Promoting Cross Border Electricity Trade in South Asia

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Overview of the South Asian region: poised for stronger growth

South Asia between 2014-22 has emerged as the fastest growing subregion in the world with annual growth of ~5.6% vis-à-vis world level of 2.9%\(^1\). Subsequently, South Asia Subregional Economic Cooperation (South Asia) subregion comprising of Bangladesh, Bhutan, India, Maldives, Myanmar, Nepal, and Sri Lanka are thereby experiencing an economic transformation fueled by a dramatic increase in energy consumption.

*Myanmar is also a South Asia member country, however ADB’s support to Myanmar is currently restricted and put on hold.*

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**World's Population (2022)**

- **21%**

**World's GDP (2022)**

- **04%**

**World's Renewable Energy Capacity (2022)**

- **5.2%**

**World's GHG Emissions, Mt CO\(_2\) eq (2022)**

- **8.4%**

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**Projected Annual Growth Rates (%) (World Bank, IMF)**

- **2024 (P):**
  - World: 3.1%
  - South Asia: 5.6%

- **2025 (P):**
  - World: 3.2%
  - South Asia: 5.6%

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**Strong Economic Prospects Persist for the Region**

**Economic Growth in South Asia is projected to remain stronger in the upcoming years.**

With the region blessed with immense growth potential and natural renewable resources, a strong policy and regulatory framework is required to aid economic development and energy transition.

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1 - Due to COVID-19, the region and world witnessed negative growth rates in 2020 followed by a revival surge from 2021 onwards, WB-South Asia, WB-World.
ADB has supported the regional initiatives through the South Asia program

The **South Asia Subregional Economic Cooperation (South Asia)** Program brings together Bangladesh, Bhutan, India, Maldives, Myanmar, Nepal, and Sri Lanka in a project-based partnership to promote regional prosperity and improve opportunity and the quality of life for the people of the South Asia subregion.

**South Asia Vision Framework**

<table>
<thead>
<tr>
<th>VISION</th>
<th>MISSION</th>
<th>GOAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Asia: Powering Asia in 21st Century</td>
<td>Generate Synergies through regional cooperation and enhanced integration to unleash latent potential</td>
<td>Accelerate sustainable and inclusive growth</td>
</tr>
</tbody>
</table>

**Key Strategic Sectors**

- Transport
- Trade Facilitation
- Energy
- Economic Corridor Development

The Asian Development Bank’s continued commitment to achieve prosperous, inclusive, resilient, and sustainable Asia -

Since 2001, **ADB** has been financing loans, grants, and technical assistance to South Asia member countries and serves as the **South Asia Secretariat**.

*Other key sectors include Information and Communication Technology (ICT) and Health Sector which was included into South Asia operational priorities in 2022 to strengthen COVID-19 recovery. [Link](#)
In the Energy Sector, the Energy Working Group is the main guiding body to undertake projects and knowledge works

The focused South Asia Energy Working Group (EWG) and Senior Officials guide/advice ADB on energy cooperation in the region. These groups comprise of senior officials from ministries, and government agencies of the member countries.

Key Focus Areas of the EWG and Senior Officials -

1. Development of nearest point interconnections
2. Power market development in the region
3. Low-Cost Financing for energy projects and interconnections
4. Capacity building of power sector stakeholders
5. Development of resilient regional supply and value chains for energy systems
6. Endorse studies and projects included in the Action Plan for South Asia Initiatives (APSI)*
7. Draft a 10-year vision, strategy and road map
8. Develop South Asia Knowledge Network to promote knowledge generation
9. Review progress of the ongoing energy projects
10. Identify and address key challenges in the seamless execution of activities

In Nov 2023, the EWG requested ADB to set-up a regional low-cost fund for the South Asia drawing inspiration from the ASEAN Catalytic Green Finance Facility. In the Dec 2024, the Senior Officials endorsed this request.

*Action Plan on South Asia Initiatives (APSI) is developed to generate momentum for the South Asia Program by identifying priority South Asia projects mostly from the South Asia Operational Plan for a more focused coordination and facilitation by South Asia member countries. APSI also summarizes knowledge initiatives undertaken by the South Asia program, and country initiatives facilitated by South Asia.
Significant financing support has been provided through the South Asia program across sectors.

**As of December 2023**, South Asia countries have signed and implemented 86 ADB-financed investment projects worth around **$20.54 billion** in the **transport, trade facilitation, energy, and economic corridor, ICT and health sectors**.

<table>
<thead>
<tr>
<th>Project Type</th>
<th>Number of Projects</th>
<th>Total Project Costs $ Billion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OVERALL LOANS AND GRANTS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>49</td>
<td>14.40</td>
</tr>
<tr>
<td>Trade Facilitation</td>
<td>6</td>
<td>0.38</td>
</tr>
<tr>
<td>Energy</td>
<td>16</td>
<td>2.92</td>
</tr>
<tr>
<td>Economic Corridor Development</td>
<td>10</td>
<td>2.40</td>
</tr>
<tr>
<td>ICT</td>
<td>2</td>
<td>0.02</td>
</tr>
<tr>
<td>Health</td>
<td>3</td>
<td>0.41</td>
</tr>
<tr>
<td><strong>OVERALL TECHNICAL ASSISTANCE</strong></td>
<td>152</td>
<td>0.22</td>
</tr>
</tbody>
</table>

**Cumulative ADB Financing for South Asia Projects (2002-23), ($ Billion)**

![Cumulative ADB Financing Chart](chart.png)

South Asia prioritizes 100% electricity access, but the per capita electricity consumption is very low.

South Asia electricity access increased from **86.8% in 2015** to **98.8% in 2021**. However, the region combats very low per capita electricity consumption of 799 kWh\(^1\) compared to global average of 3,191 kWh\(^2\).

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### South Asia’s Access to Electricity (% of population)

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>86.8</td>
<td>88.9</td>
<td>91.7</td>
<td>94.6</td>
<td>95.3</td>
<td>96.2</td>
<td>98.8</td>
</tr>
</tbody>
</table>

### Electricity Access\(^3\) (Percentage) - 2021

<table>
<thead>
<tr>
<th>Country</th>
<th>Access %</th>
<th>Per Capita Electricity Consumption (^1) (kWh/Per Capita) – 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>99.6%</td>
<td>850</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>99%</td>
<td>477</td>
</tr>
<tr>
<td>Nepal</td>
<td>89.9%</td>
<td>253</td>
</tr>
<tr>
<td>Bhutan</td>
<td>100%</td>
<td>2,538</td>
</tr>
<tr>
<td>Maldives</td>
<td>100%</td>
<td>1,468</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>100%</td>
<td>665</td>
</tr>
</tbody>
</table>

"South Asian countries are envisaging to enhance electricity generation to boost per capita electricity consumption and ensure a reliable and affordable power supply in the region".

**Latest Status**:

- **India** – As of 2022 onwards, the country **achieves close to 100%** of population availing electricity access. [IEA, PIB](#)
- **Bangladesh** – **Achieves 100%** access to electricity as of 2023. [MOF](#)
- **Nepal** - **94% of Nepal’s population has access to electricity** which is increasing at a significant pace. [WECS Energy Synopsis Report 2023](#)

\(^1\)ADB, \(^2\)IEA, \(^3\)World Bank
South Asian countries have made strong commitment to transition to clean energy and mitigate climate change impact

- **India**
  - Installed Capacity (2024): 434,195 MW
  - • Net zero - 2070
  - • 500 GW RE - 2030

- **Sri Lanka**
  - Installed Capacity (2023): 4,991 MW
  - • Net zero - 2050
  - • 70% RE share by 2030

- **Nepal**
  - Installed Capacity (2023): 2,684 MW
  - • Net-zero - 2045
  - • 100% RE by 2050

- **Bhutan**
  - Installed Capacity (2023): 2,343 MW
  - • 10 GW of hydro capacity planned

- **Bangladesh**
  - Installed Capacity (2023): 24,911 MW
  - • Electricity from RE 15% - 2030; 40% - 2041; 100% - 2050
  - • Carbon emission re-duction by 22% by 2030

- **Maldives**
  - Installed Capacity (2022): 561 MW
  - • Net zero - 2030
  - • 33% electricity from RE by 2030

The South Asian countries are pledging ambitious commitments and taking steps to accelerate their economy's transition to be powered by green energy

Source – NDC Targets, Annual Reports, IRENA
Potential Benefits of Regional Energy Infrastructure & CBET in SA

Economic & Financial
- Access to Competitive Power
- Export Revenues
- Economic Extension of grid
- Regional Cost Optimization & Economic growth

Technical & Operation
- Larger grid, better grid
- Intra-seasonal differences
- Peak Time/Time zone differences
- Better Hydro - Thermal Mix
- Regional Balancing

Environment & Social
- Regional Hydro Power Development,
- RE/Clean Energy Development
- Reduced CO2 Emission, RE based CBET
- Improved Energy & Environmental Security

Regional Energy Market
- Competitive Energy Market
- Fair & Transparent Price Discovery
- Choice - Different Products
- Consumer Benefits & Social Welfare

Mobilising Investment
- New Investment Avenues
- Enhanced feasibility due to larger market
- Return on Investment
- Innovative Financing Mechanism

Source: Country specific reports
Clean Energy Financing is a key lever to their Energy Transition journey. However, financing gap remains a key roadblock.

South Asia has huge investment gap fueled by their investment requirement to meet the energy targets.

Key prevailing uncertainties impeding inflow of clean energy investment -

- Weak Policy and Regulatory framework
- Slow adoption of climate and energy policies by policy makers, financial regulators, banks, investors
- Lack of well-developed capital market resulting in limited availability of venture capital in Asian nations
- Lack of attractive financing schemes to foster private sector participation
- High real or perceived risk, low returns, and limited finance and concessional lending

1 Sectors of Mitigation Finance includes energy systems, low-carbon transport, low-carbon technology, etc., and that of Adaptation Finance includes disaster risk management, water and wastewater management. Mitigation finance is aimed at reducing GHG emissions, and stabilize the climate in the long term. Adaptation finance is focused on reducing the impact of climate-related risk and damage.
Mobilization of Clean Energy Finance – a key lever to fuel Energy Transition in South Asia

Accelerating financial flows for green investments in the South Asia region will promote regional cooperation and integration in power sector. The low-cost financing will aid in clean energy transition through -

- Enables Green Infrastructure through origination and structuring of green projects
- Promotes regional energy security, as power outages in one country can be offset by importing electricity from another country
- Stimulates economic growth by providing cheaper and more reliable electricity to industries, creating new opportunities for cross-border investment
- Enables sharing of energy resources, which allows countries to meet electricity demands at a lower cost, reducing their dependence on costly imported fuel
Regional Flagship Project: Dudhkoshi Storage Hydroelectric Project (DKSHEP)

A 635 MW seasonal reservoir designed to utilize the water of the snow-fed perennial Dudhkoshi River. Planned to be the largest reservoir based hydro power project in Nepal.

To mitigate the growing seasonal power gaps and enhance energy security, the Government of Nepal and NEA have prioritized the implementation of this project. The project will also target regional markets.

This project will have financing support from ADB and World Bank for its significant value proposition

<table>
<thead>
<tr>
<th>Salient Features of DKSHEP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location</strong></td>
</tr>
<tr>
<td>Nepal</td>
</tr>
<tr>
<td>Khotang, Okhaldhunga and</td>
</tr>
<tr>
<td>Solukhumbu Districts of</td>
</tr>
<tr>
<td>Koshi Province</td>
</tr>
<tr>
<td><strong>Live Storage</strong></td>
</tr>
<tr>
<td>1,342 Mm³</td>
</tr>
<tr>
<td><strong>Installed Capacity</strong></td>
</tr>
<tr>
<td>670 MW</td>
</tr>
<tr>
<td>[600 MW Main Powerhouse, 70 MW Dam Toe Powerhouse]</td>
</tr>
<tr>
<td><strong>Average Annual Energy</strong></td>
</tr>
<tr>
<td>3,442 GWh</td>
</tr>
<tr>
<td>Dry Season = 1,358 GWh</td>
</tr>
<tr>
<td>Wet Season = 2,084 GWh</td>
</tr>
<tr>
<td><strong>Estimated Cost</strong></td>
</tr>
<tr>
<td>2.2 Billion USD</td>
</tr>
</tbody>
</table>

Production of clean energy, enhancing energy security
Strategic location near industry with electricity high demand
Boosts infrastructure, tourism along with creation of Jobs
Control possible high floods with the help of reservoir
Due to reservoir, the project will be of strategic regional significance

Source: Dudhkoshi Jalvidyut Company Limited, Subsidiary company of Nepal Electricity Authority
The undersea power link project between India and Sri Lanka exemplifies *regional energy cooperation* aimed at securing *sustainable energy future*. Estimated Project Cost of **1.2 USD Billion (TBC)**

Link Sri Lanka’s north central town of Anuradhapura with Chennai, India through an overland transmission line in India of 130 km, followed by an undersea line emerging (via *submarine cable*) at Thiruketheeswaram in Mannar, Sri Lanka.

Opportunity for Sri Lanka to gain *access to power sector of other South Asian nations*. Imports will reduce GHG emission on account of avoiding capacity addition through new thermal plants.

Promote *sharing of regional energy resources*, enhanced *interconnected grid* aiding in *improved power supply*.

Source: ADB Assessment, Wire & Cable India, Deccan Herald, PTI
Cross Border Electricity Trade in South Asia: Current Scenario

- ~3760 MW of power trade in SA region with 70% agreements through G-G mode and 30% through commercial CBET
- Cross Border power trade in the SA region has doubled in the last 6 years
- CBET power transfer potential in SA is expected to grow from 17 Bus to 100 Bus by 2030

### Particulars

<table>
<thead>
<tr>
<th>Source</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>India 🡪 Bangladesh (~1160 MW)</strong></td>
<td></td>
</tr>
<tr>
<td>250 MW NTPC</td>
<td>G-G</td>
</tr>
<tr>
<td>250 MW Market</td>
<td>Commercial</td>
</tr>
<tr>
<td>160 MW Tripura</td>
<td>G-G</td>
</tr>
<tr>
<td>500 MW Market</td>
<td>Commercial</td>
</tr>
<tr>
<td><strong>Bhutan 🡪 India (2260 MW)</strong></td>
<td></td>
</tr>
<tr>
<td>1020 MW Tala</td>
<td>G-G</td>
</tr>
<tr>
<td>336 MW Chukha</td>
<td>G-G</td>
</tr>
<tr>
<td>60 MW Kurichhu</td>
<td>G-G</td>
</tr>
<tr>
<td>126 MW Dagachhu</td>
<td>Commercial</td>
</tr>
<tr>
<td>720 MW Mangdechhu</td>
<td>G-G</td>
</tr>
<tr>
<td><strong>India 🡪 Nepal (800-1000 MW)</strong></td>
<td></td>
</tr>
<tr>
<td>237 MW India</td>
<td>G-G</td>
</tr>
<tr>
<td>660 MW Market</td>
<td>Commercial</td>
</tr>
</tbody>
</table>

Source: Country specific reports

INTERNAL. This information is accessible to ADB Management and staff. It may be shared outside ADB with appropriate permission.
Planned Cross Border Infrastructure in SA

### Name of the Project | Capacity (MW) | Countries involved
--- | --- | ---
Punatsangchhu I HPP | 120 | Bhutan/India
Punatsangchhu II HPP | 1020 | Bhutan/India
Kholongchhu HPP | 600 | Bhutan/India
Dorjilung HPP | 1125 | Bhutan/India/Bangladesh
Arum III HPP | 900 | Nepal/India
Dudhkoshi HPP | 650 | Nepal/India
Upper Karnali HPP | 900 | Nepal/India/Bangladesh

### Multi Country power trade
- Bangladesh will import 500 MW of power from Nepal using India’s transmission corridor.
- Bhutan’s Nyera Amari and Dorjilung hydropower projects will be developed through trilateral cooperation between Bangladesh, Bhutan, and India.

### Increase in Private participation and commercial power trade
- Gradual evolution of CBET from G-G agreements to Commercial cross border trade (Currently ~30% of the current CBET in SA Region).

### Promote RE integration
- CBET of hydropower is currently the most viable option to meet the balancing needs of the SA countries which have aggressive renewable energy addition targets.

<table>
<thead>
<tr>
<th>Countries</th>
<th>Name of the Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>India - Bangladesh</td>
<td>Interconnection between Bihar (Katihar), India- (Parbotipur), Bangladesh – (Bornagar) Assam, India at 400 kV D/C and augmentation to 765 kV D/C</td>
</tr>
<tr>
<td>India - Nepal</td>
<td>400 kV D/C Interconnection between Butwal (Nepal) and Gorakhpur (India)</td>
</tr>
<tr>
<td>India – Sri Lanka</td>
<td>500/1000 MW interconnection</td>
</tr>
</tbody>
</table>

Source: Country specific reports

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Interconnection capacity in SA Region expected to increase to ~43 GW by 2040.
CBET through Indian power exchanges

The participation and transaction of the power on energy exchange for any neighboring nation is governed by “Procedure for Approval and facilitating of import/export (cross border) of electricity by the Designated Authority” issued by CEA in February 2021

In 2021, IEX has launched the CBET on its platform

- On 19 April 2021, Nepal was the first country to participate in Indian energy Market.
- Nepal purchased around 835 MUs from IEX and sold 1357 MUs between April 2022 to February 2023.
- By trading in in DAM, Nepal was able to meet its dry season demand optimally, and sell its surplus electricity generated during monsoon season.
- On 1 January 2022, Bhutan also commenced trade in the day-ahead market through Druk Green Power Corporation Limited (DGCPL) on IEX
- Till March 2023, ~559 MU was imported through IEX-DAM to meet lean season deficits by Bhutan

IEX is working closely with stakeholders in Bangladesh to facilitate its participation towards reinforcing the cross-border electricity trade and building an integrated South-Asian regional power market
# Knowledge Products under the TA

## SASEC Cross-Border Power Trade Development

<table>
<thead>
<tr>
<th></th>
<th>Knowledge Product</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SASEC Cross-Border Power Trade Development – Master Plan Review and Update</td>
<td>Review and update of status of ongoing cross border transmission projects, new projects that are identified, changes to load forecast, changes to generation development options &amp; generation cost.</td>
</tr>
<tr>
<td>2</td>
<td>Economic Analysis for Benefits Derived for Interconnected grids in SASEC region</td>
<td>Estimation of economic benefits of CBET in the SASEC region through assessment of the future electricity demand and programs and policies of each country.</td>
</tr>
<tr>
<td>3</td>
<td>Impacts and Roadmap of Replacing Natural Gas with Renewable Energy in SASEC region</td>
<td>Analysis of economic and environmental/climate change benefits in SASEC countries of replacing natural gas with renewable electricity sourced domestically or imported from the region and preparation of a roadmap.</td>
</tr>
<tr>
<td>4</td>
<td>Technical and Economic Benefits of Interconnection between SASEC and Southeast Asia</td>
<td>Examining current energy resources, socio-economic development needs, energy demand for the next 2 decades for the 2 SASEC sub-regions. Generation of Power system development scenarios &amp; estimation of impact on CO₂ emissions from the power sector.</td>
</tr>
</tbody>
</table>
Technical Assistance to promote Energy Transition

**Objectives**

- Identify and prepare cross-border power projects
- Capacity development for regional cooperation
- Improve collaboration between agencies operating in SASEC subregion
- Support implementation of the SASEC Operational Plan, 2016–2025
- Align with energy security and climate ambitions

**TA Financing Amount:** US$ 3 million; **Implementation Period:** 2023-2028