

# “ Power Trade: Bangladesh, India and Nepal: Challenges and Opportunities”

Presentation at

## SAARC Dissemination Workshop

On

### Study for Development of a Potential Regional Hydro Power Plant in South Asia

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by

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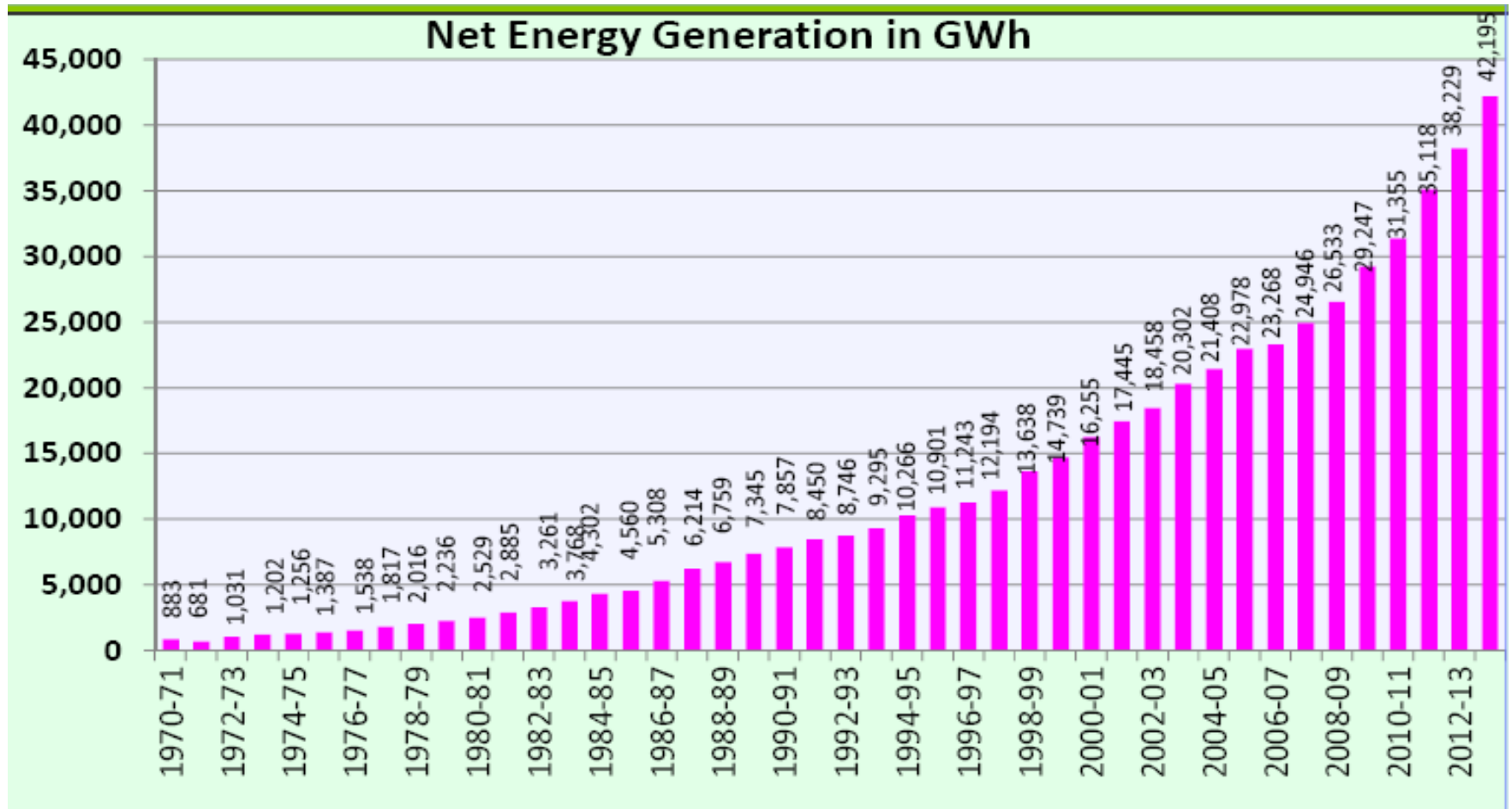
# Bangladesh at a Glance

• Official Name	: People's Republic of Bangladesh
• Political System	: Parliamentary Democracy
• Area	: 147,570 km <sup>2</sup>
• Population	: 156 million
• Total Exports	: USD 15 billion
• Total Imports	: USD 39 billion
• Remittance	: USD 15 billion
• Forex Reserve	: USD 29 billion
• GDP Per Capita	: USD 1116
• Power Capacity	: 10, 600 MW

# GDP Growth, Electricity Demand and Challenges

- **With Sustained GDP Growth, Electricity demand is increasing at a rate of 9-12%**
- **Power sector are facing challenges to meet this demand growth are mainly:**
  - Shortage of primary fuel supply from indigenous resources
  - Financing capital intensive power projects

# Historical Energy Net Generation (GWh) in Bangladesh



# Private Sector Power Generation Policy (PSPGP) 1996

## Key Points in PSPGP

- Tariff based bidding
- Capacity Charge: ensures reasonable return on investment
- Energy Charge: fuel cost is pass through item in the tariff
- Payment guarantee from the Government through Implementation Agreement (IA)
- Assistance in getting clearances from various agencies
- Attractive incentive packages

# Strategic Policy on Power

- Fuel diversity and sustainable supply of primary fuel
- Regional Co-operation on Cross Border Electricity Trade
- Enhanced private participation in power generation
- Harnessing renewable energy resources
- Demand Side Management (DSM) and Energy Efficiency improvement program etc.

# Investment Environment in Bangladesh

- Sovereign Credit Rating **BB-**(S & P) and **Ba3** (Moody's) indicates relatively better investment environment
- Bangladesh is one of N11 countries (Next Eleven) by Goldman Sachs
- 30 bn US \$ export, 15 bn US \$ remittance and 21 bn US \$ foreign exchange reserve indicates payment capability to foreign investors

# Bangladesh's Power Sector: At a Glance

▪ <b>Generation Capacity</b>	<b>: 10,600 MW</b>
▪ Electricity Growth	: 9-12%
▪ Total Consumers	: 15.4 Million
▪ Transmission Lines	: 9,500 km
▪ Distribution Lines	: 300,000 km
▪ Per Capita Generation	: 348 kWh (including Captive)
▪ Access to Electricity	: 68% (including 8% RE)



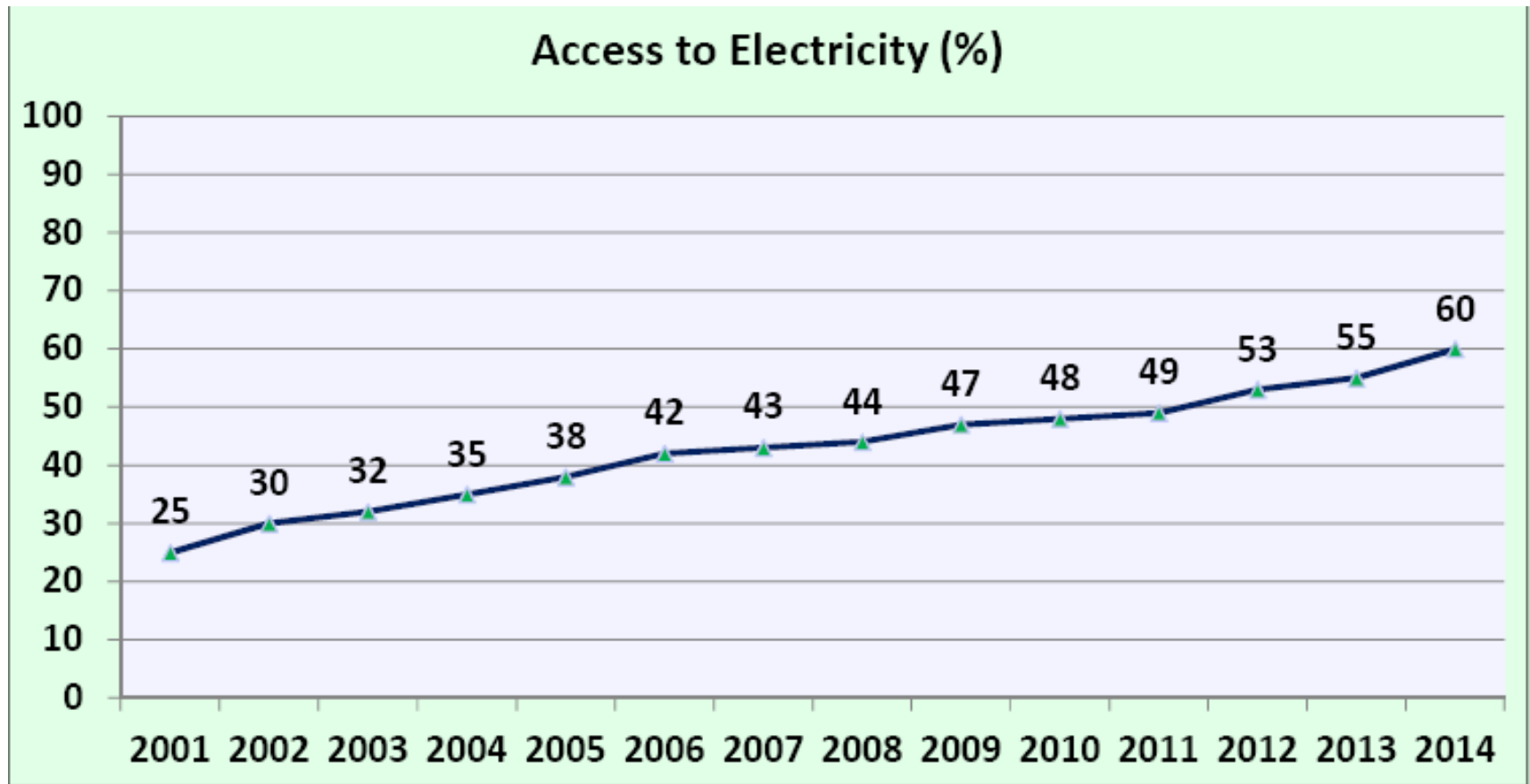
# Access to Grid Electricity

- 60 Million people do not have direct access to grid electricity
- Rest 90 Million are getting unreliable power
- Load shed up to maximum 800 MW during hot summer days
- Shortage of power supply has constrained economic growth

## Vision

- **Provide affordable and reliable electricity for all by 2021**

# Access to Electricity (Grid) in Bangladesh



# Primary Fuel Supply Options

# Primary Fuel Supply Options: Import

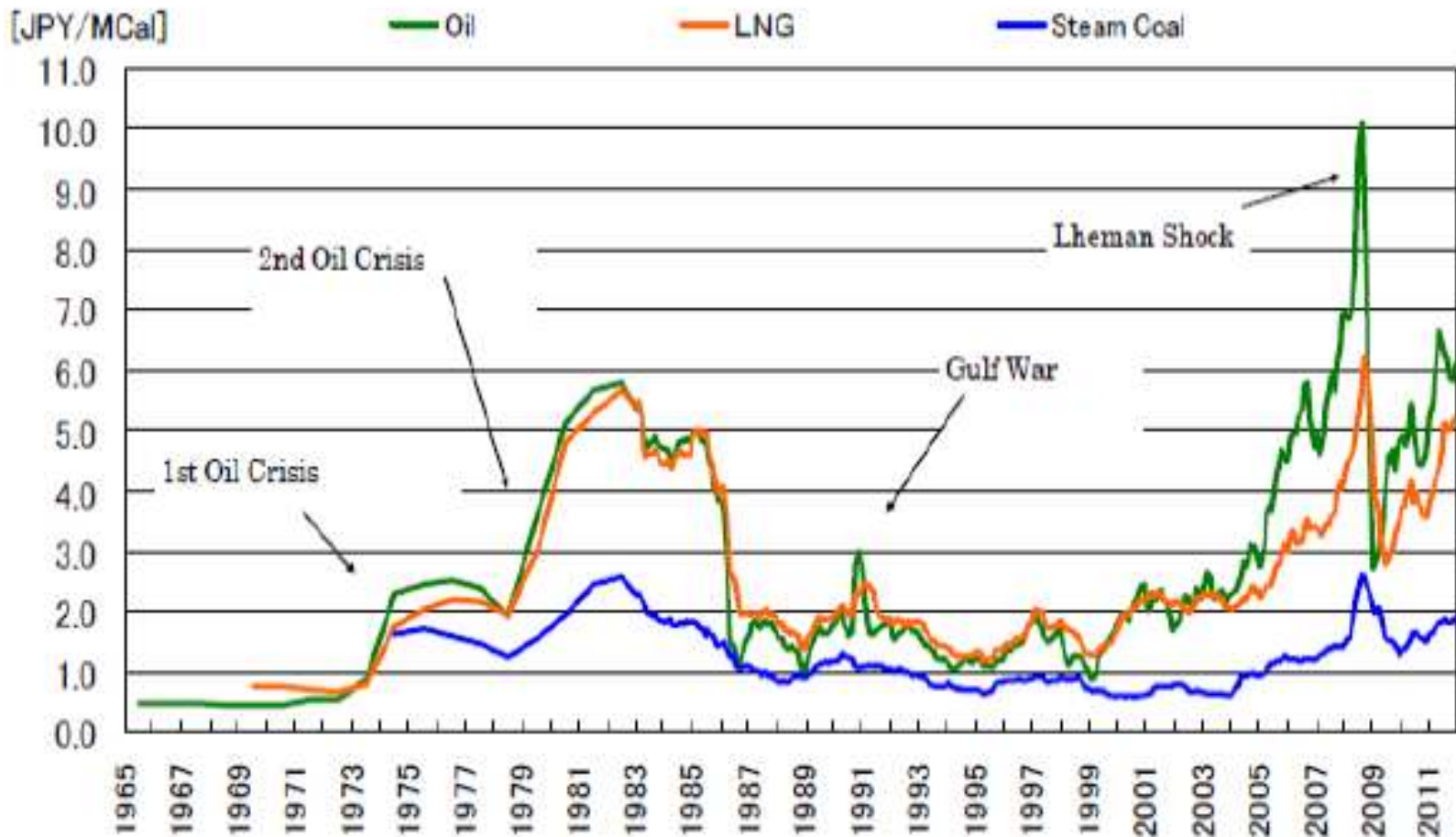
## Import Options as Indigenous resources are Inadequate

- **Coal Import:** Indonesia, Australia, South Africa
- **LNG Import-** Price is high in Asia-Pacific Market
- **Oil-** Volatile Market
- **Nuclear-** High initial investment cost
- **Regional Hydro Power Import- Cross Border Trade**

# Primary Fuel Options: Indigenous Resources

- **Gas:** Only 16 tcf proven reserve; No significant gas discovery in recent years; Depleting gas reserve restricts gas based generation expansion; R/P ratio is only about 20 years.
- **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; Base Load
- **Renewable:** Present capacity only 150 MW; still high cost

# Trend of Fuel Price for Power Generation



Source: The Institute of Energy Economics, Japan

# PSMP Peak Demand Forecast 2030

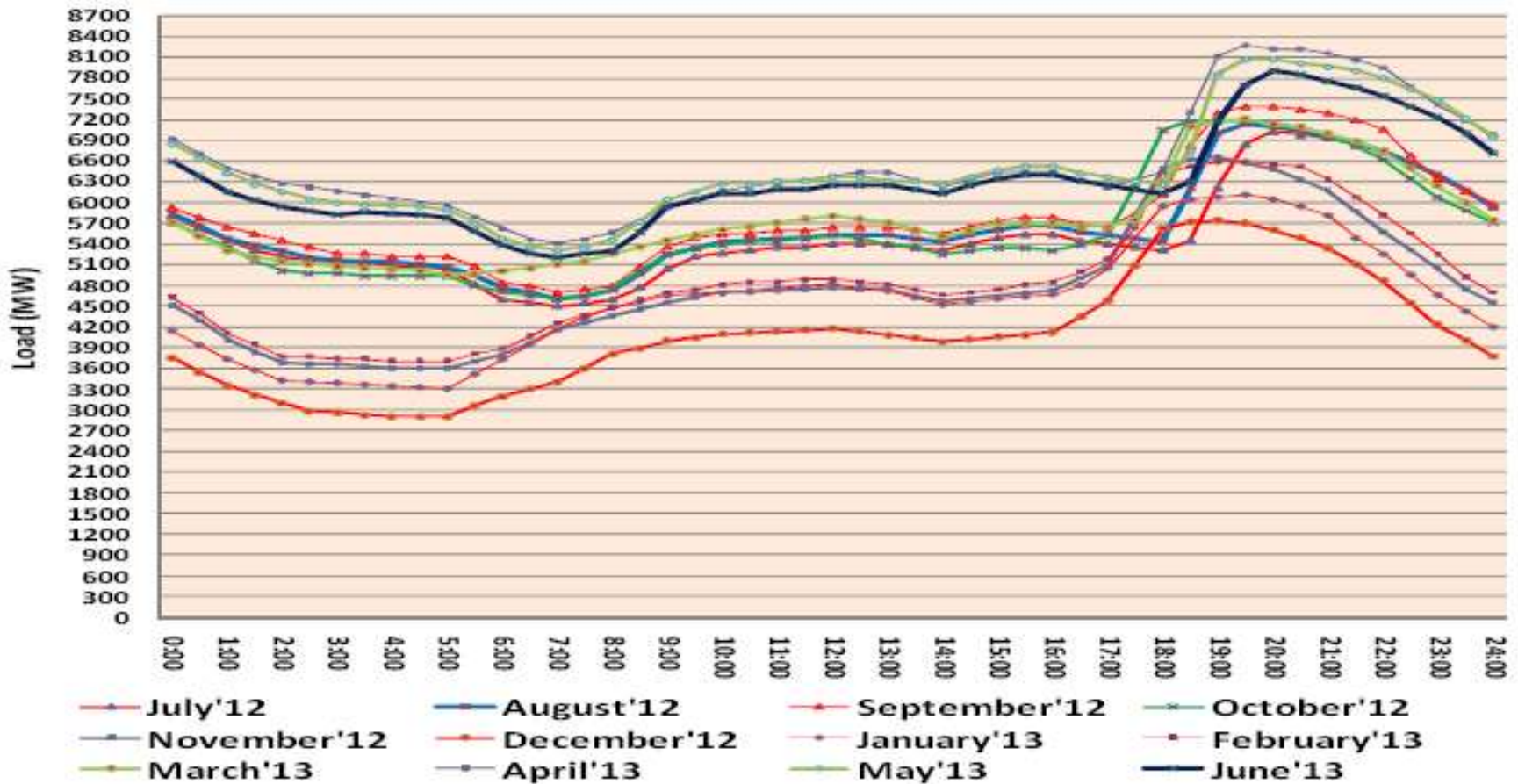
FY	GDP growth rate	Elasticity	Effect of DSM	Electricity growth rate	Total Demand without DSM	Total Demand with DSM	Off-grid captive demand	Grid System Demand with DSM
Unit	[%]	-	[%]	[%]	[MW]	[MW]	[MW]	[MW]
2010	5.5%	1.50	5.0%		7,454	7,454	1,000	6,454
2011	6.7%	1.50	5.0%	4.5%	8,203	7,793	1,027	6,765
2012	7.0%	1.50	5.0%	10.5%	9,064	8,611	1,093	7,518
2013	7.0%	1.50	5.0%	10.5%	10,016	9,515	1,166	8,349
2014	7.0%	1.50	5.0%	10.5%	11,068	10,514	1,246	9,268
2015	7.0%	1.50	5.0%	10.5%	12,230	11,618	1,335	10,283
2016	7.0%	1.50	5.0%	10.5%	13,514	12,838	1,433	11,405
2017	7.0%	1.50	5.0%	10.5%	14,933	14,186	1,542	12,644
2018	7.0%	1.50	5.0%	10.5%	16,501	15,676	1,662	14,014
2019	7.0%	1.50	5.0%	10.5%	18,233	17,322	1,794	15,527
2020	7.0%	1.40	6.0%	8.6%	20,020	18,819	1,515	17,304
2021	7.0%	1.35	6.5%	8.9%	21,912	20,488	1,649	18,838
2022	7.0%	1.30	7.0%	8.5%	23,906	22,233	1,790	20,443
2023	7.0%	1.25	8.0%	7.6%	25,998	23,918	1,925	21,993
2024	7.0%	1.20	9.0%	7.2%	28,182	25,645	2,064	23,581
2025	7.0%	1.15	10.0%	6.9%	30,450	27,405	2,206	25,199
2026	7.0%	1.10	11.0%	6.5%	32,795	29,187	2,349	26,838
2027	7.0%	1.05	12.0%	6.1%	35,205	30,981	2,494	28,487
2028	7.0%	1.00	13.0%	5.8%	37,670	32,773	2,638	30,134
2029	7.0%	1.00	14.0%	5.8%	40,306	34,664	2,790	31,873
2030	7.0%	1.00	15.0%	5.8%	43,128	36,659	2,951	33,708

# Long Term Power Generation Expansion Plan



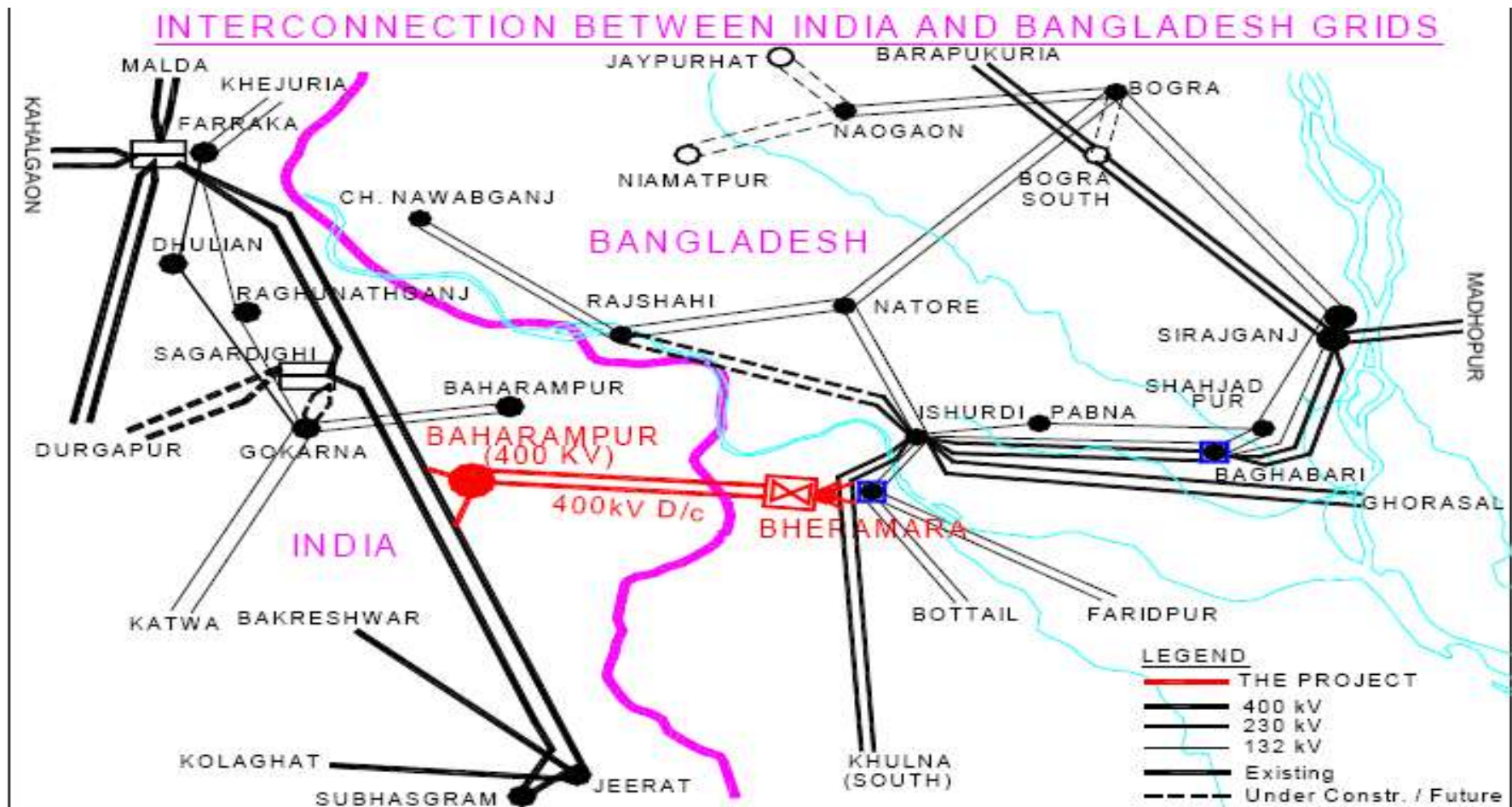
# Typical Demand Curve

## Typical demand for FY 2012-2013



# Issues and Challenges in Regional Power Exchange

# First Regional Power Inter-Connection Line



# Present Power Import

## Present Power Trade Through 1<sup>st</sup> Inter-connector

- 250 MW Import from unallocated resource of Indian Government; NVVN is the nodal agency for power trade
- 250 MW power from Indian market through PTC for 3 yr short term contract
- 30 MW from IEX is under consideration

# Payment Guarantee for Power Import

- PPA ensure fair and reasonable risk allocation, and payment by the purchaser (BPDB) is guaranteed by the government
- Two component tariff- ' Capacity Price' and ' Energy Price'-ensures sufficient cash flow to recover investment and return
- Payment under the PPA is ensured by Letter of Credit

# Power Import in Future

## Future Power Trade

- Long Term Contract mainly with IPPS developing HEP in North-Eastern India, Nepal and Bhutan
- Short Term Contract from Indian Power Market
- Power Trade from 'Regional Power Market' in future where Bangladesh, India, Nepal, Bhutan, Sri Lanka and Pakistan can participate

# Opportunities and Challenges

- Availability and Adequacy of power at competitive price is a pre-Condition for regional power market
- Investment and development of hydro resources in North-Eastern India, Nepal , Bhutan at competitive Price is a major challenge
- Investment and development of regional transmission inter-connection with adequate capacity is also a major challenge
- **Role of experienced investors and developers** are very important for facility development and competitiveness
- Establishment of 'Regional Power Market' is utmost priority for maximizing benefits and ensuring energy Security in South Asia

# Rationale for Cross Border Power Trading for Bangladesh

## Reduced dependence on liquid-fuel rentals

- HFO/HSD based power touched 19% of BPDB's portfolio in FY14 (2500 MW)
- Price of oil based power is more than 3 times **BPDB's average purchase cost of 5.88 Taka per kWh**
- Cross border imports work out to be cheaper

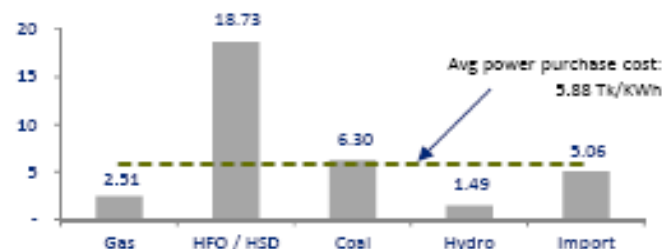
## Diversity in regional consumption patterns

- Complementary seasonal variations- Power demand in B'desh reduces by 2,500 MW in winters- coincides with lean hydro period in Nepal & NE India.
- Different time zone and weekly holidays vis-à-vis India, Bhutan and Nepal provide opportunities for intra-day trading

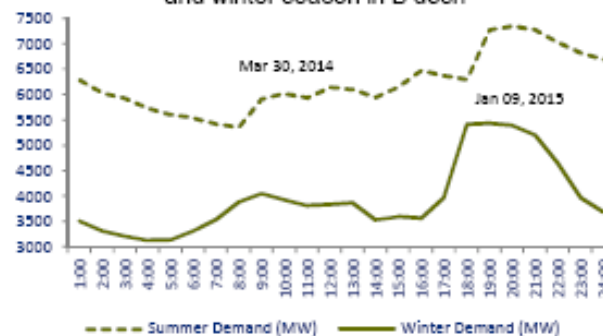
## Cheaper hydropower imports during rainy season

- Cheaper hydropower from countries like Nepal, Bhutan or North-eastern India during the rainy season as replacement of costlier HSD/ HFO based power in Bangladesh

PDB power purchase cost (Tk/kWh) in FY 2013-14



Sample 24 hour load curves during summer and winter season in B'desh



Cross border trading in power presents huge benefits for Bangladesh to meet the demand deficits, however, it can be realized only when the institutional framework of the power sector is geared up to meet the future challenges

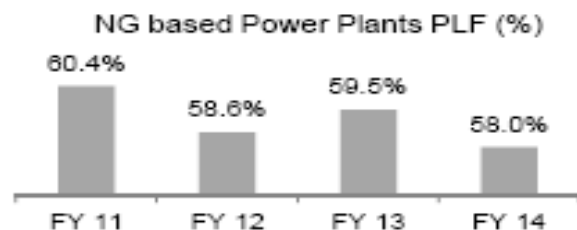
Source: BPDB Annual Report 2013-14, PGCB Daily Generation Report



# Key drivers for Cross Border Trading in Bangladesh

## Natural Gas Supply Shortage

- Power generation in Bangladesh is heavily dependent on natural gas with 72% of the total electricity generation in FY 2013-14
- Natural gas shortfall (~500 mmscfd) has resulted in lower PLFs.

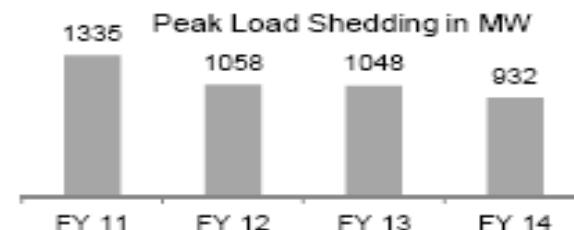


## Coal based power project development issues

- PSMP (2010) has envisaged over 50% (~19 GW) contribution from domestic and imported coal based power plants by 2030.
- At present, only 1320 MW of coal based capacity has the visibility to be commissioned by 2021.
- Bangladesh is likely to face major challenges in this area due to lack of previous experience in handling imported coal based power projects.

## Electricity Supply Shortages

- A recent study has estimated that Bangladesh lost about 5.5% of its business revenue due to electrical outages in 2013
- To meet this deficit around 2.5 GW of short-term projects have been added and they command an extremely high tariff of Tk 18 – 19 per kWh.



Source: BPDB Annual Report 2013-14, PGCB Daily Generation Report

# The transition to cross border trading mechanism would require technical and commercial harmonization measures

Particulars	Bangladesh practices	India practices
<b>Scheduling &amp; dispatch</b>	Schedules are prepared on hourly basis	Schedules are prepared on 15-minute time block basis
<b>Energy accounting</b>	Commercial meters are installed at interconnection point / delivery point for recording of actual active and reactive energy flows	Special Energy Meters are installed at interface points for recording of actual active and reactive energy flows for every 15-minute time block; RPC-s prepare Regional Energy Accounts indicating capacity & energy charges, based on which generators raise invoices
<b>Tariff Computation</b>	Components: <ul style="list-style-type: none"> <li>• Capacity charge</li> <li>• Energy charge</li> <li>• Incentive / penalty</li> </ul>	Components: <ul style="list-style-type: none"> <li>• Capacity charge</li> <li>• Energy charge with FPPCA</li> <li>• Incentive</li> </ul>
<b>Deviation settlement (frequency based)</b>	No mechanism	Unscheduled Interchange (UI) Charges as per CERC Deviation Settlement Mechanism Regulations 2014
<b>Billing &amp; payment</b>	<ul style="list-style-type: none"> <li>• Monthly bills raised by supplier, backed by Letter of Credit and Govt. of Bangladesh guarantee;</li> <li>• Provision of late payment surcharge;</li> <li>• Quarterly and annual reconciliation</li> </ul>	<ul style="list-style-type: none"> <li>• Monthly bills raised by supplier, backed by Letter of Credit;</li> <li>• Provision of late payment surcharge;</li> <li>• Quarterly and annual reconciliation</li> </ul>

# Roadmap for power trading entity

## Phase 1

### Strategic Business Unit within BPDB

- BPDB Owned
- Establish specialized unit for cross-border power trading under IPP Cell

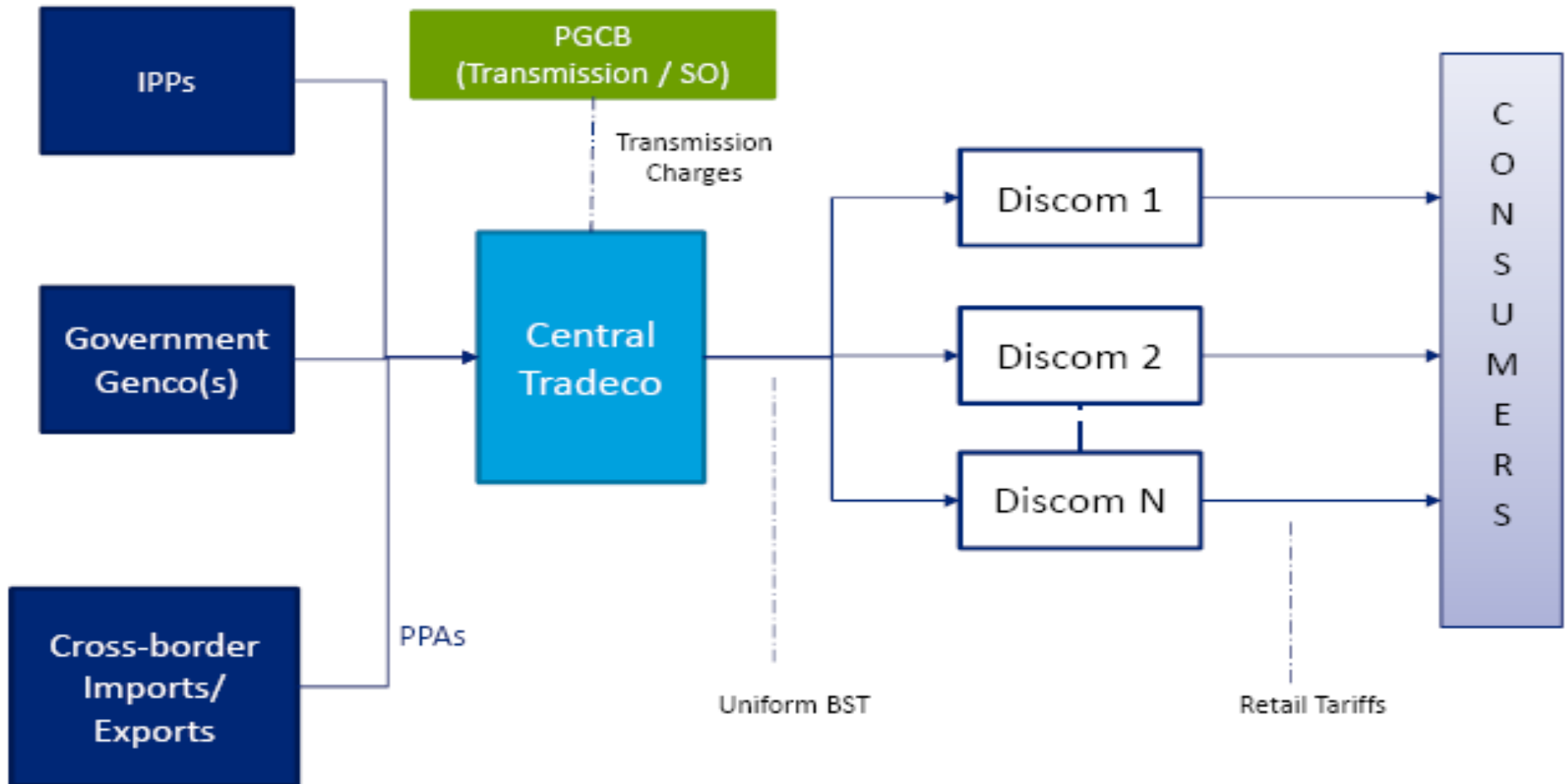
BPDB  
Restructuring  
(~within 2 years)

## Phase 2

### Centralized Trading Company

- Centralize All Power Trading activities within a restructured BPDB structure; independent of generation and retail supply of electricity

# Envisaged Trading Arrangements of the future



# Cost of Delay in Developing Hydro Resources

- Difference between a fossil fuel reserve (coal, oil or gas) is that thermal energy remains in the ground, if not developed
- Hydro resources fall down every day. If not developed for one day, the energy is lost forever.
- Assuming 43,000 MW hydro power potential and with 12.5% received as free electricity.
- Loss to Nepal is about **\$2 billion per year**

Thank You