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SOUTH ASIAN ENERGY EXECUTIVES EXAMINE THE BANGLADESH – INDIA BILATERAL ELECTRICITY MARKET

EXECUTIVE EXCHANGE FOR SOUTH ASIA REGIONAL INITIATIVE FOR ENERGY INTEGRATION (SARI/EI)

DHAKA, BANGLADESH – From August 25-27, 2014, energy executives representing South Asia Regional Initiative for Energy Integration (SARI/EI) countries participated in the Executive Exchange on the Bangladesh-India bilateral electricity market. The visiting 13 member delegation, from Afghanistan, Bangladesh, Bhutan, India, Nepal and Sri Lanka met with their counterparts from the Bangladesh Power Development Board (BPDB), Power Grid Company of Bangladesh (PGCB) and the Bangladesh Energy Regulatory Commission (BERC). Co-sponsored by both BPDB and PGCB, the exchange included updates on cross-border electricity trade (CBET) from each of the participating SARI/EI countries, an overview of regulatory affairs in Bangladesh-India cross border electricity trade, technical presentations from BPDB and PGCB, along with site visits to a combined cycle power plant and a 230/132 kV AIS substation.



The SARI/EI delegation heard from keynote speakers, seated left to right: Ms. Monali Hazra (Regional Energy Manager, USAID/India), Mr. Abduhu Ruhullah (Chairman, BPDB), Mr. A.R. Khan (Chairman, Bangladesh Energy Regulatory Commission), Mr. Masum Al-Beruni (Managing Director, PGCB), and Mr. Karl Wurster (Deputy Director, USAID/Bangladesh).

During the exchange, which was funded by the United States Agency for International Development (USAID), the delegation gained an understanding of the mechanisms and policies necessary for a successful exchange of electricity in South Asia. The SARI/EI program promotes energy security in South Asia through cross border energy trade, energy market formation regional clean energy development. Through these activities, SARI/EI facilitates more efficient regional energy resource utilization, works toward transparent and profitable energy practices, mitigates the environmental impacts of energy production, and increases regional access to energy. SARI/Energy countries include: Afghanistan, Pakistan, India, Nepal, Bhutan, Bangladesh, Sri Lanka and the Maldives.

Bangladesh – India Bilateral Market Background:

In September 2013, India and Bangladesh commissioned the first electricity grid interconnection among SAARC countries with a 71-km 400 kV AC link between Baharampur, India and Bheramara, Bangladesh, made possible under an India-Bangladesh power exchange program funded by the Asian Development Bank (ADB). The first 175 megawatts of power flowed from India to Bangladesh through a HVDC back-to-back station (to ensure that any fluctuations or disturbances of one grid would not affect the other side) the following month.

The cross-border link can facilitate electricity transfer of up to 500 megawatts (MW) from India to Bangladesh. Under the arrangement, 250 MW is from an unallocated quota of power (at rates notified by the Central Electricity Regulatory Commission) and the other 250 MW to be contracted by Bangladesh from the Indian electricity market.

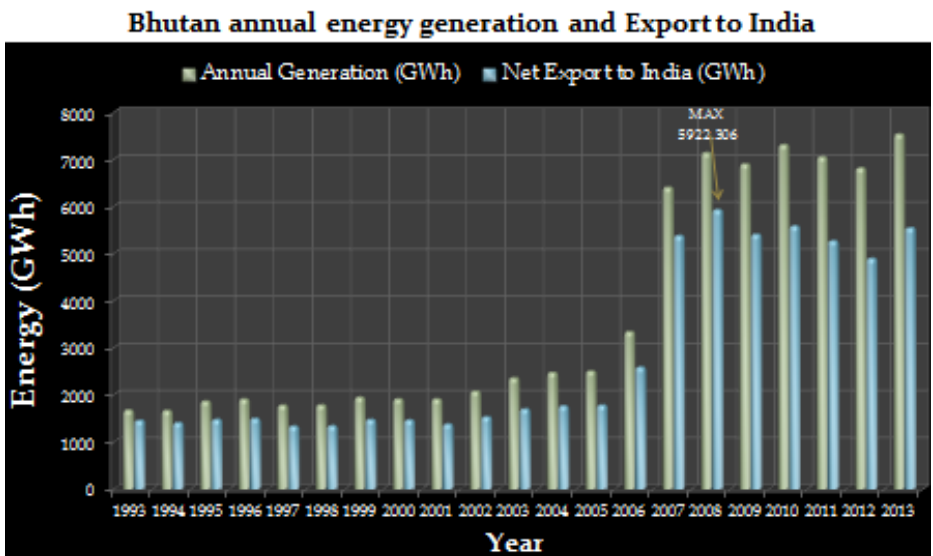
Since the line's energizing, which links India's eastern electrical grid to Bangladesh's western grid, electricity exports from India has gradually shot up with every passing month. Since December 2013, electricity flows to Bangladesh have actually been higher than the cumulative exchanges with India's other two traditional energy trading partners — Bhutan and Nepal.

SARI/EI Delegate Presentations

During the executive exchange, a presentation was made by a delegate from each visiting SARI/EI member country on the current state of their cross-border electricity connections.

Delegates from Afghanistan described the CASA-1000 project with Pakistan, Afghanistan, Tajikistan, and Kyrgyzstan that will transport surplus power (1300MW) during five summer months from Kyrgyz Republic and Tajikistan to Afghanistan (300MW) and Pakistan (1000MW). Construction is set to begin by the end of the year with the first supply of energy occurring in May 2018.

Representatives from Bhutan provided an update on their interconnection with India and current bilateral electricity market. Under Bhutan's Power System Master Plan, the country intends to expand generation by over 10,000 MW over the next decade, meaning by the year 2017-18 Bhutan will begin having excess power, creating further opportunities for electricity trade. Additionally, Bhutan currently has four major cross border interconnection links planned with India, which will help integrate the Bhutanese transmission system with the Indian system for further evacuation of surplus power.



Above: Mr. Ugyen Chopel of the Bhutan Department of Hydropower & Power Systems outlined the current electricity trade between Bhutan and India.

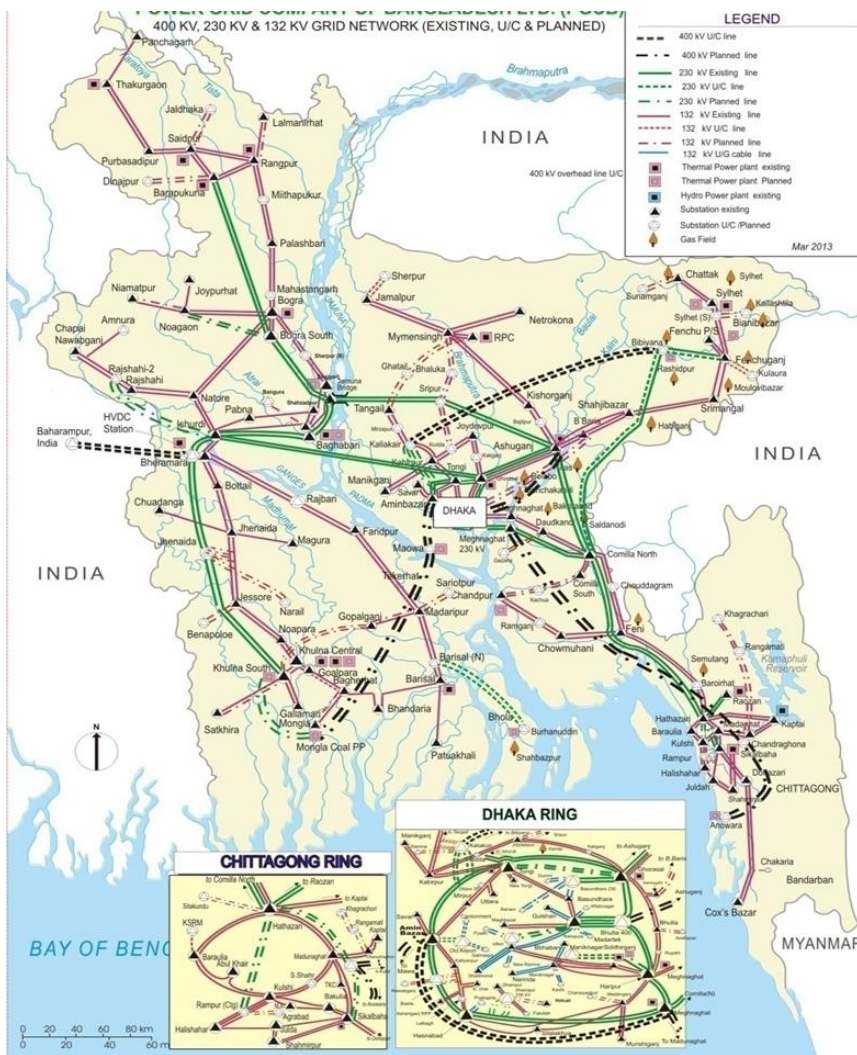
Sri Lanka's Ceylon Electricity Board presented the latest developments of the proposed undersea HVDC cable connecting the island at Thalai Mannar to the Indian mainland at Panaikulam. This cable would be the only feasible connection for Sri Lanka into a South Asian electricity market, mainly to import power. The planning process began with a pre-feasibility study in 2002. Sri Lanka is currently awaiting Indian approval in order to move ahead with the revised undersea cable route.

Indian delegates from both PTC India and NTPC/NVVN presented on power trading activities connected to cross border electricity exchange. The representatives covered the power purchase agreements (PPA's) both trading companies entered into with BPDB; NVVN for a period of 25 years and PTC India for a period of 3 years. Furthermore, both PTC India and NVVN delegates highlighted power trading with respect to the India-Bhutan and India-Nepal interconnections.

Representatives from Nepal covered the country's current progress in pursuing a power trade agreement with India, with plans for the Nepal Electricity Authority (NEA) to eventually enter into a long term PPA with PTC India. While Nepal has an estimated 42,000 MW of commercially viable hydropower potential, the hydropower generation has large seasonal fluctuations. Thus, cross-border trade is ideal to make up seasonal supply shortages. The Nepalese delegates also noted that a 400 kV DC line is currently under construction from Dhalkebar (Nepal) to Muzaffarpur (India).

Regulatory Affairs – The Bangladesh Context

The first day of the exchange also featured Dr. Salim Mahmud of the Bangladesh Energy Regulatory Commission (BERC), who highlighted the regulatory issues of the cross border power trade with India. Delegates had the opportunity to learn about the overarching objectives of an electricity regulatory body, including creating an environment conducive to private investment, promoting sector transparency, bolstering competition and protecting consumer's interest. Furthermore, Dr. Mahmud covered BERC's role in facilitating the cross border interconnection and power trade with India. Of particular significance to the interconnection was the intergovernmental treaty, comprehensive legal regime, supportive policy framework and signing of long term contracts at the beginning. Dr. Mahmud also noted the importance of BERC Grid Code 2012, which defines responsibility for the procedure of international interconnection to the grid, along with safety codes.



Bangladesh Power Development Board

Delegates received a comprehensive overview of the current power scenario in Bangladesh from BPDB, who noted that while the current demand in the country (with DSM measures in place) is around 9,200 MW, current installed capacity hovers just above 10,000 MW, creating a peak deficit of between 1000-1500 MW. Given this, BPDB showcased Bangladesh's Power System Master Plan, which projects a peak demand that grows at 7% annually, with a peak of 33,708 MW in 2030. In order to meet this demand, BPDB has embarked on a Long

Term Generation Plan, which includes boosting its domestic coal and gas generation fleet, as well as importing further coal, gas and LNG, in addition to planning for nuclear power.

BPDB outlined the steps taken in establishing the Bangladesh-India bilateral electricity market, which began with the MOU signed between the Indian and Bangladeshi governments in January 2010. BPDB and NVVN entered into a PPA for a period of 25 years beginning in February 2012, set at 250 MW of capacity and an energy tariff determined by the Central Electricity Regulatory Commission (CERC). The transmission charges would be incurred from beyond the delivery point to BPDB's A/C system, with payment security set in the form of a letter of credit. Furthermore, in February of 2013, BPDB issued an RFP for the purchase of 250 MW of power from eligible Indian sponsors. From this, PTC India Ltd signed a PPA for a period of 3 years, eventually sourcing power from the West Bengal State Utility at a levelized tariff of 4.45/kWh, set to run through July 2016.



Left: The Electricity Generation Company of Bangladesh's Haripur 412 MW CCPP as seen from across the Shitalakshya River. Right: SARI/EI delegates were able to examine the difference between a simple cycle and combined cycle plant, as they toured Haripur's control room, water treatment facility, cooling towers and areas around the gas turbine, heat recovery steam generator and steam generator.

Site Visit to Haripur 412 MW Combined Cycle Power Plant

Delegates had the opportunity to visit the Electricity Generation Company of Bangladesh's (EGCB) Haripur 412 MW CCPP, located in the outskirts of Dhaka. Implemented by the Bangladesh Power Division of the Ministry of Power, Energy and Mineral Resources, the turn-key contract value for the project was USD 376 million. Completed in March 2014, the Haripur CCPP has a thermal efficiency of 56% (combined cycle) fueled by natural gas and is connected to the Bangladesh national grid at a level of 132kV. SARI/EI delegates also learned about BPDB's PPA with the plant, which was signed in April 2014. The PPA states a levelized tariff of Tk 1.7154/kWh at 84.6% plant factor.

Power Grid Company of Bangladesh

The final day of the executive exchange was hosted by co-sponsor PGCB, which provided delegates with an overview of the Bangladesh electric grid development, transmission system operations, dispatch and communications, cross border interconnections and PGCB's activities under the Power System Master Plan. At the time of the executive exchange, Bangladesh's transmission system had 165 circuit km of 400 of kV lines, 3066 circuit km of 230 kV lines and 6195 circuit km of 132 kV lines, with 125 substations at the 230/132 level or below and the newly constructed HVDC back-to-back station at 400 kV.

Established in 1996, PGCB overtook the responsibility for the entire grid network operation and maintenance of Bangladesh beginning in 2002. Currently, PGCB is undertaking the first phase of the PSMP (2010-15) as it attempts to develop the required 1340 circuit km of 400 kV lines, 1031.5 circuit km of 230 kV lines and 1268.1 circuit km of 132 kV lines. In addition, it is also in the process of implementing 10 substations at the 400/230 kV level, 17 substations at the 230/132 kV level and 72 substations at the 132/33 kV level, exceeding requirements set forth by the PSMP.

PGCB also covered their involvement in the recent grid interconnection project with India, which has since yielded results in terms of increasing energy security in Bangladesh. The main components of the interconnection on the Bangladesh side include 27 km of 400 kV double circuit transmission lines and a 400 kV back-to-back HVDC station at Bheramara, while the Indian side includes 72 km of 400 kV double circuit transmission lines and a 400 kV switching station at Baharampur.

When considering future cross border interconnections, PGCB is currently looking at 5 additional scenarios beyond the current Bheramara – Baharampur interconnection with India. As per the PSMP, PGCB is considering the following interconnections: Myanmar – Bangladesh, Palatana – Comilla, Shilchar – Fenchuganj, Kishanganj – Bogra, and Alipurduar – Bogra. Taken together, PGCB estimates this would bring an additional 3,500 MW of imported power by the year 2030 as it would take advantage of thermal power from India and Myanmar and hydropower from Nepal and Bhutan.

Results & Next Steps

The participating utility and government executives discussed the benefits of a regional power pool and the steps necessary to form a South Asian energy market. By examining the evolution of various power pools around the world, the participants were exposed to the challenges faced in different political and regulatory environments, as well as the universal benefits achieved by implementing regional electricity markets. By interconnecting grids, utilities can achieve economies of scale that provide increased grid reliability, lower energy production cost through centralized dispatch, a decreased need for infrastructure investment, and the provision of ancillary grid services.

USEA will implement its next SARI/EI program, focused on the Nepal – India cross border interconnection and power trade, in November 2014.



*Top: SARI/EI delegates gather at PGCB's headquarters in Dhaka to learn about the history and development of the Bangladesh grid, including the recent interconnection with India and future planned cross border interconnections.
Bottom: The delegation had the opportunity to tour PGCB's Aminbazar 230/132 kV AIS substation.*

Workshop Participants

Afghanistan

- Mr. Mohammad Samim, Electrical Engineer, Ministry of Energy & Water
- Mr. Sayed Ahmadzada, Manager of Energy Control Department, Da Afghanistan Breshna Sherkat

Bhutan

- Mr. Hari Sharma, Executive Engineer, Department of Hydropower & Power Systems
- Mr. Ugyen Chopel, Engineer, Department of Hydropower & Power Systems

India

- Mr. Prasenta Jena, AGM, NTPC Vidyut Vyapar Nigam Limited (NVVN)
- Mr. Anurag Gupta, AGM, NTPC Vidyut Vyapar Nigam Limited (NVVN)
- Ms. Sumitra Dhani, DGM, NTPC Vidyut Vyapar Nigam Limited (NVVN)
- Mr. Mukesh Kumar, AVP, PTC India Ltd
- Mr. Ravi Shankar, Manager, PTC India Ltd

Nepal

- Mr. Badri Teli, Project Director, Power Transmission Company of Nepal Ltd
- Mr. Sandip Dev, Sr. Divisional Engineer, Ministry of Energy

Sri Lanka

- DSR Alahakoon, Chief Engineer, Ceylon Electricity Board
- UN Sanjaya, Electrical Engineer, Ceylon Electricity Board

Bangladesh

BPDB

- Md. Abduhu Ruhullah, Chairman
- Mr. Mizanur Rahman, Chief Engineer (Planning & Design)
- Mr. Sayeed Ahmad, Director (System Planning)
- Mr. Golam Kibria, Director (IPP-1 Cell)
- Mr. Fazlul Haque, Deputy Director (IPP-1 Cell)
- Mr. Kazi Ahsanullah, Director (Audit)
- Mr. Monwar Khan, AE (System Planning)
- Mr. Ahmed Al-Mohtad, Executive Engineer

PGCB

- Mr. Masum Al-Beruni, Managing Director
- Mr. Arun Saha, SE (Planning)
- Mr. Quamrul Ashan, Chief Engineer
- Mr. Iqbal Azam, Superintendent Engineer
- Mr. KM Quamruzzaman, Superintendent Engineer
- Mr. Manzurul Islam, Executive Engineer
- Mr. Manjur Alam, Executive Engineer

BERC

- Mr. AR Khan, Chairman
- Dr. Salim Mahmud, Member (Commissioner)
- Mr. AKM Akhand, Director (Gas)
- Mr. Mostak Ahmed, Director (Power)
- Mr. Kamruzamman, Assistant Director (Tariff)
- Mr. Shariful Shahin, Assistant Director (Tariff)

MINISTRY OF ENERGY

- Mr. Anowar Hossain, Joint Secretary

USAID

- Ms. Monali Hazra, USAID/India
- Mr. Karl Wurster, USAID/Bangladesh
- Mr. Sher Khan, USAID/Bangladesh

For more information about the South Asia Regional Initiative for Energy Integration, please contact Ms. Sarah Blanford at sblanford@usea.org.