"Participation of Private Sector in Overcoming Energy Poverty in SAARC Member States“

Presentation on


29-30 August 2019
Dambulla, Sri Lanka
Presentation Outline

• Introduction - Country Information
• Power Sector Reforms
• Institutional Arrangement
• Power Sector Policies
• Hydropower Development
• Transmission Development
• Energy Trade
• Energy Security (Supply-Demand Scenario)
• Challenges & Opportunities
Introduction - Country Information

- Land Area: 38,394 Sq. km
- Democratic Constitutional Monarchy
- Forest Cover: 71%
- Population (2017): 727,145
- Per Capita GDP (2016): $2,879

- Per Capita Electricity Consumption (2017): ~3,000 kWh
- Electricity Contribution to GDP (2017): 12%
- Electricity Contribution to Revenues (2017): 10%
Power Sector Reforms

• Electricity Act of Bhutan 2001
• Power Sector unbundled in 2002
  i. DHPS – Apex Agency for Hydropower Dev.
  ii. DRE & NCHM – Nodal Agency for Renewable Energy Dev. and Weather & Climate
  iii. BEA – Regulator, made autonomous in January 2010
  iv. DGPC (Jan 2008) – O&M of all existing hydropower plants
  v. BPC – Transmission & Distribution
Power Sector Policies

i. Sustainable Hydropower Development Policy 2008 (under revision)


iv. Domestic Electricity Tariff Policy 2016

v. Economic Development Policy 2017
Energy Sources

• Major Hydropower Plants: **2326 MW**
• Mini Hydropower Plants: **8.065 MW**
• Wind Power Plants: **0.6 MW**
• Solar Power Plants: **0 MW**
• DG Power Plants: **0.366 MW**
Hydropower Development

River Basins & Hydropower Potentials

- Basin I: 4819 MW
- Basin II: 8182 MW
- Basin III: 10759 MW

Legend:
- River Network
- Basin Boundary
- Dzongkha Boundary

Scale: 1:1,260,000

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Hydropower Development

• Total Hydropower potential (PSMP 2003) 30,000MW (35000 MW).
• Techno-economically viable ~23,000MW
• Installed Capacity: 2,326MW (6 projects)
• Under construction: 2,338MW (3 projects)
• DPR study completed: 5,770 MW (6 projects)
• PFR study completed: 3,011MW (10 projects)
• Reconnaissance study completed: 3,991MW (15 projects)
Investment Mechanisms

• Hydropower is a strategic national resource
• Maximum projects through bilateral investment window
• Joint Ventures
• PPP model
Transmission Development

- National Transmission Grid Master Plan 2012 (Updated 2018)

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<th>Voltage level (kV)</th>
<th>Route length (km)</th>
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Energy Trade

- Hydropower Export – 70%
- LT PPAs
- Market access – a challenge
Energy Security: Supply-Demand Scenario

• Excess supply in summer
• Winter (December - March) Firm Power supply – 320 MW (FP from UC projects – 589 MW)
• Peak Demand – 375 MW Feb’ 2018 (~7%)
• Hotter temperatures have melted as much as a quarter of Himalayan glacial ice in the past 40 years, reveals a study of declassified spy satellite photos from the 1970s.
• Run-off schemes
Energy Security: Supply-Demand Scenario

✓ Import mechanisms (during lean months) - Energy Banking
✓ Enhance firm power capacity through reservoir projects (timely implementation)
✓ Promote Renewable energy technologies (600kW wind & solar farms)
# Hydro Development

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<tr>
<th><strong>Opportunities</strong></th>
<th><strong>Challenges</strong></th>
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| • Renewable, Clean form of Energy  
• CDM & Substitution to fossil fuels/reduction in GHG emission  
• Growing demand in India and South Asia (peaking energy)  
• Opportunities from huge RE growth | • Resources constraints (capital intensive & skills & technology !)  
• Strict Environment laws !  
• Risks (geology, long gestation, weather – floods, GLOF)  
• Market (pricing, competition)  
• Transport cost (land locked !) |
Kadrinche La
(Thank you)