South Asia Regional Energy Trade: Opportunities and Challenges

Vladislav Vucetic
Lead Energy Specialist, South Asia Sector Energy and Infrastructure Unit, The World Bank
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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

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</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>56,900</td>
<td>10,615</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Bhutan</td>
<td></td>
<td></td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>Nepal</td>
<td></td>
<td></td>
<td>158</td>
<td></td>
</tr>
<tr>
<td>Sri Lanka</td>
<td></td>
<td></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Afghanistan</td>
<td>95,000*</td>
<td>2,000-3,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pakistan</td>
<td>310,443</td>
<td>26,365</td>
<td>130</td>
<td>2,265</td>
</tr>
<tr>
<td>Iran</td>
<td>89,700,000</td>
<td>812,300</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>India **</td>
<td>5,367,173</td>
<td>26,943</td>
<td>660</td>
<td>84,396</td>
</tr>
</tbody>
</table>

* 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: $10^{12}$ watt-hours
## Installed power generation capacity & access

<table>
<thead>
<tr>
<th>Country</th>
<th>Installed capacity (MW)</th>
<th>Electricity Access (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>454</td>
<td>6</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>4,710</td>
<td>33</td>
</tr>
<tr>
<td>Bhutan</td>
<td>445</td>
<td>30</td>
</tr>
<tr>
<td>India</td>
<td>112,058</td>
<td>56</td>
</tr>
<tr>
<td>Nepal</td>
<td>522</td>
<td>40</td>
</tr>
<tr>
<td>Pakistan</td>
<td>17,953</td>
<td>56</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>1,615</td>
<td>64</td>
</tr>
</tbody>
</table>
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-coincident
- 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

<table>
<thead>
<tr>
<th>Risk</th>
<th>Mitigation</th>
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</table>
| Supply security due to import/transit dependency | • Diversification of supply and fuel mix  
• Economic cooperation has a positive feedback on political relationships |
| Contract enforcement and payment risks          | • Need to improve arbitration, regional banking (payment securities)       |
| Pricing policies                                | • Harmonize regulation, improve subsidization policies                    |
| Balance of payment exposure                     | • Improve regional pricing, risk sharing, develop hedging opportunities and instruments |
| Infrastructural bottlenecks                     | • Improve regional planning  
• Harmonize infrastructure access regulation |
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

### Europe / Caucasus

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<tr>
<th>Region</th>
<th>Countries</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>South East Europe Regional Electricity Market</td>
<td>Eight countries in South-East Europe</td>
<td>• $500 mln lending facility planned in investments to support power trade</td>
</tr>
</tbody>
</table>
| Baku-Tbilisi-Ceyhan Oil Pipeline | Caucasus: Azerbaijan, Georgia, Turkey + private sector | • $125 mln IFC investment loan  
• $125 mln IFC-syndicated inv. loans  
• IBRD TA loan to Turkey (pipeline feasibility study)  
• IDA TA loan to Georgia (capacity building) |

### South America

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</table>
| Bolivia-Brazil Gas Pipeline      | Bolivia, Brazil + private sector               | • $130 million investment loan  
• Partial Credit Guarantee for $180 mln |

### South Asia

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</table>
| Indus Waters Treaty (1960)       | India, Pakistan                                | • WB-arranged development fund (raised $893.5 million)  
• World Bank responsible for dispute resolution and a court of arbitration. |

### Southeast Asia

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</table>
| Greater Mekong Subregion Program | Cambodia, China, Lao PDR, Malaysia, Myanmar, Thailand, Vietnam | • WB financed initial study  
• A GEF grant for promotion of sustainable and equitable utilization of water resources |
# WBG support for regional energy trade

<table>
<thead>
<tr>
<th>Region</th>
<th>Countries</th>
<th>Highlights</th>
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<tbody>
<tr>
<td><strong>Southern Africa Power Pool</strong></td>
<td>Angola, Botswana, Congo (Dem Rep), Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe</td>
<td>• $440 million in investment support: planned (some loans already active)</td>
</tr>
<tr>
<td><strong>West Africa Power Pool</strong></td>
<td>Benin, Burkina Faso, Cape Verde, Côte d’Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo</td>
<td>• West Africa Power Market Development Project (under development)</td>
</tr>
<tr>
<td><strong>West African Gas Pipeline</strong></td>
<td>Benin, Ghana, Nigeria, Togo + private sector</td>
<td>• IDA Credit and IDA Partial Risk Guarantee planned</td>
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<td>• MIGA breach of contract insurance Global Gas Flaring Reduction Initiative grant</td>
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<tr>
<td><strong>Chad-Cameroon Petroleum Pipeline</strong></td>
<td>Chad, Cameroon + private sector</td>
<td>• IDA Credits to Chad and Cameroon IFC: $100 mln A and $100 mln B loan)</td>
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<td>• Funding for capacity-building of over $40 million</td>
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<tr>
<td><strong>Nile Basin Initiative</strong></td>
<td>Burundi, Congo (Dem Rep of), Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, Uganda</td>
<td>• IDF grant for capacity and institutional building</td>
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<tr>
<td></td>
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<td>• ESMAP scoping study</td>
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<td></td>
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<td>• IDA $35 million for Ethiopia-Sudan transmission interconnection Project</td>
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