SOUTH ASIA REGIONAL INITIATIVE FOR ENERGY INTEGRATION
Background, Prospects and Objectives

1st Meeting of Task Force 3
“South Asia Regional Electricity Markets”
29th-30th April, 2014 | Mumbai, India

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SARI/EI PARTICIPATING COUNTRIES

- Bangladesh
- Bhutan
- India
- Nepal
- Sri Lanka
- Maldives
- Afghanistan
- Pakistan
## PROSPECTS FOR CBET IN SOUTH ASIA (EASTERN SUB-REGION)

<table>
<thead>
<tr>
<th>Importing Countries</th>
<th>Exporting Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>India</td>
</tr>
<tr>
<td>India</td>
<td>X</td>
</tr>
<tr>
<td>Bhutan</td>
<td>Dry season support</td>
</tr>
<tr>
<td>Nepal</td>
<td>Thermal power support. Dry season support.</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>HVDC back-to-back link. Sharing reserves; electricity swap</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>Dry season and thermal power support</td>
</tr>
</tbody>
</table>
## Opportunities for CBET in South Asia Due to Diversity in Demand & Supply

<table>
<thead>
<tr>
<th>System Characteristics</th>
<th>Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak time differences</td>
<td>While there is difference in time zone (15 to 30 minutes) between the countries of the region, the difference in daily load curve provide opportunities for optimising load-generation balance across the region. Apart from this, difference in designated weekends and annual festivities also give similar opportunities.</td>
</tr>
<tr>
<td>Seasonal differences</td>
<td>Monsoon season has sufficient to excess hydro power output, whereas in lean periods (dry winter season), more thermal power support can be provided</td>
</tr>
<tr>
<td>Hydro thermal mix</td>
<td>Useful for balancing load in terms of peak and off-peak load during a day.</td>
</tr>
</tbody>
</table>
## Technical and Operational Benefits:

- Optimal Use of Regional Resources and System Operation
- Economies of scale in the development of regional resources
- Improved energy security and reliability of respective power systems
- Optimized transmission network
- Reduce environmental impact
- Reduce fossil fuel imports

## Economic and Financial Benefits:

- Cost effective power system
- Better return to investors in generation assets
- Improvement in industrial productivity and competitiveness
- Less exposure to volatile international energy prices
- Economic Growth
- High export income

## Environmental Benefits:

- Less Impact on Local and Global environment
- Reduce Adverse Impact of Indoor Air Pollution
- Improvement in Social Indicators
- Renewable Energy Development
## CURRENT STATUS OF POWER SECTOR COOPERATION IN SOUTH ASIA

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Countries</th>
<th>Interconnection Description</th>
<th>Capacity (MW)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bhutan-India</td>
<td>Grid reinforcement to evacuate power from Punatsangchhu I &amp; II</td>
<td>Reinforcement of 2,100 MW</td>
<td>Under implementation</td>
</tr>
<tr>
<td>2</td>
<td>Nepal-India</td>
<td>Dhalkebar-Muzaffarpur 400 kV line</td>
<td>1,000 MW</td>
<td>Under implementation</td>
</tr>
<tr>
<td>3</td>
<td>Sri Lanka-India</td>
<td>400kV, 127 km HVDC line with submarine cable</td>
<td>500 MW in the short-term</td>
<td>Planning</td>
</tr>
<tr>
<td>4</td>
<td>Bangladesh-India</td>
<td>400kV HVDC back-to-back asynchronous link</td>
<td>500 MW</td>
<td>Completed</td>
</tr>
<tr>
<td>5</td>
<td>India-Pakistan</td>
<td>220 kV in the short-term (could be upgraded to 400 kV later)</td>
<td>250-500 MW</td>
<td>Yet to be formally discussed</td>
</tr>
</tbody>
</table>
SARI/Energy’s Major Cross-Border Infrastructure & Key Energy Market Formation Activities

**AFGHANISTAN**
- CASA 1000 Advisory Services
- GEMT Programs, Wind Energy Support

**PAKISTAN**
- CASA 1000 Advisory Services
- GEMT Programs, Wind Energy Support

**INDIA**
- Bilateral Electricity links to Bangladesh, Sri Lanka and Nepal
- Spread energy exchange models & training
- GEMT Programs, Power Markets Training, Wind Energy Exchange with MDRE & CWET

**MALDIVES**
- Maldives Submarine Cable Interconnection Study
- Workshop on Advancing Low Carbon Growth Through Regional Cooperation and Cross-Border Energy Trade
- GEMT Programs, Workshop on Wind Energy Exchange with MDRE

**NEPAL**
- Expert review of Transmission Service Agreements and Key Issues
- GEMT Programs, Power Markets Training, Wind Energy Exchange with MDRE & CWET

**BHUTAN**
- Executive Exchange to Bhutan Power Corp.
- Wind Energy Exchange and MDRE

**BANGLADESH**
- HVDC training at PGCIL sub-station
- Senior Level Exchange Program to Indian Energy Exchange, PTC & CERC
- GEMT Programs, Indian Power Markets Training, Wind Energy Exchange with MDRE & CWET

**SRI LANKA**
- India-Sri Lanka Submarine Power Transmission Interconnection-Interconnection Reliability and Stability Study for CEB, Sri Lanka Wind power development
- HVDC Hands-on training at PGCIL sub-station
- GEMT Programs, Power Markets Training, Wind Energy Exchange with MDRE & CWET

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- SATURN Network formation and Induction of POWERGRID as SATURN member
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This phase titled South Asia Regional Initiative for Energy Integration (SARI/EI) is fourth and the implementation phase designed to build upon SARI/Energy’s successful initiatives of the past to move South Asian countries towards increased regional energy security.

Integrated Research and Action for Development (IRADe) has been selected by U.S. Agency for International Development (USAID) for the implementation of the South Asia Regional Initiative for Energy Integration (SARI/EI) program.

During this five year program (2012-2017), IRADe and USAID in a cooperative agreement will work to promote integration of energy systems and enhance Cross-Border Energy Trade (CBET) among the participating South Asian countries.
PHASE IV: SOUTH ASIA REGIONAL INITIATIVE FOR ENERGY INTEGRATION

Goal: Advance Regional Energy Integration

Objective: Enhance Cross-Border Electricity Trade (CBET)

8 SAARC SARI/EI PARTICIPATING COUNTRIES

Afghanistan, Pakistan, Nepal, Bhutan, Bangladesh, India, Sri Lanka, Maldives
SARI/EI PROGRAM OBJECTIVES

- Advance regional integration of Energy Systems
- Enhance Cross-Border Energy Trade (CBET) among the South Asian countries.
- Focus is on the following three interrelated tasks and development outcomes for overall socio-economic development of the region:
  - Coordination of Policy, Legal and Regulatory Framework
  - Advancement of Transmission Systems Interconnection
  - South Asia Regional Electricity Markets
- Early phases of SARI/E concentrated on a “top down” process focusing on bringing parties together and identifying a decision making frameworks for developing projects.
- Current SARI/E program focus is on a demand driven “bottom up” development paradigm specific for cross-border project development.
Project Steering Committee

Project Steering Committee (PSC) is the apex body of the program and provides overall strategic directions.

PSC members consist of the following:

- Senior level officials from respective South Asia country governments
- Representatives of regional institutions like SAARC Energy Centre
- Representatives of multilateral donors like ADB and World Bank
- Independent Energy Experts/Diplomats

The Steering Committee is to provide the vision, credibility and high profile support for the SARI/EI program.
TASK FORCE 1
Coordination of Policy, Legal and Regulatory Framework

- Task Force 1 component deals with issues related to the policy, legal and regulatory aspects of CBET.
- It is to create the enabling systemic conditions for a sustainable market for investment and implementation of CBET.

TASK FORCE 2
Advancement of Transmission Systems Interconnection

- Task Force 2 focuses on the advancement of Transmission Systems Interconnection.
- The key result of Task Force 2 component is to create the enabling, systemic conditions for a sustainable market for investment and implementation of sub-regional bilateral transmission interconnections beginning with the eastern sub-region of South Asia.

TASK FORCE 3
South Asia Regional Electricity Markets

- Task Force 3 will focus on Electricity Trading/exchanges and markets.
- The key result of this component is to create the enabling and systemic conditions for a sustainable market for energy trading and exchange among the South Asian countries.
Task Forces are the main drivers of the SARI/EI program in order to achieve the desired objectives.

Task Force activities form the heart of the SARI/EI Program.

Members are the owners of their respective Task Force and its outcomes.

Task Force meetings follow highly structured, consultative, participative and demand-driven approach.

Needs for technical analysis, research and studies will evolve during the course of the discussion in the Task Force meetings.