Powering the Future: The Northeast Asia Super Grid

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Regional power grids

- Asia Super Grid (GEI)
  - Various subregional grids:
    - SE Asia – GMS, ASEAN
    - C Asia - CAREC
    - S Asia - SASEC
    - NE Asia
- ADB supported grid integration & power trade:
  - HVDC India-Bangladesh
  - HVAC Lao – Viet Nam
NE Asia region – characteristics

- 3 of the 4 largest Asian economies and global manufacturing hubs (PRC, Japan, ROK)
- Limited renewable energy resources to meet demand
- Mongolia has plenty of RE resources, lowest population density, and limited export resources

Solar resources

Wind resources
Japan ranks 19th, ROK is 22nd, PRC is 40th and Mongolia 66th globally, out of 91 countries measured.

For Northeast Asia and in the current energy transition, low carbon resources are becoming essential to meet climate objectives.

However, energy security is always paramount, as shown by overdependence on foreign resources.

While affordability needs to be also considered to protect vulnerable population.
Regional interconnections + 100 GW solar/wind in south Gobi = $10 billion in annual savings + 210 Mt CO$_2$-eq reductions
ADB’s TA: Promotion of NAPSI (2021)

Investment readiness

Pre-feasibility study and optionality for the development of the NAPSI project, including:

- 5GW of Renewable Energy Generation
- Cross-Border Power Transmission System
- Commercial and Regulatory Structures

Reports will be accessible at ADB website in July 2024
Renewable Energy Generation

- **Wind Power (4.5 MW complex terrain)**
  - CAPEX (USD/kW): 1,099 USD/kW
  - OPEX (USD/kW year): 34.2 USD/kW year
  - Capacity Factor: 47.8%
  - Avg LCOE (USD/MWh): 31.3 USD/MWh

- **Solar PV Power (mono-facial fixed)**
  - CAPEX (USD/kW): 697 USD/kW
  - OPEX (USD/kW year): 11.0 USD/kW year
  - Capacity Factor: 20.2%
  - Avg LCOE (USD/MWh): 36.2 USD/MWh

### Seasonality Mitigation (worse case)

[Graph showing monthly yield for different energy scenarios]
Power Interconnection System

1. Single corridor
2. Dedicated Lines
3. Progressive

LCOE would range from **USD 8-10/MWh**, depending on capacity factors of RE generation, choice of line (AC/DC), distance to connection point, etc.
Power Interconnection System - BESS

1. No BESS
2. BESS 50%
3. BESS 75%

Cost-Benefit analysis of BESS-line capacity balance
Regulatory and Commercial Arrangements

Based on current regulatory frameworks in Mongolia, it is necessary a new regulatory regime for RE exports to PRC (specific to NAPSI):

- Mongolia-PRC Bilateral Treaty
- New Law on Renewable Energy Generation, specific for Exports to PRC
- Technical Regulation and Standards
- Commercial and Market Regulation
Next Steps

ADB will continue supporting the government of Mongolia in the development of NAPSI, by:

- Supporting bilateral engagement and communication with PRC, in cooperation with other development partners (like UNESCAP)
- Developing new laws, regulations, a new grid code, and standards to:
  - Enable foreign investments in RE generation for exports
  - Develop a cross-border transmission system (bilaterally-owned)
  - Maximize revenue generation and sharing for Mongolia
  - Build capacity at the regulator (ERC) to develop and operationalize the new regulation
  - Analyze potential business models and market structures
Thank you!