



# *South Asia Regional Energy Trade: Opportunities and Challenges*

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# SAARC & Neighbors





# The energy sector in South Asia

- **Access to commercial energy needs to expand**
- **Demand is increasing due to:**
  - Economic growth
  - Expanding access
- **Commercial and technical electricity losses are high**
  - Often in excess of 40%
- **Significant investment is needed to keep up with demand**
  - Important to exploit comparative advantages and win-win opportunities
- **Energy endowments differ among the countries, but energy trade and regional integration low**
  - Only India, Bhutan, and Nepal currently trade electricity



# Estimated resource base: complementarities

	<b>Oil Reserves (1000 bbls) (Jan 3, 2003)</b>	<b>Gas Reserves (bcf) ( Jan 3, 2003)</b>	<b>Economic Hydro Potential TWh/yr (end 1999)</b>	<b>Coal (mill. tons) (end 2002)</b>
<b>Bangladesh</b>	<b>56,900</b>	<b>10,615</b>	<b>2</b>	
<b>Bhutan</b>			<b>70</b>	
<b>Nepal</b>			<b>158</b>	
<b>Sri Lanka</b>			<b>8</b>	
<b>Afghanistan</b>	<b>95,000*</b>	<b>2,000-3,000</b>		
<b>Pakistan</b>	<b>310,443</b>	<b>26,365</b>	<b>130</b>	<b>2,265</b>
<b>Iran</b>	<b>89,700,000</b>	<b>812,300</b>	<b>48</b>	
<b>India **</b>	<b>5,367,173</b>	<b>26,943</b>	<b>660</b>	<b>84,396</b>

\* *Source: EIA –Soviet estimate for the late 1970;*

\*\**Hydropower estimate reflects technical potential;*

*Source: Oil & Gas Journal; World Energy Council*

*bbls: barrel; bcf: billion cubic feet; TWh: 10<sup>12</sup> watt-hours*



# Installed power generation capacity & access

	<i>Installed capacity</i>	<i>Electricity Access</i>
	(MW)	(%)
Afghanistan	454	6
Bangladesh	4,710	33
Bhutan	445	30
India	112,058	56
Nepal	522	40
Pakistan	17,953	56
Sri Lanka	1,615	64



# South Asia current cross-border trade is very small

- **The region's cross-border trade in network energy (electricity, pipeline natural gas) limited to India-Bhutan and India-Nepal electricity trade**
- **India's peak demand in 2003-04 was about 85,000 MW and gross energy consumption about 558 billion kWh**
- **India-Bhutan electricity trade:**
  - Maximum transfer capacity: 400 MW (less than 0.5% of India's peak demand)
  - 90% dependable imports: 1,720 million kWh (0.3% of India's 2003-2004 consumption)
- **India-Nepal electricity trade:**
  - The exchange currently limited to 50 MW (being upgraded to 150 MW)
  - In 2003-04 India imported 139 million kWh and exported 186 million kWh



# South Asia lags in energy trade and regional integration

- **Europe's integrated markets:** Western and Central Europe (UCTE); Scandinavia (NORD POOL); South-East Europe Regional Market; Baltic Electricity Market
- **CIS countries:** increasing reintegration and trade
- **North America:** US and Canada have extensive electricity and gas trade
- **South America electricity markets:** South Cone countries and Andean Community of Nations
- **Central America (SIEPAC):** efforts under way to integrate electricity systems
- **Africa's integration efforts:** Southern Africa (1995); Nile River basin; West Africa; East Africa
- **East Asia:** Greater Mekong Subregion initiative for integrated electricity markets



# Rationale for regional energy trade

- **Significant scope for advancing regional economic development by increasing energy access and supply, and improving energy security, reliability, and quality in the region**
- **Potential financial gains from energy trade could be substantial for all**
- **Energy trade fundamental part of regional resource management (e.g., water and fuel) and broader regional integration**
- **More attractive markets for private investment**
- **Better use of global investment flows and technology transfers**
- **Easier integration with global markets**



# Types of energy trade

- **Trading bulk energy**
- **Trading to meet daily and/or seasonal peaking requirements, especially when non-coincidental**
- **Trading electricity system services (frequency and voltage regulation support, operating reserves)**
- **Sharing electricity operating reserves and gas storage**
- **Emergency support**
- **Transit: cross-country and cross-regional transfers**



# Market arrangements

- **Short-term opportunistic exchanges**
- **Long-term supply arrangements**
- **Bilateral trade**
- **Multilateral arrangements**
- **Integrated regional electricity pools**



# **Some illustrative energy trade opportunities**

- **Northern Region of India is projected to be short of power in the next several years at least (estimated shortage is 10,000 MW by 2007)**
- **Nepal and Bhutan have hydro power resources well in excess of their projected domestic needs**
- **New gas discoveries in Bangladesh present viable options for exports to India**
- **Afghanistan can import more electricity from Central Asia**
- **India, Pakistan: gas imports from Iran, Qatar, Turkmenistan**



# Broader potential for energy trade

- **India:** electricity and gas imports; trading base-load power for peak power
- **Pakistan:** gas imports; energy transit; reliability support
- **Nepal and Bhutan:** hydropower exports; base-load electricity generation imports; reliability support
- **Bangladesh:** gas exports (directly and/or through electricity); reliability support
- **Afghanistan:** electricity and gas imports and transit
- **Trade with countries outside the region:** Central Asia, Iran, Myanmar



# Benefits of energy trade

- **Benefits from exploiting complementarities and comparative advantages in:**
  - **Primary energy endowments**
  - **Resource development costs**
  - **Complementary demand profiles (daily, seasonal)**
- **Larger markets – enhanced opportunities for the economies of scale and scope**
- **Optimizing fuel mix to reduce costs, improve energy security and better address environmental concerns**
- **Increase supply and access faster in importing countries**
- **Enhance supply security, reliability, and quality**
- **Bottom line: reduce cost of supply for all participants from the win-win opportunities**



# Barriers

- **Political and security problems, including territorial disputes**
- **Lack of trans-regional energy infrastructure**
- **Weak regional institutional and regulatory framework for regional planning, investment financing, investment protection, contract enforcements, and policy and commercial risk mitigation**
- **Riparian rights and water sharing issues**
- **Incongruent pricing policies and access regulations**
- **Differences in subsidization policies**



# Risks and mitigation measures

<b>Risk</b>	<b>Mitigation</b>
Supply security due to import/transit dependency	<ul style="list-style-type: none"><li>• Diversification of supply and fuel mix</li><li>• Economic cooperation has a positive feedback on political relationships</li></ul>
Contract enforcement and payment risks	<ul style="list-style-type: none"><li>• Need to improve arbitration, regional banking (payment securities)</li></ul>
Pricing policies	<ul style="list-style-type: none"><li>• Harmonize regulation, improve subsidization policies</li></ul>
Balance of payment exposure	<ul style="list-style-type: none"><li>• Improve regional pricing, risk sharing, develop hedging opportunities and instruments</li></ul>
Infrastructural bottlenecks	<ul style="list-style-type: none"><li>• Improve regional planning</li><li>• Harmonize infrastructure access regulation</li></ul>



# The way forward

- **Increasing bilateral trade**
  - Pursue simpler deals first
- **Getting the broad framework right to open up longer term trading and investment potential:**
  - Analysis of regional energy trade economics
  - Addressing institutional, regulatory and policy issues
  - Addressing technical issues: parallel operation of electrical grids
  - Developing commercial framework for trading: framework trading agreements, model power purchase agreements
  - Addressing investment issues: regional investment planning, riparian rights, right of way for electricity transmission lines and gas pipelines, environmental and social concerns, etc.
- **Strengthening physical infrastructure: regional electricity transmission lines and gas pipelines**
- **Creating regional forums for discussions and coordination**



# Next steps

- **Organize regional working forums for discussing energy trade and investments**
- **Advise international donors of their possible role in advancing regional energy trade**
- **Convene a regional conference on energy trade**
- **Identify opportunities and barriers**
- **Initiate technical-economic studies to inform policy makers, investors, and other stakeholders**



# **Role of the international community**

- **Help establish regional forums for policy discussions, knowledge sharing, and consensus building**
- **Undertake and/or participate in technical-economic studies**
- **Strengthen capacity of ministries and utilities in the region in energy trade and investments**
- **Provide investments financing and risk mitigation**



# WBG support for regional energy trade

<b>Europe / Caucasus</b>		
South East Europe Regional Electricity Market	Eight countries in South-East Europe	<ul style="list-style-type: none"> <li>• \$500 mln lending facility planned in investments to support power trade</li> </ul>
Baku-Tbilisi-Ceyhan Oil Pipeline	Caucasus: Azerbaijan, Georgia, Turkey + private sector	<ul style="list-style-type: none"> <li>• \$125 mln IFC investment loan</li> <li>• \$125 mln IFC-syndicated inv. loans</li> <li>• IBRD TA loan to Turkey (pipeline feasibility study)</li> <li>• IDA TA loan to Georgia (capacity building)</li> </ul>
<b>South America</b>		
Bolivia-Brazil Gas Pipeline	Bolivia, Brazil + private sector	<ul style="list-style-type: none"> <li>• \$130 million investment loan</li> <li>• Partial Credit Guarantee for \$180 mln</li> </ul>
<b>South Asia</b>		
Indus Waters Treaty (1960)	India, Pakistan	<ul style="list-style-type: none"> <li>• WB-arranged development fund (raised \$893.5 million)</li> <li>• World Bank responsible for dispute resolution and a court of arbitration.</li> </ul>
<b>Southeast Asia</b>		
Greater Mekong Subregion Program	Cambodia, China, Lao PDR, Malaysia, Myanmar, Thailand, Vietnam	<ul style="list-style-type: none"> <li>• WB financed initial study</li> <li>• A GEF grant for promotion of sustainable and equitable utilization of water resources</li> </ul>



# WBG support for regional energy trade

<b>Africa</b>		
Southern Africa Power Pool	Angola, Botswana, Congo (Dem Rep), Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe	<ul style="list-style-type: none"> <li>• \$440 million in investment support: planned (some loans already active)</li> </ul>
West Africa Power Pool	Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo	<ul style="list-style-type: none"> <li>• West Africa Power Market Development Project (under development)</li> </ul>
West African Gas Pipeline	Benin, Ghana, Nigeria, Togo + private sector	<ul style="list-style-type: none"> <li>• IDA Credit and IDA Partial Risk Guarantee planned</li> <li>• MIGA breach of contract insurance</li> <li>• Global Gas Flaring Reduction Initiative grant</li> </ul>
Chad-Cameroon Petroleum Pipeline	Chad, Cameroon + private sector	<ul style="list-style-type: none"> <li>• IDA Credits to Chad and Cameroon IFC: \$100 mln A and \$100 mln B loan)</li> <li>• Funding for capacity-building of over \$40 million</li> </ul>
Nile Basin Initiative (cooperative water resources management, including power generation among other aspects)	Burundi, Congo (Dem Rep of), Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, Uganda	<ul style="list-style-type: none"> <li>• IDF grant for capacity and institutional building</li> <li>• ESMAP scoping study</li> <li>• IDA \$35 million for Ethiopia-Sudan transmission interconnection Project</li> </ul>