asian countries. Nearly all energy consumption was in the residential sector and most of that energy was derived from fuel wood. Nepal has little or no fossil fuel reserves so it relies totally on imports. Because of this, some emphasis is being put on renewable sources of energy. For example, the 10th Five Year Plan (2002–2007) aimed to provide more access to energy to rural families from alternative energy sources, as a means for poverty alleviation. In 2008, Nepal generated 3.05 billion kilowatthours of electricity from an installed capacity base of 717 megawatts. The top 2 energy sources overall were Hydroelectricity (92.05% of total capacity) and Conventional Thermal (7.95%). 92.05% of the installed capacity base comprised of renewable energy sources, the largest being Hydroelectricity at 660 megawatts [9].

Sri Lanka

Fuel wood and oil provide Sri Lanka with about 90% of its primary energy supply, in roughly equal proportions [2]. Nearly half of the oil is used for transportation and a quarter for power generation. In terms of electrical power produced, roughly equal amounts come from hydro and thermal plants. Some of the issues Sri Lanka will have to deal with concerning electrical power are:

- Inadequate generation capacity additions
- Absence of cost reflective pricing
- Absence of a coherent policy towards sector expansion such as weak public-private partnership situation
- Increased dependence on imported fossil fuels in the thermal generation sector and increased fuel switching, biomass to LPG.

Pakistan

Pakistan’s economy is at the crossroads. The energy sector consists of natural gas (45%), oil (15.2%), hydroelectricity (6.43%), coal (3.3%), nuclear (.42%) and

renewable (negligible). Natural gas is currently utilized by the power sector (35.4%), fertilizer (23.4%), industrial (18.9%), household (17.6%), commercial (2.8%), and cement (1.5%). In electricity consumption, the domestic sector demands 41.4%, with industries claiming 31.1%, agricultural 14.1%, other government sectors 7%, and commercial consumers 6%. The government has recently published a 25 year Energy Security Action Plan (ESAP) with two main thrusts: first is to clearly separate short-term, mid-term and long-term goals, and secondly to increase self-reliance on indigenous fuels.

Natural gas is the fuel of choice, and the country is considering various pipeline options from Iran, Qatar and Turkmenistan as well as enhancing exploration. This Plan also aspires to change the hydro-thermal mix in favor of hydro power, and increase the share of nuclear energy to 5–6% by 2025 [2].

3. Benefits of Regional Cooperation in Energy Sector of SMSs

i. Dependable support, reserve sharing, cleaner fuels, improved investment opportunities and decreased risks for investors, and the associated sharing of knowledge and experience will benefit every country.
ii. Scope to increase access to up to date and cleaner energy, especially electricity, to unreached localities and to intensify performance of the energy utilities would be created by economic progress.
iii. Differing resource endowments, development needs, and demand patterns among the countries in the region and its neighborhood create significant opportunities for cooperation and trade in the energy sector and eventually for creating one of the world's largest integrated energy markets.
iv. Energy resource-surplus countries (Nepal, Bhutan in the region, Central Asian countries, Iran, Myanmar in the neighborhood) would be benefitted from economic progress through energy export and accomplishments of comprehensive regional schemes, which would not be practically feasible otherwise.
v. Improved energy security would be possible in those countries with considerable energy import needs like India, Pakistan, Sri Lanka and Afghanistan, as would the others like Bangladesh from developing the energy mix.
vi. Enhancing energy trade through specific projects, whether bilateral or multilateral, and strengthening regional organizations and institutions, to complement the track, help to enhance mutual trust and confidence. SAARC could play a major role in helping to build mutual trust, to

develop regional institutions and physical infrastructure, and to partner with development organizations [11].

vii. Two regional energy trading hubs initially: the first at the western flank of the region, comprising Afghanistan, Pakistan and north-western India as importing markets, trading with Central and Western Asia; the second at the eastern flank of the region, comprising India (as the main importing market), Nepal, Bhutan, Bangladesh, and Sri Lanka. Both hubs could develop gradually, with India eventually bridging the two hubs into a region-wide integrated market [11].

4. Obstacles for Regional Co-operations in Energy Sector

Political Obstacles

- In Bangladesh and Nepal, a group of politicians and some other important persons from the civil society **discourage energy trade with India**.
- **Prolonged political tension between India and Pakist**an over Kashmir, warlike conditions in Afghanistan, internal armed conflicts in Nepal, as well as the political turmoil in Bangladesh, are not conducive to develop regional cooperation and trade.
- The previous inward-looking, import-substitution–based policy was aimed at the elusive goal of national self-sufficiency. This approach regarded energy imports as diluting energy security.
- Overshadowing all the aspects mentioned in the previous paragraphs is a **severe lack of trust between SAARC member states**. This can be perceived in almost any aspect of the negotiations, in particular the regional negotiations at the SAARC level. The SAARC Energy Working Group, which is in theory the correct platform to facilitate regional cooperation, has shown rather slow progress. In 2008, a high-level study on regional energy trade was carried out by the ADB. While this is only a preparatory study and further feasibility studies will have to be carried out before any implementation, it does indicate that energy trade has not been high on SAARC's list of priorities [12].

Monetary Obstacles

- Pervasive state ownership of the utilities, their poor earnings, and their inadequate internal cash generation to finance their own domestic needs let alone the investments for export infrastructure—is a major handicap for the development of regional trade.
- **Economic benefits were the main reason for cooperation in other**

regions, such as the Greater Mekong, the Nordic Pool and Southern Africa. In South Asia, most countries are energy-deficient and lack the capacity to trade in electricity. Instead, large-scale upfront investments have to be incurred for a long-term benefit. That is one of the reasons why both decision makers and the people at large perceive short-term improvements in domestic systems and power availability as superior investment priorities.

- On account of such **poor operational and financial performance of the power utilities and their lack of creditworthiness**, the entry of independent power producers (IPPs) for generation in most cases could be only on the basis of "take or pay" obligations fully covered by sovereign guarantees [1]. Even in such cases, the inability of the utilities to absorb the rising cost of power from IPPs (indexed to variations in fuel prices, exchange rates, domestic inflation, and similar variables) resulted in disputes, cancellation, or renegotiations, which soured the investment climate. This environment was clearly not conducive for electricity trade among the countries.

Environmental Obstacles

- Hydropower generation and the construction of multipurpose projects are considered to have significant environmental repercussions [12]. Internationally, it is still highly debated whether hydropower is a renewable energy source or not. The construction of multipurpose projects, which include large reservoirs, means a disruption of riverine fauna, and displacement of human settlements and agriculture.

Technical and Infrastructural Obstacles

- **The absence of infrastructure in the region** by way of electrical interconnections and gas pipelines across the borders (except in the case of the few interconnections between India and Nepal, India and Bhutan, and between Afghanistan and Central Asia and Iran) is a physical constraint to the energy trade [1]. There is no special geographical reason for lack of interconnections between India and Pakistan or between India and Bangladesh.

5. Lessons from the International Community

There are a number of successful examples of regional electricity grids throughout the world. Bangladesh may derive lessons from the success of various

regional blocks in achieving a government-level agreement; institutionalizing interaction between different member states and stakeholders; establishment of a supervisory/supranational authority; infrastructure investment and transmission connections; and increased availability of reliable energy for citizens. Let us take a look at some of these successful organizations.

5.1 ASEAN

ASEAN has been very active in energy cooperation. At several levels of government the member countries meet on an annual basis, and their reports are made available to the general public. In 2002, the Memorandum of Understanding (MOU) for the construction of the Trans-ASEAN Natural Gas Pipeline (TGAP) was signed, establishing the ASEAN Gas Consultative Council. For both the gas pipeline and a power grid, an ASEAN Master Plan was completed in 2000 and 2003 respectively (The 22nd ASEAN Ministers on Energy Meeting 2004). Four power grid interconnections are already in place in Southeast Asia: Peninsular Malaysia–Singapore, Thailand– Peninsular Malaysia, Vietnam– Cambodia, Thailand–Cambodia. ASEAN's strategy is to "encourage interconnections of 15 identified projects, first on cross-border bilateral terms, then gradually expanding to a sub-regional basis and, finally to a totally integrated Southeast Asian power grid system." There are four ongoing interconnection projects and an additional 11 projects are planned for interconnection by 2015.

5.2 Southern Africa

The Southern African Power Pool (SAPP) is a cooperation of national electricity companies in Southern Africa under the auspices of the Southern African Development Community (SADC). The members of the SAPP have created common power grids between their countries and a common market for electricity in the SADC region. The SAPP was founded in 1995 and is considered to be the most successful example of regional energy cooperation. Its coordination centre is located in Harare, Zimbabwe. Prior to its creation a history of 40 years of cooperation supported its development. Before 1995, two independent networks were already in existence.

The Southern Network, which connected Namibia, South Africa and Mozambique, was dominated by thermal-based power generation; and the Northern Network, which connected the DRC, Zambia and Zimbabwe, supported mainly hydropower generation. It is a fascinating achievement when looking at electricity exports, imports and production for all sub-Saharan countries. In 1997, 20 out of 42 countries were exporting or importing power. Half of those are

members of the SAPP. The SAPP example demonstrates one of the preconditions for grid integration: the prevalence of competitive electricity trade legislation, which had been decided at an early stage of cooperation.

5.3 Europe

The EU's story of integration can be seen as the mother of all regional agreements. While the EU mainly evolved out of the regional cooperation on coal, steel and nuclear energy under the 1951 European Coal and Steel Community (ECSC) and European Atomic Energy Community (EURATOM) treaties, energy policy has never become a supranational portfolio. Energy cooperation at the intergovernmental level, however, has deepened integration and always been supported by EU institutions. Gas Pipelines like the Nabucco (connecting Europe to the Middle East through Turkey) or North-Stream projects (connecting to Russia through the Baltic) have an inherently European character for importing gas from the EU's eastern and southern neighbors. Before 2007, the EU was divided into regional transmission organizations, coordinating national transmission system operators. Synchronization of the regional grids happened in 2007 (Bower 2003). An analysis of the role played by energy policy in the overall European integration process will further add to the theoretical approach to regional cooperation.

5.4 The Lessons for South Asia

One of the key arguments given by representatives and commentators in our region is that apart from Bhutan none of the South Asian countries has an energy surplus, which could essentially justify regional integration. Europe, however, has always relied on external supply of energy sources to meet its demand. Predictions till 2020 even foresee a dependence of 56 percent of its energy needs. This is due to a peaking in domestic consumption in, for example, the North Sea. By 2020, 77 percent of natural gas will have to be imported, 93 percent of oil, and 8 percent of solid fuel supplies (European Commission 2008). This is why the goal of the EU's energy policy has been in fact exogenously oriented: it is "to build up a wide network of countries around the EU, acting on the basis of shared rules or principles" (European Commission 2007). Furthermore, the European Commission argues that "the dependency is not a problem in itself. However it requires an active energy security policy, building up internal strengths through a well functioning internal energy with good interconnections, diversity in the types of energy used, clear regulation for security of supply and mechanisms for cooperation to deal with crisis" The ideal rationale therefore becomes that

common problems may only be solved with transnational solutions. Two ideas can be seen as central to the success of any regional project: the role of a secretariat, and the role of spillover effects. In theory, India could pursue a similar strategy with its northern neighbors. By persuading SAARC member states to adopt similar energy regimes and to jointly decide on certain standards, the theory suggests that a spill over into other areas of cooperation could not only generate trade benefits but also contribute to economic and political stability in the region. One of the key aspects of such a spillover, the theory claims, is an increasing frequency in the meetings of representatives from different countries

6. Initiatives for Regional Energy Cooperation

6.1. SAARC Inter governmental Framework agreement for Energy co-operation

Energy ministers in SAARC nations have decided to finalize the SAARC Inter-Governmental Framework Agreement (IFA) for Energy Cooperation to ease electricity crisis in the region. The importance of electricity in promoting economic growth and improving the quality of lives, and the potential common benefits of cross-border electricity trade among the SAARC member states have prompted this initiative. The framework agreement would also include the provision of allowing unrestricted cross-border trade of electricity on voluntary basis subject to regulations of the respective member countries. The agreement would allow the SAARC nations buying and selling entities to negotiate the terms, conditions, payment security mechanism and tenure of their power purchase agreements as normal commercial agreements. It would also allow the national grid operators to jointly develop coordinated procedures for the secure and reliable operation of the inter-connected grids of the member states and prepare scheduling, dispatch, energy accounting and settlement procedures for cross border trade. It would also allow transfer of technology related to the power generation, transmission and distribution among the SAARC member states.

6.2 SAARC Energy Trade Study (SRETS)

Completed with the assistance of Asian Development Bank, this study has identified four trade options, which will be considered by the relevant SAARC mechanism in order to make a road map for implementation. As a follow up, SAARC has commissioned a study on Regional Power Exchange. The study was to be completed in 2012. It could explore the development of a regional power market involving SAARC countries that already have interconnection, as well as those that have planned interconnections. It would also examine both economic

and technical requirements of establishing a regional power exchange that would maximize the potential for power transfers among SAARC regions to reduce power shortages and reap economic benefits.

6.3 SAARC Market for Electricity (SAME)

The 16th summit held on 28-29 April 2010 in Thimpu, Bhutan adopted an Indian proposal for a roadmap to create a SAARC market for electricity. The summit urged the member countries to quickly ratify the trade in services deal to open their service sectors. The leaders in their declaration emphasized the need to undertake studies to develop regional energy projects, promote regional power trade, efficiency, conservation and development of labeling and standardization of appliances, and sharing of knowledge and technologies. Earlier, Bangladesh Prime Minister Sheikh Hasina in her summit speech had proposed for a regional grid of electricity in the SAARC region. Energy-starved Bangladesh has been in negotiation with India and Bhutan to import electricity from the neighboring countries.

6.4 SAARC Energy Centre (SEC)

The creation of SAARC Energy Centre (SEC) came into picture after the Dhaka Declaration in 2005. In this declaration, the Heads of State or Government welcomed the joint Statement of the first SAARC Energy Ministers' meeting held in October 2005 in Islamabad. They agreed to the recommendation to establish the SAARC Energy Centre in Islamabad: to promote development of energy resources, including hydropower, and energy trade in the region; to develop renewable and alternative energy resources; and to promote energy efficiency and conservation in the region. It started journey from 1st March 2006 in Islamabad. SAARC energy cooperation program provides a major substantive element for economic prosperity of South Asia through meeting the energy demand of the countries. SAARC Energy Centre is converting energy challenges into opportunities for development. It is the platform involving officials, experts, academics, environmentalists and NGOs to tap potentials of cooperation in energy sector, including development of hydropower, renewable and alternative energy, promoting technology transfer, energy trade, energy conservation, and efficiency improvement in the region.

6.5 Energy Cooperation through BIMSTEC

Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC), comprised of seven countries, viz., Bangladesh, India, Myanmar, Sri

Lanka, Thailand, Bhutan and Nepal was formally launched on 31 July 2004 in order to create a link between ASEAN and SAARC. Out of the seven members, five are members of SAARC, and energy is one of the priority sectors.

Member states of the BIMSTEC reached a consensus to sign a Memorandum of Understanding (MoU) to exchange electricity among them. The proposed MoU will provide a broad framework for the member countries to cooperate towards the implementation of grid interconnection for the trade in electricity with a view to promoting rational and optimal power transmission in the BIMSTEC region. It also added that the BIMSTEC trans-power exchange and development projects would be implemented through strengthening of bilateral and intra-regional cooperation within the framework of respective member countries' environmental and electricity laws and regulations. According to the MoU, the member states would coordinate and cooperate in the planning and operation of interconnected systems to optimize costs and maintain satisfactory security to provide reliable, secure and economic electricity supply to the member countries. The issue of imposing import, export, or transit fee, duty, tax or other government charges on construction, operation and maintenance of the BIMSTEC grid interconnection would be mutually agreed upon under the MoU.

6.6 Four Borders Project: Reliability Improvement and Power Transfer in South Asia

During 2001–2002, under the USAID sponsored SARI/Energy programme, Nexant conducted a study on the "Four Borders Project: Reliability Improvement and Power Transfer in South Asia", which suggested connecting Siliguri (India) to Anarmani (Nepal) and Thakurgaon (Bangladesh) initially by 132 kV lines, capable of being upgraded to 220 kV as the volume of interchange increases. It also suggested the alternative of connecting Purnea (India) to Duhabi (Nepal) and Ishurdi (Bangladesh). Further connections are possible from Chhukha (Bhutan) to Siliguri and then on to Purnea. The cross-border flows would be around 500 MW and these would represent a relatively low-cost initiation of power trade, which could be extended later.

6.7 Energy trade and creating energy ring

After decades of insignificant volumes of cross-country electricity trade and absence of any trade in natural gas through pipelines among the countries in South Asia, political leaders and businessmen of the region have recently evinced a great deal of interest and enthusiasm in cross border electricity and gas trade, not only within South Asia but also with its neighbors in the west (Central Asia and Iran)

and in the east (Myanmar). So the concept of an "energy ring" has now come into picture and political leaders now realize that it is necessary to establish a regional energy ring and build an international grid among the countries. The steady, reliable supply of energy at reasonable cost is one of the key determinants for industrial competitiveness.

7. Recommendations

To ensure energy security all the neighboring countries have to step up their efforts. Co-operation agreements like SAARC and BIMSTEC have been active in this regard, but there are a few more areas where the countries should focus on.

7.1 Governments

The governments of all South Asian countries carry the key responsibility for advancing regional energy cooperation. Recommendations for these governments can be condensed into four key ones:

i. Unbundle national utilities, distribution and transmission systems operators.
ii. Sign more agreements to harmonize and synchronize the grids, which will also facilitate conventional imports and exports.
iii. Update domestic power grids to allow for feed-in.
iv. Become the prime project sponsors to create an environment of security for private and foreign investors, as well as upgrade regional infrastructure.

Given the state of energy deficiency in Bangladesh, India and Nepal, the key to cooperation lies not only in the import and export of power and gas to exploit complementarities but also in many softer areas of cooperation that are still lacking. These are energy efficiency, rural electrification, smart grid, grid harmonization, renewable energy and technology transfer, e.g., through exporting solar photovoltaic technology. More concretely, the 2010 SAARC Regional Energy Trade Study (SRETS) carried out by the ADB suggests four ways of moving forward in regional energy cooperation. The four areas for successful regional cooperation were identified as:

a) Regional/Sub-regional Power Market
b) Regional/Sub-regional Refinery
c) Regional/Sub-regional LNG Terminal and Gas Transmission Expansion
d) Regional/Sub-regional Power Plant

The final market approach can be adopted, once the essential preconditions for any region to trade in a competitive market are fulfilled, which are:

a) Adequate redundancy in generation and transmission
b) Electricity sales price reaching its economic value
c) Level playing field
d) Mechanism for market surveillance to guard against abuse of power

The attainment of these conditions affects the final timeline of market opening.

On a more general note, the individual countries should pursue their trading interests. The key remains a connection through the chicken neck area, where Bangladesh, Bhutan and Nepal are separated by only a narrow strip of Indian Territory. Bangladesh needs to lobby hard for a connection to the hydropower centers of its neighbors, Bhutan and Nepal. At the same time, Bangladesh government will have to support natural gas pipelines from Southeast Asia connecting its own infrastructure. While they are necessary for regional cooperation to happen, they are not sufficient. When technical knowledge and feasibility are attained, policy makers on all sides and in particular India have to take the leadership role.

7.2 International Aid

Donors and actors like the World Bank have always been trying to make these types of co-operation function properly. But sometimes they have been criticized for being unsuccessful in fostering regional energy cooperation. According to a former Nepali Minister for Water Resources, Dipak Gyawali (2010), in the Nepali context, donor-funded projects have become mere “cemeteries” of energy cooperation.

Regardless of such criticisms, the USAID, the World Bank and the ADB are continuing their assistance on the issue. The USAID has been focusing on capacity building in the Nepal Electricity Authority known as NEA. The World Bank is giving legal assistance to the NEA and carrying out feasibility studies on the consequences of electricity trade. The ADB is willing to assist in future transmission lines and integration. There remain a number of areas where their involvement is likely to enhance the overall progress in energy cooperation.

There are a number of areas in which the expertise of international donors and organizations can be useful. These are:

a) Capacity building of policy makers
b) Fostering interaction of decision makers at the highest level

c) Support of negotiations through provision of advisory and legal services
d) Research support
e) Payment mechanisms

Technical assistance is also a major part where the international actors can play a vital role. At a conference in New Delhi, Shri S Padmanabhan, the regional director of SARI/Energy explained how imported hydropower and natural gas would help in moderating the increase in fossil fuel requirements. He enumerated the following roles of SARI/E: to promote regional cooperation together with governments and the private sector; to bridge the gap of barriers and distrust; to provide counterpart funding, resources and unbiased support for regional initiatives; and to showcase examples of the benefit of regional cooperation.

Unlike more recent directional changes in development assistance, there remains a considerable scope for raising technical assistance. The debates on regional cooperation have remained at the policy level. What is needed is a detailed feasibility study to estimate possible trade volumes, transmission lines required, and citizens affected. Similarly, financial and economic calculations of the poverty- alleviating benefits surrounding the construction of export projects should be weighed against their true social costs. This will facilitate goal-oriented negotiations between India and its future energy trading partners, as well as at the multilateral level in the long run.

7.3 Education, Research and Training

Educational institutions can play a key role in supporting regional cooperation. Universities are able to provide neutral platforms for discussions, since they are both centers of research and ideas.

Through executive training, specifically on energy trade, higher-level officials can be targeted and representatives from the different countries brought together. One of the key advantages of the encouragement of education institutions to work in the area of energy cooperation is their neutrality and acceptability for most stakeholders.

7.4 Leadership

It is clear in the case of energy cooperation that the challenges faced by stakeholders and advocates are not of a technical nature. The issues here are the lack of initiative, leadership and ownership of the issues. Interventions require problem solving, when problems cannot be clearly defined and solutions not easily found. Even to define the problem and subsequently find the solution

requires significant capacity and willingness to learn. India's commitment and leadership can push the stalled process of regional energy cooperation forward. However, prudent diplomacy from other member states can play an important role in setting the policy agenda. A strong alignment of these members can help bring India on board. An important step would be to accept the responsibility for the shortcomings of the past and build a consensus to move forward.

8. Immediate steps the South Asian governments should take to promote regional cooperation

Now the South Asian governments should make determined efforts to encourage the power trading. Some guidelines are given below:

Subscribe to, and become members of the Energy Charter Treaty, as Pakistan has done, in order to place the cross border energy trade on a firmer multilateral footing in relation to investment protection, regulation of cross-border energy infrastructure and flows, provide additional comfort and confidence to all participants, and minimize the political risks to prospective investors.

- Create firm political commitment towards energy trade.
- Give attention in adequate training to enhance individual country capability in power sector as well as launch educational program.
- Reduce political tensions within and across the countries, with special attention to the integrity of transit countries (such as Afghanistan) and the viability and operational stability of their energy systems. Trade flourishes under peaceful conditions.
- Adopt a sustainable commercial approach to trade (rather than a political ad hoc approach) and use standard commercial contracts which allocate risks fairly. Let the private investors and market forces play a major role in actual buying and selling,
- Keep the price expectations realistic based on reliable market signals and ensure that both the buyer and seller see advantage in the trade.
- Promote private sector investment and public private partnership in power production.

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