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ENERGY CONNECTIVITY AND COOPERATION IN THE SAARC REGION: IN BANGLADESH PERSPECTIVES

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Organised by:
Embassy of Japan in Pakistan, The Ministry of Foreign Affairs (MOFA) of Japan,
Co-hosted by National University of Science & Technology (NUST), Islamabad, Pakistan
and In Cooperation with SAARC Energy Centre (SEC).

WELCOME

TO

ENERGY CONNECTIVITY AND COOPERATION IN THE SAARC REGION: IN BANGLADESH PERSPECTIVES

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Energy and economic development are **interlinked** and the **quality** of life achieved in a community or a country can be assessed from the **amount of (per capita) energy it consumes.** This approach is more **appropriate for societies** where the **production** and **distribution** of **energy are secured** and widely spread.

Energy Connectivity and Cooperation in the SAARC Region deals with the **integration** of the (possible excess surplus) **generating power stations**, **development of transmission**, **distribution** and **load management** up to **consumers' points**. It also **needs** to **upgradation** of **power generation/distribution** and **long distance transmission** grids **in order to reduce** the **losses**, as well as, **open up new power markets/trades /cooperations** for all **possible** power **productions**.

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Though the ***Energy Connectivity and Cooperation in the SAARC region*** is a very **complex** system, but some of the **benefits** of such a modernized integrated **energy system** network are :

(i) ability **to reduce load shedding/blackout** at the **consumer side** during **peak** hours, namely demand side management;

(ii) to **enable grid** connection of **distributed generation** power with all possible **alternative** power **sources**;

(iii) to incorporate grid **energy storage** for distributed generation **load balancing**;

(iv) to **eliminate failures**, such as **widespread power grid cascading failures**, and

(v) to **increase efficiency** and **reliability** of the **integrated power** systems **among SAARC member countries** .

As per election manifesto of the Present Government of Bangladesh, electricity generation would be increased from **4000 MW to 7000 MW** by the year 2013, **8000 MW by 2015** and **20,000 MW by 2021**. In line with the election manifesto, present Government has **adopted short**, **medium** and **long-term expansion plan**. The government has planned to generate **additional about 13,000 MW** electricity **from 2013 to 2017 under short** and **medium term plan**.

1. **At present** only **68% of the people** have **direct access** to **electricity. Per capita generation** is **348 kWh,**
2. Every year the **demand is increasing** at a **rate of 12%.**
3. The government's vision: **To build 'Digital Bangladesh' Electricity for all by 2021.**

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In the paper I have discussed on

(i) Bangladesh Power System: Present and Future Projection;
(ii) Bangladesh Power System prospective;
(iii) Challenges in Bangladesh Power Sector Development;
(iv) Present Generation Cost Per Unit & Energy Rates;
(v) Probable Power Generation: Primary Fuel Sources by 2030;
(vi) Energy Connectivity and Cooperation in the SAARC Region;
(vii) Challenges of the Energy Connectivity and Cooperation in the SAARC Region;
(viii) Regional Power Exchange (Export/Import) : Possibilities, and
(ix) Energy System Stability Analysis, A Case Study.

Bangladesh Power System : Present and Future Projection

Background

BPDB has started its journey with the generation capacity of **200 MW on May 1, 1972**, presently which has reached to **10,817** MW(January 2015). BPDB has been **unbundled** into **transmission** and a part of distribution. The **transmission** function has been vested upon Power Grid Company of Bangladesh **(PGCB)** while the **distribution** has been segregated into a number of entities, such as, Dhaka Power Distribution Company Limited **(DPDC),** Dhaka Electric Supply Company Limited **(DESCO),** West Zone Power Distribution Company Limited **(WZPDC),** Palli Biddyut Samiti **(PBS)** and BPDB itself.

Bangladesh's Ministry of Power, Energy and Mineral Resources (MPEMR) has overall responsibility for the country's energy sector, as shown in Figure 01.

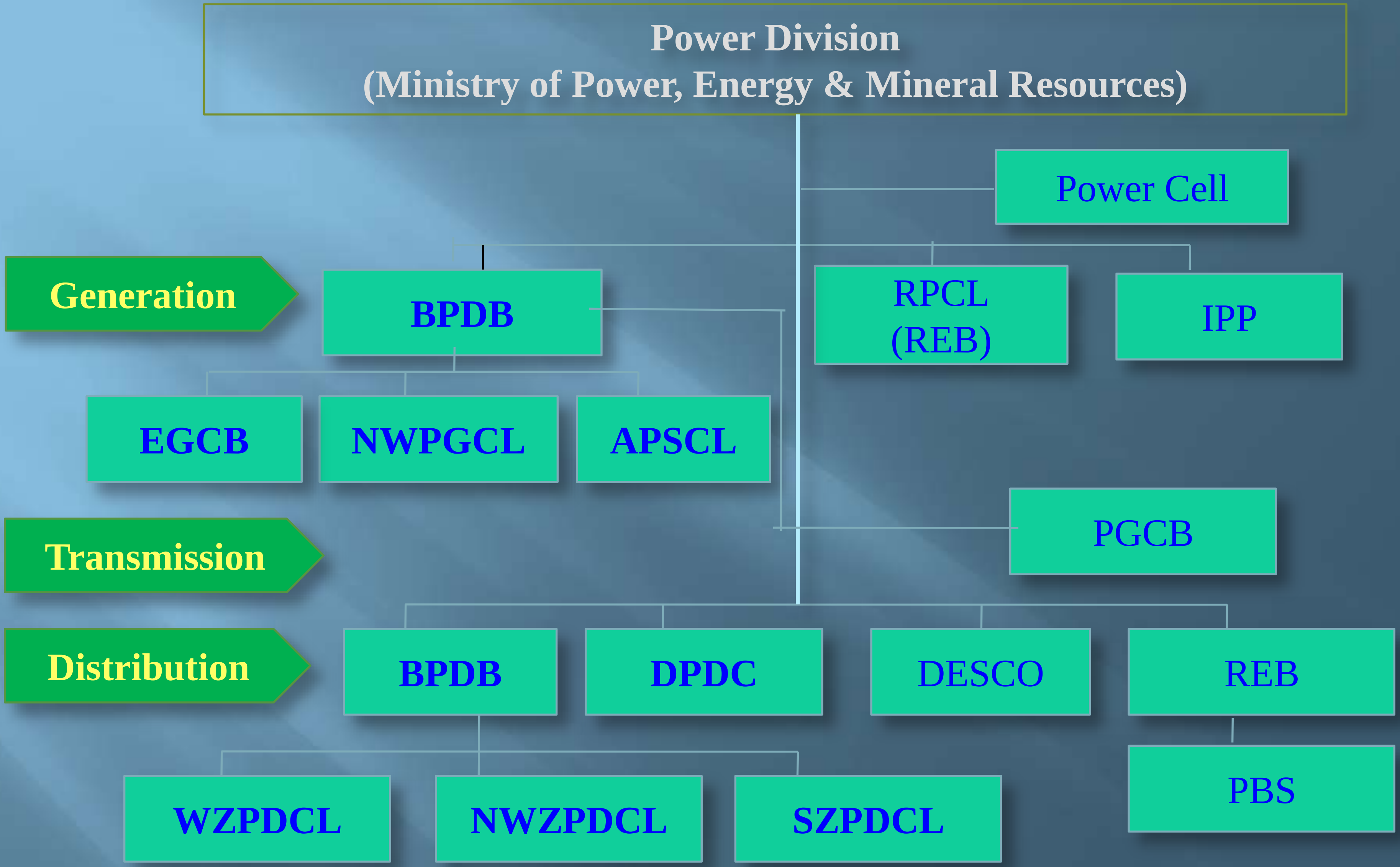

Figure 01 : Current Structure of Bangladesh Power Sector

Power Sector at a Glance

Installed Generation Capacity Public sector 5880 (54%) + Private sector (46%)	10,817 MW (as on January, 2015)
Demand Maximum Served	7418 MW (on 18-07-2014)
Transmission Lines (400kV)	165 Ckt. kM
Transmission Lines (230 kV)	3066 kM
Transmission Lines (132 kV)	6305 kM
Grid Sub-station Capacity (400/230/132 kV)	500 MVA
Grid Sub-station Capacity (230/132 kV)	9325 MVA
Grid Sub-station Capacity (132/33kV)	12893 MVA (on 18-07-2014)
Distribution Line(33 kV &below)(only BPDB)	38,934 kM
Number of Consumers	15.40 Million
Access to Electricity(including renewable)	68%
Per Capita Power Generation(including private)	348 kWh

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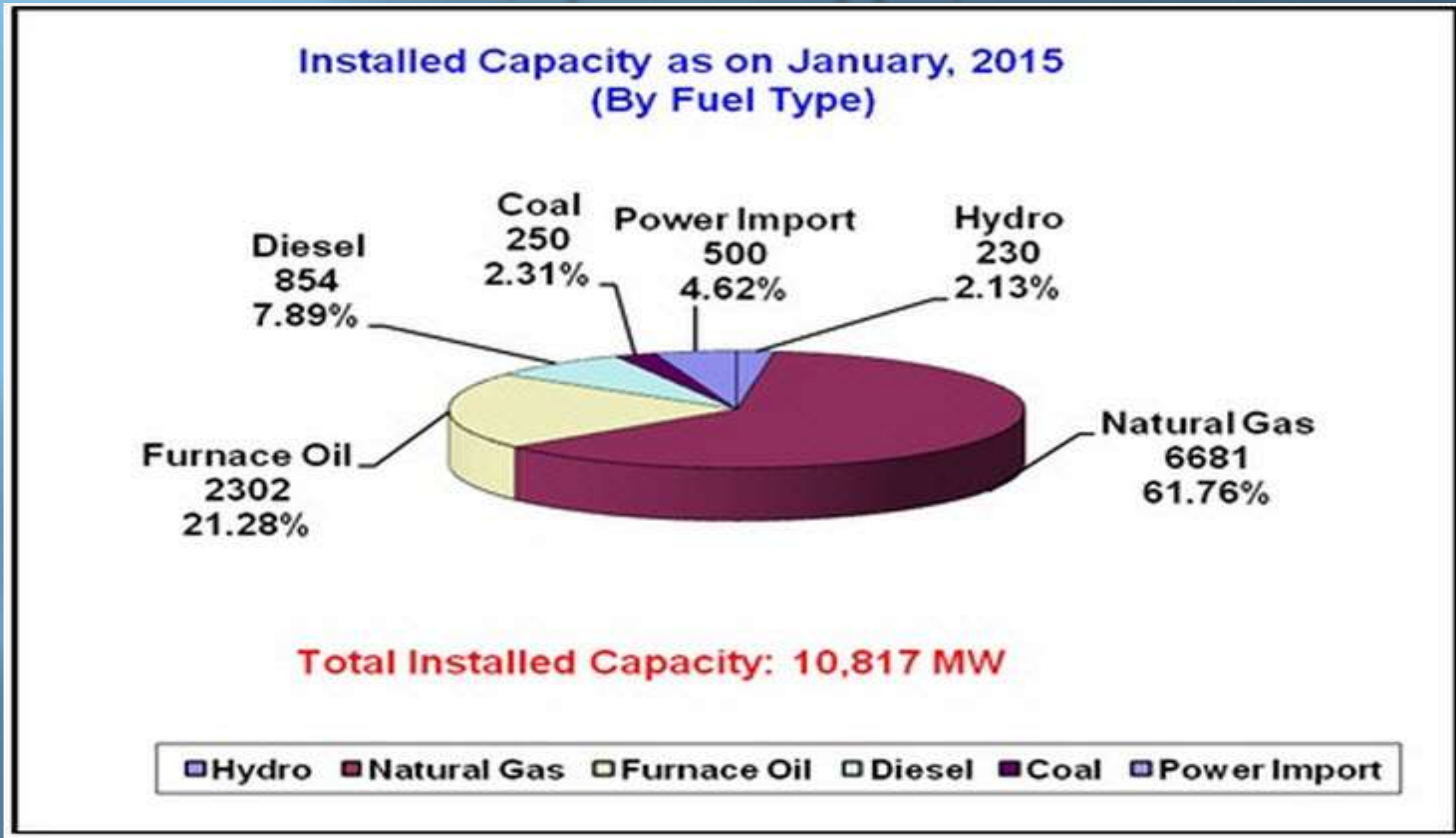
Installed Capacity as on January, 2015 (By Fuel Type)



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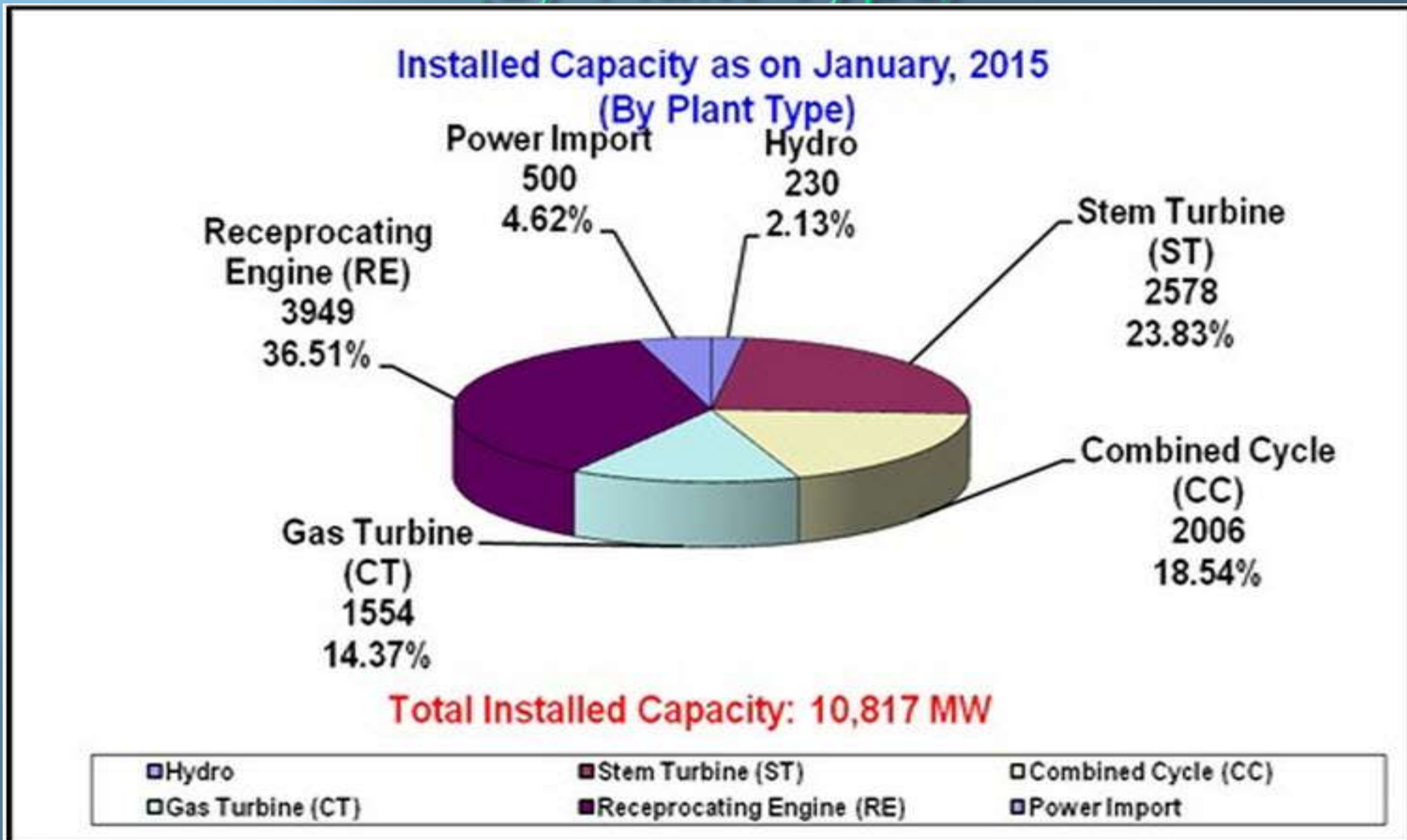
Installed Capacity as on January, 2015 (By Plant Type)



Bangladesh Power System Perspectives

Present Infrastructure

Communication:

- **PGCB** owns an **optical fiber backbone** network covering **BPDB** and major **IPP owned** power stations and all **230kV/132 kV/33 kV** and **132kV/33 KV grid** substations.
- Last mile fiber connectivity is offered by a number of BTRC approved **private link providers**.
- Mobile **phone operators** have **wireless connectivity** **all over the country.**

Metering:

- Meters with **AM/RM** (automatic/remote metering) facilities have **already been installed** for a significant number of **bulk consumers** at **11 kV and 400 volts level**.
- **Prepayment meters** are **installed** at **selected areas** for **single phase** consumers.

Distributed generation:

- **Very small sized** (<100 W) PV **panels** are used in **stand-alone** mode at the **off-grid** sites.
- PV systems with **roof top kW** sized PV modules in **urban sites** near the grid are being **installed.**
- Directed the new urban consumers to **install 3%** of the connected load demand by their own PV panels to get **grid utility** supply connection. Very **recently** Govt. has **suspended this decision** for time being.
- **Captive generation** plants with a total of **about 800 MW** are operated by **some industries near the grid**.

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Long Term Generation Plan (2010-2030)

* Government has prepared a **<u>Power System Master Plan 2010</u>** (PSMP 2010). * According to the PSMP-2010, the maximum demand in 2015, 2021 and 2030 will be **<u>10,000, 19,000 and 34,000 MW</u>** respectively. * To meet the demand with reliability, installed capacity needs to be increased to **<u>24,000 MW and 39,000 MW</u>** by the year **<u>2021 & 2030</u>** respectively. * Generation capacity from **<u>different primary fuel in the year 2030</u>** would be:

• Domestic and imported coal based ST:	19,650 MW
• Nuclear power:	4,000 MW
• Gas and LNG:	8,850 MW
• Liquid fuel, Hydro, Renewable:	2,700 MW
• **<u>Regional Grid:</u>** <u>(Cross Boarder Trade with Neighboring countries)</u>	3,500 MW
<u>Total :</u>	**<u>38,700 MW</u>**

Way Forward to Provide Electricity to All by 2021

Primary Fuel Supply

- Enhanced Gas Exploration, Production
- Domestic Coal development
- Coal and LNG Import and deep sea port for coal handling
- Safe Nuke for Base Load

Project Financing

- Ensuring financing for Public and Private sector projects
- Availability of foreign currency

Establishment of Regional Power Market

- Infrastructure for regional grid inter-connection
- Establishment of regional power market for power trade

Human Resources Development

- Development of skilled manpower: adopt and operate new technology
- Introduction of corporate culture and professionalism in sector entities

Primary Fuel Supply Options

- Gas: Only 16 tcf proven reserve; No significant gas discovery in recent years; Depleting gas reserve restricts gas based generation expansion
- Hydro: Present capacity 230 MW and average energy generation- 800 GWh; No further significant potential
- Coal: Total 3.2 billion ton reserve in 5 mines; Near term option; Indigenous or Imported; Base Load
- Oil: Volatile market; High price; For peaking duty only
- LNG: Necessary to ensure secure and reliable gas supply
- Nuclear: Safe technology; No pollution; Future Base Load option
- Renewable: Present capacity only 80 MW; still high cost

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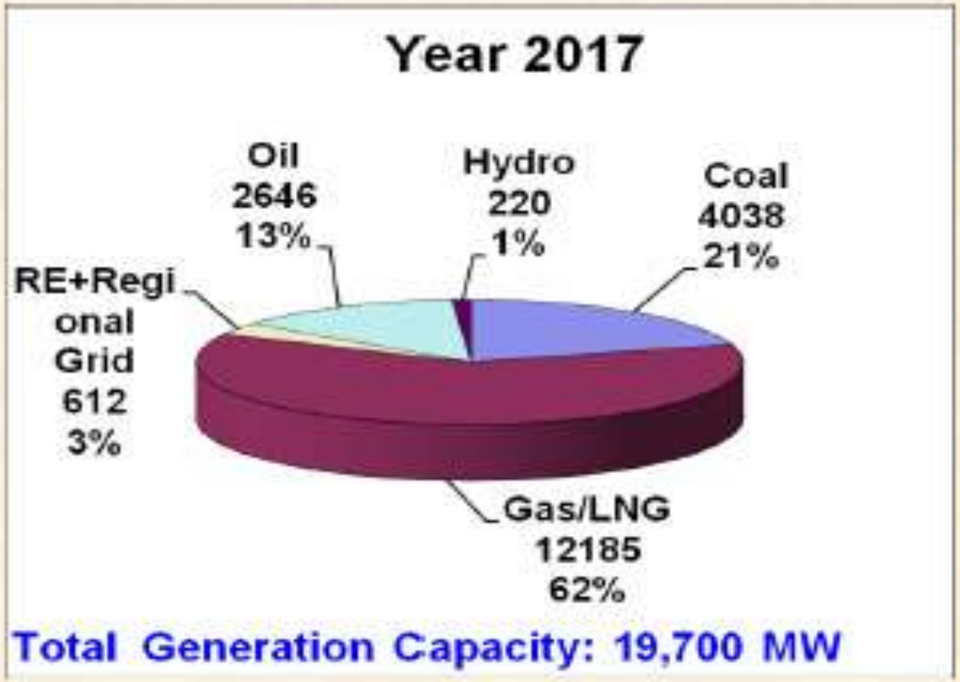
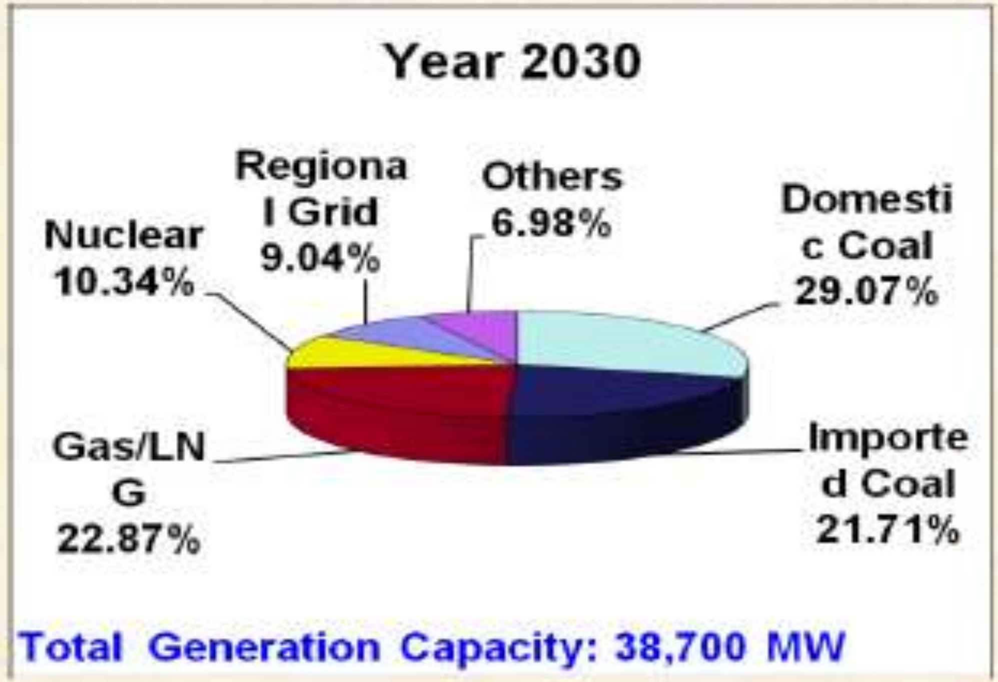
Probable Generation Capacity in 2017 & 2030: Fuel Type





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Challenges in Power Sector Development

- Increased Cost of Production due to increased oil consumption and high price of imported oil
- Gas supply constraints
- Policy barrier for conducive investment environment (Tax, Vat, Governing Law etc)
- Delay in base load project implementation (coal and gas) and failure to achieve financial close of some large power projects
- Old aged plants and lack of it's proper maintenance
- Tariff adjustment and budgetary support

Tariff Adjustment

- Average Cost in FY 2009 : 5.35 Tk/kWh
- Average Cost in FY 2012 : 6.07 Tk/kWh
- Average Fuel Cost from Oil Base Plants:

1) HSD – 15/16 Tk/kWh;

2) FO – 13/ 14 Tk/kWh

- Bulk Tariff Increased
  - Av Bulk Tariff in 2009: 2.37 Tk/ kWh
  - Av Bulk Tariff in 2012(since Sep): 4.70 Tk/ kWh
  - Average Cost in FY 2015 : 6.20 Tk/kWh

Cost of Supply at Different Level, Tariff & Gap

	Voltage Level	Cost of Supply		
		2010 – 2011	2011 – 2012	2012 – 2013
	Cost of Supply for Bulk (Utility)			
A	Generation (Net Gen)	4.057	5.16	5.85
B	Average (Bulk) Supply Cost	4.20	5.35	6.07
C	Bulk Tariff	2.61	4.02	4.70
D	Difference	1.59	1.33	1.37

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Probable Power Generation: Primary Fuel Sources by 2030

Sl. No.	Description	Capacity (MW)	Probable Location (s)
1	Domestic Coal	11,250	North West Region at Mine Mouth
2	Imported Coal	8,400	Chittagong and Khulna
3	Domestic Gas/LNG	8,850	Near Load Centers
4	Nuclear	4,000	Ruppur
5	Regional Grid	3,500	Bahrampur - Bheramara, Agartola - Comilla, Silchar - Fenchuganj, Purnia-Bogra, Myanmar - Chittagong
6	Others (Oil, Hydro and Renewable)	2,700	Near Load Centers
	Total	38,700	

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Road Map for Coal Power Development (as of 2030)

Domestic Coal

K-D-P 6x1000 MW USC
K-D-P 8x 600 MW USC

Import Coal

Meghnaghat 2x600MW

Zajira/New Meg 3x600MW

Chittagong 3x660MW

Moheshkhali/Matarbari 4x600MW

Khulna 2x660MW (Dom Future)

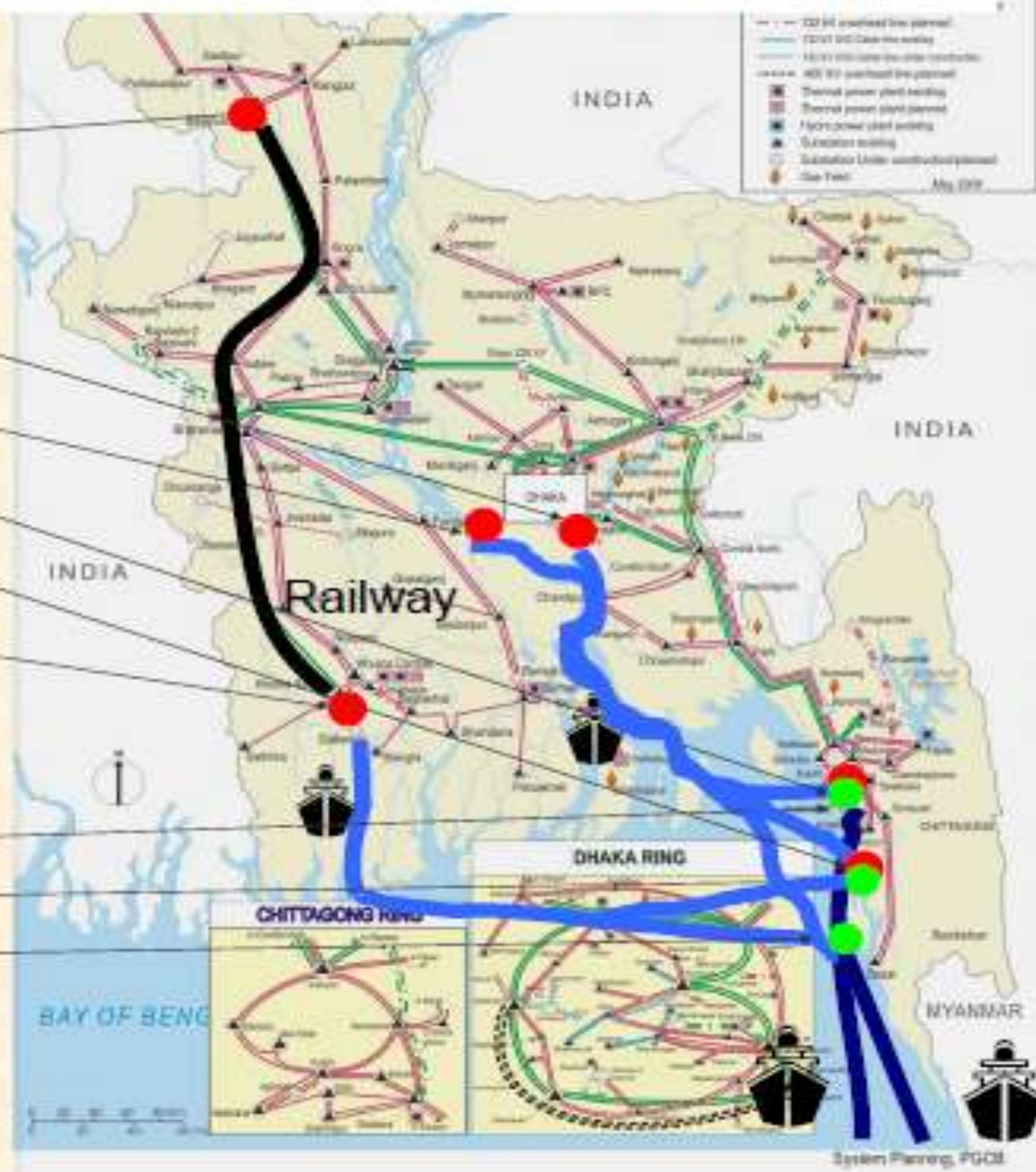
Total 19,200MW (New)

Coal Center

Chittagong

Matarbari

Sonadia Island



: Potential Coal PS
: Potential Coal Center
: Ocean-going vessel
: Transship

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Nuclear Power Plant : Inter Governmental Agreement (IGA)

- Supply, installation, commissioning and operation of the RNPP with 2 units of 1000 MWe VVER (PWR) reactors
- Cooperate to build up infrastructures including Regulatory infrastructures
- Financing
- Supply of fuel for the whole operational life of the reactors
- Take-back of Spent Fuel
- Development of HRD both for operation and regulation of RNPP

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ENERGY CONNECTIVITY AND COOPERATION IN SAARC REGION

For Energy Connectivity analysis, the following information are necessary:

- **Generation capacity** at different Power Stations of each member country.
- **Type** of Power **Generation/Fuel** use to generate power
- **Per-unit cost** of power generation
- **Per-unit rate** of electrical energy
- Possible amount of power/energy **import/export** among member countries: At Present Bangladesh has been importing 500MW from **Bahrampur** (India) to **Bheramara** (BD), by 400 kV Line.
- **Possibility of joint venture** Power Generation. e.g. Nepal-India Electricity Transmission and Trade Project.

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- Construction of **transmission line** among **member countries**. e.g. Grid Interconnection between Bangladesh (**Bheramara**) and India (**Bhaharampur**) Project (**400 kv DC Transmission line, 165 km** transmission line + **2 substations**) to **import 500 MW**.

- Development of **distribution** system.

- **Fixation of per unit of cost** of power.

- Determine the **legal matters**, relate to generate, to transmit and to distribute power **among SAARC member countries**

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Major Sources of Electrical Energy are:

(i)Fossil fuel (coal, oil and gas), (ii)Nuclear fuel, (iii)Hydro power

Unconventional (Renewable) Sources of Energy

(i)Wind, (ii)Solar, (iii)Waves, (iv)Tides, (v)Biomass, (vi)Ocean current, (vii)Geothermal, (viii)Minihydro etc.

Basic Concept of Cost Analysis

- Capacity cost
- Production cost
- Operating and maintenance cost

Global Cost Analysis

- Service life of a generating unit
- Interest rate
- Depreciation and
- The salvage value of the generating unit

Challenges of the Energy Connectivity in the SAARC Region

- **Enable all power production** and **distribution** systems
- **Development** of **effective communication** system to **millions of parties** in a **single market**.
- **If possible extension** of the system **to SAARC countries** and beyond.
- **Introduction** of **intelligent generation** and **consumption** system.
- **Enabling all consumers** to play an **active role** in the system **operation**.
- **Exploitation** of **renewable energy** sources e.g. Hydro/Minihydro, Biomass, Waves, Solar, Wind etc.
- **Development of efficient connections** for **remote power generation centers.**

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- **Fast** and **reliable load management**.
- **Proper energy distribution** during **peak** and **off-peak** hrs to **improve overall efficiency** of the system.
- **Effective operation** of a **modernized grid community.**
- **Development of efficient electrical appliances** to **cope** with the **modern integrated power system**.

For Bangladesh proper application of an effective and **integrated electrical power** system and participation of **neighboring South Asian countries** can open new doors towards glory.

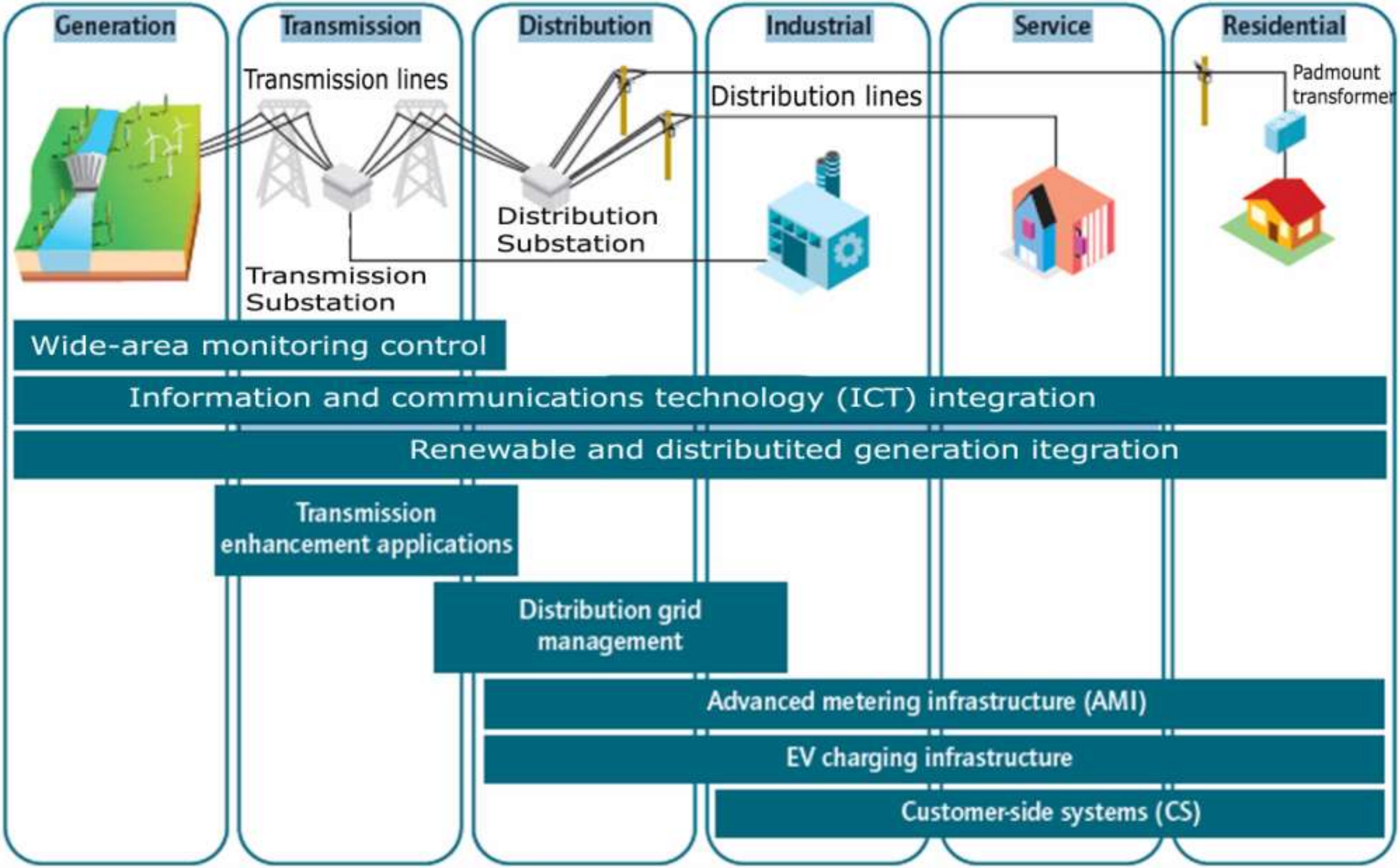

Figure: Integrated Grid Technology

Integrated Grid Technology Areas

- **Wide-area monitoring and control**
  - **Renewable and distributed generation integration**
  - **Distribution grid management**
- **Information and communications technology integration**
  - **Transmission enhancement applications**
  - **Advanced metering infrastructure**

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Goals of the Integrated Power System : Purposes are to :

Best usage of central generation

- **Enhancement of Reliability**
- **Reduce Peak Demand**

Environmental limitations

- **Shift usage to off-peak hours**
- **Respond to Solar, Wind, and other Renewable Resources**

Consumer savings

- **Security of Supply and Distribution**
- **Utilization of Renewable Energy Sources**

Integrated & Grid Technologies

Technology Area	Hardware	Systems and Software
Wide-area **monitoring** and control	**Phasor measurement units** (PMU) and other **sensor equipments**	**SCADA**, wide-area **monitoring** systems , wide-area **adaptive protection**, **control** and **automation** , wide area **situational awareness**
Information and communication technology integration	Communication **equipment, routers**, **relays**, **switches**, **computers**, **internet**	**resource planning software** (ERP), **customer information** system (CIS)
Renewable and **distributed generation** integration	Power conditioning equipment for **bulk power** and **grid** support, communication and **control hardware** for **generation** and **enabling storage technology**	**Energy management** system , **distribution** management system , **SCADA**, **geographic Information** system

Integrated & Grid Technologies (Cont'd)

Technology Area	Hardware	Systems and Software
Transmission enhancement	**Superconductors,** FACTS, HVDC	Network **stability** analysis, **automatic recovery** systems
Distribution grid management	Automated **re-closers**, switches and **capacitors**, **remote controlled distributed generation** and **storage**, **transformer sensors**, wire and cable s**ensors**	**Geographic information** system, **distribution management** system, **outage management** system, **workforce management** system
Advanced metering infrastructure	**Modern meter**, **in-home displays**, **servers**, **relays**	Meter **data management system**
Customer-side systems	**Efficient Electrical appliances**, **routers**, **in-home display**, **building automation** systems, **thermal accumulators**, **smart thermostat**	**Energy dashboards**, **energy management** systems, energy **applications** for s**mart phones** and **tablets**

Regional Power Exchange: Possibilities

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Electricity Tariff (Res & Agri) in Neighboring Countries

Sl	Countries/Area	0-100 unit Residential (Taka/kWh)	Agriculture (Taka/kWh)
1	Bangladesh	3.68	2.51
2	West Bengal WBSEDCL	3.88 (Rural) 3.90 (Urban)	Off Peak: 2.34 Peak: 9.06
3	CESC (Calcutta)	6.00 (Urban)	
4	KESC, Karachi	5.90	Flat:11.00
5	Nepal	6.79 (>50 Unit: 8.00)	
6	Srilanka	3.88 (>90 Unit: 13.25)	

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A CASE STUDY

Performance of the Year 2004 Power System:

- **Stability analysis was made for the 2004 system base case peak demand considering a 3-phase fault at Ishurdi end of the East West Interconnector(EWI) circuits**.

- The fault was considered to be **cleaned in 4 cycles (at t=0.08 seconds on 50 Hz basis) by tripping only the faulty circuit**.

- Stability analysis was repeated considering a fault at the Indian end and only the faulty circuit was considered to be tripped.

- The **swing curves** show that the system will be **unstable if 500 MW** is imported the system is found stable.

- The swing curves system will remain **stable if 450 MW** is **exported** and the number of tie **line circuits is 4**.

Performance of the Year 2015 Power System:

- **Stability analysis was** made for the **2015(Planned)** system base case peak demand considering a 3-phase fault at Ishurdi end of the EWI circuits.
- The **fault was** considered to be **cleaned in 4 cycles (at t=0.08 seconds on 50 Hz** basis) by **tripping only the faulty circuit**.
- The swing curves of selected machines relative to KPT—123 machine.
- System as a **whole is found stable**.
- Considering the **same fault** the stability analysis was repeated for **import or export through** Ishurdi bus considering the **highest level** of power **feasible from load flow point of view** i.e. **500 MW both export or import**.
- **Shows that** the system will be **stable if 500 MW is imported**.
- Similarly, an **export of 500 MW** power through Ishurdi bus is possible without losing stability as evident from the swing curves

❑ <u>Suggestions for Further Research</u>:

❑ A <u>**detailed financial study to compare**</u> the gains from <u>**local generation**</u> with <u>**occasional export**</u> against the <u>**gains**</u> from power <u>**import(considering energy purchase, tariff, wheeling charge**</u> and the <u>**cost of extra transmission loss incurred**</u>**)** is worthy of investigation studies made in the present <u>**investigation can be load growth**</u> as well as <u>**local resource (gas, coal**</u>**)** development <u>**scenarios in Bangladesh up to the year 2030**</u>.

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Conclusion

- **Nepal** has hydro power generation capacity of about 80,000 MW. At present under **Nepal-India Electricity Transmission** and Trade Project only about **2,000 MW** has been producing.
- Similarly, **Bhutan** has hydro power generation capacity of about 60,000 MW and at present under, **Bhutan-India** Project has been producing only about **1,000 MW**. Bangladesh has been **importing 500MW** power from India and has made agreements to **import more 200 MW and 500 MW** from **Asam**, and **West Bengal, India respectively**. Bangladesh has also made **agreements with Nepal** and **Bhutan to import power**.

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Conclusion (CONT.)

- In future under **joint venture** program, **20,000 to 30,000** MW Power may be produced from hydro source of **Nepal** for **Energy Connectivity in the SAARC region** and **neighboring** countries(e.g. Iran, Myanmar).
- **Bangladesh** may have possibility to **import** power from **neighboring country** e.g. Myanmar.
- **Pakistan** has already made an agreement (on 2nd March,2013) to **import gas** from **Iran**.
- Such **bi-lateral** or **multi-lateral agreement** will **benefit** the **SAARC member countries and other neighboring countries.**
- With present data and **information** further studies on **stability analysis** and **financial analysis** for **power import** and **export** must be done for **smooth operation** of the **system**.

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THANK YOU

VERY MUCH FOR YOUR KIND ATTENTION

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Abbreviations:

kWh: Kilowatt hour
PV: Photovoltaic
MW: Megawatt
ADB: Asian Development Bank
BRAC: Bangladesh Rural Advancement Committee
IFRD: Institute of Fuel Research and Development
LGED: Local Government and Engineering Department
SRL: Società a Responsabilità Limitata
CHT: Chittagong Hill Tracts
PJ: Petajoule
BCF: Billion Cubic Feet
FY: Fiscal Year
MT: Metric Tonne
LNG: Liquefied Natural Gas
C&F: Cost and Freight

Abbreviations(Cont'd)

USD: United States Dollar
BPC: Bangladesh Petroleum Corporation
BPDB: Bangladesh Power Development Board
RPCL: Rural Power Company Limited
REB: Rural Electrification Board
EGCB: Electricity Generation Company Of Bangladesh
NWPGCL: Northwest Power Generation Company Limited
APSCL: Ashuganj Power Station Company Limited
PGCB: Power Grid Company of Bangladesh
DPDC: Dhaka Power Distribution Company
DESCO: Dhaka Electric Supply Company
WZPDCL: West Zone Power Distribution Company Limited
NWZPDCL: Northwest Zone Power Distribution Company Limited
SZPDCL: South Zone Power Distribution Company Limited
PBS: Palli Biddyut Samiti
MPEMR: Bangladesh's Ministry of Power, Energy and Mineral Resources

Abbreviations(Cont'd)

RE : Renewable Energy
kV : Kilo Volt
MG : Mega Watt
AM : Automatic Metering
RM : Remote Metering
COS: Change over Switch
ICT : Information and Communication Technology
HVAC : High Voltage Alternating Current
CS : Customer side System
AMI : Advanced Metering Infrastructure
CIS : Customer Information System
PLC : Power Line Carrier
FACTS : Flexible A.C. Transmission System

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Generation Cost Per unit

Annex-1

Sl.No.	Generating Plant under Power Station.	Capacity	Generation Cost Tk/kWh
1	KARNAFULI HYDRO POWER STATION	230.00	1.43
2	WIND BASE POWER STATION, KUTUBDIA		23.95
3	BAGHABARI POWER STATION	171	1.78
4	GHORASHAL POWER STATION	950	1.82
5	CHITTAGONG POWER STATION, RAWZAN	420	3.40
6	SHIKALBAHA POWER STATION	210	3.27
7	KUMERGOAN GT POWER SYLHET	20	1.67
8	SYLHET 150 MG PEAKING POWER PLANT	150	1.48
9	FENCHUGANJ 2x 90 MW CCPP (1&2 unit)	180	1.55
10	SHAHJIBAZAR POWER STATION	117	2.29
11	TONGI POWER STATION	109	8.19
12	SIDDIRGONJ POWER STATION	210	2.86
13	CHADPUR PEAKING POWER PLANT	163	1.65
14	BARAPUKURIA POWER STATION	250	6.22
15	KHULNA POWER STATION	170	29.17
16	BAGHABARI 50 PEAKING POWER PLANT	50	17.51
17	BERA PEAKING POWER PLANT	71	16.96
18	HATHAZARI PEAKING POWER PLANT	100	17.22
19	DOHAZARI PEAKING POWER PLANT	100	16.71
20	FARIDPUR PEAKING POWER PLANT	50	17.88
21	GOPALGONJ PEAKING POWER PLANT	100	17.28
22	DAUDKANDI PEAKING POWER PLANT	50	17.29
23	SHANTAHAR 50MW POWER PLANT	50	17.16
24	KATAKHALI 50MW POWER PLANT	50	16.72
25	BHERAMARA POWER STATION	60	35.56
26	BARISHAL GAS TURBINE POWER STATION	40	40.80
27	SAYEDPUR GAS TURBINE POWER STATION	20	35.67
28	RANGPUR GAS TURBINE POWER STATION	20	33.86
29	KUTUBDIA DIESEL GENERATOR	1.5	84.14
30	SANDIP DIESEL GENERATOR	2.64	53.08
31	HATIYA DIESEL GENERATOR	2.2	37.18
32	SBU Haripur	99	2.52
33	Ashujong Power Co. Ld	724	1.82
34	Ashujong 50MW Power Co. Ld	50	1.92
35	EGCB Ltd.	210	5.77
36	EGCB Ltd.	412	1.51
37	North West Power Gen (NWPGCL) Sirajgonj	150	2.74
38	North West Power Gen (NWPGCL) Khulna	158	28.24
39	Khulna Power Company Ltd.	110	15.25
40	NEPC Consortium Power Ltd.	110	19.85
41	RPCL 52MW Gazipur	52	20.51
42	RPCL 25MW Rawjan	25	16.20
43	Summit Meghnaghat	203	29.37
44	Raj Lanka Power Limited	52	16.81

Generation Cost Per unit (Cont'd)

Sl.No.	Generating Plant under Power Station.	Capacity	Generation Cost Tk/kWh
45	Baraka Patenga Power Limited	**50**	**14.34**
46	Digital Power & Associates Ltd.	**102**	**15.10**
47	Meghnaghat Power Ltd	**450**	**2.27**
48	Haripur Power Ltd	**360**	**1.52**
49	Rural Power Co. Ltd	**210**	**3.04**
50	United Power Generation & Distribution	**30**	**2.83**
51	Regent Energy & Power Ltd.	**108**	**0.88**
52	Midland Power Company Ltd.	**51**	**2.33**
53	Doreen Power Ltd, Feni	**22**	**2.58**
54	Doreen Power Tangail	**22**	**2.55**
55	Regent Power Limited	**22**	**2.69**
56	Summmit Purbanchal Power Ltd.	**33**	**2.60**
57	GBB Power Limited	**20**	**2.91**
58	Shahjibazar Power Co. Ltd.	**86**	**2.65**
59	Desh Cambridge Kumargaon Power Co. Ltd.	**10**	**2.87**
60	Barkatullah Electro Dynamics Ltd.	**51**	**2.31**
61	Aggreko International Projects Ltd. (145MW)	**145**	**5.95**
62	Aggreko International Projects Ltd. (70MW)	**70**	**5.38**
63	Aggreko International Projects Ltd. (80MW)	**80**	**4.51**
64	Energyprima Limited, Kumargaon	**50**	**3.07**
65	Energyprima Limited, Shahjibazar	**50**	**3.21**
66	Venture Energy Resources Ltd,	**34**	**4.16**

Sl.No.	Generating Plant under Power Station.	Capacity	Generation Cost Tk/kWh
67	Precision Energy Ltd.	**50**	**3.05**
68	Max Power Ltd	**78**	**5.80**
69	United Ashugonj Power	**53**	**4.77**
70	Energyprima Limited, Bogra	**20**	**3.09**
71	Energyprima Limited, Fenchugonj	**50**	**2.92**
72	Summit Narayangonj Power Ltd.	**102**	**15.77**
73	KPCL Unit (2)	**115**	**16.49**
74	Khanjahan Ali Power	**40**	**16.49**
75	IEL Consourtium & Associates	**100**	**16.58**
76	Dutch Bangla Power & Associates Ltd.	**100**	**16.40**
77	Acron Infrastructure Services Ltd (Julda)	**100**	**15.41**
78	Amnura (Sinha Power Generation)	**50**	**21.40**
79	Power Pac Mutiara Keranigonj	**100**	**16.76**
80	Northern Power	**50**	**18.66**
81	Aggreko International Projects Ltd. (40MW)	**40**	**20.15**
82	Aggreko International Projects Ltd. (55MW)	**55**	**23.69**
83	R Z Power Ltd.	**47**	**23.82**
84	DPA Power Gen. Int. Ltd	**50**	**23.60**
85	Desh Energy - Shiddhirgonj 100 MW	**110**	**27.46**
86	NVVN Ltd. - India	**250**	**3.82**
87	PTC India Ltd.	**250**	**6.59**

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ENERGY RATE (BERC)

Annex-2

Sl. No.	CLASS OF CUSTOMERS	Approved Rate: Taka/kWh
1	2	3
1	**CLASS-A: DOMESTIC**	
	1st Step : 00-75 Unit	3.33
	2nd Step : 76-200 Unit	4.73
	3rd Step : 201-300 Unit	4.83
	4th Step : 301-400 Unit	4.93
	5th Step : 401-600 Unit	7.98
	6th Step : 601 Unit above	9.38
2	**CLASS B: Agriculture Pump**	2.51
3	**CLASS C: Small Industry**	
	(A) FLAT	6.95
	(B) OFF-PEAK HOUR	5.96
	(C) PEAK HOUR	8.47
4	**CLASS D: NON DOMESTIC LIGHT & ELECTRICITY**	4.53

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5	**CLASS E: COMMERCIAL & OFFICE**		
	(A)	FLAT	9.00
	(B)	OFF-PEAK HOUR	7.22
	(C)	PEAK HOUR	11.85
6	**CLASS F: MEDIUM VOLTAGE GENERAL USE (11kV)**		
	(A)	FLAT	6.81
	(B)	OFF-PEAK HOUR	5.96
	(C)	PEAK HOUR	9.33
7	**CLASS G-2 :VERY HIGH VOLTAGE GENERAL USE (132kV)**		
	(A)	FLAT	6.16
	(B)	OFF-PEAK PERIOD	5.57
	(C)	PEAK HOUR	8.67
8	**CLASS H : HIGH VOLTAGE GENERAL USE (33kV)**		
	(A)	FLAT	6.48
	(B)	OFF-PEAK HOUR	5.87
	(C)	PEAK HOUR	9.14
9	**CLASS J: STREET LIGHT & WATER PUMP**		6.48

Source: Bangladesh Energy Regulatory Commission, GoB, (Valid since 1st Sept., 2012)

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