Paradigm Shift in Bangladesh Energy Sector: A Few Insights of Energy Statistics

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Outline of the Presentation

- Introduction
- Energy Scenario in Bangladesh
- Primary Energy
- Power Sector
- Renewable Energy & Energy Efficiency
- Cross-Boarder Energy Trade
- Challenges & Way Forwards in the Sector

Bangladesh: Country Profile

Geographical Location:
Latitude: 20°34′ & 26°38′N &
Longitude: 88°01′ & 92°41′

Total Area: 147,570 km²
Population: 159.9 Million
Per Capita Income: $ 1466
(estimated inFY 2015-16)
GDP Growth Rate: 7.05%
(estimated in FY 2015-16)

Cox's Bazar: World's Largest Sandy Sea Beach

Sundarban: Word's Largest Mangrove Forest

The People's Republic of Bangladesh

The National Statistical System

- Bangladesh Bureau of Statistics (BBS) under Statistics and Informatics Division (SID) of the Ministry of Planning.
- BBS comprises of eight functional wings.
  - Census Wing
  - Agriculture Wing
  - Industry and Labour Wing
  - Finance, Administration & Management Information System
  - National Accounting Wing
  - ICT & Data Processing wing
  - Demography and Health Wing
  - Statistical Staff Training Institute

Economy of Bangladesh

- Bangladesh had an agrarian economy so far. But since last few years it is likely to be shifting to an industry based economy due to continuous industrialization process.

- According to the provisional estimate of GDP for the fiscal year 2014-15 the share of broad Agriculture and Industry and Service sectors were 15.96%, 30.42% and 53.62%, respectively.

GDP of Bangladesh at Current Price by Broad Industry Sector (mill. Tk.)

Broad industry sectors	2011-12	2012-13	2013-14	2014-15 (p)
GDP				
Agriculture	1,707,064	1,857,524	2,062,758	2,245,880
Industry	2,670,717	3,154,016	3,535,349	4,029,843
Services	5,608,575	6,401,073	7,206,899	8,126,284
GVA at basic price	9,986,356	11,412,612	12,805,005	14,402,006
Share				
Agriculture	17.09	16.28	16.11	15.59
Industry	26.74	27.64	27.61	27.98
Services	56.16	56.09	56.28	56.42

Source: Bangladesh Bureau of Statistics

Vision & Mission of Energy Sector

Vision:

- Affordable sustainable energy for all by 2021.

Mission:

- Achieving energy security for the country through:

  - Exploration, development, production, import, distribution and sound management of different sources of primary energy;

  - Generation, Transmission, Distribution, Cross-Border Trade of Electricity;
  - Exploring Renewable Energy & Augmenting Energy Efficiency.

Vision 2021

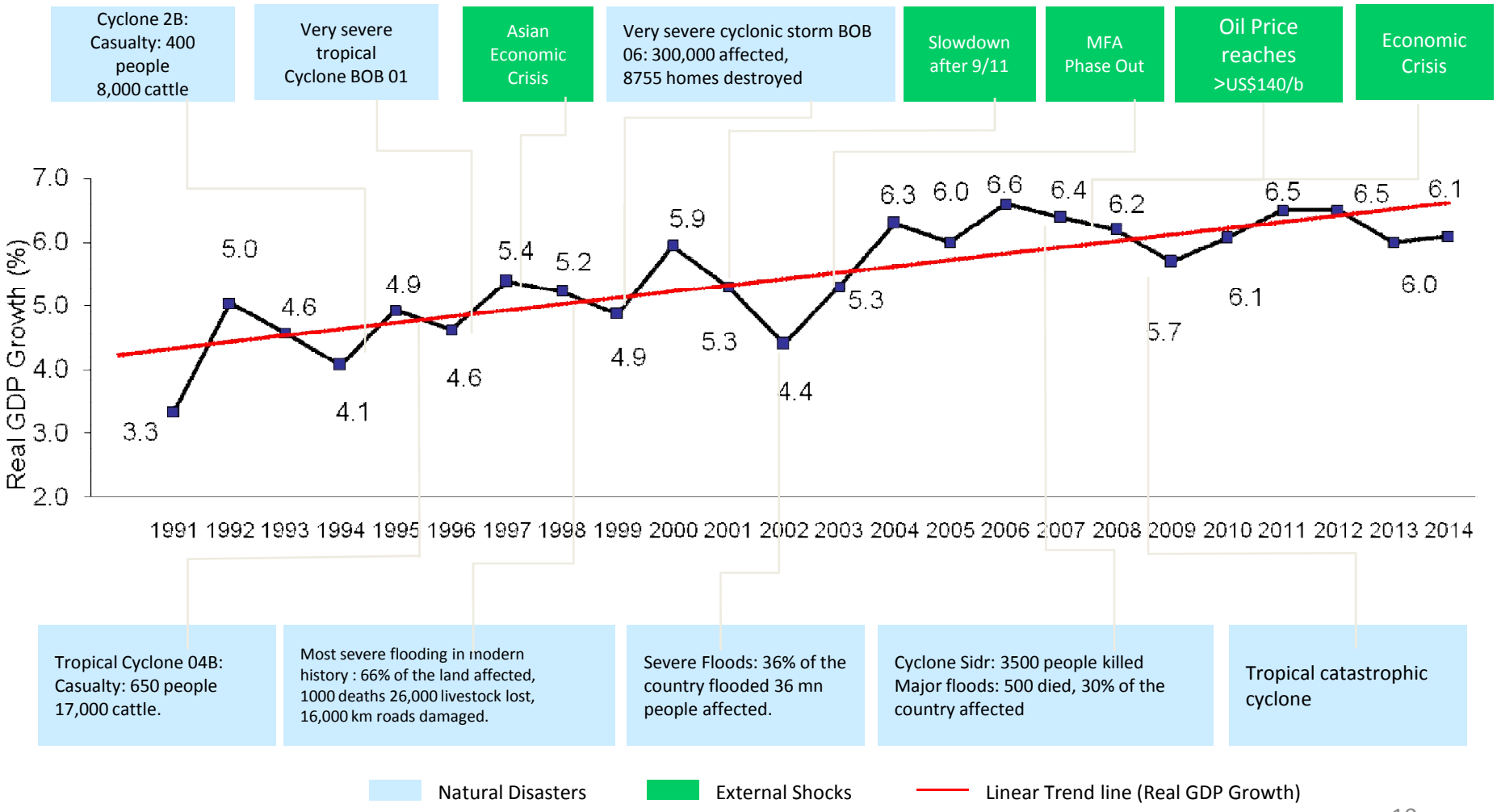
- Boosting GDP growth to 10% by 2021 & sustained thereafter
- Reducing poverty rate to 15%
- *Electricity Generation: 24,000 MW*
- *Domestic Coal Production : 10Mton/year*
- Provide affordable and reliable electricity for all by 2021
- Raising the economy to the level of a middle-income country

❑ 7FYP (2016-20) adopted to achieve SDGs, Vision 2021 & Vision 2041

GROWTH IS REMARKABLY STABLE AGAINST ALL SHOCKS

Resilient growth despite regular political, environmental and external setbacks

Bangladesh has maintained consistent growth and never defaulted on its internal or external debt obligations despite the Asian and Global Financial Crises, numerous political upheavals and countless natural disasters. This consistency is practically unrivaled amongst countries of a similar level of development



The Millennium Development Goals (2000-2015)

1. Eradicate extreme poverty and hunger;
2. Achieve universal primary education;
3. Promote gender equality and empower women;
4. Reduce child mortality;
5. Improve maternal health;
6. Combat HIV/AIDS, malaria and other diseases;
7. Ensure environmental sustainability;
8. Develop a global partnership for development.

Success in Achieving MDGs Targets in Bangladesh

Improved drinking water: 98.5% (Target-100%)
Forest-covered area: 13.4% (Target-20%)
Improved sanitary facility: 64.2% (Target-100%)
People consume dietary energy below minimum level: 16.4% (T- 14%)
Upper poverty line declined: To 24.8% (T-29%)
Primary education enrolment: 97.7% (T-100%)
Share of women in wage employment (Non-agri): 31.6% (T-50%)
Seats in the National Parliament: 20% (T-33%)
Child mortality per 1,000 live births: 41 (T-48)
Children immunised against measles: 79.9% (T-100%)
Maternal mortality per 100,000 live births: 170 (T-143)
Births attended by skilled health personnel: 42.1% (T- 50%)
Combating HIV/AIDS and malaria: Achieved
Employment rate (aged 15+): 57.1% (T-100%, 48.5% in 1909-91)

Source: 1. ***MDGs: Bangladesh Progress Report 2015, Published on 16-09-2015 by GED, Planning Commission, Bangladesh.***
2. ***The Daily Star, 17-09-2015, Published from Dhaka, Bangladesh***

SDG-7 Ensure Access to Affordable, Reliable, Sustainable & Modern Energy for All

By 2030:

1. Ensure universal access to affordable, reliable and modern energy services;

2. Increase substantially the share of renewable energy in the global energy mix ;

3. Double the global rate of improvement in energy efficiency;

a. Enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced & cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology

b. Expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support.

Achievement of Energy Sector Targets in 6th FYP (2010-15)

Performance Indicators	FY2010 (Baseline)	FY2015 (Achievement)	FY2015 (Target)
Electricity Installed Capacity (MW)	5823	13540	15457
System Loss Reduction (%)	16	13.03	13.70
Diversify Fuel Mix in Power Generation	Gas- 84% Liquid Fuel-8% Coal-4% Others-4%	Gas- 63% Liq. Fuel-29% Coal-2% Others-6%	Gas-71% Liq. Fuel-20% Coal-3% Others-6%
Private Sector Participation i. Electricity ii. Gas Production	i. 33%	i. 43% ii. 58%	i. 44% -
Cross-Boarder Energy Trade	0 MW	500 MW	500 MW
Per Capita Electricity Generation (KWh)	220	371	360
Access to Electricity (%)	48	72	71

Policy Targets in 7th FYP (2016-20) for Primary Energy

SI.	Actions	Responsible Agency	Timeframe
1	Establish Gas Allocation Policy (incl. LPG and Biogas Alternative policy)	Energy and Mineral Resources Division	FY2015-FY2016
2	Domestic Gas Exploration Policy	Energy and Mineral Resources Division	FY2015-FY2016
3	Energy Efficiency and Conservation Programme	SREDA	FY2016-FY2020
4	Domestic Coal Export Policy	Energy and Mineral Resources Division	-
5	Develop Energy Subsidy Policy	Finance Division and Energy and Mineral Resources Division	FY2016 (by when LNG import starts)
6	Import LNG Strategy	Energy and Mineral Resources Division	FY2015-FY2016 (Before LNG import starts)
7	Planning for Import Coal Facilities	Energy and Mineral Resources Division	FY2016
8	Financial Incentive Mechanism for Improved Cooking Stove	SREDA	FY2015-FY2016
9	Promote Use of LPG in Domestic and Transport Sector	Energy and Mineral Resources Division	FY2016-FY2020

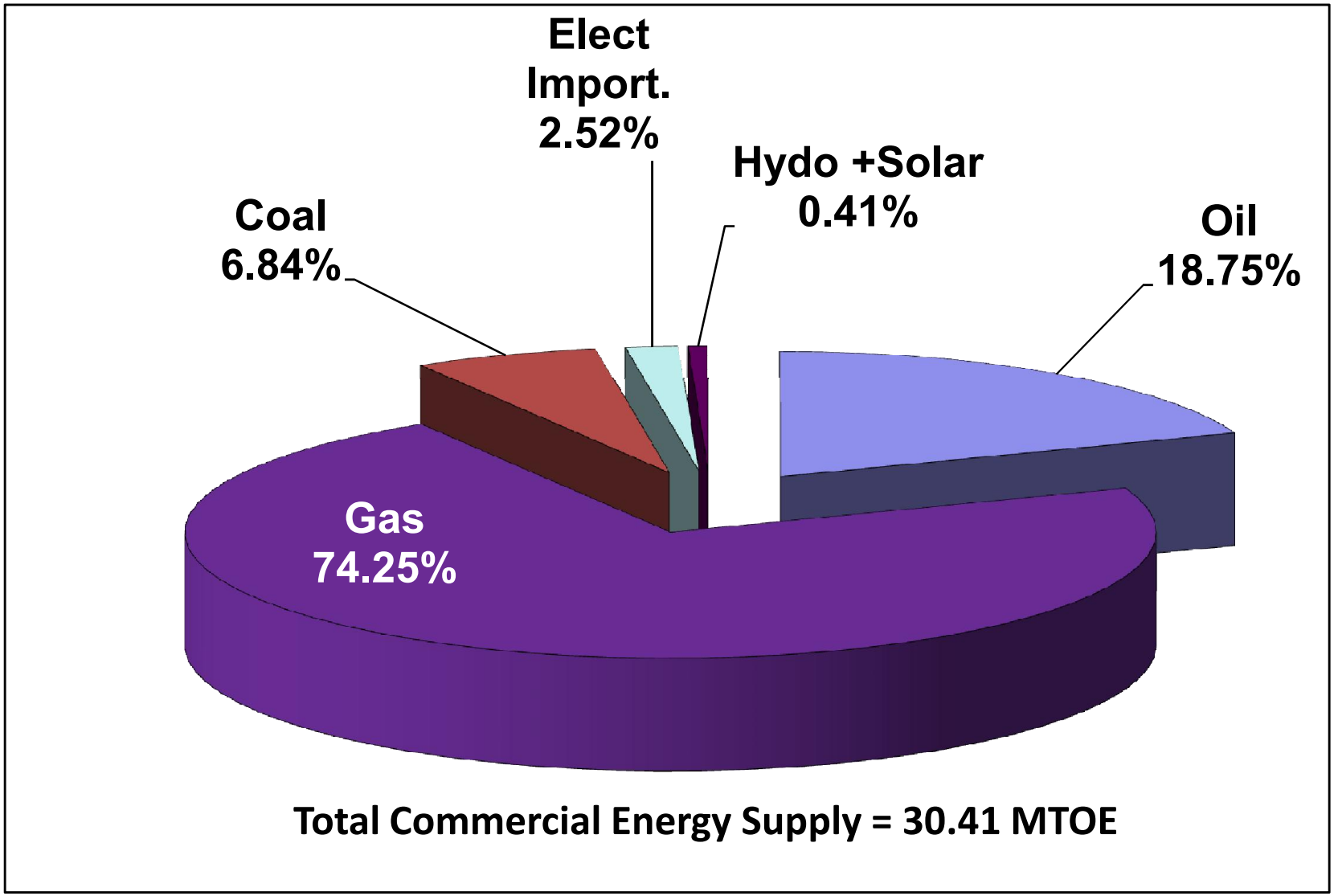
Strategy to Meet Emerging Primary Energy Demand

Short term	Enhance production from existing Gas & Coal fields
	Demand side management
	Conservation & Efficient use of energy
Medium term	Enhance production from existing Gas & Coal fields
	Intensify exploration activities for new reserve (Offshore & Onshore)
	Demand side management
	LNG, LPG import
	Increased Domestic Coal Production & Import of coal
Long term	Demand side management
	LNG import
	Increased Domestic Coal Production & Import of coal
	Intensify exploration activities for new reserve (Offshore & Onshore)
	Pipeline gas and oil import
	Diversify energy sources (RE incl. Solar, Nuclear etc)

Gas Sub-Sector - At a Glance
(April 2016)

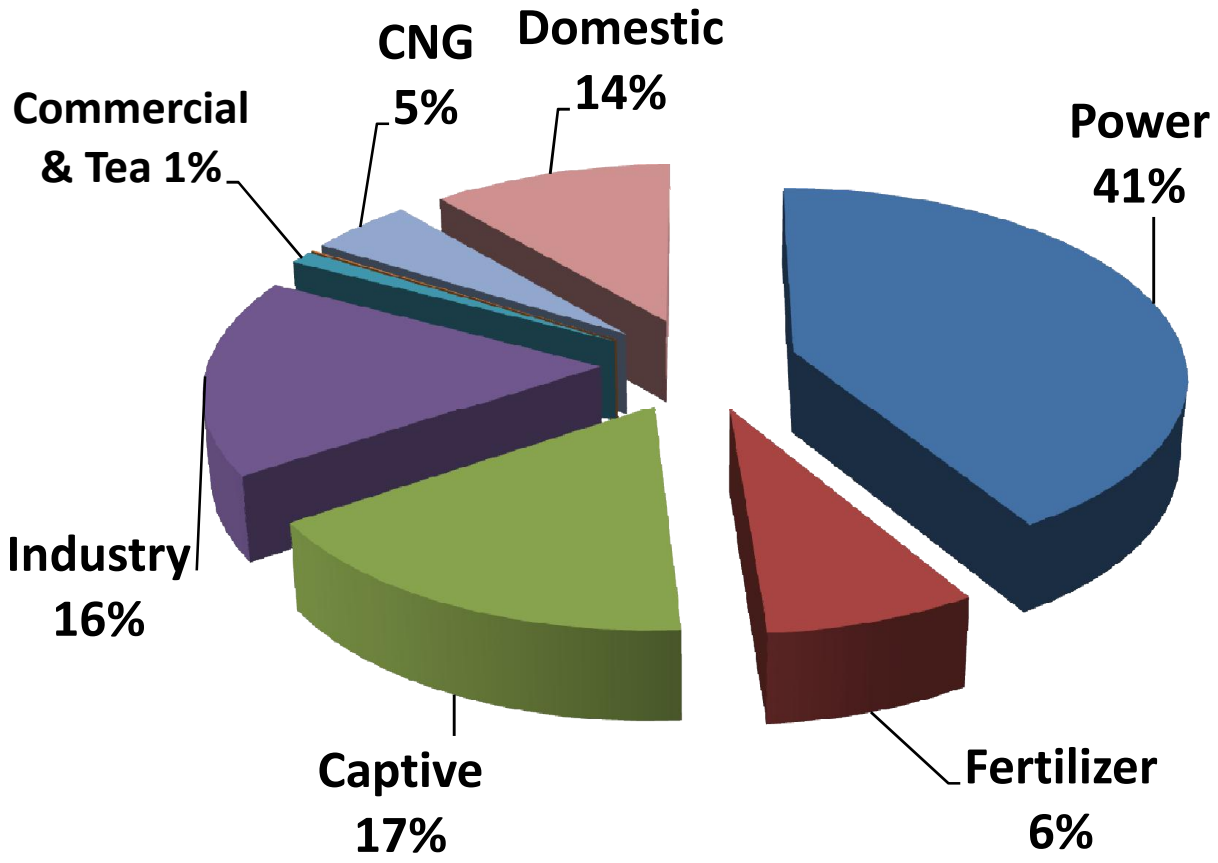
Total number of gas fields	: 26
Number of gas fields in production	: 20
Number of producing wells	: 101
Present gas production rate	: 2,740 MMCFD
Total recoverable (proven + probable) reserve	: 27.12 TCF
Total production of gas	: 13.48 TCF
Total reserve remaining	: 13.64 TCF
Total Customers	: 3.3 Million
Daily gas demand of Existing Customers	: 3,200 MMCFD

Primary Commercial Energy Supply



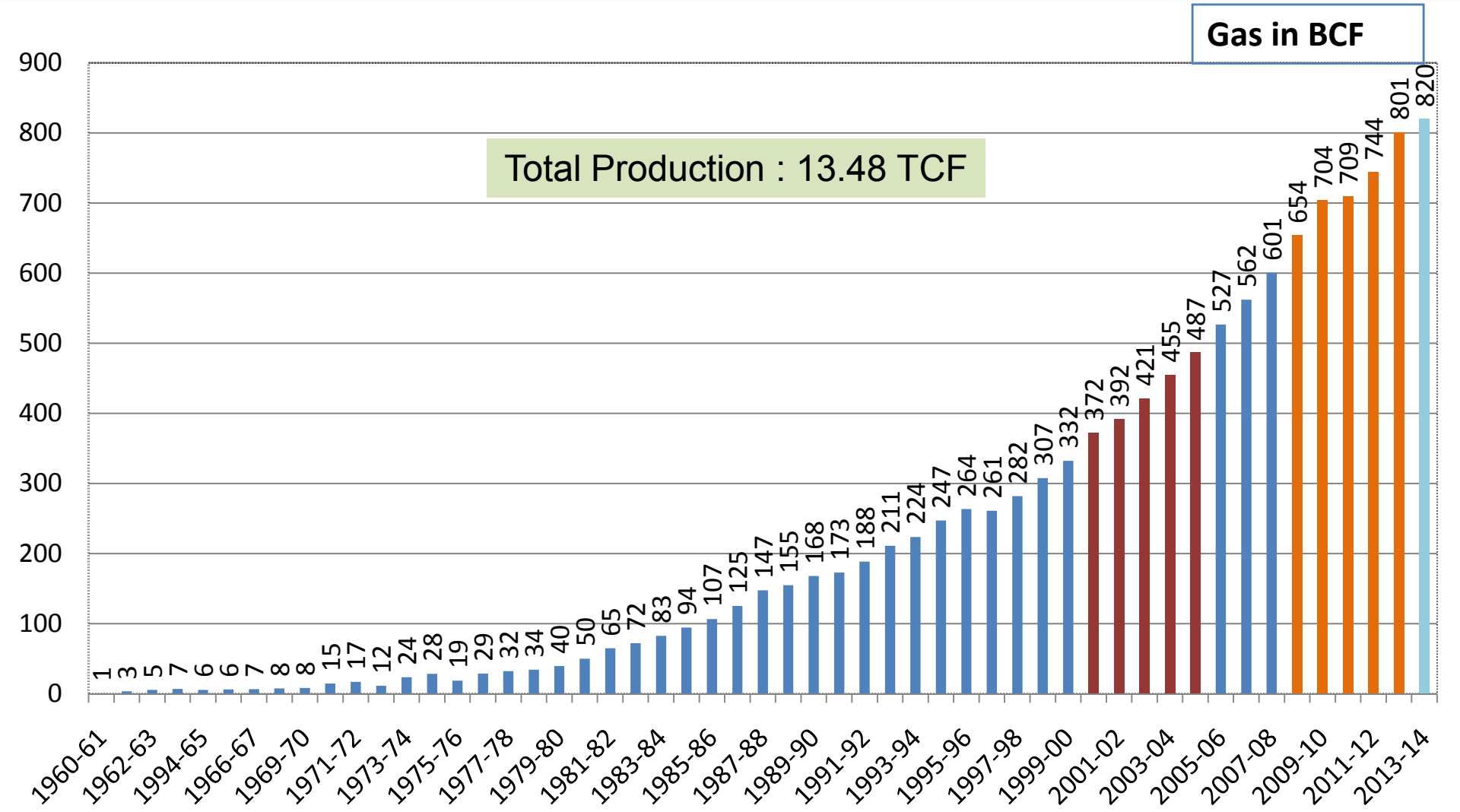
Total Commercial Energy Supply = 30.41 MTOE

Category-wise Gas Consumption

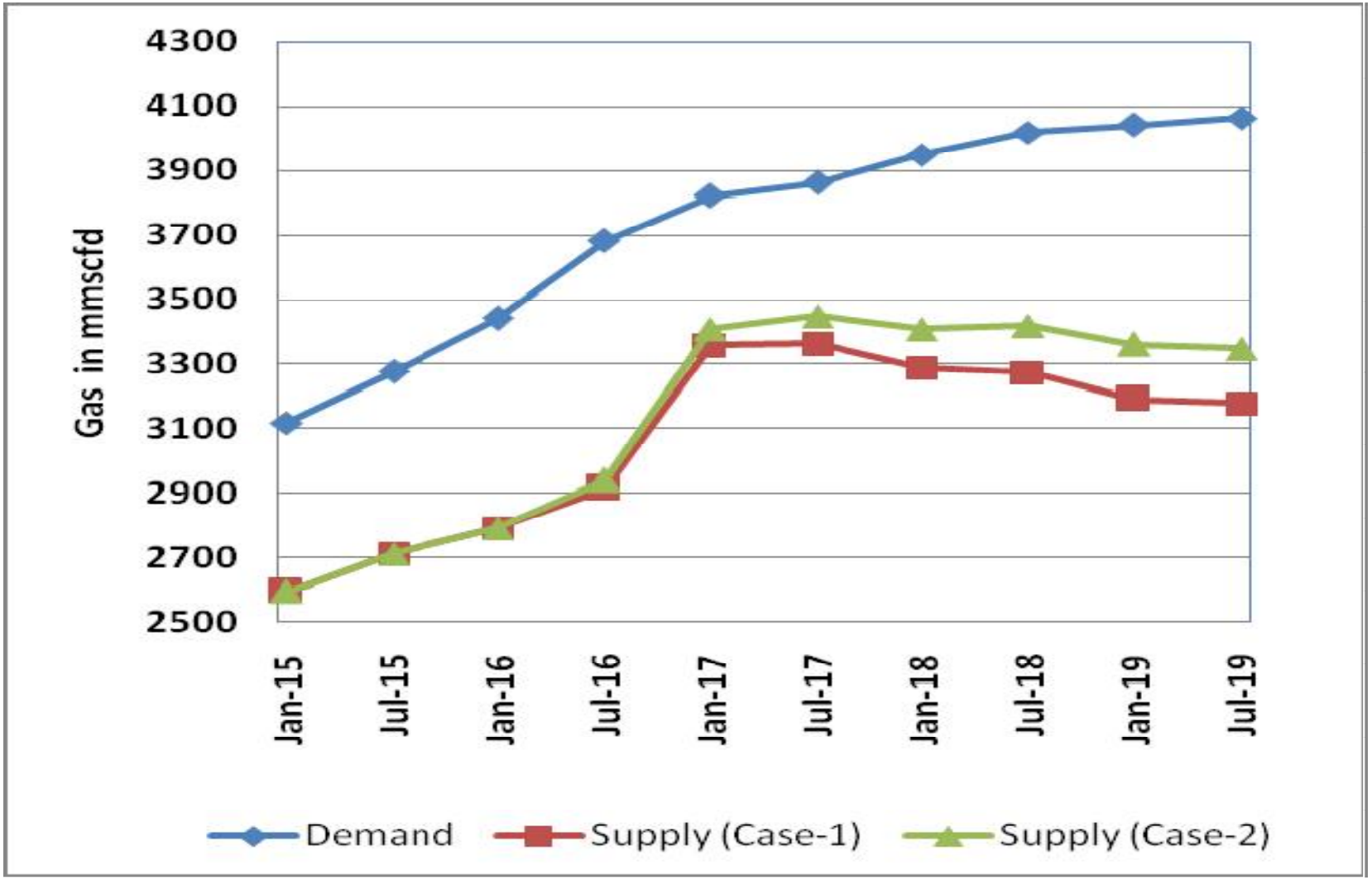


Total Consumption about 1 TCF per year

Gas Production History



Demand Vs Supply 2015 - 2019

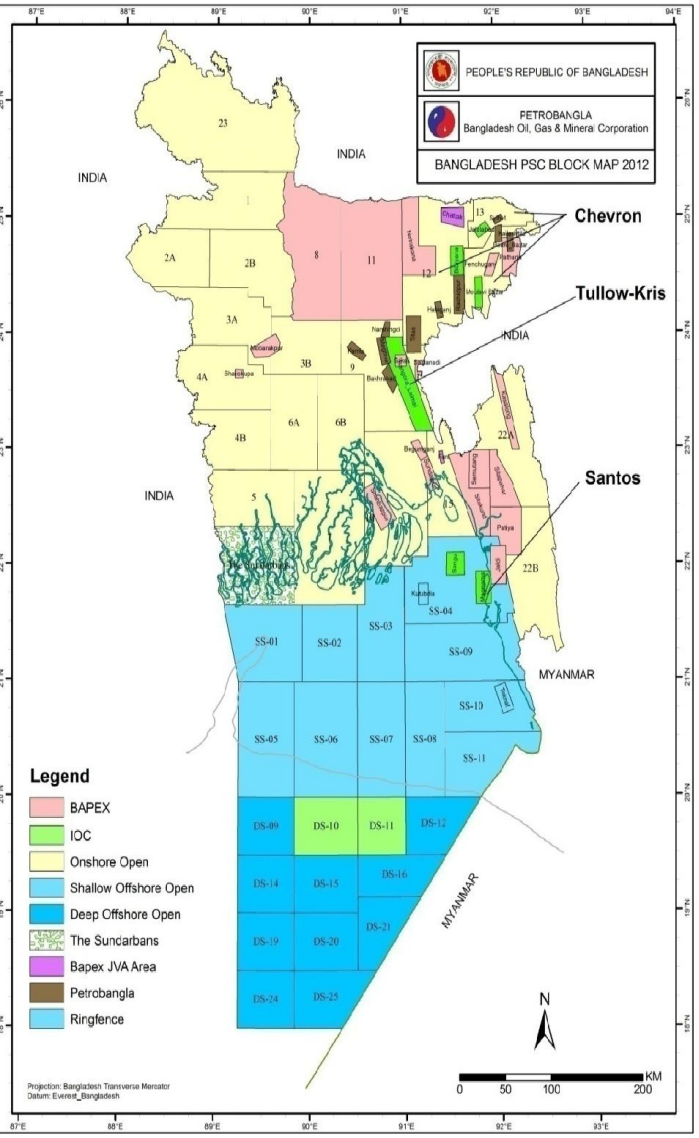


Possible Gas Supply Scenario

Gas in mmscfd

Source	2015		2016		2017		2018		2019	
	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan - Jun	Jul-Dec	Jan-Jun	Jul-Dec
Existing Fields	2594	2713	2793	2916	2859	2863	2802	2784	2698	2681
New Discovery				25	50	85	120	145	170	170
LNG	-	-	-	-	500	500	500	500	500	500
Total	**2594**	**2713**	**2793**	**2941**	**3409**	**3448**	**3422**	**3429**	**3368**	**3351**

Production Sharing Contracts

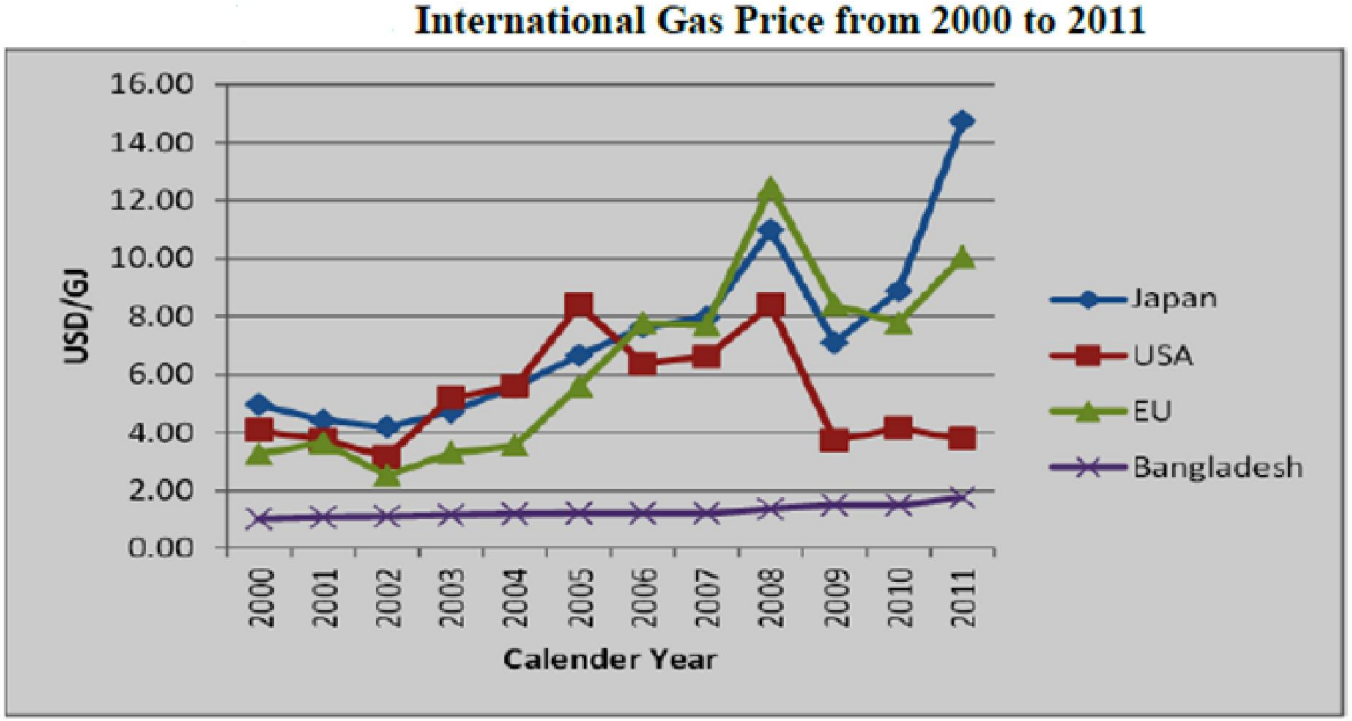


Exploration ongoing

Company	Blocks	Signed on
ONGC	Shallow Offshore –SS-4 & SS-9	**February 2014**
Santos –Kriss Energy-JV	Shallow Offshore –SS-11	**February 2014**

Company	Blocks	Signed on
Bid offered	**Deep Sea DS-12, 16 & 21**	**Under process**

International Gas Price & Price Projection



Source: Petro Bangla and IMF

Gas Price Projection in 2016 (assuming Bangladesh starts LNG import)

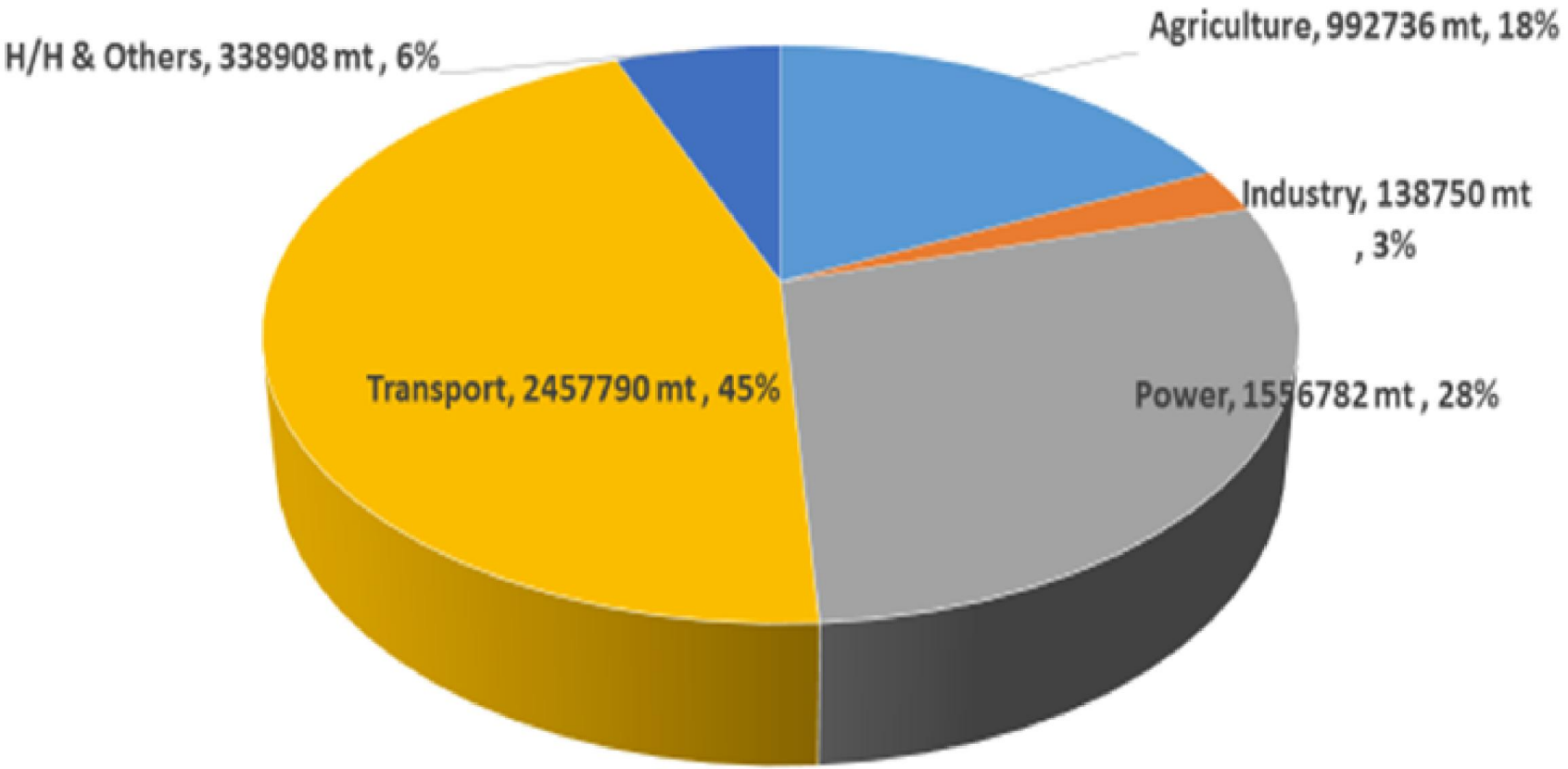
	Bangladesh	US	EU	Japan
Gas price (USD/GJ)	3.1	4.2	11	14

Source: IEA World Energy Outlook and Government of Bangladesh

Liquid Fuel Scenario (2014-15)

- Total Consumption of POL: 5.5 Million MT;
- Import of Refined Oil : 4.2 Million MT;
- Import of Crude Oil : 1.3 Million MT;
- Export of Naphtha: 0.1 Million MT;
- Total Storage Capacity: 11.63 Million MT;
- Supply of POL in Power Plant: 15.56 Million MT;
- Production of LPG under Public SOEs 14,000 MT per year
  (Private distribution about: 118,000 MT per year)

Sector-Wise Liquid Fuel Utilization



Coal Deposits

5 Coal fields with in in-situ total Reserves 3565 million tonne

Barapukuria	390 million *tonne*
Khalashpeer	685 million *tonne*
Jamalgonj	1,053 million tonne
Phulbari	*572 million tonne*
Dighipara	*865* million *tonne*

Challenges Ahead for Primary Energy

- Narrowing demand supply gap
- Efficient use of gas
- Market price adjustment
- Import of LNG
- Enhancement of coal extraction commensurate with needs.
- State of the art capacity building
- Import of natural gas through pipeline
- Arranging huge Investment

Bangladesh Power Sector: At a Glance

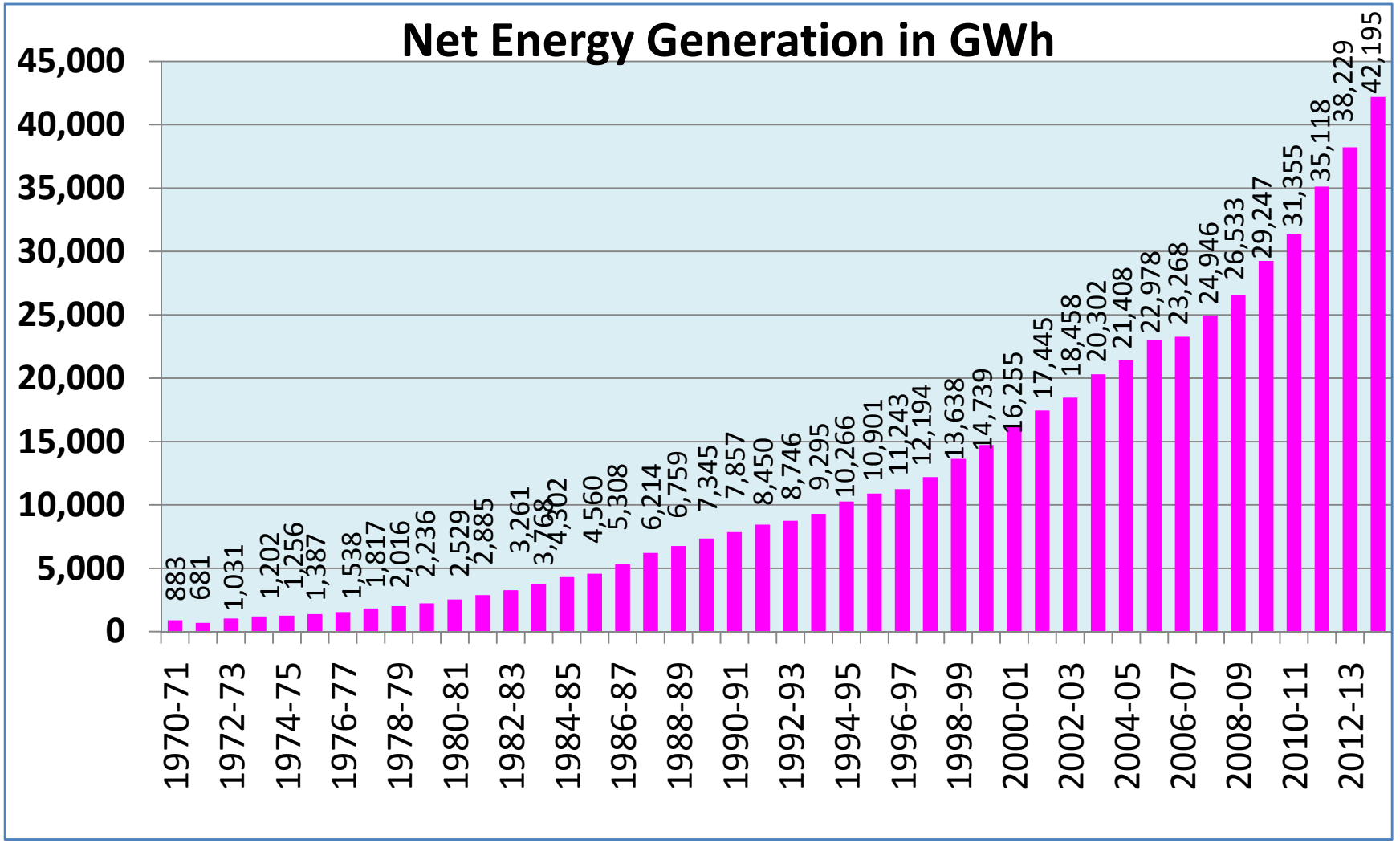
Generation Capacity [including captive] [MW]	14077
Highest Generation [MW]	8177 [13 August'15]
Transmission Line[Ckt. Km]	9695
Distribution Line [Km]	3,41,000
Power Import [MW]	500
Per Capita Power Generation[kWh]	371
Access to Electricity	74%
Electricity Consumer [Million]	17.8
System Loss	13.55%

Source : Bangladesh Power Development Board

Power Sector Key Strategies

- A rapid growth in electricity generation;
- Development of transmission and distribution system in line with generation;
- Mobilizing private and joint venture investment in power sector;
- Diversification of primary fuel for electricity generation;
- Use coal as main source of energy for power generation;
- Improving power sector efficiency and reducing transmission and distribution losses;
- Use of alternative sources of energy;
- Use of nuclear energy for power generation;
- Exploring electricity-trading options with neighboring countries (India, Nepal, Bhutan and Myanmar);
- Use of alternative sources of financing (Export Credit Agency, etc.).

Historical Energy Net Generation (GWh) in Bangladesh



Power System Master Plan - 2010

- Fuel diversity and sustainable supply of fuels
- Private sector participation in power generation
- Harnessing renewable energy sources
- Demand Side Management (DSM) and
- Energy Efficiency improvement program
- Rationalize power tariff
- Cross Boarder Power Trade

Power Generation Target in 7FYP

By Fuel Type

Calendar Year	2015-2016 (MW)	2016-2017 (MW)	2017-2018 (MW)	2018-2019 (MW)	2019-2020 (MW)	Total (MW)
Gas	973	2401	657			**4031**
Gas/LNG					1750	**1750**
Duel Fuel	75	395	512			**982**
HFO	55	511				**566**
Coal			274	3036	1247	**4557**
Import	100		500			**600**
Renewable	68	30				**98**
Total	**1271**	**3337**	**1943**	**3036**	**2997**	**12584**

By Ownership Type

FY	Public sector (MW)	Private Sector (MW)	Total (MW)
2016	937	334	1271
2017	2599	738	3337
2018	1076	867	1943
2019	1320	1716	3036
2020	1750	1247	2997
Total	**7682**	**4902**	**12584**

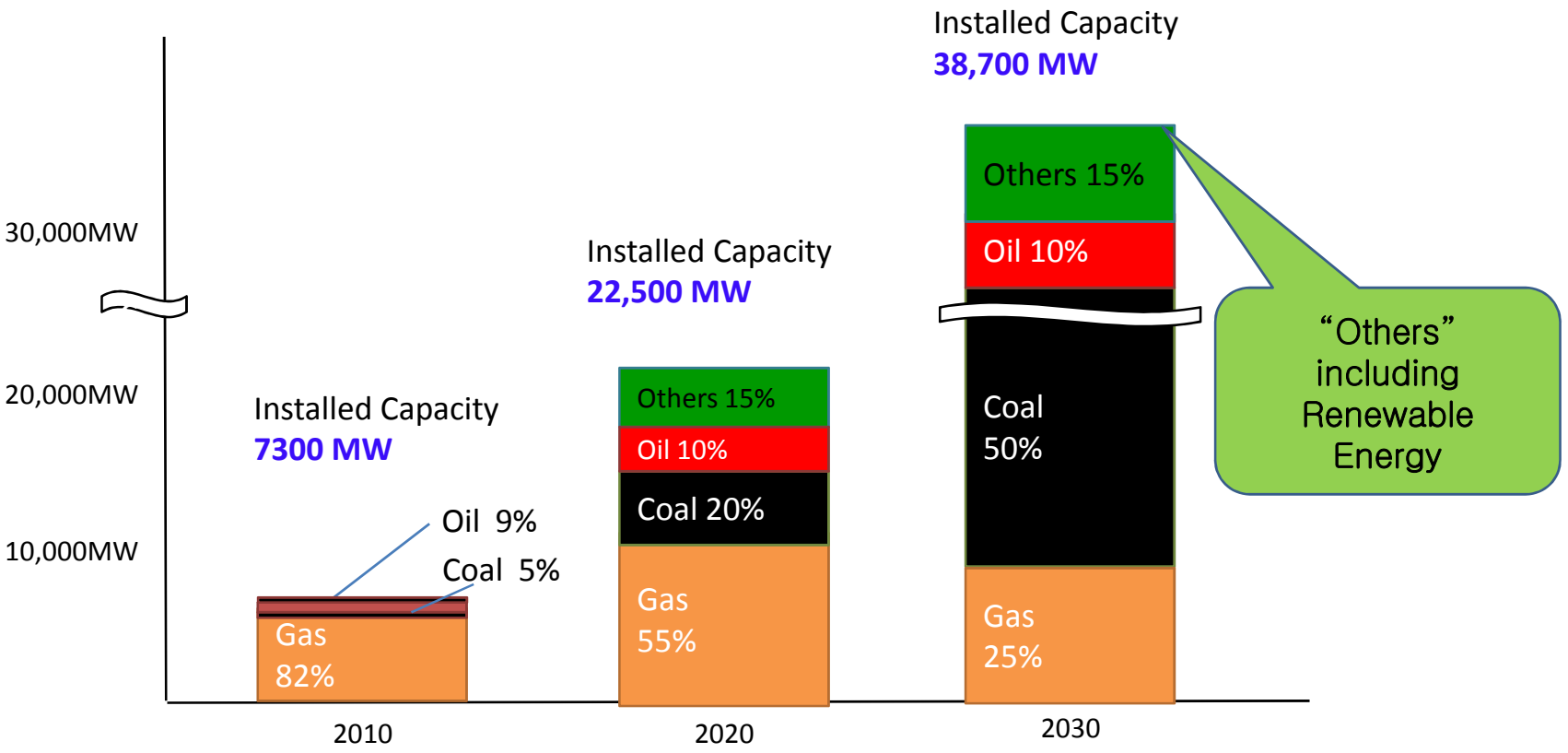
Future Plan

- Generation capacity requirement by 2021: 24,000 MW
- Generation capacity requirement by 2030: 40,000 MW
- 50% generation from coal
- Coal based generation capacity by 2030: 20,000 MW
- Cross Boarder Trade with neighboring countries

Power Generation Trend

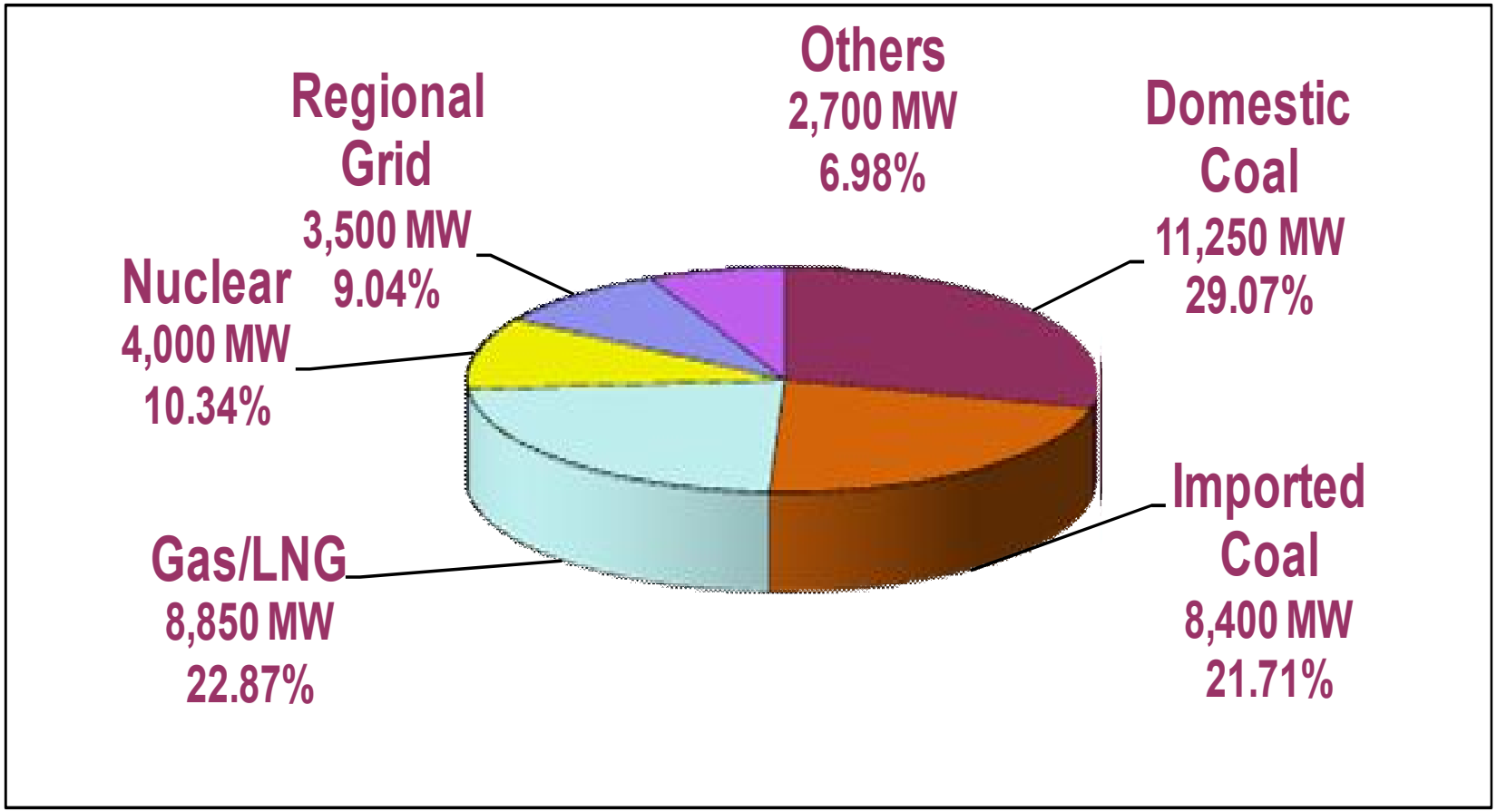
Generation Capacity in 2009: 4942 MW
Generation Capacity in 2016: 14429 MW
Capacity Enhanced (Last 7 yr) : 9487 MW

Generation Mix Suggested in PSMP



Future Plan

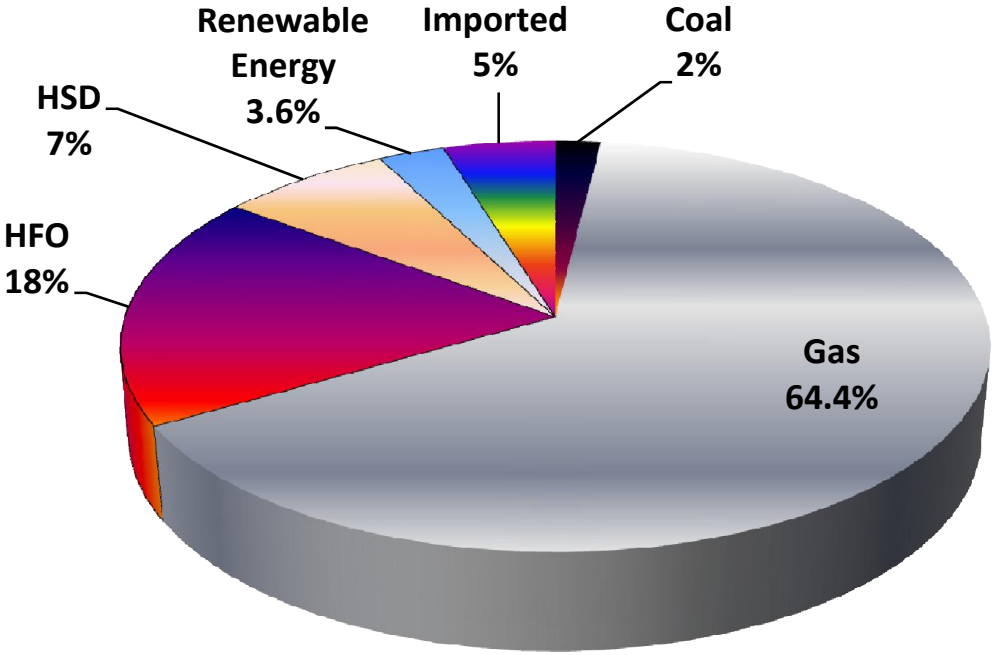
- Fuel Mix: by 2030



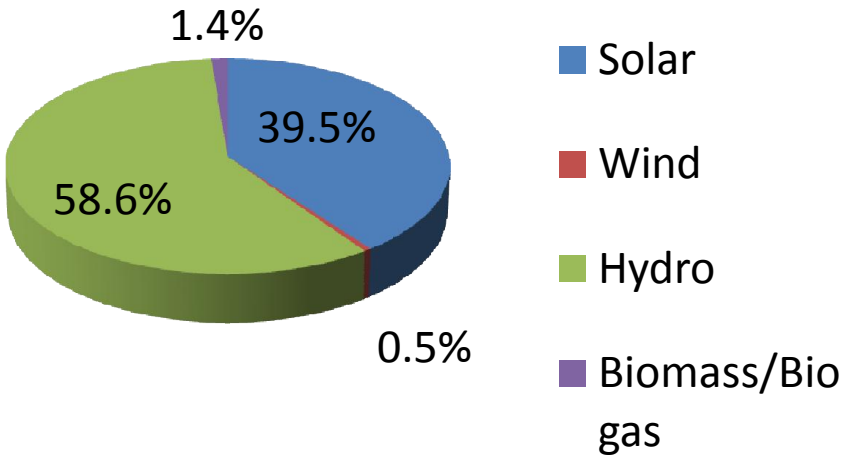
Source: PSMP-2010

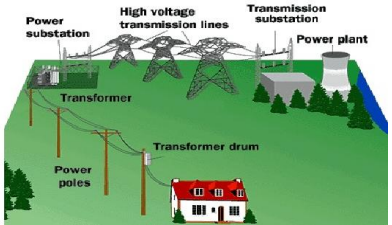
Present Fuel Mix of Power Generation

Electricity Generation by Fuel Type



Renewable Energy Share





Regional Power Trade (Hydro Power)

Regional Cooperation: PSMP-2010: 3,500 MW

Present cooperation : 600 MW

Feasibeility Study started to construct 800 KV Bipole DC transmission Line from Rangia-Rowta to Barapukuria to Mugaffarpur, Bihar for transmitting 6500-7000 MW.

Bangladesh intends to import about 2000 MW from this Line.

Legal Framework for Regional Cooperation

SAARC Framework Agreement for Energy Cooperation (Electricity)

MoU for Establishment of the BIMSTEC Grid Interconnection.

LNG Based Power Plants

Sl. No.	Name of the Company	Project Name	Amount of Gas	Generation Capacity
01	Relaince Group	LNG Based Combined Cycle Power Project and FSRU Terminal.	500 MMCFD to 570 MMCFD	3000 MW
02	H-Energy Ltd	Integrated LNG Terminal	500 MMCFD (3.5 MMTPA)	
03	Power Cell	LNG Terminal	500 MMCFD	2000 MW
04	MPC-LNG MEIYA Power Co. Ltd.	LNG Based		1075 MW (Net) Combined Cycle Operation with 725 MW Simple Cycle + 349 MW Steam Turbine Plant.
05	NWPGCL	Khulna 750-850 MW LNG Based Combined Cycle Powe Plant	125 MMCFD (1MTPA)	750-850 MW (2×400 MW± 10%)
06	Total			6,939 MW

Nuclear Power

Under Construction Projects

- (Commission year 2022 - 2023): 2X1000 MW

Future Plan

- 4000 MW

Present Status of Renewable Energy

Type	Off-Grid
Solar PV	145 MW
Wind	1 MW
Hydro	0.1 MW
Total	146.1 MW

Renewable Energy Policy, 2008 Envisions

5% (800 MW) of total energy production will be from RE by 2015

10% (2000 MW) of total energy production will be from RE by 2020

"500 MW Solar Program" & "Wind Resource Mapping" Program will facilitate to reach the goal

Renewable Energy Target (MW)

Technology	2015	2016	2017	2018	2019	2020	2021	Total
Solar	75	336	421.75	267	229	203	208	**1739.75**
Wind	0	20	250	350	350	200	200	**1370**
Biomass	1	16	6	6	6	6	6	**47**
Biogas (Biogas to electricity)	1	1	1	1	1	1	1	**7**
Hydro (mini/micro)		2	2	-	-	-	-	**4**
Total	**77**	**375**	**680.75**	**624**	**585**	**410**	**415**	**3167.7**

Energy Efficiency Action Plan

10% of Primary and Secondary Energy Saving by 2015

15% by 2021

20% by 2030

Energy Efficiency & Conservational Master Plan up to 2030

39 Interventions – Industry, Commercial and Residential

Power Sector Financing Requirements in 7FYP

BDT in Billion

	Generation (Public)	Generation (Private)	Total Generation	Trans-mission	Distribution	Primary Energy	Total Public	Percent of GDP
FY2016	108	40	148	81	42	23	254	1.6
FY2017	259	106	365	81	42	28	382	2.4
FY2018	103	30	133	81	42	30	226	1.4
FY2019	195	347	542	81	42	32	318	1.7
FY2020	183	284	467	81	42	34	306	1.6
Total	848	807	1655	404	209	147	1461	8.7

Total Investment requirement: About US$ 19 Billion

Challenges for Power Sector

Primary Fuel Supply

- Enhanced Gas Exploration, Production
- Domestic coal development
- Coal Import (long term contract) and deep sea port for coal handling
- LNG import
- Safe Nuclear Technology

Project Financing

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

Transportation of fuel and equipment

- Infrastructure development by Railway and R&H
- Dredging of river routes by BIWTA
- Capacity build up of BPC, Railway, R&H and BIWTA etc.

Human Resources Development

- Development of skilled manpower: adopt and operate new technology

Thank You for Patience Hearing