

ENVIRONMENT

TRANSPORTATION

ENERGY & POWER

TELECOMMUNICATIONS & ICT



NSU-MONASH UNIVERSITY  
JOINT SEMINAR

# INFRASTRUCTURE DEVELOPMENT & INNOVATION

04 NOVEMBER 2017

## VENUE

SYNDICATE HALL  
LEVEL 5, ADMIN BUILDING, NORTH SOUTH UNIVERSITY

## ORGANIZERS

SCHOOL OF ENGINEERING AND PHYSICAL SCIENCES, NSU  
MONASH INFRASTRUCTURE, MONASH UNIVERSITY

**MR. MOHAMMED SHAJAHAN, CHAIR, BOARD OF TRUSTEES, NSU**

**PROF. ATIQUUL ISLAM, VICE CHANCELLOR, NSU**

WILL BE IN ATTENDANCE OF THE SEMINAR

## CONTACT

Dr. Mohammad Nazmul Islam, Organizing Secretary,  
Phone: + 880 2 55668200 (Ext. 1982), + 8801715117113,  
E Mail: [mohammad.islam@northsouth.edu](mailto:mohammad.islam@northsouth.edu)



MONASH University



NSU-MONASH UNIVERSITY  
JOINT SEMINAR ON INFRASTRUCTURE DEVELOPMENT & INNOVATION



Date: 24 October, 2017

To  
<Name and address>

Subject: Invitation to NSU-Monash University joint seminar on Infrastructure Development and innovation

Dear sir/madam,

I am delighted to inform you that School of Engineering and Physical Sciences (SEPS) of North South University and Monash Infrastructure (MI) Institute of Monash University, Australia are going to organize the NSU-Monash joint seminar on **Infrastructure Development and innovation**. The seminar will feature several keynote presentations by professors of NSU and Monash University; and an interactive roundtable discussion by the participants. The program is designed for participants from the public as well as private sector enterprises who are engaged in managerial roles in various large infrastructure projects of Bangladesh.

The Chair of the Board of Trustees of NSU Mr. Mohammed Shajahan and the Vice Chancellor of NSU Professor M Atiqul Islam will be in attendance.

Date : 04 November, 9:30 am to 1:30 pm  
Venue : Syndicate Hall, Level 5, admin building, NSU campus,  
Bashundhara, Dhaka, Bangladesh

Your participation in the event will help us finding solutions to our national infrastructure problems as well as advance education and research on infrastructure.

Best Regards,

Dr. Mohammad Nazmul Islam,  
Professor and Chair  
Department of Civil and Environmental Engineering,  
North South University  
Organizing Secretary of the seminar  
E mail: [mohammad.islam@northsouth.edu](mailto:mohammad.islam@northsouth.edu)



## PROGRAM SCHEDULE

- 9.30 am Guests arrive
- 10.00 am Guests take seats
- 10.02 am Welcome Speech by Mr. Mohammed Shajahan  
Chair, Board of Trustees  
North South University
- 10.10 am Presentation - I  
Dr. Mohammad Nazmul Islam  
Chair, Department of Civil & Environmental Engineering, NSU
- 10.25 am Presentation - II  
Dr. Mohammad Rezaul Bari  
Chair, Department of Electrical & Computer Engineering, NSU
- 10.40 am Presentation - III  
Prof. Amrik Sohal,  
Monash Infrastructure, Monash University, Australia
- 11.00 am Closing remarks from Prof. Atiqul Islam  
Vice Chancellor  
North South University
- 11.10 am Roundtable Discussion  
Moderator: Prof. M. Rokonuzzaman  
Dean, SEPS, NSU  
Rapporteur: Dr. Shoaib Chowdhury  
Associate Prof. DCEE, NSU
- 1.30 pm Lunch Break
- 2.00 pm End of Program

You are cordially invited to the seminar “Infrastructure Development and Innovation Challenges in Bangladesh”; jointly organized by the School of Engineering and Physical Sciences of North South University, Bangladesh and Monash Infrastructure of Monash University, Australia.

The seminar is scheduled on **November 4, 2017, Saturday** at the Syndicate Hall (Level 5, Admin Building) of North South University, Bashundhara, Dhaka from 9:30am - 2:00pm.

Mr. Mohammed Shajahan, the Chair of the Board of Trustees of North South University and Professor Atiqul Islam, Vice Chancellor of North South University will be in attendance of the seminar.

Dr. M Rokonuzzaman,  
Dean, School of Engineering & Physical Sciences  
North South University



NSU-MONASH UNIVERSITY  
JOINT SEMINAR ON INFRASTRUCTURE DEVELOPMENT & INNOVATION



# Transportation and Environment: Issues, Opportunities and Challenges

Professor Mohammad Nazmul Islam  
Department of Civil and Environmental Engineering  
North South University

# Outline

- Introduction to a few representative mega projects and their Issues, Opportunities and Challenges
- Common Challenges of Infrastructure Development (from interview with ADB, RHD, LGED personnel)

# Dhaka Mass Rapid Transit Development Project (DMRTDP)

- **Road Transport and Highways Division** of the Ministry of Road Transport and Bridges
- In 1998, Bangladesh Government created the **Dhaka Transport Coordination Authority**.
- An urban transport plan was commissioned in 2008, wherein the Government laid out a comprehensive transport plan naming **Strategic Transport Plan (STP)** for the Greater Dhaka City and its adjoining areas
- In June 2013, **Dhaka Mass Transit Company Limited (DMTC)** was established by the Government to implement the Metro Rail Lines across the City.
- MRT Line 6 Depot Land Development has been started

# Schematic Images for MRT Line-6



Source: <http://www.dmtc.org.bd/photographs>

# Challenges for Dhaka City Transportation systems

- Traffic Management
- Bus Consolidation
- Integrated Multi-Modal Mass Rapid Transit System
- Selected Highway Projects
- Safety Improvements
- Pedestrian Facilities
- Inter-City Railway Resolution

Source: The Strategic Transport Plan (STP) for Dhaka by The Louis Berger Group Inc. and Bangladesh Consultants Ltd



# Greater Dhaka Sustainable Urban Transport Project [BRT Gazipur-Airport]

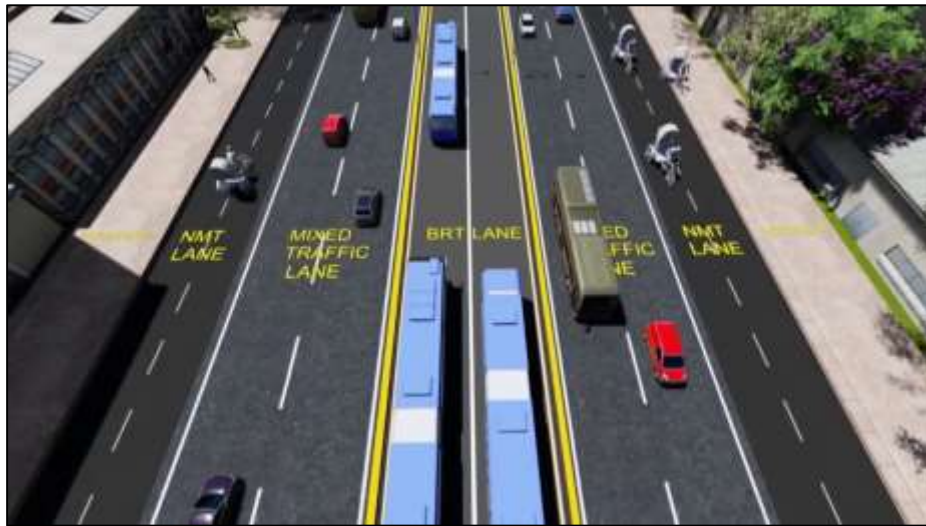
- will carry 20 thousand passenger/hour/direction and travelling time will be half of the present
- construction of 20 km dedicated bus lane, out of which 4.5 km will be elevated 4-lane bus lane, reconstruction of 8-lane Tongi bridge, construction of 7 flyovers, and more
- Executing agency: Roads Division, Ministry of Communication
- 3 (three) separate Project Implementation Units (PIU) were formed under
  - Roads and Highways Department (RHD),
  - Bangladesh Bridges Authority (BBA) and
  - Local Government Engineering Department (LGED).

# ISSUES AND OPPORTUNITIES (SNOWY MOUNTAIN ENGINEERING CORPORATION)

- Field Surveys and Investigations
- Design Review and Detailed Design Framework
- Detailed Design of the road corridor, BRT elevated section and stations, and the BRT Terminal and Depot in Gazipur
- PPP Concept Design for the BRT Airport Terminal
- Detailed Design for Municipal Infrastructures Improvement
- Identification and relocation of utilities
- Procurement
- Implementation Plan (including traffic management during construction)
- Construction supervision of civil works

Source: [http://www.smec.com/en\\_au/what-we-do/projects/Greater-Dhaka-Sustainable-Urban-Transport-Project](http://www.smec.com/en_au/what-we-do/projects/Greater-Dhaka-Sustainable-Urban-Transport-Project)

# Schematic Images for BRT Gazipur-Airport



# Challenges to implement BRT

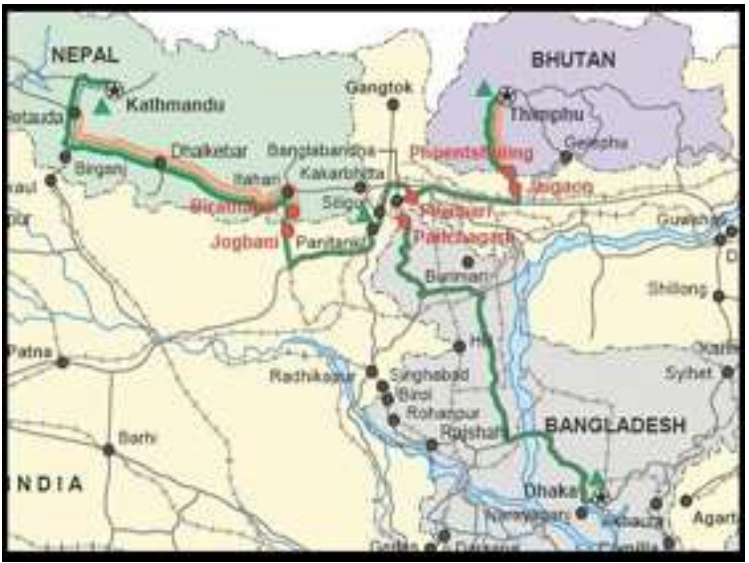
- Consolidation of the existing bus operators in the BRT route or to convince them to stop their bus service and operations in the mixed traffic lanes along the BRT corridor.
- During the construction of physical infrastructure, traffic management of the existing Gazipur-Joydebpur-Airport corridor.
- Land Acquisition and Resettlement Plan Implementation along the whole BRT route, followed by detailed design of the project.
- Utility Shifting from the BRT corridor.

Source: Website of Bangladesh Bridge Authority, Bridges Division, Ministry Of Road Transport And Bridges.

## SASEC Road Connectivity Project: Improvement of Joydevpur-Chandra-Tangail-Elenga Road (N-4) to a 4-lane Highway

- South Asia Sub regional Economic Cooperation (SASEC)
- Upgrading of existing 70 km Joydevpur-Chandra-Tangail-Elenga (JCTE) 2 Lane Road to 4 Lane Highway
- Construction of 5 Flyovers, 26 Bridges and 60 Culverts
- Construction of separate lane for slow moving vehicles
- Roads and Highways Department (RHD), Road Transport and Highways Division, Ministry of Road Transport and Bridges

# SASEC Road Connectivity and the JCTE Road before improvement and being improved



# Issues and Challenges in JCTE Road

- Land Acquisition and Resettlement
  - Common to almost all road projects
  - Bangladesh 1982 Ordinance: Deputy Commissioner plays the key role
  - Development partners have their own policy (e.g. Safeguard Policy Statement ADB June 2009)
  - The policies do not match, for example ADB would compensate for land, structure, displacement cost, livelihood restoration etc.
  - Legal battle continues for a long time and project cost increases
  - Rural people mushroomed the paddy fields with makeshift houses where they actually do not live, for better compensation

# Dhaka-Chittagong Expressway Public-Private Partnership Design Project

- Roads and Highways Department (RHD), Road Transport and Highways Division, Ministry of Road Transport and Bridges
- Currently on Feasibility Study and Detailed Design Consultancy
- Bangladesh Bridge Authority (BBA) is also contemplating to have an Elevated Expressway from Dhaka to Chittagong.



# Existing Dhaka-Chittagong Highway (N1) and the Proposed Dhaka-Chittagong Expressway



# Opportunities and Challenges on Dhaka-Chittagong Expressway Project

- assessment of different route alignment options
- Economic and financial analysis for the follow-on project, structuring of the PPP, establishment of the financial model, and recommendation of the PPP structure for the follow-on project.
- Detailed engineering design for the selected option including the finalization of all safeguard documents.
- Safeguard implementation

Project Administration Manual, Dhaka – Chittagong Expressway PPP Design (RRP BAN 45174),  
<https://www.adb.org/sites/default/files/project-document/73594/45174-001-ban-pam.pdf>

# Padma Multipurpose Bridge Project (PMBP)

- Bangladesh Bridge Authority
- Main Bridge Length: 6.15 km, Viaduct: 3.148 km (Road), 532 m (Rail), Approach Road, 12.117 km, River Training Works 14 km (1.6 Mawa + 12.4 in Janjira)
- 150 m each Composite Superstructure (Warren type Steel Truss Girder and Concrete on Upper Deck) on 2 transition pier at landward ends and 40 Center piers
- Racked (Inclined at 1H:6V) Steel Tubular driven pile, 6 Nos. In each pier, Pile Diameter = 3m, Pile Length = 128m
- Upper Deck: 22 m wide concrete deck slab (2.5 m hard shoulder on the both side), 4 Lane road, Lower Deck: Single Track Dual Gauge Rail

Source: <http://www.padmabridge.gov.bd/mainbr.php>

# Schematic of Padma Multipurpose Bridge



# Work in Progress Padma Multipurpose Bridge



# Components of the Padma Multipurpose Bridge Project (PMBP)

- Main Bridge
- River Training Works (RTW)
- Janjira Approach Road & Selected Bridge End Facilities
- Mawa Approach Road & Selected Bridge End Facilities
- Service Area- 02
- Management Support Consultant (MSC) Service
- Construction Supervision Consultant- 02 (for Main Bridge & RTW)
- Construction Supervision Consultant- 01 (for Approach Roads & Service Area- 02)
- Engineering Support & Safety Team (ESST)
- Resettlement
- Environment
- Land Acquisition

# Other Issues and Challenges: Flood

- A good number of roads are vulnerable to floods, particularly the East-west roads, and the LGED roads that usually do not have adequate openings (e.g. bridges)
- A few roads are high above the flood level, but blocks or slows down the recession of floodwater
- Review Panel does not exist for all transportation projects, e.g. Padma Multipurpose Bridge Project has a review panel

# Other Issues and Challenges: Road Safety

- Bangladesh Police data: 3,500 - 4,000 fatalities/year, and 4,000 - 4,500 injuries (casualties)/year. These data would not match with ARI (BUET), WHO, TRL (UK) etc.
- National Road Safety Council (NRSC) has National Road Safety Strategic Action Plan (NRSSAP)
- RHD has Road Safety Cell (RSC): mostly engineering
- Every district has a District Road Safety Committee headed by the Deputy Commissioner.
- LGED has Road Maintenance and Road Safety Unit (RMRSU)
- Fire Service and Civil Defense (FSCD) is the first respondent
- A Few Non-Government Organizations work on awareness campaign
- ADB funded Road Safety Improvement Programs (RSIP) with RHD



# Other Issues and Challenges: Delay

- Reasons are delay are unprecedented but it happens
  - Availability of Construction materials; these are imported from India, China and Vietnam
  - In every project, a host of agencies (ministries, departments etc.) are involved
  - Land acquisition
  - Procurement process is long. Usually Cabinet Committee makes the decision
  - Availability of Skilled manpower

# Local Government Engineering Department (LGED) Issues

- No comprehensive plan, existing earthen roads based on users requests (influence) are being widened and paved
- Land acquisition usually not done
- Most of the roads don't fit into standard geometric design, since they follow existing alignment
- Rural people continue to use the road area for various other purposes. Road crashes are common and not documented. Black Spots are not identified
- New growth centers rise; unidentified and unconnected
- SRIIP : Sustainable Rural Infrastructure Improvement Project is a good example

# Common Issues and opportunities

- maintenance,
- capacity constraints of ports, and lack of strategic international transit connectivity,
- presence of mixed traffic in the arterial city roads,
- lack of proper enforcement of traffic safety regulations,
- congestion and overloading
- limited ability to respond to user needs
- Investment

# THANK YOU



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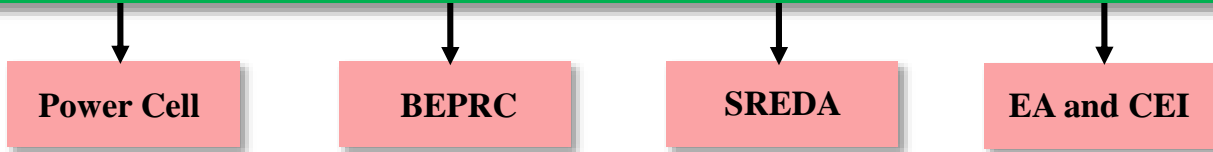


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**Mohammad Rezaul Bari, PhD**

# Energy and Power

# Power Division (Ministry of Power, Energy and Mineral Resources)



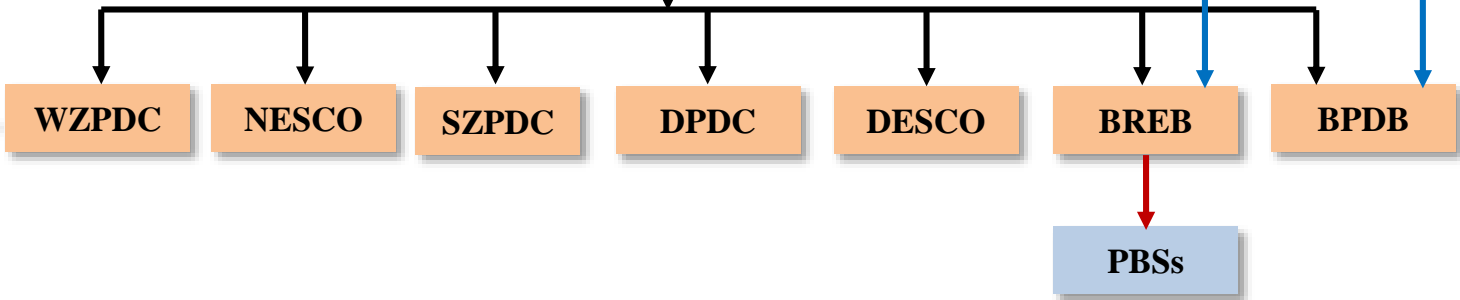
Generation



Transmission



Distribution



# Present Installed Generation Capacity (MW)

as on 30 September, 2017

	Installed Generation Capacity (MW)		
<b>Public Sector</b>			
BPDB	4,402		
APSCL	1,508		
EGCB	622		
NWPGCL	718		
RPCL	77		
BPDB-RPCL JV	149		
Subtotal MW		<b>7,476</b>	55%
<b>Private Sector</b>			
IPPs	3,245		
SIPPs (BPDB)	99		
SIPPs (REB)	251		
15 yr Rental	169		
3/5 yr Rental	1,721		
Power Import	660		
Subtotal MW		<b>6,145</b>	45%
<b>Total MW</b>		<b>13,621</b>	

Including Captive Power Total Installed Capacity (13,621 + 2,200) = 15,821 MW

Maximum Demand served so far: 9,479 MW on 07-06-2017





# Ashuganj Power Station Company Ltd (APSCCL)

**Number of Generating Units : 11 (5 Steam Turbine + 1 Gas Turbine  
+ 1 Gas Engine + 3 CCPP + 1 Modular)**

**Installed Capacity: 1508 MW**

## **On Going Projects:**

- Ashuganj 400 MW CCPP (East) Project
- Patuakhali 1320 MW Coal Fired Thermal Power Plant Project

## **Upcoming Projects**

1. 100 MW HFO Based Power Plant at Ashuganj
2. 100 MW Grid Tied Solar Park at Kishoreganj
3. 400 MW Dual Fuel Combined Cycle Power Plant at Ashuganj
4. 1320 MW North Bengal Coal Fired Thermal Power Plant
5. 200 MW Solar Park at Padma Char in Rajshahi





# Electricity Generation Company of Bangladesh Ltd. (EGCB)



## Existing Plants

Installed Capacity: 622 MW

## Ongoing Projects

Siddhirganj 335 MW Combined Cycle Power Plant  
Siddhirganj Compact Hybrid 36 KW Solar Power Plant

## Upcoming Projects

- 1200 MW or above Ultra Super Critical Coal Based Power Plant (1st phase) and 1200 MW or above Ultra Super Critical Coal Based Power Plant (2nd phase) at Pekua, Cox's Bazar
- Munshiganj 300 - 400 MW Super Critical Coal Based Power Plant
- Feni 100 MW Solar and 100 MW Wind Power Plant Projects





# North-West Power Generation Company Limited (NWPGL)

**Installed Capacity: 718MW**

## **Ongoing Projects**

Payra 1320 MW Thermal Power Plant

Sirajganj 225 MW Combined Cycle Power Plant (2nd Unit)

Sirajganj 225 MW Combined Cycle Power Plant (3rd Unit)

Sirajganj 400 MW ( $\pm 10\%$ ) Combined Cycle (Dual Fuel-Unit 4) Power Plant

Sirajganj 7.6 MW Grid Connected Solar Photovoltaic Power Plant

**Upcoming Projects: 5,442 MW**





# Rural Power Company Limited (RPCL)



**Existing Plants: 77 MW**

## **Ongoing and Upcoming Projects:**

Gazipur 100 MW HFO Fired Power Plant

Mollahat 100 MW Solar Power PV Power Plant

100 MW Wind Power Plant

Gazaria 350 MW Coal Based Thermal Power Plant

Patuakhali 1320 MW Coal Based Thermal Power Plant

Mymensingh 360 Combined Cycle Power Plant



# Coal Power Generation Company Bangladesh Limited

2X600 MW Coal Fired Power Plant at Matarbari and Dhalghata Union in Maheshkhali Upazilla of Cox's Bazar District.

This project comprises of construction of jetty and coal handling facilities for coal import, coal storage, power plant construction, township development, rural electrification, construction of transmission facilities, and road communication

Future Projects of CPGCBL

Sl No	Projects Name	Fuel	Capacity (MW)	Expected COD
1	Bangladesh-Singapore 700 MW USC Coal Fired Power Plant (Phase-1)	Coal	700	June 2023
2	CPGCBL-Sumitomo 2x600 MW USC Coal Fired Power Plant	Coal	1200	June 2026
3	CPGCBL-Mitsui 500-600 MW LNG Based Gas Fired Combined Cycle Power Plant (Phase-1)	LNG	500	June 2027
4	Matarbari 2x600 MW USC Coal Fired Power Plant (Phase-2)	Coal	1200	June 2028
5	Bangladesh-Singapore 700 MW USC Coal Fired Power Plant (Phase-2)	Coal	700	June 2032
6	CPGCBL-Mitsui 500-600 MW LNG Based Gas Fired Combined Cycle Power Plant (Phase-2)	LNG	500	June 2033
<b>Total</b>			<b>4800</b>	

## Joint Venture Power Plants

1. 1320 MW Moitri Super Thermal Project at Rampal, Bagerhat, BPDB-NTPC, India JV
2. 1320 MW Maheshkhali BPDB- Consortium of TNB-PB, Malaysia JV
3. 1320 MW BPDB- CHDHK, China JV
4. 1320 MW BPDB- KEPCO, South Korea JV
5. 700 MW Matarbari CPGCBL-SEMBCORP, Singapore JV

## BPDB-RPCL Powergen Limited

### Existing:

Kodda 150 MW Dual Fuel (HFO/Gas) Power Plant

### Upcoming Projects:

Mirsarai 150 MW Dual Fuel Power Plant

Sreepur 150 MW HFO based Power Plant

Madarganj 100 MW solar power plant.

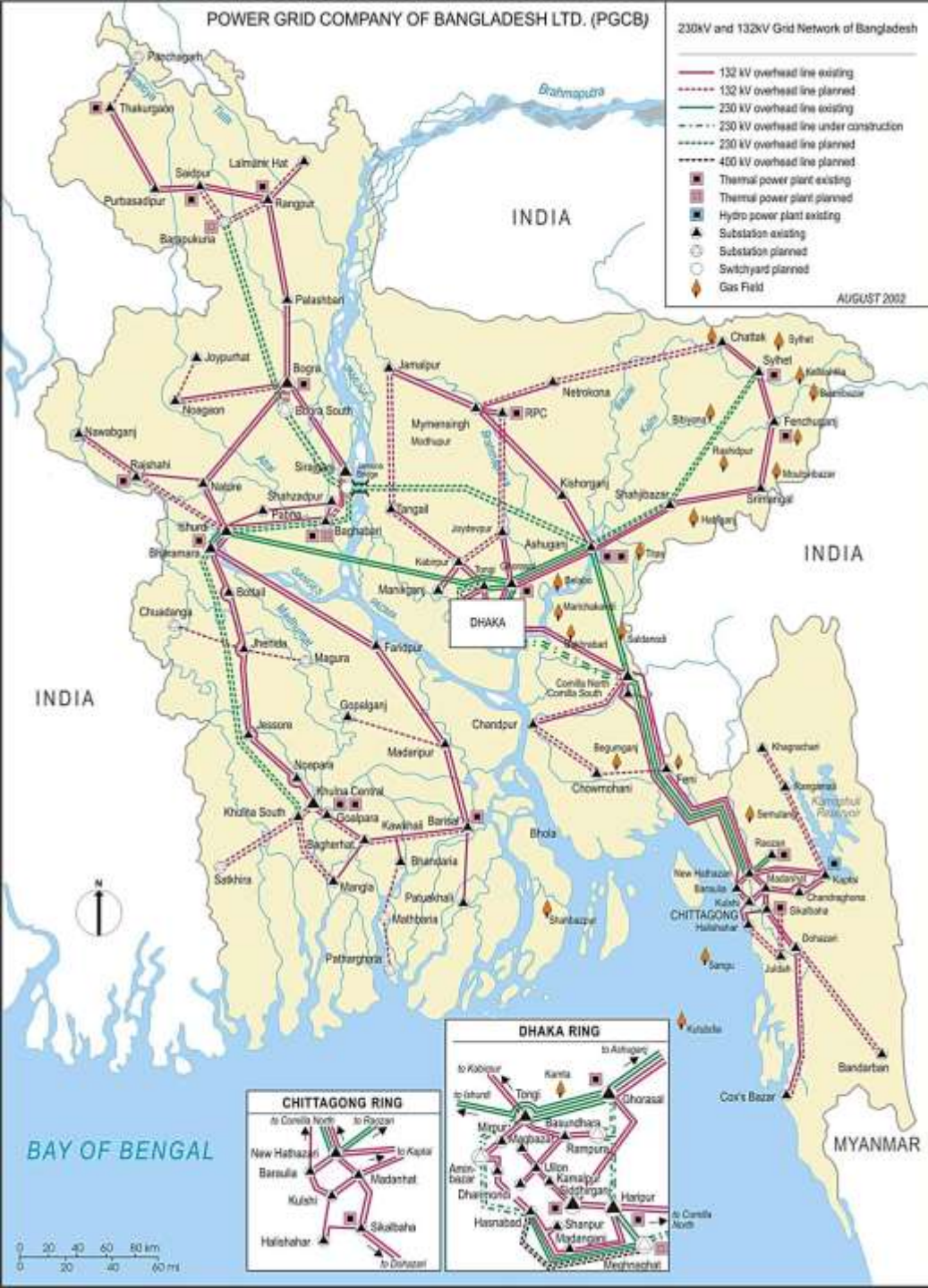




- Operation, maintenance and development of the electrical transmission system of the country for distribution of generated electricity**

<b>Transmission Line as on: June, 2017</b>	
<b>400 KV</b>	<b>560 Circuit km</b>
<b>230 KV</b>	<b>3325 Circuit km</b>
<b>132 KV</b>	<b>6465 Circuit km</b>
<b>Substations as on: June, 2017</b>	
<b>400 KV</b>	<b>1 No. 500 MW HVDC Back to Back station</b>
<b>400/230 KV</b>	<b>2 Nos. 1560 MVA</b>
<b>400/132 KV</b>	<b>1 No. 650 MVA</b>
<b>230/132 KV</b>	<b>19 Nos. 9675 MVA</b>
<b>132/33 KV</b>	<b>91 Nos. 14154.5 MVA</b>

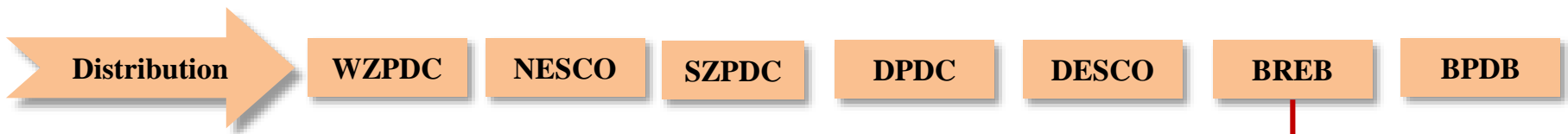
- PGCBL has been working on 16 projects, 16 more are upcoming**



# Optical Fiber Backbone of PGCB

- OPGW (Optical Ground Wire) installed on high voltage transmission line to protect the transmission lines from thunder.
- Installed OPGW length 4300 km (2012 data)
- After PGCB's own communication need, the spare optical fibers are being leased out to local telecom operators to develop national communication infrastructure





33 KV feeder, 33/11 KV sub-station, 11 KV feeder, 33 KV Line,  
11 KV Line, 11/0.4 KV sub-station, 0.4 KV Line, 0.2 KV Line

WZPDC: West Zone Power Distribution Company Ltd. → Khulna Division,  
Barisal Division, and Faridpur District

NESCO: Northern Electric Supply Company Ltd. → Rajshahi Division, and  
Rangpur Division

SZPDC: South Zone Power Distribution Company Ltd. → Chittagong Division

DPDC: Dhaka Power Distribution Company Ltd. → Dhaka City excluding DESCO,  
and Narayanganj areas

DESCO: Dhaka Electric Supply Company Ltd. → Dhaka (North) City Corporation,  
and Tongi

BREB: Bangladesh Rural Electrification Board → 80 PBSs, 3,59,947 km line,  
69,339 villages

PBSs: Palli Biddut Samities

BPDB: Bangladesh Power Development Board → Rest of the Urban areas



# Power Situation

- **GDP growth – ~ 7%**
- **Electricity Generation Growth – ~ 10%**
- **Demand-Supply gap has shrunk**
- **Government plans to provide electricity to all by 2018  
(moved forward from 2021)**
- **Faster implementation required**
- **New 3000 MW oil-based power plants are planned –  
Electricity cost may go up by 30% – dilemma**
- **If oil price increases globally – trouble!**
- **Cost of electricity is higher in South Asia**

## Power Situation

- **No new coal-based plant went in operation in last 8 years**
- **Rampal 1320 MW – slow progress**
- **2 other projects Payra and Matarbari 1320 MW – not much development**
- **Private sector is failing in many cases**
- **Some new power plants are stuck in fuel import permission row**
- **60 MW wind turbine power plant in Cox's Bazar – no tangible progress**

# Power Situation

- Demand estimate is not accurate?
- No reliable methodology established to get the actual demand
- No survey is done for last 5 years
  
- Transmission Loss has been reduced to one digit
- Rate of transmission interruptions has been reduced too
- 1 November 2014 black out
- Alternative Grid?

# Energy mix of the Perspective Plan for Power Generation

Energy Sources	Target Period		
	Current (2017)	2021	2030
Gas	64%	30%	28%
Coal	1.8%	53%	38%
Oil	27.7%	3%	5%
Hydro	1.7%	1%	4%
Nuclear	0%	10%	19%
Renewable	0%	3%	6%

# Rooppur Nuclear Power Plant

- **Russia to install two units of 1200 MW each VVER nuclear power plant at Rooppur, Pabna**
- **VVER-1200 is a 3.5 generation safer and more economical nuclear reactor**
- **Rooppur NPP will be expected to be commissioned by the year 2024 (Unit 1) and 2025 (Unit 2)**
- **The life of the two new generation nuclear power plants will be 60 years**
- **The cost of electricity will be competitive though initial investment is very high**
- **As nuclear power plant has no emission, it will help building low carbon society**



# **Telecommunications and ICT**

# Ministry of Posts, Telecommunications and Information Technology

## Posts & Telecommunications Division

Bangladesh Telecommunication Regulatory Commission (BTRC)

Department of Telecommunications

Bangladesh Telecommunications Company Ltd (BTCL)

Bangladesh Submarine Cable Company Limited

Teletalk Bangladesh Ltd

Bangladesh Communications Satellite Company Limited

## ICT Division

Directorate of ICT

Bangladesh Hi-Tech Park

Bangladesh Computer Council (BCC)

Controller of Certifying Authority (CCA)



# Telecommunications



# Bangladesh Submarine Cable Company Ltd. (BSCCL)



**BSCCL → Long-haul communication between Bangladesh and the rest of the world**

**Submarine Cable Landing Station  
SEA-ME-WE-4 (SMW-4) → Cox's Bazar  
SEA-ME-WE-5 (SMW-5) → Patuakhali**

**Main telecommunications infrastructure for  
“Digital Bangladesh” in 2021**



LS SMW5



LS SMW4



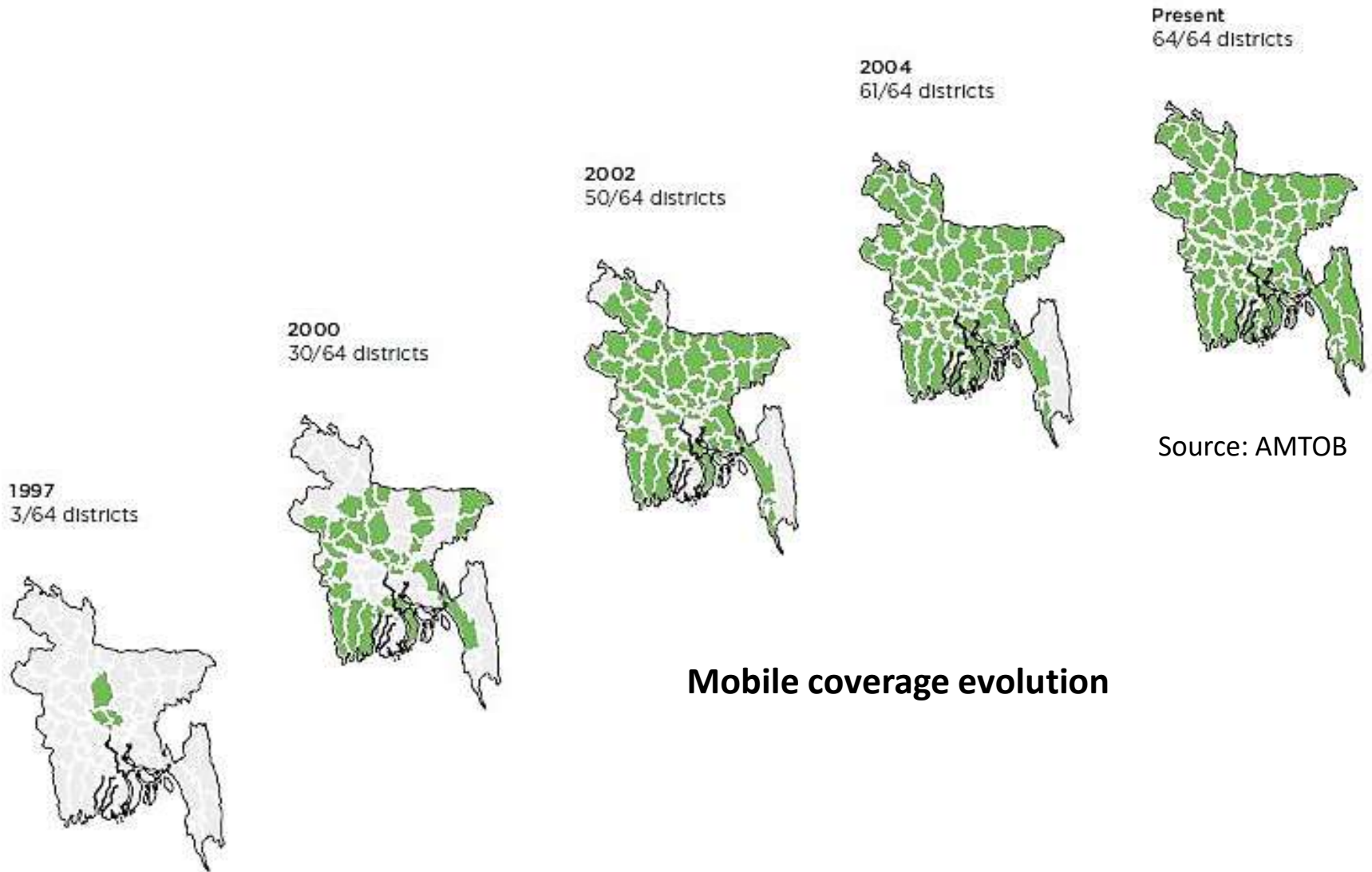
# WELCOME TO BTCL

BTCL is a voice carrier, IGW, IIG, ICX, ISP, NTTN, PSTN operator and country code top level domain (.bd) registrar.



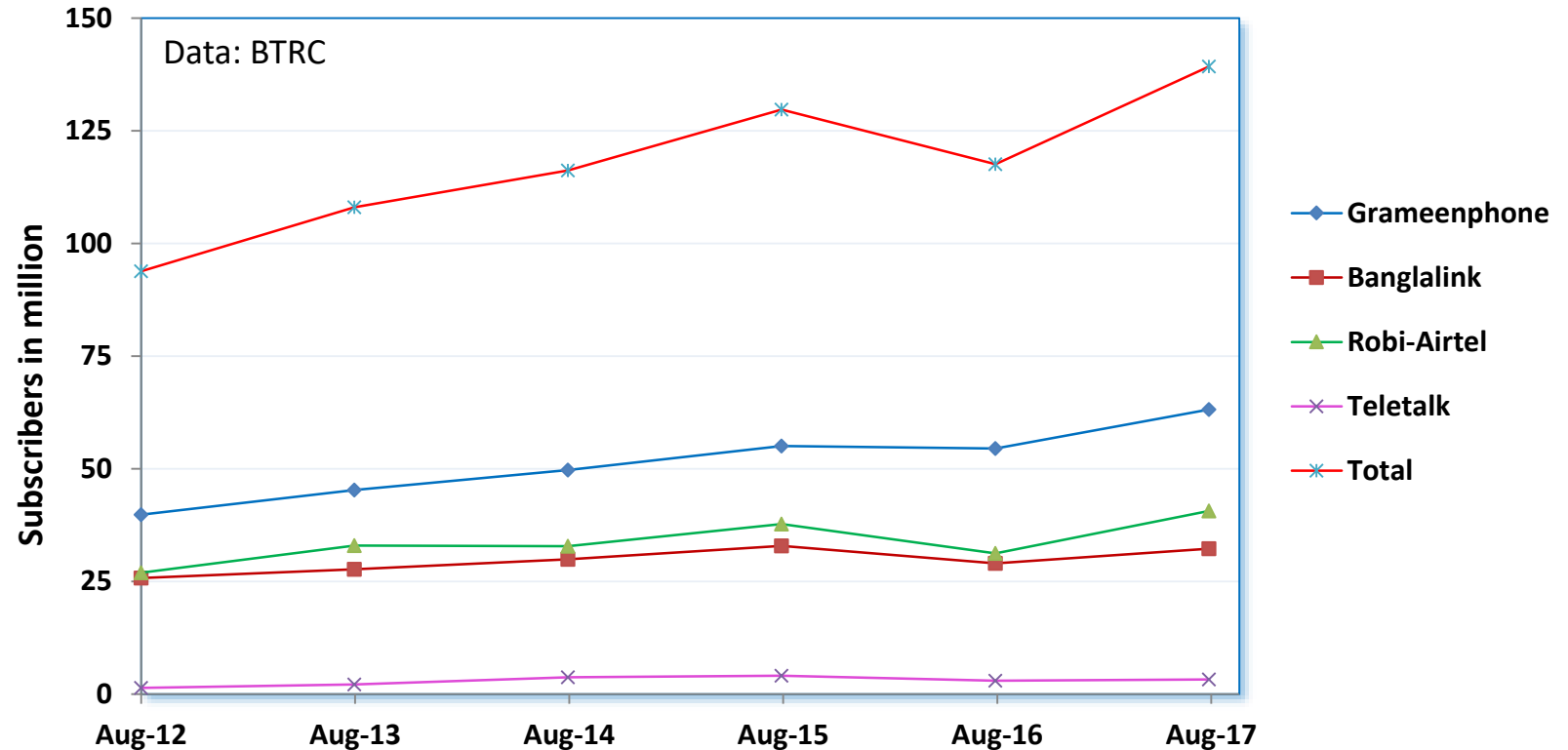
- Nationwide optical fiber network
- 700 digital exchanges
- 1.5 million landline telephone capacity

# Mobile service coverage



**Mobile coverage evolution**

# Mobile Phone Companies - Subscribers



Robi-Airtel merger completed in November 2016



# 4G Roll Out Challenges



- BTRC to hold an open auction by December 2017 for selling spectrum in three bands – 900, 1,800, and 2,100
- Price for each megahertz of spectrum in the 2,100 band → \$27 million and in the 900 and 1,800 bands → \$30 million
- Spectrum conversion fee for technology neutrality in the existing 900 and 1,800 bands → \$7.5 million per megahertz
- The 4G licence fee : Tk 10 crore
- The 4G annual fee : Tk 5 crore
- Participation fee : Tk 150 crore for each category of spectrum auction
- Bank performance guarantee → Tk 150 crore
- At present, of the spectrums in the 900 and 1,800 bands
  - Grameenphone uses 22 MHz
  - Robi-Airtel uses 26.4 MHz
  - Banglalink uses 15 MHz
  - Teletalk uses ] 15.2 MHz

# 4G Roll Out Challenges



- Participation fee: Tk 150 crore in each category of spectrum auction
- Bank performance guarantee → Tk 150 crore
- Operators to extend 4G services in all divisional headquarters within 9 months  
district headquarters within 18 months  
and all over the country within 36 months  
after getting the licence
- Operators to share 5.5 percent gross revenue with the BTRC and another  
1.0 percent for social obligation segment
- [Operator feedback] “Substantial” return of the Tk 22,600 crore that needs  
to be invested to roll out 4G services within the first 3 years is uncertain
- [Operator feedback] High spectrum charges, tax, low 4G device  
penetration, and data price rates contribute to the depressing outlook

# Mobile Tower Management

- **35,000 telecom towers in Bangladesh and all of them are currently run by mobile phone operators**
- **BTRC has decided to award three licences**
  - **to manage mobile towers in Bangladesh**
- **With tower management companies the number of mobile towers will go down to 25,000**
  - **Save land and energy, and cut operational expenses**





**ICT**

# ICT in Bangladesh

- Driven by the Government's Vision 2021: Digital Bangladesh
- Government is committed for inclusive uses of ICT
- ICT to unlock tremendous social and economic benefit
- Middle income country by 2021
- E- Governance
- Development of national ICT infrastructure to promote cross sectoral synergy

Bangladesh National Portal 3 November, 2017 বাংলা

58 Ministries & Divisions	353 Directorates & Others	8 Divisions	64 Districts	491 Upazilas	4554 Unions
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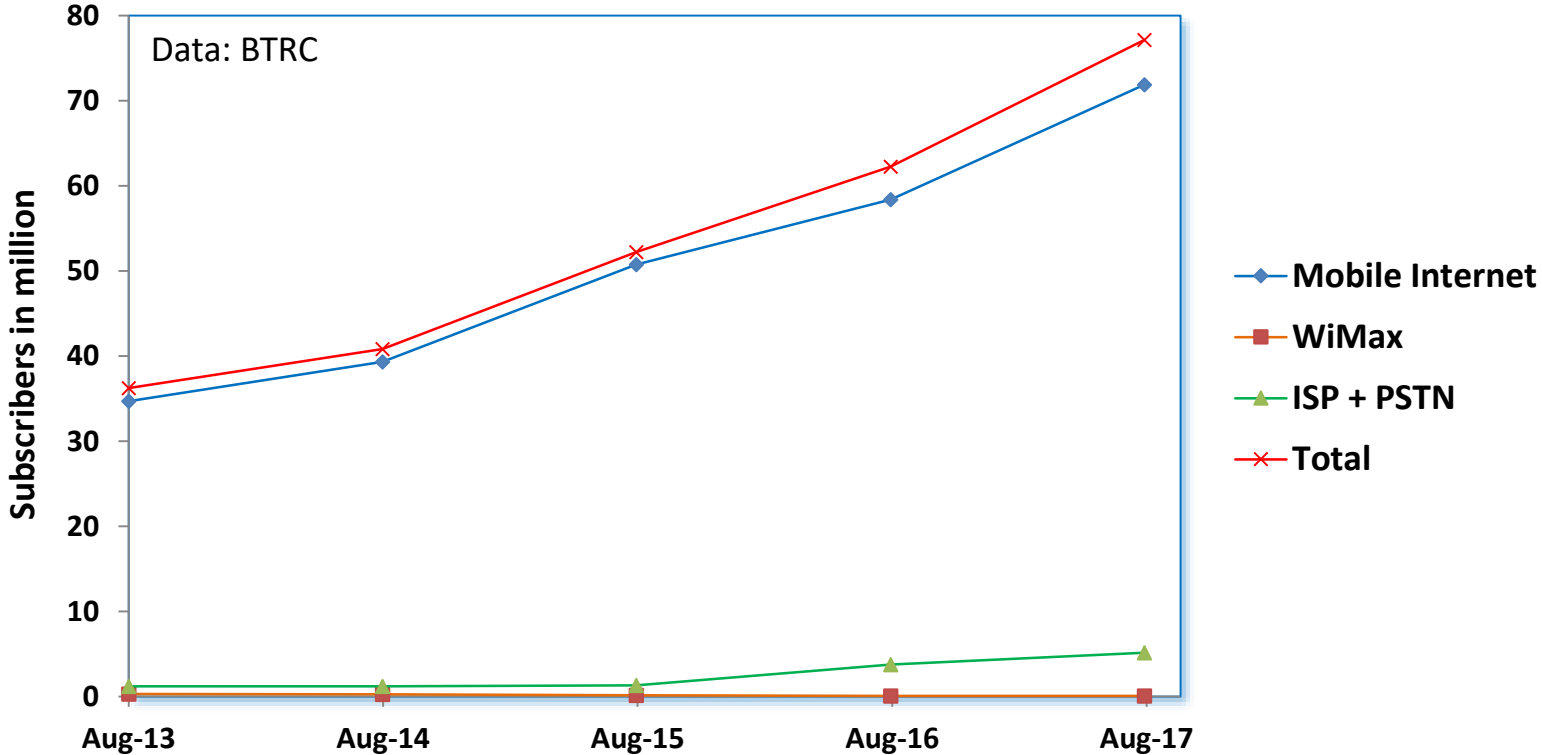
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# Internet Subscribers





# ICT Development Index 2016

#ITUdata

## IDI 2016 Regional Rank: Asia & Pacific

	IDI 2016 Rank	Economy	IDI 2016 Value	IDI 2015 Rank	IDI 2015 Value	Rank Change
1	1	Korea (Rep.)	8.84	1	8.78	—
12	86	Maldives	5.04	88	4.68	↑
20	116	Sri Lanka	3.77	116	3.56	—
21	117	Bhutan	3.74	122	3.12	↑
26	138	India	2.69	135	2.50	↓
27	140	Myanmar	2.54	153	1.95	↑
30	145	Bangladesh	2.35	143	2.27	↓
31	146	Pakistan	2.35	145	2.15	↓

## IDI ACCESS SUB-INDEX

# 3.06

Fixed-telephone subscriptions per 100 inhabitants

0.52

Mobile-cellular telephone subscriptions per 100 inhabitants

83.36

International internet bandwidth per Internet user (Bit/s)

6,181.46

Percentage of households with computer

8.19

Percentage of households with Internet access

11.00

## IDI USE SUB-INDEX

# 1.06

Percentage of individuals using the Internet

14.40

Fixed (wired)-broadband subscriptions per 100 inhabitants

2.41

Active mobile-broadband subscriptions per 100 inhabitants

13.45

## IDI SKILLS SUB-INDEX

# 3.51

Mean years of schooling

5.07

Secondary gross enrolment ratio

58.31

Tertiary gross enrolment ratio

13.23

	World	Developing	India	Bangladesh
<b>IDI Access Sub-Index</b>				
Fixed-telephone subscriptions per 100 inhabitants	14.34	9.33	1.99	0.52
Mobile-telephone subscriptions per 100 inhabitants	98.61	93.01	78.84	83.36
International internet bandwidth per internet user (bit/s)	61030	34508	5724	6181
Percentage of households with computer	45.63	33.09	14.08	8.19
Percentage of households with internet access	49.03	37.59	20.00	11.00
<b>IDI Use Sub-Index</b>				
Percentage of individuals using the internet	43.83	36.74	26.00	14.40
Fixed (wired)-broadband subscribers per 100 inhabitants	11.21	7.45	1.34	2.41
Active mobile-broadband subscriptions per 100 inhabitants	44.17	35.29	9.36	13.45

# Security of Telecom and ICT Infrastructure

In USA

## **Office of Cybersecurity and Communications**

Office of Emergency Communications

National Cybersecurity and Communications Integration Center

Stakeholder Engagement and Cyber Infrastructure Resilience

Federal Network Resilience

Network Security Deployment

In Bangladesh

## **Cyber Threat Detection and Response Project**

(Dept. of Telecommunications)

# Innovation in ICT Infrastructure

- Internet is scaling faster than today's infrastructure can keep up
- The Internet just isn't built to handle the enormous amount of data that is being distributed between millions of people and devices
- Over the next five to ten years, the most rapid growth of Internet consumption and distribution will be seen here in Bangladesh
- A dynamic network provides a sustainable alternative to the old model of scaling by investing in static infrastructure
- We can utilize technologies such as **artificial intelligence** and **machine learning** to unlock enormous optimization gains. We can create **intelligent data routing** based on network data
- We need to utilize existing infrastructure in a much **smarter way** and allow the network to grow organically based on demand

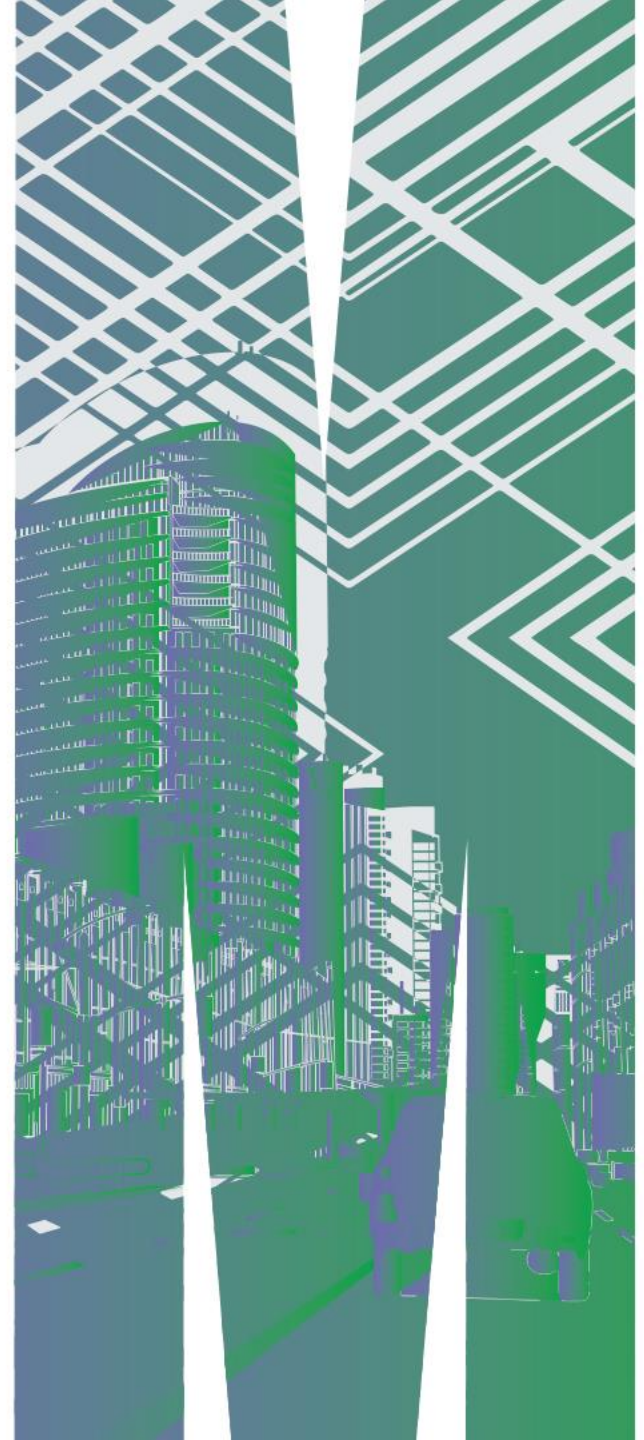
**Thank You**



**NSU-MONASH UNIVERSITY  
JOINT SEMINAR ON  
INFRASTRUCTURE  
DEVELOPMENT &  
INNOVATION**

**Professor Amrik Sohal**  
**Professor Quamrul Alam**  
Monash Infrastructure Institute

4 November 2017



- Infrastructure is crucial to the future of our cities and to our livelihoods.
- Proper infrastructure enables a nation to transform itself.
- McKinsey estimate: world needs spending of \$57 trillion on infrastructure by 2030 to enable the anticipated levels of GDP growth globally.
- About two-thirds of this is needed in developing nations.

- Megaprojects characteristics – understanding of complexity, uncertainty, multiple-stakeholders involvement.
- Use of new materials and technologies.
- Time over-run and cost over-run are common.
- Conflicting objectives and priorities.
- Problems of co-ordination, communication, decision-making and knowledge-sharing.

- Massive investment in infrastructure: power/energy, transportation, housing, education, health
- Public Private Partnerships
- Sustainability Issues
- Lean Construction
- Green Construction
- Construction Supply Chains

- Socio-cultural, Economic and Operational aspects of a nation matter
- Stakeholders impact/influence Projects in different ways – *Power, Legitimacy and Urgency*
- Government stability, transparency
- Synchronisation of long-term and short-policy objectives
- Creation of Human resource capability to support the above

- We can do it better – deliver greater benefits
  - *on time*
  - *on budget*
- Capacity building
- Knowledge-sharing
- Collaboration

Deliver greater impact for society from Monash University's extensive resources in infrastructure research and education

- Population growth
- Ageing infrastructure
- Resource constraints
- Technology advances

Research and innovation is needed for:

- Creation of new infrastructure that is resilient, cost effective and aligned to community needs
- Greater productivity from existing infrastructure







- Innovative solutions to infrastructure problems
- Access to research expertise and international knowledge networks
- Access to human capital in infrastructure
- New technologies and processes
- Evidence based policies for infrastructure plans

# About Monash Infrastructure

MONASH  
INFRASTRUCTURE



- A front door for industry and government to engage with Monash University's infrastructure researchers
- Coordinates interdisciplinary research teams across engineering, IT, design, humanities, and business
- Solves infrastructure challenges, supports government policy, and gives companies an competitive edge
- Provides access to Monash's extensive international knowledge networks

-  Transport
-  Water
-  Structures
-  Information and communications
-  Planning and management

# 11 new programs, \$29M

## **Water**

- ARC Research Hub for Energy-efficient Separation
- Green water technologies for Chinese cities
- Australia-Indonesia Centre – Urban Water Cluster
- CRC-P for graphene based wastewater filtration
- Stormwater management in China
- 4x water quality research projects

## **Transport**

- Rail Manufacturing CRC PhD scholarships

## **Structures**

- ARC Research Hub for nanoscience-based construction materials manufacturing

## **Water**

- Smart linings for water pipes

## **Transport**

- Optimising rail-road crossing solutions
- Train disability access device
- Hydrogen bus feasibility
- Intelligent Transport Systems industry PhD program

## **Information & communications**

- IoT platform for smart cities
- Machine learning for customer digital meter data

## **Structures**

- ARC Research Hub for pavement innovation

# 2017 seed projects

- 14 new \$50K interdisciplinary seed projects
- Aims - grow into bigger projects, build internal capability
- Examples: smart parks index, Monash campus IoT platform for environmental monitoring, re-design of an advanced electric bus, visualising future resilient cities, nano-engineered hospital infrastructure



# 2017 seed projects

## Early outcomes:

- Smart Cities grant application
- Two possible inventions
- Huawei grant



# Future priority areas

- Intelligent Transport Systems
- Travel demand management
- Rail industry centre of excellence
- Large scale infrastructure research program – Centre of Excellence or Cooperative Research Centre



# Contact us

MONASH  
INFRASTRUCTURE



[www.monash.edu/infrastructure](http://www.monash.edu/infrastructure)  
[infrastructure@monash.edu](mailto:infrastructure@monash.edu)

- What are the major challenges facing Bangladesh in developing infrastructure?
- What should the priority areas for collaborative research?
- What types of partnerships can be developed involving universities, government and private sector?
- What future events (conferences, seminars) would be attractive for you to attend?



# NSU-MONASH UNIVERSITY

## JOINT SEMINAR ON INFRASTRUCTURE DEVELOPMENT & INNOVATION

NOVEMBER 4, 2017

Rapporteur Report, Prepared By Dr. Md. Shoaib Chowdhury, Assoc. Prof. DCEE, NSU

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MONASH University

## 1 INTRODUCTION

A seminar on “Infrastructure Development and Innovation” was held at the Syndicate Hall of NSU on Saturday, November 4, 2017. This half-day event was jointly organized by the School of Engineering and Physical Sciences (SEPS) of North South University (NSU) and Monash Infrastructure Institute (MII) of Monash University, Australia. The main objective of the event was to invite the infrastructure development experts and decision makers from all relevant government agencies, consulting firms/industries and academia/research community in a forum to address the issues, challenges and opportunities that Bangladesh faces in the development of sustainable infrastructure. The seminar also aimed at preparing the groundwork for establishing an infrastructure institute at NSU in collaboration with the Monash Infrastructure Institute. A total of 41 guests attended the seminar representing officials from Prime Minister’s Office, Roads and Highways Department (RHD), Local Government Engineering Department (LGED), Dhaka North City Corporation (DNCC), Bangladesh Army, Department of Telecommunication, Snow Mountain Engineering Corporation, MAX group, Grameen-Phone, and Metro Net Bangladesh. The seminar arranged an opening session in which the inaugural speech and several keynote presentations were scheduled and an interactive roundtable discussion session in which participants shared their experiences, views, observations, opinions, inquiries etc on infrastructure development and innovation. This report covers both the opening and roundtable discussion sessions.

## 2 OPENING SESSION

The host Ms. Ismat Hossain, Senior Lecturer of Architecture, started the event at 10:15 AM. The guests and other participants took their seats and introduced themselves.

Professor Atiqul Islam, the honourable Vice Chancellor (VC) of NSU, was pleased to deliver the welcome speech and inaugurate the seminar. VC thanked all the guests for their participations in the event and shared the view that the university will not only create and disburse knowledge but also transform the ideas through engagements and collaborations with the national government and city administrators, industrial leaders and experts, and others. VC also mentioned that NSU has already established a vibrant internship

program, and university staffs and students are in constant interactions with the government, industry and professional bodies. VC stressed that adequate investment is needed in the infrastructure (i.e., roads, waterways, power and energy, telecom, ITC etc) sector for a sustainable GDP growth of 8% or higher. VC also suggested that an international collaboration is needed to overcome the challenges of infrastructure development. VC concluded his speech by stating that NSU is aiming to organize a much larger event next year (March-April) to strengthen our collaborations further.

Dr. Md Nazmul Islam (Chair, DCEE, NSU) delivered a presentation on “Transportation and Environment: Issues, Opportunities and Challenges”. He began his presentation by addressing the transportation problems of Dhaka city. As reported in the Strategic Transport Plan for Dhaka, some of the key transportation issues include traffic management, consolidation of bus services, integration of multimodal transportation systems (MRT, BRT, and other public transportation systems), transportation safety, and pedestrian facilities. He also addressed some of the issues and challenges associated with mega projects. The issues and challenges for the “Greater Dhaka Sustainable Urban Transport Project (GDSUTP-BRT: Gazipur-Airport)” were: conceptual design of BRT-Airport-Terminal under the PPP scheme, identification and relocation of utilities, project implementation plan including traffic management during construction, implementation of land acquisition and resettlement plan along the entire BRT route etc. The biggest challenge for the “South Asia Sub regional Economic Cooperation (SASEC) Road Connectivity” Project was to resolve the land acquisition and resettlement problems. The SASEC project has been funded by ADB and executed by RHD and there is a policy gap/mismatch between the Government’s 1982 ordinance and ADB’s safeguard policy on land acquisition and resettlements. The issues and challenges for the Dhaka-Chittagong Expressway Public-Private Partnership Project were to: assess route alignments for different alternatives, detailed design for the preferred alternative, and finalize the safeguard documents. The biggest challenge for the Padma Multipurpose Bridge Project (PMBP) -- the largest project ever undertaken by the Bangladesh Bridge Authority – was to resolve the technical issues (i.e., soil exploration and pile design). Other issues with the project were land acquisition, resettlements and environment impacts. He concluded his presentation by addressing some of the common transportation issues including bridge clearance along east-west roads and railroads, road maintenance, mixed traffic, traffic enforcement, big event road management and road safety. He suggested that an integrated effort will be needed to improve road safety.

Dr. Mohammad Rezaul Bari (Chair, DECE, NSU) delivered a presentation on “Energy, Power, Telecommunication and ICT”. He mentioned that the country’s current power generation capacity is 13,621 MW and out of which 55% is generated by the public companies (government owned) and other 45% is generated by the private companies. In order to maintain a GDP growth of 7%, we need to maintain the electricity generation growth of 10%. Currently, gas (64 % share) and oil (28%) are the two major energy sources for the generation of power. Due to a rapid depletion of gas and to reduce the dependency on oil, the government has a plan to diversify the energy sources. According to the government plan, by 2030, the energy sources for the generation of power will be 38% coal, 19% nuclear and 6% renewable. In order to achieve this goal, the Government of Bangladesh has a plan to commission the Roopur Nuclear power plant by 2024. He also indicated that there is a serious weakness in the estimation of demand for electricity and academia has an opportunity to work on this area.

Regarding the Telecommunication/ICT Infrastructure, Bangladesh Submarine Cable Company Limited provides a long-haul communication between Bangladesh and rest of the world. Bangladesh Telecommunications Company Limited has a nationwide optical fibre network with a capacity of 1.5 million land lines and the mobile phone service providers have approximately 140 million subscribers across the 64 districts. Although the mobile phone service providers have very good service coverage, however, the challenge remains for Bangladesh in providing a higher bandwidth and faster service (i.e., 4G). The vision 2021: Digital Bangladesh is a motivating force in the rapid development of ICT sector in Bangladesh. Currently, there are some 7.8-million internet subscribers of which 65-million or so is on mobile phone. The same challenge remains here to ensure a better and faster service. Referring to the newly created entity called “Cyber threat detection and response project” under the Department of Telecommunications, he indicated that more institutional efforts will be needed to ensure the security of Telecommunication/ICT infrastructure. Given the rapid growth of internet traffic with enormous amount of data being exchanged among millions of devices/people, technologies such as artificial intelligence and machine learning could be a help for the optimization of data routing.

Professor Amrik Sohal (Monash Infrastructure, Monash University) recalled the discussion of collaboration in the area of infrastructure development with Professor Atiqul Islam, the honourable Vice Chancellor of NSU, in Melbourne last year as the Vice Chancellor visited Monash University with a group of delegations. He presented a statistics that the world needs to spend 57 trillion dollars on infrastructure by 2030 for the

anticipated levels of GDP growth and about two-thirds of it is needed in developing countries. He then suggested that we must look at very long term view of the project and align short term objectives with long term objectives to avoid wasteful duplication of effort. He further added that there are many uncertainties involved with the complex and mega projects, and we need to identify and address them all for the successful implementation of a project. He indicated that 9 out of 10 projects go over the budget and poor execution of projects is often responsible for cost overrun and/or time over run.

Professor Sohal mentioned that Monash Infrastructure Institute (MII) was established three years ago with the mission to deliver greater benefits for the society and its primary research focus is to make the infrastructure more resilient, cost effective and more aligned with the needs of the community. MII research team is multidisciplinary and includes Faculty of Engineering, Faculty of IT, Faculty of Arts, and Faculty of Business and Economics. Currently, MII has five theme areas: Transportation, Water, Structure/Bridges, Information and Communication, and Planning and Management. MII has planned to set up a Rail Industry Centre of Excellence and also has a future research priority in the area of Intelligent Transportation Systems. He recommended establishing an infrastructure institute here at NSU that will be similar to MII and will provide innovative infrastructure solutions through interdisciplinary research. He further added that MII will be happy to collaborate with the NSU Infrastructure Institute and form partnerships with all relevant stakeholders.

In his closing remarks, Dr. M. Rokonuzzaman (the then Dean, SEPS, NSU) put forward some thoughts for future debate. He raised a question whether we should repeat the last 50 years infrastructure development experience of developed countries or our societal need will transform our economy and for that we need to develop a different kind of infrastructure. He indicated that 140 countries will be energy self sufficient by utilizing batteries and renewable energy in the near future, then should we build power plants based on coal, gas, oil or nuclear? He questioned further whether the funding and financing mechanisms for the infrastructure development projects will continue to remain the same or there should be an innovation in the business model. He wondered whether the technological innovation in construction industry would create large scale unemployment and if so, how we will address this issue. Do we have a plan for the local capacity building or should we continue to rely on high level overseas consulting services? He concluded that NSU -- being a comprehensive university with many different disciplines including Business and Economics, Engineering, Social Sciences, and Public Health -- has the capacity to support a

multidisciplinary collaborative research program that would help Bangladesh to get the best value for the money that would be invested in the infrastructure sector.

### **3 ROUNDTABLE DISCUSSION SESSION**

The roundtable discussion session started at 12:00 PM and lasted for approximately 2 hours. The experiences, views, observations, opinions, inquiries etc shared by the participants are summarized below.

Mr. Md Mahbubul Alam (DPDC) expressed a concern that the infrastructure must meet the needs of the people and we must find a better way to involve citizens in the planning process.

Mr. Iftekhar Ahmed (LGED) shared his opinion on the development of rural roads from a historical perspective. Rural roads had been evolved over the many years without proper transportation and land use planning. He added, we need to introduce integrated land use and transportation planning. Furthermore, we need special planning based on local potential and opportunities. Regarding the issues with roadway alignment and geometry, an engineering initiative alone without proper policies and planning will not provide a complete solution. In terms of climate change, we need paradigm shifts in the planning process, design standards and specifications.

Professor Kamrul Alam (Monash University) shared an observation how peoples are involved in projects in Australia. Organizations/ministries in charge of mega projects invite public including community groups, business groups, councillors, district administrators and so on to provide their opinions/ views on potential projects. The technical, managerial, financial and other aspects of the project are consulted with the public. The projects are also kept in the public domain to get the stakeholders feedbacks. He gave another example of a freeway project where an innovative approach was used to convince people and stakeholders about the project benefits. The end result was that the project completed six months ahead of the scheduled completion date saving some money. He also stressed that public consultation is very important to build sustainable (implementable, usable) mega projects. Regarding the PPP projects, his indicated that private sector should come up with the financial commitment and also share the project risks. He also informed that the Government of Bangladesh has planned to set up a power sector management institute and suggested that NSU and other universities should look for opportunities to participate and add values to such a government initiative.

Mr. Mushtaque Habib (Project Director, NSU) shared his view on the innovation and sustainability issues. He suggested that the innovation should be encouraged at the policy making and planning stages. Innovation is also required at the program level when multiple projects are planned for. Financial Innovation is needed not only to construct a project but also to maintain it. The sponsors also need to recognize that there is a benefit with the innovation.

Dr. Md. Abdullah Al Mamun (RHD) indicated that the implementation of western ideas without proper calibration and validation is the biggest problem in our country. We often implement project without proper planning and economic assessment. At a project level, consultant/contractor follows the contractual requirements and opportunity for innovation is very limited. Regarding the higher cost of road construction in Bangladesh, he informed that most of our roads are on embankments and our soils are very poor often requiring expensive treatments. Often construction materials come from overseas. He further added that we are also facing huge challenge to ensure the serviceability of infrastructure throughout its design life. In majority of the cases, service life does not reach the design life. Our roads are also not planned to support the anticipated GDP growth.

Mr. Syed Almas Kabir (Metro Net Bangladesh Limited) suggested that government agencies should provide build-in underground ducts/conduits along roads, highways and bridges for the telecommunication purpose. His point was that the private sector telecommunication service providers can able to use these ducts without wasteful duplication of infrastructure.

Mr. Najmus Sayadat (PPP Authority) indicated that the value for money analysis is required for the cost effective and innovative PPP structuring purpose. However, often the value for money analysis is not performed in the PPP projects. He suggested that the executing agencies should develop their own in-house capabilities to conduct the value for money analysis instead of relying on the consultants.

Mr. Syed Quadrat Ullah (DNCC) shared some of the critical urban infrastructure issues and challenges with reference to Dhaka city including drainage and water logging, congestion, urban space, intersection signal operations, and consolidation of bus transportation systems. He also raised a concern that the unplanned housing projects along roads and highways that capture valuable agricultural lands could eventually create a food security problem.



Major General Abu Sayeed Md Masud (Chief Coordinator, PMBP) shared his own personal experience working on a number of infrastructure projects where innovation and sustainability were considered. In the hilly areas of Chittagong, he worked on a road project to provide an innovative storm drainage solution using geo-textile materials that successfully prevented erosion/landslide. He informed that the airport in Cox's Bazar used modified bitumen that has a potential to increase the longevity of the airport pavement and he has also a plan to use it in Hatir-jheel project. In Hatir-jheel East-West Connectivity Project, stakeholders including all relevant government departments, consultants, architects, and engineers worked (collaborated) together to find an integrated solution to the problem. The project accommodated all utility provisions including the provision for underground duct. On a project in Dhaka city he replaced the low pressure sodium lights with the high pressure sodium lights in the city streets which brought twofold benefits -- it cut cost by saving energy and also provided a better quality light. He also informed that the ministry of energy has been planning to relocate their electric lines including substations from above ground to underground in Dhaka city. Regarding the Padma Bridge project, he mentioned that it was a challenging task to finalize the bridge alignment given that the Padma river has a long history of changing its course. Pile design and pile placements were also challenging tasks as it was difficult to find all the soil parameters that were needed for pile design.

Mr. Santosh Kumar Roy (RHD) shared a weakness of the planning process in Bangladesh by giving a project specific example. Soon after the Planning Commission approved RHD's Dhaka-Chittagong Expressway Project, the Bangladesh Bridge Authority initiated to conduct another engineering study on the same corridor undermining/ignoring the already approved project. He also mentioned that there has been a serious coordination problem in cutting and digging of roads in Dhaka city.

Professor Amrik Sohal (Monash Infrastructure, Monash University) summarized the roundtable discussion. He found the discussion very interesting and suggested that the dialog should continue. He further stressed that more integrated approach is needed in the planning, design, and construction processes. In other words all stakeholders, particularly the users, need to be involved. He indicated that the information and communication industries should work hand in hand with the physical infrastructure sector. He stressed that an interdisciplinary approach will be needed to solve many of the issues and challenges we have identified and discussed here. He also reminded that universities, researchers, and others need right incentives to be engaged/ involved. He expected that the outcome of the seminar would result in establishing an

infrastructure innovation institute at NSU with the supports from public and private sector infrastructure developers. Finally he reiterated that Monash University and Monash Infrastructure will be happy to engage further/collaborate with NSU.

Dr. M. Rokonzaman (The then Dean, SEPS, NSU) concluded the event with a comment that the innovation should take place at the planning level. He expected that NSU in partnership with Monash university will organize a bigger national event in the coming days to scope out that institute and form the partnership with other stakeholders.

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**NSU-MONASH UNIVERSITY**  
INFRASTRUCTURE DEVELOPMENT & INNOVATION



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