Opportunities for Energy Trade in South Asia

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Presentation Sequence

1. South Asia Energy Scenario in Brief

2. Initiatives undertaken to Promote Regional Energy Trade in South Asia

2. Opportunities of Regional Energy Trade in South Asia
Section 1: South Asia Energy Scenario in Brief
Despite relatively a large energy resources base of 109 billion Tonnes of Coal and 300,000 MW HPP SA faces acute power shortages except for Bhutan
### Access to Electricity—Regional Aggregates

<table>
<thead>
<tr>
<th>Region</th>
<th>Population without electricity (millions)</th>
<th>Electrification Rate %</th>
<th>Urban electrification rate %</th>
<th>Rural electrification rate %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>587</td>
<td>41.8</td>
<td>68.8</td>
<td>25.0</td>
</tr>
<tr>
<td>North Africa</td>
<td>2</td>
<td>99.0</td>
<td>99.6</td>
<td>98.4</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>585</td>
<td>30.5</td>
<td>59.9</td>
<td>14.2</td>
</tr>
<tr>
<td><strong>Developing Asia</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China &amp; East Asia</td>
<td>182</td>
<td>90.8</td>
<td>96.4</td>
<td>86.4</td>
</tr>
<tr>
<td>South Asia</td>
<td>493</td>
<td><strong>68.5</strong></td>
<td><strong>89.5</strong></td>
<td>59.9</td>
</tr>
<tr>
<td>Latin America</td>
<td>31</td>
<td>93.2</td>
<td>98.8</td>
<td>73.6</td>
</tr>
<tr>
<td>Middle East</td>
<td>21</td>
<td>89.0</td>
<td>98.5</td>
<td>71.8</td>
</tr>
<tr>
<td><strong>Developing countries</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>World*</td>
<td>1,314</td>
<td>74.7</td>
<td>90.6</td>
<td>63.2</td>
</tr>
<tr>
<td>World*</td>
<td>1,317</td>
<td>80.5</td>
<td>93.7</td>
<td>68.0</td>
</tr>
</tbody>
</table>

*World total include OECD and Eastern Europe/Eurasia

Source: IEA, Table 1: Electricity Access in 2009-Regional Aggregates, (http://www.iea.org/weo/electricity.asp)
Gasp Pipeline Map of India
MAJOR TRANSMISSION NETWORK OF INDIA
(400kV AND ABOVE)
(EXISTING AND APPROVED)
(UPDATED UPTO JAN. 2013)

LEGEND

International & regional boundaries shown are tentative.
Current State of Energy Infrastructure In/Around SA

CAR Power Grid Map

ASEAN Power Grid Map

Indian Power Grid
Section 2: Initiatives undertaken to Promote Energy Trade in South Asia
Cross Border Power Interconnections

Existing Interconnections:

- Bhutan-India - 1260 MW
- Bangladesh –India – 1000MW
- India –Nepal – 150 MW
- Iran-Pakistan: 100
- Afghanistan and Central Asia

Potential Interconnections:

- India-Sri Lanka -1000 MW
- Iran-Pakistan -1000MW

Inter-regional Interconnections on Horizon:

- CASA-1300 MW
- Iran-Pakistan -1000 MW
# Planned Power Grid Interconnections & Benefits

<table>
<thead>
<tr>
<th></th>
<th>Interconnection</th>
<th>Capacity (MW)</th>
<th>Est. Cost (Million USD)</th>
<th>Annual Benefit (Million USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>India-Bhutan</td>
<td>2,100</td>
<td>140-160</td>
<td>1840</td>
</tr>
<tr>
<td>2</td>
<td>India-Nepal</td>
<td>1,000</td>
<td>186</td>
<td>105</td>
</tr>
<tr>
<td>3</td>
<td>India-Sri Lanka</td>
<td>500</td>
<td>600</td>
<td>186</td>
</tr>
<tr>
<td>4</td>
<td>India-Bangladesh</td>
<td>500</td>
<td>192-250</td>
<td>145-389</td>
</tr>
<tr>
<td>5</td>
<td>India-Pakistan</td>
<td>250-500</td>
<td>50-150</td>
<td>335-491</td>
</tr>
<tr>
<td>6</td>
<td>CASA 1000</td>
<td>1,000</td>
<td>970</td>
<td>906</td>
</tr>
</tbody>
</table>

Source: SAARC Energy Centre
Initiatives for Regional Energy Cooperation

Pre-feasibility studies
- 2-Borders: to interconnect Indian power grid with Sri Lanka
- 4-Borders: to connecting power grids of India, Nepal, Bangladesh, and Bhutan
- Possibility of interconnecting the Sub-stations along India-Bangladesh Border
- Indo-Sri Lanka Trade Project

Policy Studies
- Regional Energy Security for South Asia
- Power Trade in Between Central Asian Republics and with South Asia
- SAARC Regional Energy Trade Study

………….continued
Initiatives to Regional Energy Trade in South Asia

Economic & Social Benefits Analysis of Power Trade in:
- South Asia Growth Quadrangle (4-Border Region)
- Power Trade between India and Pakistan
- Indo-Sri Lanka Trade Project

Gas Options
- Gas options study for India (Selected options would benefit entire South Asia)
- Gas options study for Sri Lanka

Hydropower Resources Mapping:
- Regional Hydro-power Resources in South Asia

Power Exports from Bangladesh to India
- Viability of Power Export from Bangladesh to India study conducted in 2000 examined 500 MW power export from BD to India
2-Borders Interconnection

Transmission charges about US$ 0.0258/unit in Stage-I (500 MW) to $0.0164/unit in Stage-II (1000MW) – Revised
Transmission charges Stage-I (250 MW) about $0.0174/unit and Stage II (500 MW) about $0.0125/unit - Revised Estimate per new study
India-Bangladesh Sub-station Interconnections

- 24 substations - 5 to 60 Kms from the border
- 18 sub-stations – 10 to 70 Kms from the Border
- Investment required to establish the interconnections ranges between US$ 1.32 million to 4.39 million
Potential Route for the CASA 1000 Transmission System
Potential for Gas Imports in to South Asia

Iran-Pakistan-India (IPI):

Iran, Pakistan and India gas pipeline will provide South Asian nations the opportunity to procure natural gas to support their overall economic development.

Turkmenistan-Afghanistan-Pakistan-India (TAPI):

Turkmengaz has been selected as the Consortium leader to implement the project.

Work on financial close is in progress, following which project implementation will begin.

Myanmar-Bangladesh-India (MBI):

Options to bring Myanmar gas to India via Bangladesh are being explored.

Qatar-Iran-Pakistan-India Gas Pipeline (QIPI):

Adverse impact of high level of gas shortages on economies of South Asia may make this project viable economically.
Potential for other Energy Trade Options

Electricity Sector:
- Electricity Trade in Between Central Asian Republics with South Asia
- Electricity imports from Iran to South Asia
- Power trade in between the South Asian Republics
- Power Trade with the East Asian nations/ASEAN

Petroleum Sector:
- Petroleum imports through oil pipeline(s) from Iran, Central Asia and West Asia
- Joint Petroleum procurement mechanism for South Asia
- Strategic oil reserve for South Asia

Solid Hydrocarbon Sector:
- Regional Coal sector development and procurement mechanism

Renewable Energy:
- Regional mechanism for technology selection and procurement of RE equipment
- Adoption of select technologies and sharing of best practices for RE project development
Definition of Energy Ring:

“Energy Ring is a system: capable of continuously maintaining a balance between demand and supply of energy, in its various forms, within a geographical region, in a cost effective manner, eliminating the possibilities of supply disruptions, delivery constraints and giving consumers the confidence of energy security”

The first ever definition of “An Energy Ring” was given by D. N. Raina
Thank You!